SOCIALWATT

CONNECTING

OBLIGATED PARTIES

TO ADOPT INNOVATIVE SCHEMES TOWARDS

ENERGY POVERTY ALLEVIATION

D1.1

Report on the Status Quo of Energy Poverty and its Mitigation in the EU

November 2019

The SocialWatt project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 845905

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PREFACE

SocialWatt will develop and provide utilities and energy suppliers with appropriate tools for effectively engaging with their customers and working together towards alleviating energy poverty. SocialWatt will also enable obligated parties under Article 7 of the Energy Efficiency Directive across Europe to develop, adopt, test and spread innovative energy poverty schemes.

SocialWatt will contribute to the following three main pillars:

1. Supporting utilities and energy suppliers contribute to the fight against energy poverty through the use of decision support tools.
2. Bridging the gap between energy companies and social services by promoting collaboration and implementing knowledge transfer and capacity building activities that focus on the development of schemes that invest in Renewable Energy Sources / Energy Efficiency and alleviate energy poverty.
3. Implementing and replicating innovative schemes to alleviate energy poverty.

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CONSORTIUM

ICCS	INSTITUTE OF COMMUNICATION & COMPUTER SYSTEMS	EL
IEECP	INSTITUTE FOR EUROPEAN ENERGY AND CLIMATE POLICY STICHTING	NL
RAP	REGULATORY ASSISTANCE PROJECT	BE
E7	E7 ENERGIE MARKT ANALYSE	AT
ISPE DC	ISPE PROIECTARE SI CONSULTANTA SA	RO
EDF	ELECTRICITE DE FRANCE	FR
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ESB	ELECTRICITY SUPPLY BOARD	IE
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GA#: 845905 **Start Date:** September 2019
Topic: LC-SC3-EC-2-2018 **Duration:** 36 Months
Type of Action: CSA **Coordinator:** ICCS

Deliverable Number	D1.1
Deliverable Title	Report on the Status Quo of Energy Poverty and its Mitigation in the EU
Work Package Number	WP1
Task Number	Task 1.1
Date of Delivery	November 2019
Dissemination Level	Public
Work Package Leader	Institute of Communication & Computer Systems (ICCS)
Lead Beneficiary	The Regulatory Assistance Project (RAP)
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1 INTRODUCTION TO THE REPORT

SocialWatt is a European Commission Horizon 2020 funded project that aims to enable obligated parties under Article 7 of the Energy Efficiency Directive to develop, adopt, test and spread innovative energy poverty schemes across Europe. The project will enable energy suppliers to build their own capacity and use the tools developed within the project to effectively engage with their customers and implement schemes that aim to alleviate energy poverty.

Partners from 11 European Member States form the project team, including utilities and energy suppliers from eight Member States.

The purpose of this report is to establish the essential background setting in which the SocialWatt activities will be carried out. It therefore contains a discussion of definitions and indicators currently available to measure energy poverty at European and Member State level, studies on the national contexts for each of the 11 SocialWatt countries and a range of good practice examples that illustrate different approaches taken to alleviate energy poverty.

The structure of the report is as follows:

Chapters 2 and 3 present an introduction to energy poverty and the main approaches used to define it, along with an overview of the relevant data sources and indicators at pan-European and Member State level. It considers the strengths and weaknesses of the available definitions and indicators in order to inform the approach taken for defining energy poverty within the SocialWatt decision support tools.

Chapter 4 contains country context studies for each of the 11 participating countries. Each study presents selected data relevant to the causes, impacts and prevalence of energy poverty. The studies therefore include relevant information, such as national climate, population and demographics, economy, residential building stock, energy markets and relevant policies. The studies also contain an assessment of energy poverty levels and characteristics.

Chapter 5 presents a matrix of good practice examples with a focus on energy poverty alleviation programmes or initiatives. It includes at least one initiative from each participating country and additional noteworthy examples from other Member States. Focus has been placed on programmes delivered by or in partnership with an energy supplier to ensure a level of replicability by partners within the project. The matrix categorises the examples according to four broad types of support to energy-poor, low-income or vulnerable households: energy bill support or disconnection prevention, energy advice, low-cost energy-saving measures and energy efficiency or renewable energy measures.

The **Appendix** presents all 21 good practice case studies.

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2 INTRODUCTION TO ENERGY POVERTY

Energy poverty affects 50 million people in the European Union according to the latest survey data[1] although this figure could be much higher given the limitations of existing data sources.

Energy poverty is broadly understood as the inability of households to maintain adequate levels of energy services at an affordable cost. Energy poverty is caused by the interplay of three main factors: low incomes, high energy need (due to inefficient housing) and high energy prices. Although each of these three factors is distinct, there is clear overlap and interplay amongst them. For example, in the UK, the country with the longest policy experience with energy poverty, low-income households (outside the social housing sector, which has benefitted from energy improvements in recent years) are found to be more likely to live in homes with poor energy efficiency. Low-income and vulnerable households have also been found to pay more on their household bills (most markedly energy bills) than better-off families, and some of the least efficient homes in the UK rely on the most expensive fuels for heating.[2] Energy poverty research and the development of policies to alleviate it, therefore not only needs to consider these multiple causes but the interaction amongst them.

In addition to the three central causes, there are a large number of other causal factors that illustrate the regional, structural, economic and social specificities that can have a large bearing on energy poverty. These include extreme climatic variation, fuel availability, stock type and performance, tenure (in particular reliance on privately rented accommodation), high living costs (particularly housing costs), household composition, underoccupancy of the home (particularly relevant to Europe's aging population), low levels of energy literacy and low levels of engagement in the energy market, unclear billing and personal vulnerability leading to high energy need.[3]

The experience of energy poverty has a wide range of negative effects, including health and social well-being impacts. The inability to afford energy bills can result in energy rationing (both through temperature reduction and partial heating of the home), energy bill debt, disconnection and debt or rationing on other areas of the household budget. Energy rationing and the inability to keep an inefficient home warm can lead to unhealthy indoor environments. Low indoor temperatures, damp and mould all contribute to cardiovascular and respiratory health impacts.[4] Energy

[1] EPOV. (2019). *Addressing energy poverty in the European Union: State of play and action.* Available at: https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/paneureport2018_updated2019.pdf

[2] Sunderland, L., and Croft, D. (2011, June). Energy poverty: Risks, conflicts and opportunities in the development of energy poverty alleviation policy under the umbrella of energy efficiency and climate change. Eceee Summer Study proceedings, Presqu'île de Giens, France. Available at: https://tinyurl.com/y4dffobj

[3] Ibid.

[4] See for example Marmot Review Team. (2011). *The health impacts of cold homes and fuel poverty.*

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poverty has also been linked to negative impacts on social inclusion, educational attainment and mental health.[5] Vulnerable groups such as young children, older people and those with a disability or long-term illness are particularly vulnerable to these health and well-being impacts.

The multiple causal factors and multiple effects of energy poverty cross policy boundaries. Therefore, energy poverty is a complex concept that sits between economic, social and energy policy. The potential policy responses may reside in energy efficiency and carbon reduction policy, energy market regulation, social policy and wealth redistribution, economic and employment policy, housing standards and public health.

Energy poverty is not a new issue in the context of European legislation. The gas and electricity directives have, since 2009, required that vulnerable customers be defined for the purpose of consumer protection, and this definition 'may refer to energy poverty'. A key aim of the Clean Energy for All Europeans package was to promote fairness in the clean energy transition. Under the new Governance Regulation, Member States are required, in their National Energy and Climate Plans (NECPs), to assess the number of households in energy poverty and, if significant numbers are found, to introduce an objective, as well as indicative policies and measures to reduce it.

Furthermore, energy poverty is recognised in the two key EU energy efficiency directives: the Energy Performance of Buildings Directive (EPBD) requires that relevant actions to alleviate energy poverty be outlined in the national renovation strategy and the Energy Efficiency Directive (EED) requires a share of measures under Article 7 (energy efficiency obligations or alternative measures) to be implemented amongst vulnerable households, including those affected by energy poverty. Finally, the role of renewable energy communities to help fight energy poverty through reduced consumption and lower supply tariffs has been recognised in the revised Renewable Energy Directive.

Although the number of countries that recognise energy poverty formally in legislation or policy is rising, the majority of Member States do not have a formal definition. In the UK the term has been recognised in research since 1975, and the UK has almost 20 years of policy on fuel poverty, dating back to the 2000 Warm Homes and Energy Conservation Act. Recognition of the issue in Eastern European states in the literature also dates back to the 1990s.[6] Belgium, Cyprus, France, Ireland, Romania, Slovakia,

Available at: https://friendsoftheearth.uk/sites/default/files/downloads/cold_homes_health.pdf; and COMBI project. (2015). *D5.1 Report: Literature review on social welfare impacts of energy efficiency improvement actions*. Available at: https://combi-project.eu/wp-content/uploads/D5.1_final_20180505.pdf

[5] Thompson H., Snell C., and Liddell, C. (2016). Fuel Poverty in the European Union: A concept in need of definition? *People, Place and Policy, 10*(1): 5–24. Available at: https://extra.shu.ac.uk/ppp-online/wp-content/uploads/2016/04/fuel-poverty-european-union.pdf

[6] Buzar, S. (2007). Energy Poverty in Eastern Europe: Hidden Geographies of Deprivation. Aldershot, UK: Ashgate.

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Greece and Spain also have or intend to introduce formal or semiformal definitions.

It should be noted that while the concept of vulnerability is related to energy poverty, it is a distinct category that is better defined by Member States. The large majority of European countries have a definition or recognition of vulnerability in energy regulation.[7] Definitions of vulnerability most frequently rely on receipt of social benefits or on socioeconomic groups (as a proxy for income-based vulnerability), age, disability or long-term illness as eligibility criteria. Although there is likely to be an overlap between vulnerable households who need protection through energy regulation and those at risk of energy poverty, vulnerability criteria are not entirely accurate proxy indicators of energy poverty. First, vulnerability criteria in use are largely *social* vulnerability criteria not specifically *energy* vulnerability criteria,[8] and second, energy vulnerability is not the same as energy poverty. Frequently, social vulnerability criteria are used as eligibility criteria for energy poverty leading to ineffective targeting.

[7] Pye, S., Dobbins, A., Baffert, C., Brajković, J., Grgurev, I., De Migio, R., and Deane, P. (2015). Energy poverty and vulnerable consumers in the energy sector across the EU: Analysis of policies and measures. INSIGHT_E. Available at: http://www.insightenergy.org/static_pages/publications#?publication=15; and Dobbins, A., and Pye, S. (2016). Member State level regulation related to energy poverty and vulnerable consumers. In ed. K. Csiba, Energy Poverty Handbook. Brussels, Belgium: Tamás Meszerics. Available at: http://bpie.eu/wp-content/uploads/2016/11/energypovertyhandbook-online.pdf

[8] Pye et al., 2015; and Kyprianou, I., Serghides, D. K., Varo, A., Gouveia, J. P., Kopeva, D., and Murauskaite, L. (2019). Energy poverty policies and measures in 5 EU countries: A comparative study. Energy and Buildings 196, 46–60. Available at: https://tinyurl.com/y5vcs3x6

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3 DEFINITIONS

3.1 EUROPEAN UNION IN SEARCH OF A DEFINITION

To date there is no official European definition of energy poverty, despite the fact that energy poverty is referred to in a number of European Directives. The role of a definition (either European or national) is to provide clarity and policy focus on the issue.

In response to the challenge of expanding knowledge about energy poverty across Europe, the Energy Poverty Observatory (EPOV) was set up in December 2016 as a 40-month project funded by the European Commission and led by the University of Manchester.

EPOV acknowledges that a widely accepted description of energy poverty is when *individuals or households are not able to adequately heat, cool or provide other required energy services in their homes at affordable cost*[9]. A more in-depth description has also been developed as a working narrative definition, the elements of which are widely supported by the literature. This provides a common understanding of what is meant broadly by energy poverty, the experience of it and its key considerations or elements:

> *Energy poverty describes a state in which a household is unable to access and/or afford sufficient levels of domestic energy services (such as heating, cooling, cooking, lighting) for its social and material needs.*[10]

A closer look at the elements that make up this narrative definition provides a deeper understanding of what is meant by energy poverty.

- The definition points us to issues of both *access* to adequate energy services and energy *affordability*. In addition to unaffordable energy services, this specifically includes situations where energy services are inaccessible due to reliance on fuels that are insecure or intermittent in their supply, in particular in off-grid situations or where charges for connection to an available grid are prohibitively high;
- The definition refers to *sufficient* levels of domestic energy services. A sufficient level of energy services is a subjective concept. Although there are recognised levels of energy service for some energy uses—the World Health Organisations outlines minimum internal temperature and heating regimes suitable to sustain human health—a comprehensive understanding of what sufficient levels of energy services would constitute across all energy services is not available. Definitions of sufficient may vary by country, region or community and change over time;
- The outcome that this definition points to is sufficient energy services for *social and*

[9] EPOV, 2019.

[10] Bouzarovski, S. (2018). Energy poverty: (Dis)Assembling Europe's Infrastructural divide. London, UK: Palgrave Macmillan. Available at: https://www.palgrave.com/gp/book/9783319692982; and Vondung, F., and Thema, J. (2019). Energy poverty in the EU: Indicators as a base for policy action. Eceee Summer Study, France. Available at: https://tinyurl.com/y2umqsru

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material needs. The concept of social and material needs is once again subjective. Material needs may refer to minimum needs to support human health (for example, internal temperatures and heating regime). Social needs refer to the needs associated with full participation in society.[11] However, no comprehensive definition of social and material needs relevant to all households in all areas of the EU has been developed. It is unlikely that one definition would be suitable for all areas of the EU.

Other definitions of energy poverty in use currently in Europe also point to additional concepts not contained in the EPOV definitions, for example:

- The Irish and Romanian definitions specifically refer to the ability to keep warm as a key energy service (as opposed, for example, to the need or ability to keep cool).
- The French and Spanish national definitions specifically link energy poverty to inefficient homes or inadequate living conditions as a causal factor.
- Recent studies have also brought together domestic energy poverty and transport energy poverty[12] to provide a more holistic definition of a household's energy needs.

The narrative descriptions of energy poverty provide significant detail to promote the common understanding of the experience of energy poverty. However, it is clear that more specific indicators and thresholds are needed at the Member State or regional level to enable measurement, monitoring and target setting.

3.2 INDICATORS

Where definitions of energy poverty have been established at Member State level (see section 3.3 below), they are usually made up of a narrative description that either points directly to or is supported by one or more indicators and thresholds. The narrative part of the definition describes the experience of energy poverty and provides the political focus, whereas the indicators and threshold enable national or regional measurement, quantitative target setting and monitoring of progress.

Four distinct approaches to the measurement of energy poverty through the use of metrics can be identified:[13]

- expenditure-based metrics;
- consensual-based metrics;
- direct measurement (of the level of energy services achieved);
- outcome-based metrics (focussed on relevant outcomes like cold- or heat-related mortality, arrears on energy bills, disconnections, etc.).

[11] EPOV, 2019.

[12] OpenExp. (2019). European Energy Poverty Index. Available at: https://www.openexp.eu/european-energy-poverty-index-eepi

[13] Vondung and Thema, 2019.

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This illustrates the variety of approaches possible. The direct measurement of energy services achieved (coupled with energy expenditure) and outcome-based metrics both have the potential to produce highly relevant and objective data on energy poverty. However, although these metrics have been used effectively at project or pilot level to measure the effectiveness of interventions (for example, the direct measurement of indoor temperatures before and after energy efficiency works), the lack of data at national and EU level hampers their widespread use.[14] Furthermore, the development of large data sets based on direct measurement or outcomes is likely to be prohibitively costly.

The search for suitable indicators for measuring the incidence or level of energy poverty is hampered by the lack of specifically designed data sets at an appropriate regional, national or European level.[15] Therefore, the measurement of energy poverty at a European level has relied on existing data that is available at the appropriate scale, captured frequently and robustly enough to enable monitoring. Indicators based on the first two categories of metrics—expenditure-based metrics and consensual-based metrics—have been pursued by EPOV and in leading studies,[16] largely due to the availability of relevant data.

In response to this challenge of data availability and suitability, the EPOV consortium has selected a cluster of four indicators, each of which captures a different dimension of energy poverty, to enable a better analysis and understanding of country-specific energy poverty across Europe.

The discussion below on indicators currently in use, and proposed, illustrates their strengths and weaknesses as measures of energy poverty.

3.2.1 EXPENDITURE-BASED METRICS

Expenditure-based metrics are those most commonly used to produce national indicators by those Member States that have established national definitions.

Expenditure-based metrics for energy poverty aim to measure the economic burden households are placed under as a result of their energy expenditure. Therefore, these indicators identify energy expenditure as a share of income or energy expenditure in absolute terms—comparing both to a normative threshold (e.g., energy expenditure greater than 10% of income or energy expenditure below half the national median).

The Energy Poverty Observatory has selected two expenditure-based indicators in its group of four primary indicators. The source of data for both of the indicators is national Household Budget Surveys. These surveys are carried out by Member States, and the national data is collected and harmonised by Eurostat. Because Member States follow different regimes in data collection in relation to timing, regularity and item specification, Eurostat undertakes the harmonisation process only once every

[14] Ibid.

[15] https://journals.sagepub.com/doi/full/10.1177/1420326X17699260 and others.

[16] Rademaekers et al., 2016.

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five years.[17] This data can be disaggregated by income decile and urban density to enable further analysis and insight.

Table 1: EPOV expenditure-based primary indicators.

EPOV Indicator	Disaggregation by	Data source (years)
High share of energy expenditure in income (2M) (share of energy expenditure in income is more than twice the national median share)	Income decile Urbanisation density	HBS (2005, 2010)
Low absolute energy expenditure (M/2) (absolute energy expenditure is below half the national median). Also known as hidden energy poverty	Income decile Urbanisation density	HBS (2005, 2010)

High share of energy expenditure in income (2M)

The high share of energy expenditure in income (2M) indicator aims to identify the level of economic burden caused by energy expenditure by measuring the relationship between income and energy expenditure. The indicator defines as energy poor those households whose share of energy expenditure in income is twice the national median. Both energy expenditure and income are equivalised for household size to produce a more accurate depiction of household experience.

Low absolute energy expenditure (M/2)

The low absolutely energy expenditure (M/2) indicator aims to capture those households that have very low energy expenditure due to unaffordability, sometimes referred to as hidden energy poverty. The indicator captures absolute energy expenditure equivalised for household size. Those households whose expenditure is below half the national median are considered energy poor.

Other expenditure-based indicators

In addition to the two expenditure-based indicators chosen by EPOV, a number of variations are in use by Member States:

- 10% threshold: household energy *need* is more than 10% of income on all fuel use to achieve an agreed level of utility (often based on predefined temperature levels);
- Low income high costs: fuel costs are above the median level, and net residual

[17] Household Budget Surveys are national surveys focusing mainly on consumption expenditure. They are conducted in all EU Member States and their primary aim (especially at the national level) is to calculate weights for the Consumer Price Index. The two last collection rounds were 2005 and 2010. Each Member State decides the objectives, methodology and frequency of conduction of the survey. Although there have been continuous efforts towards harmonisation, differences remain. The surveys vary between countries in terms of frequency, timing, content or structure.

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income (after housing and fuel costs) would be below the official poverty line;

- Low disposable income: disposable income after average energy costs is lower than a minimum monthly disposable income threshold;
- Low income low energy efficiency: households living in an inefficient home (defined as a property rated D-G by an Energy Performance Certificate) and whose disposable income, after housing costs and energy needs, would be below the poverty line[18].

3.2.2 CONSENSUAL-BASED METRICS

The EPOV has selected the following two consensual-based indicators in its group of four primary indicators. The source data for both of these indicators is the EU Survey of Income and Living Conditions (EU-SILC). EU-SILC is an annual pan-European survey. Data from each Member State are collated and harmonised by Eurostat. It is possible to disaggregate the data for these indicators by income decile, tenure type, urbanisation density and dwelling type.

Table 2: EPOV consensual-based primary indicators.

EPOV Indicator	Disaggregation by	Data source (years)
Arrears on bills: Share of (sub-) population having arrears on utility bills.	Income decile Urbanisation density Tenure type Dwelling type	EU-SILC (2004–2017)
Inability to keep home adequately warm: Share of (sub-) population not able to keep their home adequately warm	Income decile Urbanisation density Tenure type Dwelling type	EU-SILC (2004–2017)

The consensual-based indicators are relatively self-explanatory. The 'arrears on bills' data is collected from answers to the question: "*In the last 12 months, has the household been in arrears, i.e. has been unable to pay on time utility bills (heating, electricity, gas, water, etc.) for the main dwelling due to financial difficulties*?"

The 'inability to keep home adequately warm' data is collected from answers to the question: "*Can your household afford to keep its home adequately warm*?"

3.2.3 SECONDARY INDICATORS

EPOV has chosen a range of secondary indicators that are relevant in the context of

[18] At the time of writing, this definition was under consultation for introduction in the UK. Department for Business, Energy and Industrial Strategy. (2019). Closed consultation: Fuel poverty strategy for England. Available at https://www.gov.uk/government/consultations/fuel-poverty-strategy-for-england

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energy poverty but are not considered direct indicators of energy poverty. These secondary indicators support the four primary indicators and can be used to provide further country- or region-specific refinement and overlays:

- Fuel prices (fuel oil, biomass, coal, electricity, district heating, gas prices);
- Dwelling comfortably cool during summer;
- Dwelling comfortably warm during winter;
- Average number of persons per room (total and for rented accommodation);
- Dwelling in densely populated or intermediately populated area;
- Poverty risk;
- Dwelling with energy label A;
- Energy expenses by income quintile;
- Share of population living in a dwelling equipped with heating or air conditioning;
- Excess winter mortality;
- Share of population with leaks, damp or rot in the dwelling.

3.2.4 STRENGTHS AND WEAKNESS OF INDICATORS AND THRESHOLDS

As there is a lack of data designed specifically to measure energy poverty and as the experience of energy poverty is highly variable across European countries and regions, no one indicator available is a universally effective measure of energy poverty across Europe. In response to this issue, recent studies have made recommendations for the improvement of data gathering for the purpose of measuring energy poverty.[19]

Each of the indicator types identified have strengths and weaknesses, with varying sensitivities and distortions. Therefore, primary and secondary indicators to measure energy poverty should be selected that are most relevant to the country or regional situation and adapted as necessary. The table below summarises the main strengths and weaknesses of each indicator type.

[19] Rademaekers et al., 2016; and Pye et al., 2015.

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Table 3: Summary of strengths and weaknesses of indicator types.

Indicator type	Strengths	Weaknesses
Expenditure-based indicators	Identifies household spending on energy	Often measures energy expenditure rather than need Sensitive to national distribution of incomes and expenditure Income measure fails to allow for significant fixed costs like housing Subject to population distortions (e.g. proportion of population with energy costs included in rent) Harmonised European level data available only every five years and currently out of date (2010)
Relative threshold	Good indicator of inequality Screens out impact of energy prices more effectively than fixed-threshold	Fails to capture energy rationing Difficult to eradicate energy poverty as the threshold moves with population distribution
Fixed threshold	Simple and easy to communicate	Fails to capture energy rationing Very sensitive to price fluctuations Tendency to capture high/middle income with high expenditure Threshold must be set at a context relevant level
Low absolute expenditure	Captures energy rationing	May capture households with very energy efficient homes May capture households that receive subsidies to cover energy costs
Consensual-based indicators	Considers directly reported experience Data captures experiences that provide a good match with the experience or effects of energy poverty Data is captured annually for the primary set of indicators	Subjective and culturally dependent responses EU SILC Data collection is not consistent across Member States EU SILC data does not provide consistent data on summer and winter energy poverty Consensual data provides insights into effects but not cause of energy poverty

The discussion below highlights some of the main strengths and weaknesses of the main indicator types available.

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Expenditure-based indicators

Expenditure-based indicators are the most commonly used to support Member State definitions, both as single indicators (UK, Ireland, Slovakia, Cyprus) and as part of a family of indicators (France, Belgium, Spain). These indicators focus on household expenditures on energy as a direct route to assess energy affordability, which is their main strength.

However, there are a number of drawbacks to the use of these indicators in practice.

First, the EPOV expenditure-based indicators are based on data from the household budget survey (HBS) on energy expenditure rather than energy need. Expenditure-based indicators that aim to identify households spending a high proportion of their income on energy fail to capture households that are rationing energy (a common coping mechanism for households in energy poverty) and who have relatively low energy expenditure as a result. This is a significant drawback to the use of the majority of the expenditure-based indicators.

In a number of countries, including the UK and Ireland, energy *need* is calculated based on dwelling type and energy performance, fuel used and energy prices. Energy *need* is used instead of expenditure in the indicators of energy poverty, thereby avoiding the abovementioned issue related to the expenditure-based indicators.

EPOV has mitigated this negative effect through the inclusion of the 'low absolute energy expenditure' indicator, which aims to identify those household that are rationing energy significantly and therefore spending less than half of the national median spend on energy. The Belgian and Spanish approaches both include the low absolute energy expenditure (M/2) indicator alongside an indicator of high energy expenditure.

Second, expenditure-based indicators use thresholds against which to compare energy expenditure. These thresholds can be distorting and highly sensitive to the distribution across the population. Depending on the distribution of energy expenditure by income decile for the country under study, the threshold may result in a very large or very small percentage of the population being captured.[20] Figure 1 shows the vastly different energy expenditure distribution in the Czech Republic and Sweden and illustrates for the 'low absolute energy expenditure M/2' indicator how distorting the distribution can be on the numbers of the population considered to be in or out of the energy poor group.

[20] Vondung and Thema, 2019; and Rademaekers et al., 2016.

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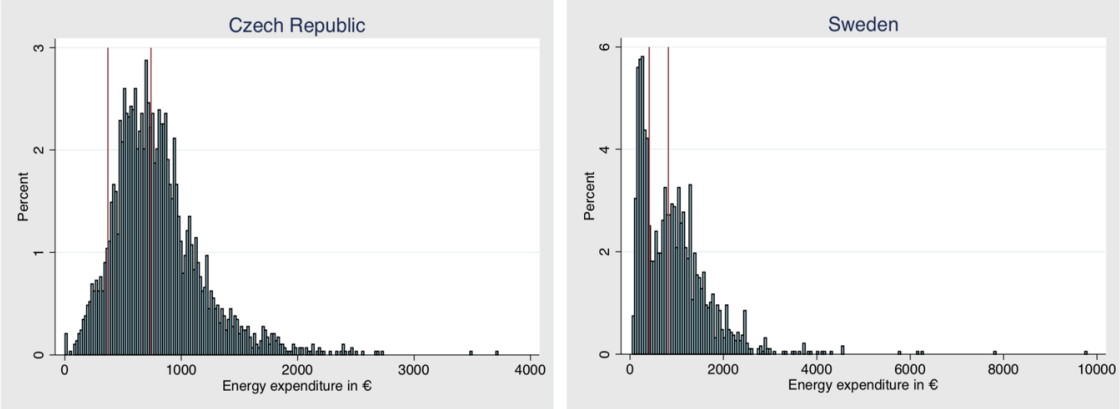
Figure 1: Distribution of energy expenditure can distort the numbers of energy-poor households captured by a threshold-based indicator.



Source: Vondung, F., and Thema, J. (2019). Energy poverty in the EU: Indicators as a base for policy making. Eceee Summer Study, Presqu'ile de Gien, France.

Expenditure-based indicators that use a fixed threshold (e.g. the 10% indicator) are particularly sensitive to country-specific energy expenditure distribution across income deciles.[21] Clearly, as the relationship between incomes, prices and energy expenditure in different Member States varies immensely, the same threshold may not be appropriate across Europe.

A third drawback of expenditure-based indicators is associated with the use of total household income, which is usually equivalised for household size. Critics of this approach[22] indicate that income after housing costs or other essential household expenses would be a more accurate measure. Housing costs are highly variable, for example between rural and urban locations, and given that housing costs are an inflexible part of the household budget that cannot be spent on energy, critics argue that equivalised income is therefore not a fair representation of expendable income.

One proposal to make these indicator types more accurate is to measure income after energy expenditure, against a minimum income standard.[23] This iteration of the indicator incorporates a definition of a minimum acceptable standard of living in order to measure the impact of energy expenditure on a household's ability to meet its physical, social and moral needs.[24] A household would therefore be defined as

[21] Rademaekers et al., 2016.

[22] Castrano-Rosa, R., Solís-Guzmán, J., Rubio-Bellido, C., and Marrero, M. (2019). Towards a multiple indicator approach to energy poverty. Energy and Buildings 193, 36–48. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0378778818319832

[23] The minimum income standard is a calculated level of income necessary for each household/family type to achieve a minimum acceptable standard of living. See https://www.lboro.ac.uk/research/crsp/mis/

[24] Castrano-Rosa et al., 2019; and Moore, R. (2012, October). Definitions of fuel poverty: Implications for policy. Energy Policy 49, 19–26. Available at: https://www.sciencedirect.com/science/article/pii/S0301421512000833

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energy poor if its income after energy expenses is below the minimum income standard for that household type.

Fourth, the majority of expenditure-based indicators fail to capture and evaluate the energy efficiency of the dwelling.[25]

Finally, the EPOV expenditure-based indicators are based on HBS data that is harmonised at a European level. Although harmonisation of data is usually carried out every five years, the process takes time. Currently, the most recent harmonised data is available for 2010, with the 2015 data still to be published. The picture of energy poverty provided by this data can therefore be out of date.

Relative threshold indicators

Both of the primary EPOV expenditure-based indicators (high share of energy expenditure in income [2M] and low absolute energy expenditure [M/2]) are relative threshold indicators. The threshold is linked to an average (median) of the overall population. Therefore, these metrics stay relevant to the population and the distribution of incomes and energy expenses within it. When compared to fixed threshold indicators, the relative threshold indicators make it easier to screen out the effect of external influences, such as energy price fluctuations.

However, energy poverty is very hard to eradicate under relative threshold indicators. As households are lifted out of energy poverty through improving their situation or a policy intervention, households that were previously just above the threshold fall into the target group. The effect of the relative indicators is therefore to create a churn of households moving into and out of the eligible group as their situation changes. It can be said that relative metrics measure inequality within the population rather than energy poverty itself.

Fixed threshold indicators

The main unique feature of the single fixed threshold indicator is that it provides a fixed threshold and target, which ensures relative simplicity in calculations and communication. The indicator also captures the dimensions of income, price and energy need.[26] In most cases the fixed threshold indicator is defined as 10%.

It is important to note, however, that the 10% indicator, originally introduced in the UK, was set at a level that captured households at the time that had an energy need of twice the median share of energy expenditure in income. Therefore, the transfer of this threshold to other contexts may be too arbitrary.[27]

A significant weakness identified by critics, and supported by the UK experience, is that the fixed threshold indicator is highly sensitive to fluctuations in energy prices and is more sensitive to energy prices than income and energy efficiency. Not only do

[25] Castrano-Rosa et al., 2019.

[26] Preston, I., White, V., Blacklaws, K., and Hirsch, D. (2014). *Fuel and poverty: A Rapid Evidence Assessment for the Joseph Rowntree Foundation*. Centre for Sustainable Energy (CSE). Available at: http://www.cse.org.uk/downloads/file /Fuel_and_poverty_review_June2014. pdf

[27] It should also be noted that the original 10% definition was introduced in the UK where advanced energy need calculations are possible.

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fluctuations in price therefore result in fluctuations in the group identified by this indicator but a rise in energy prices can easily mask progress made by income support or energy efficiency policy measures.

Given the fixed threshold, this indicator can also capture higher-income households who have high energy expenditure due to lifestyle choices and who may not be considered energy poor under the narrative definition.

Low absolute energy expenditure (M/2 or hidden energy poverty)

The key role of this indicator is to identify households that are spending low amounts on energy as a result of energy rationing and is particularly useful where energy need calculations are not available. This indicator is imperfect in that it can capture households (that are not energy poor) with low energy expenditure due to highly efficient homes and can also capture those whose energy costs are either covered in other bills (e.g. in rent) or partially paid/subsidised by the municipality or state.

Consensual indicators

EPOV includes two consensual indicators in its primary group, 'arrears on bills' and 'inability to keep home adequately warm'. Data for both of these indicators is contained in the EU-SILC (EU Survey of Income and Living Conditions).

Consensual indicators are currently utilised less often by Member States, and when in use they appear as part of a bundle of indicators, not stand-alone.

Consensual indicators are useful as they consider a household's directly reported experience. However, the survey questions from which the data set is created are answered subjectively, and one person's interpretation of 'adequately warm,' for example, might be different to another's. In addition, EU-SILC is not based on one common questionnaire but on a common framework, and questions may be interpreted slightly differently in each country.

Inability to keep the home adequately warm

The 'inability to keep adequately warm' indicator provides data on a descriptor that is very close to the experience of energy poverty in cold climates or in winter. The data on this indicator is collected annually, making it highly relevant.

Although an appropriate measure of winter energy poverty, the indicator does not have an equal partner to measure summer energy poverty and therefore provides only a partial picture. Data on the partner question in the EU-SILC data set, on whether the dwelling is comfortably cool in the summer, is not collected regularly or frequently. Data for this indicator is only available for 2012. This is a significant limitation.

Arrears on utility bills

The 'arrears on utility bills' indicator provides a good indicator of households that may be struggling to pay energy bills. However, as water bills are included in this indicator, it is not a pure measure of energy debt. Furthermore, it does not capture households that have rationed energy or other household budget areas in order to avoid energy debt.

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3.3 MEMBER STATE DEFINITIONS

Only eight Member States have official or formally recognised definitions of energy poverty: Belgium, Cyprus, France, Ireland, Romania (to be introduced in 2021), Slovakia, Spain and UK. Five of the 11 SocialWatt partner countries have official or formally recognised definitions: Belgium, France, Ireland, Romania and Spain.

Table 4: SocialWatt participating country definitions of energy poverty.

Country	Definition	Indicator/threshold
Belgium	The Belgian energy poverty barometer uses a variety of indicators which are used for official reporting: **Measured energy poverty**: households whose energy expenditure is considered 'abnormally' high relative to their disposable incomes net of the cost of housing **Hidden energy poverty**: households that have an abnormally low level of spending on energy services **Perceived energy poverty**: is based on the percentage of households that report having difficulties in adequately heating their dwelling.	• Twice median expenditure threshold (income equivalised); • Household's expenditure is below the median expenditure of those households of the same size and type; • Only the lower five income deciles are included; • self-reported inability to heat home adequately.
France	Definition according to article 11 of the Grenelle II law from 12 July 2010: *'A person in a fuel poverty situation [...] is a person who has particular difficulties in his or her home in having the necessary energy supply to meet basic needs due to inadequate resources or living conditions'.*	The National Observatory of Fuel Poverty uses three metrics: • Energy effort rate: any household spending more than 8% of its income on energy expenses, and belonging to the first 3 income deciles; • Low Income High Costs: income is below 60% of the national median and equivalized energy expenditure is above the national median; • survey data on discomfort as an indicator of cold.
Ireland	*Energy poverty is a situation whereby a household is unable to attain an acceptable level of energy services (including heating, lighting, etc) in the home due to an inability to meet these requirements at an affordable cost.*	Energy *spend* greater than 10% of income Thresholds are used to determine severity: severe energy poverty when spending is 15% of income and extreme energy poverty when spending is 20% of income.

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Country	Definition	Indicator/threshold
Romania	Romania does not have a current definition of energy poverty, although Law 196/2016 regarding the minimum income for inclusion will come into force in 2021 and includes the following definition: *'Energy poverty is defined as the impossibility of the vulnerable consumer to meet their minimum energy needs for the optimal heating of the home during the cold season'.*	
Spain	Spain's National Strategy against Energy Poverty (2019–2024) defines energy poverty as: *'The situation in which a household finds itself in which the basic needs of energy supplies can't be met, as a consequence of an insufficient income level and that, in his case, it can be aggravated by having energy inefficient housing'.*	The National Strategy against Energy Poverty uses all four EPOV primary indicators, adjusted for variables such as climate, the size of the household, the income quintile per consumption unit, the activity situation and the type of household.

Table 5: Other definitions of energy poverty across Europe.

Country	Definition	Indicator/threshold
Cyprus	*Energy poverty may relate to the situation of customers who may be in a difficult position because of their low income as indicated by their tax statements in conjunction with their professional status, marital status and specific health conditions and therefore, are unable to respond to the costs for the reasonable needs of the supply of electricity, as these costs represent a significant proportion of their disposable income.*	Share of income spent on energy.
Slovakia	Energy poverty: Energy poverty under the law No. 250/2012 Coll. of Laws *is a status when average monthly expenditures of household on consumption of electricity, gas, heating and hot water production represent a substantial share of average monthly income of the household.*	According to the Concept for the protection of consumers fulfilling conditions of energy poverty, issued by the Regulatory Office, the Statistical Office provides information on average monthly household expenditure for energy consumption and income. A household can be considered as energy poor if disposable monthly income is lower than the minimum monthly disposable income threshold. [28] The threshold is not yet adopted

[28] Pye et al., 2015.

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Country	Definition	Indicator/threshold
England	Low Income High Costs (England current): *'A household is considered to be fuel poor if they have required fuel costs that are above average (the national median level) and having spent that amount, their disposable income (after housing costs) would be below the official poverty line [60% median income]'.* Low Income Low Energy Efficiency (England proposed): *'A household would be in fuel poverty if they were living in a property with an energy efficiency rating of Band D or worse and their disposable income (after housing and energy costs) would be below the poverty line (60% median income)'.*	Household required fuel costs are above the national median level and having spent that amount, the household's disposable income (after housing costs) would be below the official poverty line (60% median income).
Scotland, Wales and Northern Ireland	Scotland, Wales and Northern Ireland all use the 10% definition where fuel poverty is 'when a household's required fuel costs are more than 10% of household net income.' The Scottish definition considers income after housing costs.	Energy use *need* is more than 10% of income.

3.4 TARGETING AND ELIGIBILITY CRITERIA: PROXIES FOR ENERGY POVERTY

In defining, measuring and monitoring energy poverty, the end goal, which is to put into place policies and measures to alleviate and eventually eradicate energy poverty, should be kept firmly in focus. It is important to distinguish between data, metrics and indicators needed to measure the problem for national-scale analysis (top down) versus the data needed for the identification of actual energy-poor households (bottom up).[29] Although the national-scale indicators provide an understanding of the country- and regional-scale problem, they do not usually provide a very usable set of criteria by which to identify individual energy-poor households.

The link between the top-down definition and indicators used to measure energy poverty at a national or regional level and methods used to target and define eligibility for assistance from the bottom up should be maintained. Whether the fault of the imperfect national indicator and threshold or the fault of the imperfect targeting or eligibility criteria in support programmes, considerable constellations of households that would be considered in need under the narrative definition are often excluded from assistance.

[29] Moore, 2012, referenced in Pye et al., 2015.

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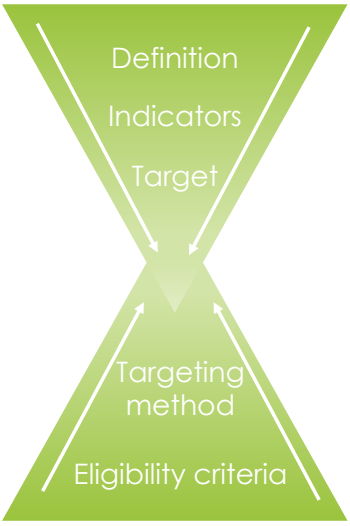
Figure 2: Interaction between energy poverty definitions and targeting eligibility criteria



The indicators used at the national level are based on a representative sample rather than exhaustive data. Because capturing the equivalent data on a household-by-household basis can be prohibitively costly and intrusive, programme-level proxies are most often used for energy poverty.

A large number of proxies for energy poverty or risk of energy poverty are available; however, the criteria most commonly used are very similar to those used to define vulnerability: receipt of benefits, age, disability or long-term illness. As noted in the introduction, social vulnerability criteria, are not indicators of *energy* vulnerability and often identify groups that are a poor fit with energy-poor populations.[30]

Experience from the UK indicates that the use of older age and receipt of social benefits as proxies for the energy poor can lead to very low targeting efficiencies. A review of targeting efficiencies across a range of UK energy poverty programmes found that only around 20% to 40% of eligible recipients were fuel poor under the national definition and conversely only between 50% and 70% of the energy-poor population were found to be eligible for most programmes.[31]

Therefore, access to suitable data is essential both for the development of a top-down definition of energy poverty and also to assist the identification of households and the provision of assistance.

3.5 Conclusion: The SocialWatt approach to defining energy poverty

A SocialWatt definition of energy poverty has been developed, with the aim to

[30] Kyprianou, I. et al. Energy povery policies and measures in 5 countries: A comparative study. Available at: https://reader.elsevier.com/reader/sd/pii/S037877881832334X?token=EC1C38184CA05056DAEF5BD70C70BE5B0F2C93EA5C96A398C8B0A89F09D6B4CBE934AE36AD722F5B3F94FA3C9E4C853B

[31] Rosenow, J., Platt, R., and Flanagan, B. (2013). Fuel poverty and energy efficiency obligations: A critical assessment of the supplier obligation in the UK. *Energy Policy 63*, 1194–1203. Available at: http://eng.janrosenow.com/uploads/4/7/1/2/4712328/fuel_poverty_and_energy_efficiency_oblig.pdf

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overcome some of the key issues with existing definitions, data, metrics and indicators and in parallel successfully implement the planned SocialWatt activities.

The SocialWatt definition helps overcome the issue that many Member States do not have an official definition of energy poverty, which is needed to provide clarity and focus. Therefore, the SocialWatt definition can be used in countries where no national or regional definition exists.

The following key considerations guided the development of the SocialWatt definition:

- Data availability (especially bottom-up data that utilities and energy providers hold);
- The need to better identify energy poor households (e.g. capturing households that are rationing energy and excluding households that are not energy poor);
- Conclusions from the available literature that there is no one definition for energy poverty that can be considered most appropriate for all circumstances;
- The EPOV analysis of existing indicators and data that concludes that no individual indicator works alone to reflect the situation in all countries effectively;
- The objectives and planned activities of Social Watt (i.e. to effectively identify energy poor households and develop effective schemes to alleviate energy poverty, related to the use of energy specifically at dwellings).

The SocialWatt definition of energy poverty is made up of two elements. The first part of the SocialWatt definition looks for households that are underconsuming energy compared to a theoretical need:

> *The actual energy consumption (e.g. electricity, natural gas) of a household is lower than the theoretically required for maintaining thermal comfort (heating and cooling).*

Thus, by analysing data on actual household consumption, in conjunction with modelled energy need of dwellings (considering, amongst other factors, climatic boundary conditions, different building typologies, and energy demand profiles of end-users and appliances), energy poor households can be identified.

The second part of the SocialWatt definition looks for households that are spending a high share of income on energy:

> *Otherwise, the ratio between energy cost and income (in a monthly or annual basis) is taken into consideration (10% fixed threshold, Low Income High Costs, etc.).*

In conclusion, the SocialWatt definition considers two indicators: hidden energy poverty and high energy costs.

The SocialWatt definition will be primarily used in the SocialWatt analyser tool that aims to facilitate utilities to efficiently identify energy poor households, using multi-sourced data and diversified layers of information. Given the issues of data availability, the complex causes of energy poverty and the contextual variations within and amongst

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European countries, many commentators suggest that definitions and indicators of energy poverty should be set at the local or regional level rather than or in addition to the national level.[32] EPOV goes further to suggest that a definition could also differ for different types of support policy.[33] In response to this issue, the SocialWatt Analyser allows users to choose a definition for energy poverty (e.g. the SocialWatt definition or other relevant definitions that will be incorporated in the tool, especially if there is a national definition or specifications/criteria at a national or utility level).

Top-down definitions and bottom-up identification of energy-poor households is often disjointed, leading to poor targeting efficiency. Through the participation of eight energy companies, the SocialWatt project aims to make a significant contribution to the improved identification and targeting of energy-poor households through the incorporation of actual energy use, location and other data if available (e.g. year of construction, area) from individual households into the SocialWatt Analyser tool. It should be noted that when implementing the schemes that aim to alleviate energy poverty, utilities and energy companies will verify the eligibility of households identified as energy poor from the use of the SocialWatt Analyser tool.

[32] Engager. (2018). Policy brief No.1. Available at: http://www.engager-energy.net/wp-content/uploads/2019/01/Engager-Brief-1.pdf; Pye et al., 2015; and Gouveia, J. P., Palma, P., and Simoes, S. G. (2019) Energy poverty vulnerability index: A multidimensional tool to identify hotspots for local action. *Energy Reports 5*, 187–201. Available at: https://www.sciencedirect.com/science/article/pii/S2352484718303810

[33] EPOV Guidance for policymakers Online content. Available at: https://www.energypoverty.eu/guidance-policymakers

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4 COUNTRY CONTEXT STUDIES

For each of the countries represented by a partner participating in SocialWatt, a contextual study has been prepared. Each study, included in this chapter, summarises relevant country-specific information on contextual factors relevant to energy poverty, including climate, population and demographics, the economy, the residential building stock, energy market and relevant energy efficiency policies.

An analysis of energy poverty data for each country has also been performed, based where possible on national analysis and data, but where this is not available an analysis of the EPOV primary indicators has been performed. As previously noted, there are limitations with the EPOV data and indicators. Most significantly, the data for the high share of expenditure in income and low absolute expenditure indicators is almost 10 years old, having been collected in 2010. This should be kept in mind when reviewing the analysis of these indicators.

The purpose of these contextual studies is to improve the understanding of the main factors that influence the causes, prevalence and experience of energy poverty in a specific country. This information will be used to build the knowledge base among the project partners and to inform the preparation of energy poverty action plans in later stages of the project.

The purpose of the analysis of energy poverty in these contextual case studies is to improve understanding of energy poverty within each country and not compare countries. To that end, data sets, indicators and approaches used vary amongst the studies and have been chosen as most relevant to each context.

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4.1 AUSTRIA CONTEXT

4.1.1 INTRODUCTION

Austria has a temperate climate. Regions in the east and southeast have a continental climate and are characterised by hot summers and moderately cold winters. The mountain regions have an alpine climate, with short summers and long winters.

There were 3.92 million private households[34] in Austria in 2018, with an average dwelling size of around 100 m^2. The total number of dwellings in Austria is 4.44 million, which means that 11.7% of those dwellings are not used as a primary residence.

On average (2015-2018) 58,359 new apartments were built per year[35], but up to 10,000 apartments disappear from the market (demolition, office use, housing consolidation, etc.)[36].

The number of households in Austria is growing: in 1990 the number of households was 2.91 million and in 2000 it was 3.24 million. The share of single-person households is also growing, from 30.2% in 1990 to 39.3% in 2018. Table 6 illustrates the numbers and percentage share for different households.[37]

Table 6: Household composition in Austria, 2017–2018

Single adult	1.54m (39.3%)
Single adult with children	0.27m (6.6%)
Couple	2.03m (51.9%)
Couple with children	1.05m (26.9%)
Multiperson household	0.08m (2.1%)

Source: Statistik Austria

About 0.645 million households (16.5% of the households) are single adults over 60 years old. About the same number of households are made up of couples over 60 years old.[38]

In 2018, just under half of all households were owned and another 43% were rented. Of these, 17% were communal apartments, 40% were apartments rented by cooperatives or non-profit developers and the remaining 43% were other—mostly private apartments. The average living area of main dwellings rose only slightly in 2018

[34] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en or www.statistik.gv.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/index.html

[35] Statistik Austria: http://www.statistik.gv.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/wohnungs_und_gebaeudeerrichtung/baubewilligungen/index.html

[36] WOHNEN Zahlen, Daten und Indikatoren der Wohnstatistik; page 64, table 29; Statistik Austria, 2019

[37] Statistik Austria: https://tinyurl.com/hj6omor

[38] Statistik Austria: https://tinyurl.com/hj6omor

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to 100.1 m². The average apartment has four rooms or 1.8 rooms per person (including kitchens from four square meters up).[39]

Broad demographic trends

At the 2001 census, Austria had 8.03 million inhabitants. By 2017, the population had increased by 770,000 to 8.80 million (a 10% increase). From 2017 to 2018, the population growth rate of Austria equalled 0.44%,[40] bringing the total population to 8.85 million.[41]

The majority of this increase since 2001 was attributable to immigration and only just under 5% to births. More immigration-related population growth is expected in the future. It is predicted that in 2022 Austria's population will exceed 9 million, and by the year 2030, the population will rise to 9.30 million people (a 6% increase). Further growth is expected after 2030, to 9.74 million in 2060 (a 11% increase) and 9.97 million in 2080 (a 13% increase). The predicted birth deficits are more than offset by expected migration gains.[42]

Projections show that the share of people older than 65 will rise from 17% in 2010 to 18.6% in 2020, 23.1% in 2030 and 27.3% in 2050.[43]

The Economy: Employment, unemployment, income distribution

Employment (including the self-employed) rose by 1.9% in 2018. In 2018, the employment rate, which corresponds to the number of people aged 15 to 64 in employment divided by the total population of the same age group, equalled 76.8%, the highest rate ever reached in Austria. By contrast, the employment rate in 2004 was 70.4%. The unemployment rate was about 7.7% in 2018, falling from 8.5% in 2017 and more than 9% in 2015.[44]

There is a gender difference, with nearly 82% of men employed, compared to only 72% of women employed.

[39] Staristik Austria: http://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/wohnsituation/index.html

[40] Statistik Austria: https://tinyurl.com/y5777l7v

[41] www.statistik.gv.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/demographische_prognosen/bevoelkerungsprognosen/index.html

[42] Statistik Austria:
https://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/demographische_prognosen/bevoelkerungsprognosen/119615.html

[43] Ibid.

[44] Statistik Austria:
https://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/arbeitsmarkt/erwerbsstatus/index.html

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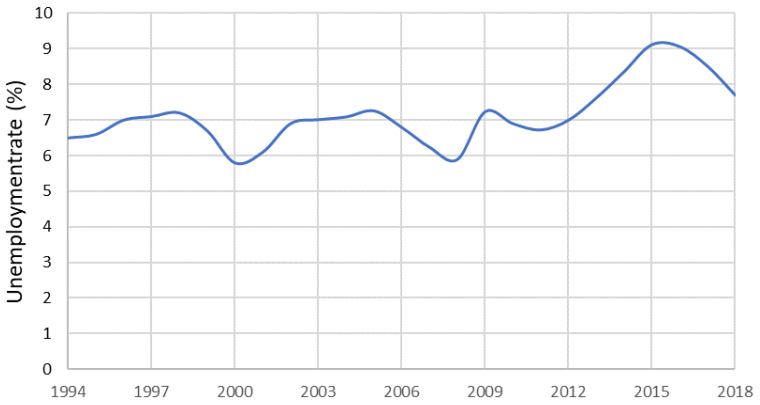
Figure 3: Time series of unemployment in Austria



Source: Statistik Austria[45]

The median income (before taxes) per employee in 2018 was €27,545, €20,821 after taxes. In 2000, it was €20,757 before taxes and €15,399 after taxes. The income of persons older than 65 years was €20,527 before taxes and €18,350 after taxes. The median income in the population was therefore €25,176 in 2018.[46]

According to calculations by Statistics Austria, Austria's real economy grew by 2.4% in 2018. Although this value is slightly below preliminary estimates, it nevertheless represents a marked growth for the third year in a row (+2.1% in 2016, +2.5% in 2017). Austria's economic growth exceeded that of the EU-28 (+2.0%) in 2018, as well as the growth rates of its main EU trading partners, Germany (+1.5%) and Italy (+0.9%). Austria's gross domestic product at current prices was around €385.7 billion (+4.2%) in 2018, which corresponds to a value of €43,640 per inhabitant.[47]

Table 7: Gross Domestic Product (GDP), nominal and real (2010–2018) in Austria

	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP, nominal, billion €	295.9	310.13	318.65	323.91	333.15	344.27	357.3	370.3	385.71
% to the previous year	2.7	4.8	2.7	1.6	2.9	3.3	3.8	3.6	4.2
% to the previous year, real	1.8	2.9	0.7	0	0.7	1	2.1	2.5	2.4

[45] Statistik Austria: https://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/arbeitsmarkt/arbeitslose_arbeitssuchende/index.html

[46] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en

[47] Statistik Austria: https://www.statistik.at/web_de/statistiken/wirtschaft/volkswirtschaftliche_gesamtrechnungen/121784.html

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Source: Statistik Austria

4.1.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

Austria has a strict policy relating to the insulation of buildings, which will be tightened in the next few years covering new construction and refurbishment. The target value determined is a demand value (kWh/m²), which also considers the building geometry. The quality of building services has a lower control value. In the last few years, the specifications have been very heavily focused on the building envelope. Only in recent years has an additional indicator been added, as a primary energy factor that makes it possible to take the heating technology used into account.

In practice, during the last years, new buildings have been built better than prescribed, as Austria has a strong system of subsidies. For builders to receive the subsidies, stricter values must be adhered to. In recent years, about 80% of the apartments built adhered to subsidy guidelines and achieved a higher efficiency than the building regulations stipulated. However, as subsidies have demanded ever higher standards over the last few years, the share of subsidized dwellings has declined in recent years.

A relevant issue in the area of poverty is the availability of cheap housing. There is good access in the capital city of Vienna: [48]

- Base renovation: If a general renovation of a residential building is carried out with the aid of public funding, the city of Vienna is entitled to award up to 25% of the renovated apartments to priority households which can include low-income households. [49]
- Subsidized housing: In March 2019[50], the city of Vienna approved a provision that dedicates two-thirds of a designated residential area (building) to subsidized or social housing. The law applies to the construction of high-rise buildings and also to changes in a residential area, such as an increase in a building's density (e.g., renovating an attic or top floor into a living space). There is also a ban on the sale of apartments. Before an apartment can be sold, the city of Vienna must give its consent, and the city receives a fee from the sale. If the apartment is re-rented, the rent is predetermined. In 2016, around 188,000 housing units were supported with housing allowances (subject subsidy) in Austria.

4.1.3 RESIDENTIAL BUILDING STOCK[51]

Table 8 lists how many apartments are occupied (as an absolute number and as a

48 Expertise e7

49 https://www.wohnfonds.wien.at/media/file/Sanierung/erstinfo_sos.pdf

50 Vienna Building Regulations (Wiener Bauordnung)
https://www.ris.bka.gv.at/GeltendeFassung/LrW/20000006/BO%20für%20Wien%2c%20Fassung%20vom%2015.11.2019.pdf (date: 15.11.2019) ; § 6

51 Pezzutto, S., et al. (2018). Hotmaps Project, D2.3 WP2 Report: Open Data Set for the EU28. Available at: www.hotmaps-project.eu; and EU Building Stock Observatory, European Commission. Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-

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percentage of the total) as a primary residence, organized according to year of construction. It is to be expected that buildings built after 1990 are better insulated, but during recent years, existing buildings have also benefited from improvements in insulation. It is estimated that about 2% of existing apartments are renovated each year. About 60% of the apartments in Austria were built before 1980. [52]

Table 8: Year of construction of apartments in Austria

	Primary residence	
	Absolute (millions)	%
Before 1919	0.548	14.0
1919–1944	0.266	6.8
1945–1960	0.443	11.3
1961–1970	0.537	13.7
1971–1980	0.560	14.3
1981–1990	0.407	10.4
1991–2000	0.450	11.5
2001 and later	0.705	18.0
All	3.9161	100

As noted earlier, the average size of these dwellings is about 100 m^2.

With regard to building size, energy-poor households differ from non-energy-poor households. Energy-poor households are more likely than non-energy-poor households to live in buildings with one to two apartments; however, this difference is not statistically significant. Differences in the useful living area are, however, noteworthy: energy-poor households are more likely to live in smaller dwellings of up to 80 m^2 (50%) than non-energy-poor households (42%).[53]

buildings/eubuildings

The majority of building stock data refer to the year 2016.

[52] Statistic Austria:
http://www.statistik.gv.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/wohnsituation/index.html

[53] Statistic Austria: Energiearmut in Österreich – Haushaltsenergie und Einkommen, Wien 2019

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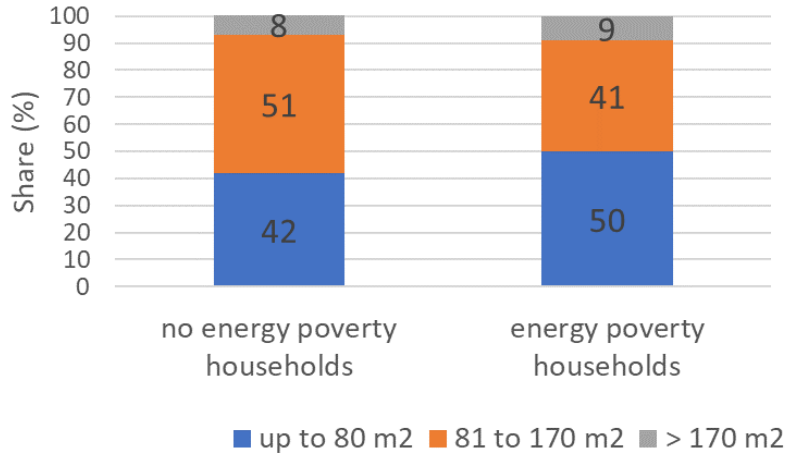
Figure 4: Relationship of the usable areas of dwellings to energy poverty in Austria, 2016



Source: Statistik Austria

In Table 9 the size of the building according to the number of apartments is shown and the number of people that live there. About 35% of Austrian apartments are in multi apartment buildings (more than 10), but only 30.1% of the population lives there. Although nearly 46.7% of the apartments are one- or two- apartment buildings, about 53.2% lives there.[54]

Table 9: Distribution of residential building size in Austria

	Primary residence		1,000 persons	
	Absolute	%	Absolute	%
1 apartment	1.37	35.1	3,575.58	41.2
2 apartments	0.45	11.6	1,041.43	12
3 to 9 apartments	0.74	18.9	1,449.33	16.7
10 to 19 apartments	0.72	18.3	1,371.22	15.8
20 and more apartments	0.63	16.2	1,241.04	14.3

Of these apartments, 48% are owned by the occupants, 42% are rented and 9.8% have another legal status. From an analysis of the age of apartments and their legal status, it appears that newer dwellings are more often inhabited by the owner, whilst older apartments have higher rates of renters.

A greater proportion of energy-poor households live in older dwellings than non-energy-poor households (Figure 55), with around 44% of energy poor households living in buildings built in 1960 or earlier, compared to only 29% of non-energy-poor households. Significantly fewer of the population that is energy poor live in the newest homes – 11% of the energy poor households compared to 30% of non-energy poor.[55]

Figure 5: Construction year of the building to energy poverty in Austria

[54] Statistic Austria:
http://www.statistik.gv.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/wohnsituation/index.html

[55] Statistik Austria, 2019.

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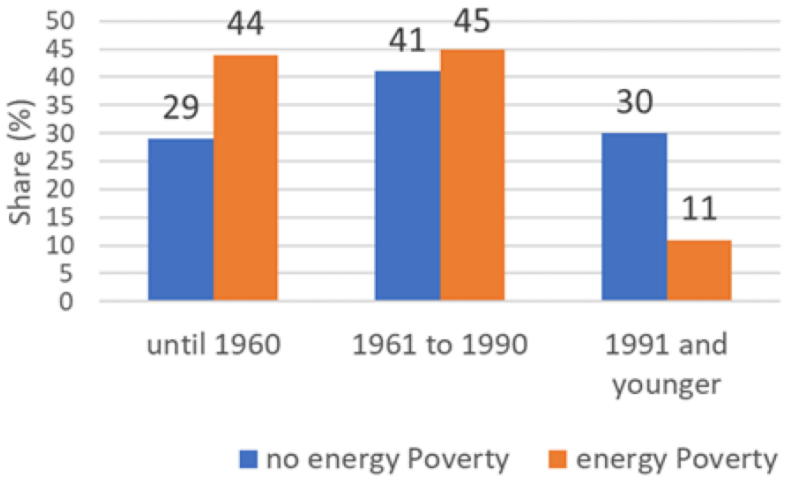

Source: Statistik Austria, 2016

The difference between energy-poor households living in apartments they own versus those who live in rented apartments is minimal (Statistic Austria 2019).

Table 10 illustrates where dwellings in Austria are situated: 32.7% of all dwellings are in cities with more than 100,000 residents (including Vienna). In these urban areas, more than 72% are rented dwellings, whilst only 22.7% are owned by the user.

On the other hand, 48.8% of the dwellings are in areas with fewer than 10,000 residents. Here, more than 65% of the apartments are used by the owner.

Table 10: Distribution of the types of use of apartments in Austria per area

	Owner of the house	Owner of the apartment	Council apartment	Co-operative apartment	Other rent	Other kind of use	All (%)	In 1,000 apartments
Vienna	1.4%	3.1%	5.2%	4.9%	7.7%	1.0%	23.2%	909.5
Larger than 100,000	1.1%	1.8%	0.4%	2.6%	2.9%	0.6%	9.5%	370.6
Municipal 10,000 to 100,000	6.1%	2.8%	0.9%	4.4%	2.9%	1.4%	18.6%	727.6
Municipal < 10,000	28.5%	3.2%	0.7%	4.8%	4.7%	6.8%	48.8%	1,910.2
All	37.2%	11.0%	7.1%	16.7%	18.2%	9.8%	100.0%	3,917.9
	1,457.0	429.2	278.8	654.9	712.2	385.9	3,917.9	

Source: Statistik Austria

No official data is available on whether energy poverty is more of an urban or a rural problem. It is assumed[56] that the definition used in Austria would put more emphasis on rural areas. Around one-third of Austria's population (35%) lives in cities, 39% live in

[56] Internal discussion within energy poverty experts in Austria in 2019

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rural areas and 27% live in intermediate regions.[57]

4.1.4 ENERGY MARKET

Table 11 shows the number of households per fuel type used, the size of these households and their energy consumption. The average dwelling is 103.4 m². The average apartment grows by 0.4 m² per year. The specific energy consumption is 198 kWh/m². In 2003, this value was about 239 kWh/m².

About 78.5 % of the energy used in private homes in Austria is used for heat. The most common source for heat is wood with a share of about 30.4%, followed by gas at 29.4% and oil at 18.4%.

A few years ago, oil accounted for more than 25%, but as a result of the CO_2 policy, there has been a marked reduction during the last years. Gas is quite stable. More and more apartments are using gas, whilst different methods of heating (e.g., gas-condensing boiler) are becoming more and more efficient. Heating with wood takes part mainly in rural area and new boilers are supported with subsidies. In recent years, demand has remained fairly constant.

District heating is the heating system with the highest growth rates in recent years. Since 2005, it has grown by about 50%. This system is mainly used in cities, but there are a lot of smaller district heating systems in rural areas. Many of these heating plants are not economical, which can mean high costs for the users. Apartments that are supplied with district heating are around 25% smaller than average. The largest apartments use heat pumps.

Table 11: Energy consumption of private households in Austria (2017–2018).

Type of fuel	Number of households	Size (m²) of living area	Number of persons	Energy (GJ)
Solid fossil fuels	37,904	3,907,393	88,751	907,721
Firewood	1,143,618	147,384,473	2,996,541	54,570,942
Pellets	119,644	15,077,135	310,518	6,206,988
Wood bricks	81,665	8,841,288	196,994	1,043,250
Wood chips	75,793	11,777,446	235,117	6,847,228
Oil	760,939	89,154,524	1,748,469	41,319,012
Liquid gas	40,136	4,894,436	97,795	1,268,425
Gas	1,088,646	104,486,414	2,340,900	66,088,428
District heating	1,073,984	83,116,431	2,068,427	32,400,700
Electricity for heat	155,604	10,114,247	202,285	1,900,919
Electricity for other uses	3,890,095	401,679,479	8,797,590	61,463,044
Solar heating	130,913	57,982,311	1,212,244	4,695,224
Heat pumps (electricity)	327,978	47,866,090	1,212,244	7,278,300

[57] https://www.staedtebund.gv.at/services/aktuelles/aktuelles-details/artikel/ein-drittel-der-oesterreicher-lebt-in-staedten.html, 11 October 2019.

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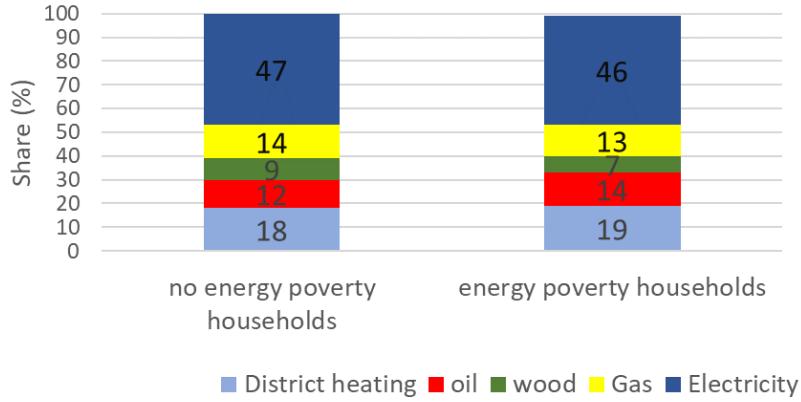
Type of fuel	Number of households	Size (m^2) of living area	Number of persons	Energy (GJ)
All	3,890,095	401,679,479	8,797,590	285,990,181

Source: Statistik Austria[58]

It can be expected that energy-poor households live mainly in multifamily buildings, but no data are available in Austria.

The mix of energy costs is quite similar between the energy-poor and non-energy-poor households. It is striking that about 46 to 47% of the energy costs are spent on electricity.

Figure 6: Proportional costs by type of energy in Austria



Source: Statistik Austria, 2019

Energy market structure

In Austria there is a free market for gas and electricity. For example, in Vienna, there are more than 130 different electricity tariffs available to private households. The price between the cheapest and the most expensive is more than 46%. For energy-poor households, it is possible to choose a cheaper tariff, but this is not so common, as there are barriers to switching to a new supplier.

During the last years, oil has been losing market share, and in some areas (Bundesländer), the use of oil is already forbidden in new buildings. It is expected that in the coming years, oil boilers will be outlawed and will be required to be replaced by alternative energy sources. Social arguments have been used in objection to the oil phase-out. It is said[59] that energy-poor households rely on oil however, the data and information used for this report does not support this assumption.

Among heating options, district heating has been growing the fastest during the last years, i.e. 50% since 2009. There is still a lack of regulation within district heating systems,

[58] Statistik Austria, 6 October 2019:
http://www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/energie_und_umwelt/energie/energieeinsatz_der_haushalte/index.html

[59] https://www.ots.at/presseaussendung/OTS_20170202_OTS0061/e-control-und-statistik-austria-energiearme-geben-beinahe-jeden-vierten-euro-fuer-energie-aus-bild

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and the share of fixed costs is usually very high, which reduces the willingness to save energy.

For the last years, for new family houses, the usual form of heating is the air source heat pump (electricity). Heating with biomass (firewood, wood chips, wood pellets) is actively promoted, but market growth for this heat source is slight.

In cities the most common heating fuel is gas and district heating systems. In Vienna the market share of dwellings that heat with gas is about 50%.

Oil and wood for heating is mainly used in Westers parts of Austria. The average age of all boilers is about 17 years, but wood boilers and oil boilers are much older.

Table 12 provides the indexed price development per year since 2010. There were no big changes during the last months. Only district heating systems changed by more than 29%. The price for electricity was pretty consistent; oil increased by nearly 5% and gas by 3.4%. Because inflation was higher, gas, oil and electricity became relatively cheaper.

Table 12: Indexed price development per year since 2010 in Austria

Statistic Austria [60]	Gas	Oil	Electricity	District heating
2010	100	100	100	100
2011	108.7	121.4	100.1	104.4
2012	114.1	131.5	100.9	112.7
2013	113.9	124.8	105.4	117.4
2014	113.6	117.3	105.4	120.4
2015	113.0	93.8	106.1	124.0
2016	110.8	80.7	107.3	123.8
2017	109.0	90.6	101.4	126.4
2018	103.4	105.7	102.3	128.9

Source: Statistik Austria[61]

Table 13[62] illustrates the pricing for different kinds of energy. The prices include all taxes and fees for delivering. Table 13

Table 13: Energy prices for households in Austria (24 November 2019)

	euro cents/kWh
Heating oil	7.82
Gas	7.44

[60] Statistik Austria, 6 October 2019:
http://www.statistik.at/web_de/statistiken/wirtschaft/preise/verbraucherpreisindex_vpi_hvpi/sonderauswertungen/index.html

[61] http://www.statistik.at/web_de/statistiken/wirtschaft/preise/verbraucherpreisindex_vpi_hvpi/sonderauswertungen/index.html

[62] Marketresearch by e7 (different sources)

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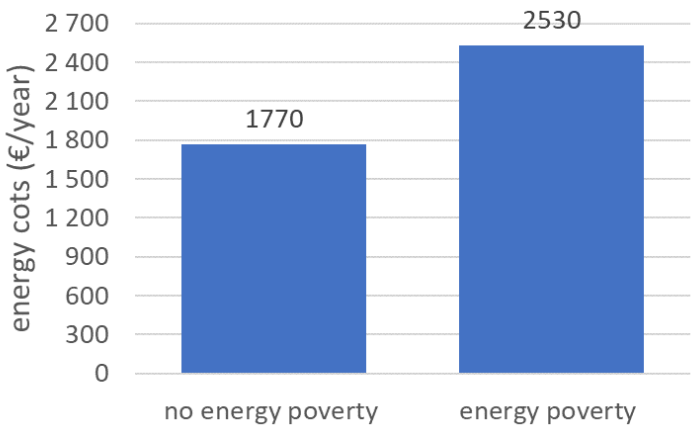
	euro cents/kWh
Pellets	5.04
Wood chips	2.7
District heating	8.5
Electricity	19.54

Spending on energy is quite different according to the household as can be seen in Figure 11. Energy-poor households spend about 43% more for energy than the average household. At the same time low-income households spend about 5.8% of their income on energy, whilst higher-income households spend only 4%.[63]

Energy-poor households spend about 20% of their income on heating and 9.2% on electricity.[64] In contrast, the other households spend 4% on heat and 1.9% on electricity. However, it should be emphasized that other studies in Austria also conclude that energy consumption is often below average.[65]

Figure 7: Spending on energy (2016) in Austria, according to the kind of household



Source: Statistik Austria, 2019

Energy costs are likely to rise. Electricity and fossil fuel costs will rise as a result of the CO_2 tax and the energy transition. In cities district heating will become standard. This kind of heating system has a high share of fixed costs (but no costs for boiler replacement, chimney cleaning, etc.) and are not able to reduce the energy cost by saving energy in the same amount.

In recent years the situation has worsened for the poorer population. Social allowances have been cut. But it should be noted that social assistance in Austria is very well developed.

Adoption of Article 7, actions for energy efficiency obligation (EEO) schemes

[63] Konsumerhebung, 2014–2015.

[64] Energiearmut in Österreich: Haushaltsenergie und Einkommen, Statistik Austria Wien, 2019.

[65] The study Pilotproject 46against energy poverty (2014) concludes that the energy consumption is below average. Here, however, urban apartments were compared with the Austrian average.

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There are several regulations in Austrian legislation regarding energy poverty. Only one regulation is driven by the requirements of Article 7 of the Energy Efficiency Directive; the others mainly follow the Directives on the internal market for electricity/gas. These extra regulations concern, for example, the disconnection of energy (gas and electricity) to vulnerable households.

The regulation in context with Article 7 says[66] that savings made with energy efficiency measurements can be counted 50% higher, if the savings are made in households that have a low household income. A low-income household is defined as a household whose net income does not exceed the statutory exemption standard. Reference rates in euros per month (from 1 January 2019) are:

- One person: €1,045.03 per month;
- Two persons: €1,566.85 per month;
- Each additional person: €161.25 per month.

4.1.5 ENERGY POVERTY

There is no official definition of energy poverty in Austria. Different definitions are used in different contexts.

Energie-Control Austria (E-Control) developed the first official definition in 2013.[67]

> *Energy poverty is those households that have an income below the at-risk-of-poverty threshold and at the same time above-average high energy costs.*

This definition is used very often in Austria. For 2016, the definition for annual low-income households is below €14,217, and the annual energy costs have to be higher than €1,509.[68] Energy costs are considered high when they are 40% higher than the average energy cost.

The average Austrian household spends about €1,790 per year for energy, whilst an energy-poor household spends about €2,530 (2017).

According to this definition, about 3.1% of Austrian households are in energy poverty. However, the problem with this definition is that it focuses on energy consumption and costs. If a household uses less energy because it cannot afford to use more, it is excluded from this definition.

[66] Federal Energy Efficiency Act—EeffG (Bundesenergieeffizienzgesetz – BGBl. 72/2014): § 27.(4),5: Measures taken in low-income households, as well as projects listed in Annex I Z 1 lit. m are to be weighted by a factor of 1.5;// Annex I Z 1 lit. m: concrete projects with relevant social institutions and debt advice centres to tackle energy poverty through energy efficiency measures (e.g. qualified energy advice from consultants with social worker experience or device exchanges);

[67] Energie-Control Austria (E-Control for short) is the regulatory authority in Austria responsible for the electricity and gas industry.

[68] This figures are for average households. The income and energy costs may differ if the size of the household is larger or smaller than average.

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Another definition is used by Statistic Austria (2018).[69]

> *Energy poverty as a lack of opportunity to properly heat your own home or a sufficient amount of energy for lighting, hot water or other (necessary) household purposes.*

Though this narrative definition is clear, it is impossible to calculate the number of involved households.

In 2019 there was a new study[70] commissioned by the Ministry of Social Affairs that concluded that two definitions would be useful. The first definition is about energy poverty risk, and the second one is about energy poverty. The focus is not on persons but on households.

Energy poverty risk: Households are at risk of energy poverty if they are at risk of poverty, and it is difficult or impossible for them to provide basic energy services for their Household cover.

Energy poverty: Households are in energy poverty if they are at risk of energy poverty and at least three of the following seven disadvantages apply to them:

- No/Limited access to energy services;
- Poor structural quality of the living space;
- Old heating system;
- Old electrical appliances;
- High energy costs relative to household income;
- High energy costs relative to the coverage of others' basic needs;
- Energy debts.

According to this definition, about 105,000 persons in Austria are at risk of energy poverty, which corresponds to about 50,000 households. Under this estimation, the number of energy-poor households is low when compared to the other definition.

National energy poverty numbers

The only official data on energy poverty in Austria is based on the E-Control definition of energy poverty. However, there are a number of other statistics that are relevant, which are described in Table 14.

[69] Statistik Austria: Energiearmut in Österreich—Haushaltsenergie und Einkommen, Wien 2019:

[70] Study to determine a definition of energy poverty in Austria from the point of view of socioeconomic and energy economic practice; study commissioned by the Federal Ministry of Labor, Social Affairs, Health and Consumer Protection, carried out by the Research Institute, Economics of Inequality (INEQ), of WU Wien (2018).

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Table 14: National numbers in context with energy poverty (Austria)

Year	Source	Relevant figure	Remarks
2011	EU-SILC	95,000 people	According to EU-SILC, in 2011, 219,000 people (about 100,000 households or about 2.6 percent of the Austrian population) were not financially able to keep their entire dwelling adequately warm. However, less than half (95,000 people) are also at risk of poverty according to the definition of fuel poverty.[71]
2013	E-Control	2.5% of Austrian households (90,000 households or 170,000 persons)	E-Control shows that more people than are generally publicly acknowledged are affected by energy poverty. Typical low-energy households are low-income single female pensioners living in oversized houses, less than half of whom (95,000) are also at risk of poverty. Before it was generally assumed that fuel poverty was more of a city issue. [72]
2014	Statistic Austria	About 3.2% of Austrian households	About 3.2% of Austrian households are in energy poverty. [73]
2016	EU-SILC (Statistic Austria)	3% of Austrian households (110,000 households or about 230,000 persons)	About 110,000 households were unable to keep their entire dwelling adequately warm, based on a (subjective) question from EU-SILC: Can you afford to keep the entire dwelling adequately warm? [74]
2016		308,000 persons	About 308,000 persons received the needs-based minimum benefit system, corresponding to about €924 million spent.[75]
2016	Wohnbeihilfe[76]	188,000 households	188,000 households received €350 million in housing assistance.
2017	E-Control	132,597 households[77]	132,597 low-income households were eligible for an exemption from the green electricity fee, which amounts to a 10% reduction in electricity costs.

[71] https://www.e-control.at/presse/aktuelle-meldungen/fachtagung-energiearmut?inheritRedirect=true

[72] https://www.e-control.at/presse/aktuelle-meldungen/fachtagung-energiearmut?inheritRedirect=true

[73] https://www.derstandard.at/story/2000100226839/wenig-geld-hohe-energiekosten

[74] Statistik Austria: ENERGIEARMUT IN ÖSTERREICH Haushaltsenergie und Einkommen; page 20; Wien 2019

[75] http://iibw.at/documents/2017%20IIBW.%20Wien.%20Berichtstandard%20WBF.pdf page: 49 (25.10.2019)

[76] Berichtsstandard Wohnbauförderung, 2017: Institut für Immobilien, Bauen und Wohnen GmbH; Wien 2017.

[77] https://www.e-control.at/newsletter-1/2018/-/asset_publisher/gJtujQ2H87Df/content/teilweise-befreiung-von-okostromkosten-2017-weiter-gestiegen?inheritRedirect=false&redirect=https%3A%2F%2Fwww.e-control.at%2Fnewsletter-1%2F2018%3Fp_p_id%3D101_INSTANCE_gJtujQ2H87Df%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26p_p_col_id%3Dcolumn-1%26p_p_col_count%3D1

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Year	Source	Relevant figure	Remarks
2017	E-Control	260,000 households	About 260,000 households qualify for a waiver of the green electricity fee, but only 132,597 use this opportunity.[78]
2018	Statistic Austria 2019	3.1% (around 117,100 households) (117.100 households => 220,000 persons)	These data were determined using the same procedure as in 2017 but collected by Statistic Austria.[79]
2018	Matzinger 2019[80]	105,000 persons or 50,000 households.	Number of households and persons that are energy poor. There must be a risk of energy poverty and three out of seven criteria must be fulfilled. The data obtained are a projection from a small data set.

Policies to mitigate energy poverty

There are no special policies in Austria to mitigate energy poverty. Only the requirements of EU-Directives are formally implemented. All the main large programmes mitigating energy poverty work on a voluntary basis and are mainly operated by Caritas, the main social organization of the Catholic Church in Austria.

There are several regulations for mitigating energy poverty.

Point of contact

Each utility (gas and electricity) with a turnover greater than €10 million must have a "point of contact" for the subject of energy poverty. This is written in GWG § 127/Abs. 3/7[81] & ELWOG[82].

> *(7) As of 1 January 2015, utilities with more than 49 employees and a turnover of more than €10 million or a balance sheet total of more than €10 million will have an advice centre for their customers for questions on supply switching, energy efficiency, gas costs and energy poverty.*

Exemption from green electricity fee

According to this legislation, low-income households do not have to pay the green electricity fee (Green electricity law 2012[83] / § 46 & § 49 expanded 2019), which

[78] https://www.ots.at/presseaussendung/OTS_20180404_OTS0070/e-control-oekostrombefreiungen-2017-weiter-gestiegen

[79] Statistik Austria: ENERGIEARMUT IN ÖSTERREICH Haushaltsenergie und Einkommen; page 20; Wien 2019

[80] Study to determine a definition of energy poverty in Austria from the point of view of socio-economic and energy economic practice; Study commissioned by the Federal Ministry of Labor, Social Affairs, Health and Consumer Protection, carried out by the Research Institute "Economics of Inequality" (INEQ) of WU Wien (2018).

[81] GWG: Gaswirtschaftsgesetz 2011 (~Gas Management Act 2011)

[82] ELWOG: Elektrizitätswirtschafts- und –organisationsgesetz 2010 (~ Electricity Industry and Organization Act)

[83] Green electricity law: Ökostromgesetz

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comprises about 10% of the costs for electricity (previously, the fee was 3% to 4%; in May 2019, the law was changed). However, households do not automatically receive this exemption; they must apply for it.

Commitment to basic services

GWG §124 & ELWOG § concerns the right for energy supply (electricity and gas):

> (4) If consumers are referred to the obligation to provide basic services within the meaning of Section 1 (1) (2) KSchG and small businesses, network operators are obligated to provide network services, without prejudice to existing arrears. Consumers may not be required to provide a security deposit or advance payment in excess of the amount of a partial payment for one month in connection with this network service.

This provision is very important, as it provides that no supplier can refuse to supply a designated customer, even in the event that the customer is in payment withholding.

Tariff calculator

With the help of the free tariff calculator[84] (ELWOG §65), it is possible for a household to find the best and/or cheapest energy supplier. Price differences among electricity suppliers can be as much as 46%.

Disconnection of electricity power (and/or gas) supply

Provision § 127 GWG 2011 concerns the type and scope of a disconnection procedure. In the case of gas:

> 3) In cases of breach of contract, in particular in the event of late payment or non-performance of an advance payment or security deposit, the network operator shall be obliged to warn or to remind at least twice, including a minimum two-week grace period. The second reminder must also contain information on the consequence of a shutdown of the network access after the expiry of the two-week grace period and on the associated probable costs of a possible shutdown. The last reminder must be sent by registered letter. Network operators must indicate the possibility of using counselling centres in accordance with paragraph 7 for each reminder within the meaning of the first sentence. If the contract for the supply of natural gas (energy supply contract) has been violated, the supplier must comply with this dunning procedure.

This regulation determines what the procedure for switching off an energy connection is and, consequently, what costs may be incurred in connection therewith.

Use of prepayment-meter

Provisions Elwog § 124(4) or § 127 GWG 2011 concern procedures for advance payment.

> (5) If a security deposit or advance payment is required by the network

[84] https://www.e-control.at/konsumenten/service-und-beratung/toolbox/tarifkalkulator

operator or supplier, each end user without load profile counter, without prejudice to the rights granted to him in accordance with § 124, instead—as far as this is technically possible—the right to use a counting device with prepayment function.

Winter fuel payment

In Austria it is possible that poor households can request a winter fuel subsidy. This subsidy is awarded at the level of the federal states and varies in amount depending on the state. In addition, there may be grants from the local community.

A few years ago, the system was changed in the city Vienna. Before a household can get a certain amount of money, it must first receive energy advice and support for energy-saving measures and help in special situations (e.g., a high annual energy bill). All federal states together spend around €25 million per year on heating subsidies. In Vienna, the winter fuel payment was replaced by the Vienna Energy Support (Wiener Energieunterstützung), which provides for a combination of energy consulting, device replacement and one-off payments in special hardship cases.[85]

4.1.6 CONCLUSIONS

There is no official definition of energy poverty in Austria. However, the national statistics office produces a report on energy poverty every second year together with a report about energy consumption in Austrian households.[86] Therefore, energy poverty is a recognised problem in Austria.

The focus in Austria is on winter (heating) poverty. Cooling is not a topic in Austria, yet. During the hot summer 2019, cool places were available in shopping centres, mainly for elderly people living in cities.

Almost all public programs for dealing with energy poverty are on a voluntary basis. There is no legislation, and the main player in this field is Caritas (in cooperation with public bodies and some suppliers). The main focus of public energy advice is not on energy-poor households.

In September 2019 it was proposed that, to aid integration of Article 7 (energy poverty) into the new Energy Efficiency Legislation, there should be a stakeholder advisory council for energy poverty in Austria, which meets every six months. In addition, there should be a platform that strives for information exchange between energy suppliers and social institutions.

It should also be mentioned that a good set of rules on how suppliers should deal with energy poverty exists. An improvement is still needed in the implementation.

[85] https://www.wien.gv.at/gesundheit/leistungen/mindestsicherung/energieunterstuetzung.html

[86] Statistik Austria, 2019: Energiearmut in Österreich—Haushaltsenergie und Einkommen—Mikrozensus Energie und EU-Silc – Statistical Matching, Statistik Austria, Wien 2019; and

Statistik Austria 2017: Haushaltsenergie und Einkommen mit besonderen Fokus auf Energiearmut, Statistik Austria, Wien 2017

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An IFES study[87] commissioned by E-Control shows that households that are most affected by energy poverty have a low awareness of saving energy: 'This can be improved with additional information, energy advice and device replacement actions. With one-off payments/subsidies, the symptoms are temporarily alleviated, but without overcoming the true causes that result in high energy costs. Also, the targeting efficiency is low: 'Most of the heating subsidies are more suited to poverty relief, because they target the poor, but not necessarily energy poor households. The amount spent on this is considerable: all federal states together spend around €25 million per year on heating subsidies.

[87] This study is not available as it was s survey of about 928 households concerning their energy-poverty situation. The results are part of the E-Control study 2013.

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4.2 BELGIUM CONTEXT

4.2.1 INTRODUCTION

Belgium has a temperate maritime climate influenced by the North Sea and Atlantic Ocean.

The population of Belgium is 11.4 million, made up of 4.77 million households (2018).[88] The composition of Belgian households is shown in Table 15. Over a third of households are single adults, with 25% of the single-adult households aged over 65 (0.44 million households).[89]

Table 15: Household composition in Belgium, 2018

Single adult	1.77m (37% of total)
Single adult with children	0.27m (6% of total; 15% of single adult)
Couple	2.31m (48% of total)
Couple with children	1.05m (22% of total; 45% of couples)
Other type	0.69m (15% of total)
Other type with children	0.21m (4% of total; 30% of other type

Belgium has a growing population (population growth 2017–2018 was 0.4%),[90] and the proportion of the population that is older is increasing (from 17.2% in 2010 to 18.7% in 2018[91] and projected to be 22.5% in 2030[92]).

The Belgian economy is relatively strong in Europe, driven by industry and services. The employment rate in 2018 at 69.7%.[93] The median equivalised household income in 2017 was €22,777, which is well above average for the EU-28 (€16,943).[94] However, the median disposable income at constant prices has gradually eroded (about -5% compared to 2009, -3% per compared to 2013).[95]

4.2.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

Decision-making power in Belgium is shared amongst the federal government, three

[88] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilst_hhnhtych&lang=en

[89] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilst_hhaceday&lang=en

[90] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow

[91] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en

[92] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en

[93] The employment rate is calculated using the number of persons aged 20 to 64 in employment divided by the total population of the same age group. Eurostat:
https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en

[94] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en

[95] King Baudouin Foundation. (2017). The Energy Poverty Barometer. Available at: https://www.kbs-frb.be/en/Activities/Publications/2017/20170313NT1

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regions (Wallonia, Flanders and the Brussels-Capital region) and three communities (the Flemish, the French-speaking community and the German-speaking community).

At the federal level, Belgium has a binding emission reduction target of 35% by 2030 (compared with 2005 levels) for non-EU Emissions Trading Scheme sectors. Both the Wallonian and Flemish governments support a greenhouse gas reduction target of 80 to 95% by 2050.

Belgium's contribution to the EU Energy Efficiency Directive energy efficiency target of 32.5% is estimated to be 22% primary energy savings compared to PRIMES baseline 2007 or 26% primary energy savings when compared to 2005 actual consumption.[96]

Specifically, in relation to energy efficiency in buildings, the regions have put in place the following policies:

Brussels-Capital region

The draft Energy and Climate Plan for the Brussels-Capital region outlines a renovation strategy for residential buildings. From 2021 to 2030, new regulatory measures will be introduced, such as enhanced Energy Performance Certificates (mandatory for all dwellings and including a list of renovation measures that should be prioritised), a building passport and a renovation roadmap. The roadmap is a five-step renovation plan that requires building owners to adopt renovation measures every five years over the period 2030–2050 in order to achieve a certain performance level, which depends on the type of building and its initial performance. On average, the residential building stock is targeted to reach a primary energy consumption of 100 kWh/m²/year by 2050.[97]

Flanders

The Flemish Energy Agency has developed a Renovation Pact to improve the Flemish building stock. The long-term objective is for existing residential buildings to achieve an energy performance level equivalent or comparable to that of new buildings (with planning applications dated 2015 or later) by 2050.[98] It has two main components:

1. Renovation advice for building owners, prospective buyers and tenants;
2. A building passport, which is an enhanced version of the Energy Performance Certificate that informs potential building buyers of the energy performance of a building and provides information on measures that are needed to achieve a future-proof energy efficiency standard.[99] The building passport will also serve to enforce certain energy efficiency

[96] Belgium's draft integrated National Energy and Climate Plan. (2018). English translation. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_be_necp.pdf

[97] Plan énergie climat 2030. (2018). Available at: https://ec.europa.eu/energy/en/content/national-energy-and-climate-plans-necps-belgium

[98] Belgium's Integrated National Energy and Climate Plan 2021–2030. (2018). Available at: https://ec.europa.eu/energy/en/content/national-energy-and-climate-plans-necps-belgium

[99] BPIE. (2016). Building Renovation Passport: Customised roadmaps towards deep renovation and better homes. Available at: http://bpie.eu/publication/renovation-passports/

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measures: five years after a change in ownership of a residential home three out of six energy efficiency measures (roof insulation, wall insulation, floor insulation, window replacement, boiler replacement when older than 15 years, installation of a renewable energy boiler) will need to be adopted.[100]

In addition, the draft Energy and Climate Plan for Flanders (part of the draft NECP) for the period 2021–2030 includes an action plan for social housing, which aims that from 2021 newly built social housing will fulfil nearly zero-energy standards and that major renovations will be realised in existing social housing from 2020.

Wallonia

The draft Energy and Climate Plan for the Walloon region for the period 2021–2030[101] defines a renovation roadmap with specific intermediate objectives:

- By 2040 all residential buildings with energy performance rating G will be renovated (envelope improvement and heating system replacement);
- By 2045 all residential buildings with energy performance rating F will be renovated;
- By 2050 all other existing residential buildings.

A mix of policies is planned to be implemented (existing policies to be maintained and improved) in order to realise these targets, specifically information measures (e.g., audits, implementation of a building passport), regulatory measures (e.g., the Walloon Housing Code) and incentive payments.

4.2.3 RESIDENTIAL BUILDING STOCK[102]

Belgium has 3.75 million residential buildings, 60% of which are in Flanders, 35.5% in Wallonia and 4.5% in the Brussels-Capital region.

Thermal regulations for residential buildings were first introduced in 1985 in the Walloon region, in 1992 in the Flemish region and in 2000 in the Brussels-Capital region. Seventy-five percent of all residential buildings in Belgium were built before 1982 and therefore before thermal regulations.

Furthermore, 24% of all homes were built before 1919 and 36% before 1945, meaning Belgium has one of the oldest building stocks in Europe.[103]

[100] Vlaams Klimaatbeleidsplan 2021–2030. (2018). Available at: https://ec.europa.eu/energy/en/content/national-energy-and-climate-plans-necps-belgium. Note: the introduction of minimum standards has been repealed by the government recently; therefore, it will not be executed in the upcoming legislation (2019–2024). Nevertheless, the plan will remain in the Flemish Long Term Renovation Strategy for future policy, as it remains an important part for reaching long-term goals.

[101] Projet de Plan Wallon Energie Climat 2030. (2018). Available at: https://ec.europa.eu/energy/en/content/national-energy-and-climate-plans-necps-belgium

[102] Two sources of data on the Belgian residential building stock have been used: STATBEL available at https://statbel.fgov.be/en/themes/housing/building-stock#figures and Eurostat

[103] STATBEL: https://statbel.fgov.be/en/themes/housing/building-stock#figures; and the EU Building Stock Observatory: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/eubuildings

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The age distribution of the residential building stock varies significantly amongst the three regions. The Brussels-Capital region has the oldest building stock, with 93% of all buildings being built before 1982 and 36% before 1919. In Wallonia, 80% of the residential stock was built before 1982 and 41% before 1919. Flanders has the newest stock by comparison, with 69% built before 1982 (although 88% before thermal regulations were introduced) and 13% before 1919.

Belgium's 3.75 million residential buildings accommodate 5.46 million dwellings. Of those, 53.5% of dwellings are single-family homes (26% stand-alone SFH and 25% terraced homes) and 46.5% are apartment blocks (19% duplexes and just 27% multifamily buildings).

Whilst the breakdown of dwellings for Flanders and Wallonia are broadly similar, with only a higher proportion of dwellings in apartment blocks for Flanders, the distribution is starkly different for the largely urban areas of Brussels-Capital. In the Brussels-Capital region the number of single-family homes is much lower at just 37% of the total and almost entirely made up of terrace homes. The proportion of apartments in the stock is also much higher at 63% with the vast majority being in multifamily blocks (60%) as opposed to duplexes (3%).

Seventy-two percent of the Belgian population own their own home (2018), although this national figure is likely to hide regional variation. Around a third rent their homes, with just over two-thirds of the tenant households renting at market prices and one-third renting at a reduced or free rent.[104]

The vast majority of Belgian households live in urbanised rather than rural areas. Over half of the Belgian population lives in towns and suburbs (54%), with a further 28% living in cities and 18.4% in rural areas.[105] Broadly, population density is higher in Flanders and Brussels than in Wallonia.

4.2.4 ENERGY MARKET

The residential sector is the main consumer of primary energy in Belgium (32.2 %).[106]

Final energy consumption in the residential sector amounts to 8,063 ktoe (8.1Mtoe), derived largely from gas (41%), oil products (31%) and electricity (19%).[107]

[104] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho02&lang=en

[105] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en

[106] Belgium's draft integrated National Energy and Climate Plan, 2018.

[107] Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_consumption_in_households#Energy_consumption_in_households_by_type_of_end-use

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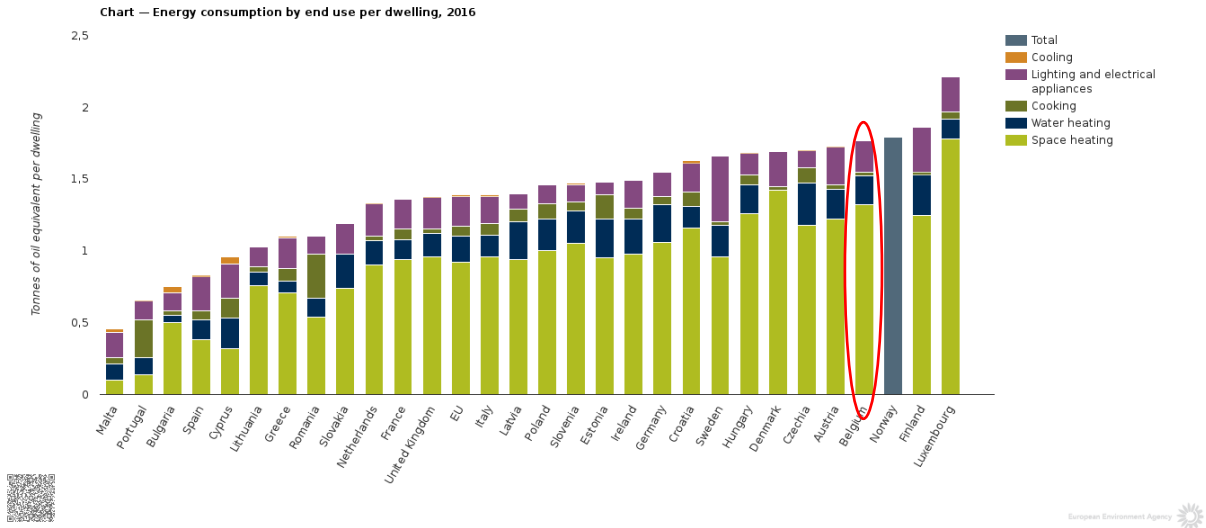
Table 16: Share of fuels in Belgian final energy consumption in the residential sector, 2017 (%)

Electricity	19.2
Derived Heat	0.0
Natural gas	40.8
Solid fuels	1.0
Oil and petroleum products	31.0
Renewables and waste	8.0

Compared to the EU average, Belgian households have high energy usage, in a large part due to high consumption for space heating (Figure 8).

Figure 8: Energy consumption by end-use per dwelling in 2016



Source: EEA, 2019[108]

Market structure

Belgium has a liberalised energy market. The gradual liberalisation of the Belgian energy markets started in April 1999, following the first EU Directive on electricity markets (Directive 96/92/EC).

The electricity market was legally fully liberalised in July 2003 in Flanders and in 2007 in the Walloon region (for all users) and the Brussels-Capital region. The transmission system operator and the regional distribution system operators were legally fully unbundled from supply and generation companies in 2007. Transmission and distribution operators are subject to a regulated monopoly.

Belgium transposed the 2009 EU directive on gas markets (Directive 2009/73/EC) into national legislation by amending the 1965 Gas Act. As with the electricity market, supply and generation are unbundled from transmission and distribution. Transmission

[108] European Environment Agency. (2019). Available at: https://www.eea.europa.eu/data-and-maps/daviz/energy-consumption-by-end-uses-3#tab-chart_1

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and distribution operators are subject to a regulated monopoly.[109]

At the federal level, CREG, the Belgian federal energy regulator, ensures that the electricity and gas market are transparent and competitive, advises public authorities on the functioning of electricity and gas markets and ensures the development of network infrastructure.

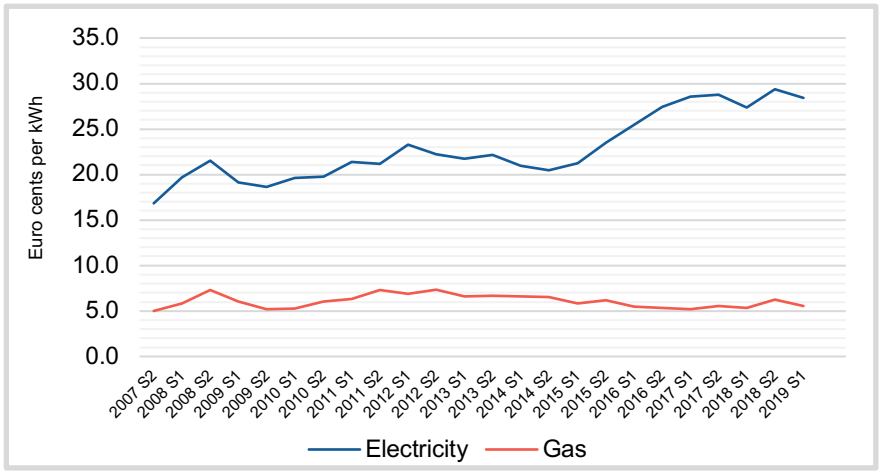
At the regional level, the regional regulators VREG (Flemish region), CWaPE (Walloon region) and BRUGEL (Brussels-Capital region) control and monitor retail market competition and are responsible for approving local distribution tariffs.[110]

Energy price trends for domestic consumers

Figure 1 shows average electricity prices[111] and average gas prices[112] for Belgian household consumers from 2007 to 2019.

Since full liberalisation in 2007, the average electricity price for a Belgian household, including taxes and levies, increased by around 69%. Belgium has the third highest average electricity price for household consumers in Europe (after Denmark and Germany).

Figure 9: Electricity and gas prices for household consumers in Belgium, biannual data from 2007–2019



Source: Eurostat

This national picture hides regional variations. On average one-third of the electricity price is made up of taxes and levies. Since 2012, taxes and levies have been different in each Belgian region. The electricity price including taxes and levies for a standard household (3,500 kWh annual consumption) is highest in Flanders, followed by

[109] IEA. (2016). Energy Policies of IEA Countries: Belgium 2016 Review. Paris, France: OECD.

[110] IEA, 2016; and Commission for Electricity and Gas Regulation (CREG): https://www.creg.be/

[111] Household electrcity consumers (2,500 kWh < annual consumption < 5,000 kWh, taxes and levies included). Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en (2,500 kWh < annual consumption < 5,000 kWh, taxes and levies included).

[112] Household gas consumers (20 GJ < annual consumption < 200 GJ, taxes and levies included). Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_202&lang=en

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Wallonia and the Brussels-Capital region.[113] In Flanders electricity prices can be around 10 euro cents/kWh higher than Brussels-Capital.[114]

In contrast the average gas price for households remained comparatively stable. Belgian gas prices are just below the European average of 6.7 euro cents/kWh (2018, including all taxes and levies) at 6.25 euro cents/kWh. Although gas prices in Wallonia are highest of all three regions.

Fuel oil prices in Belgium have seen significant fluctuations. Oil prices rose swiftly and significantly, almost doubling from 2009 to 2012, falling to a low in 2016 but have been rising in recent years.[115]

Adoption of Energy Efficiency Directive, Article 7

Flanders[116]

No energy efficiency obligation scheme has been implemented in Flanders, but alternative policy measures have been introduced, such as voluntary agreements with companies and a public service obligation on the distribution network operator. The distribution network operator is obligated to encourage a more rational energy use amongst its customers. The obligation focuses on supporting energy efficiency actions in existing buildings, for example, premiums for building envelope improvements.

Specific support for vulnerable groups/protected customers (i.e., beneficiaries of social energy price caps) include:

- premium for an individual condensing boiler;
- 50% higher premium for exterior wall, inner wall, floor insulation and total renovation bonuses; 20% higher premiums for solar water heaters and heat pumps;
- social roof insulation, cavity wall and glazing projects, that is, a bonus on basic premium programmes;
- free energy audits for the most vulnerable groups.

Wallonia[117]

No EEO has been implemented, but alternative measures have been introduced, such as voluntary agreements with industry (branch-level) and SMEs and financial schemes (loans and subsidies) for energy performance improvements in residential and public buildings.

[113] APERRe asbl: http://www.apere.org/fr/observatoire-prix

[114] King Baudouin Foundation, 2017.

[115] Ibid.

[116] Fourth Flemish energy efficiency plan. (2017). Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/targets-directive-and-rules/national-energy-efficiency-action-plans; IEA: https://www.iea.org/policiesandmeasures/pams/belgium/

[117] 4e Plan d'Action en Efficacité Energétique wallon selon la directive EE 2012/27/EU (2017). Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/targets-directive-and-rules/national-energy-efficiency-action-plans; IEA: https://www.iea.org/policiesandmeasures/pams/belgium/

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Specific social/energy poverty programmes:

- Third-party financing of (energy efficiency) renovations of social housing (PIVERT programme);
- Subsidies for low-income households to improve the energy efficiency of their dwellings (MEBAR programme);
- Specific support for the most vulnerable/energy-poor households: advice on and implementation of low-cost measures that improve the energy performance of homes and reduce the households' energy bill (CPAS-PAPE programme[118]: finances the implementation of measures and related costs of the installer).

Brussels-Capital region[119]

No EEO has been implemented, but alternative measures have been introduced, such as:

- regulation on the periodic inspection and approval of boiler technology in the residential and tertiary sector;
- mandatory energy audits followed by a mandatory implementation of cost-effective measures in large non-residential buildings (more than 3,500 m^2) at the renewal or extension of its environmental permit;
- advice and financial support for households that are willing to improve the energy performance of their homes.

No specific provision for social actions/energy poverty is included in the adoption of Article 7.

4.2.5 ENERGY POVERTY

The Belgian Energy Poverty Barometer, which is published by the King Baudouin Foundation,[120] uses three key indicators to measure energy poverty. For the first two indicators, both extent and depth of energy poverty are measured.

[118] https://energie.wallonie.be/fr/plans-d-action-preventive.html?IDC=8768

[119] Quatrième Plan d'Action en Efficacité Energétique. (2017). Government of the Brussels-Capital region. Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/targets-directive-and-rules/national-energy-efficiency-action-plans; IEA: https://www.iea.org/policiesandmeasures/pams/belgium/

[120] All data below taken from Energy Poverty Barometer unless otherwise stated. King Baudouin Foundation, 2017.

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Table 17: Belgian Energy Poverty Barometer indicators, summary and results (2017)

Measured and reported elements	Indicator	Numbers (2017)
Measured energy poverty: (PEm) households whose energy expenditure is considered 'abnormally' high relative to their disposable incomes net of the cost of housing.	Twice median expenditure threshold (income equivalised). Only the lower five income deciles are included.	14% 19.5% Wallonia 11.4% Flanders 12.1% Brussels
Hidden energy poverty: (PEc) households have an abnormally low level of spending on energy services	Household's expenditure is below the median expenditure of those households of the same size and type. Only the lower five income deciles are included.	4.5% 3.7% Wallonia 3.1% Flanders 9.9% Brussels
Perceived energy poverty: (PEr) is based on the percentage of households that self-report having difficulties in adequately heating their dwelling.	Self-reported difficulty in heating home adequately	6.2% 9.8% Wallonia 2.5% Flanders 10.9% Brussels

In 2017, 21.7% of Belgian households were affected by at least one of the forms of energy poverty measured (levelized for duplication between indicators). This is slightly increased from 21.2% in 2016. This national statistic hides significant regional variation, with the Brussels-Capital region experiencing 28.3% energy poverty, Wallonia 27.8% and Flanders significantly lower levels of energy poverty at 15.9%.

Since 2013, the rates of energy poverty in Belgium have been relatively steady but in 2017 have begun to rise, perhaps due to the rise in energy prices in this period.

Income

Energy poverty in Belgium is closely correlated with income. Both the high energy expenditure indicator (PEm) and the perceived energy poverty indicator (PEr) are particularly sensitive to household equivalised income. Under the PEm indicator, more than 50% of households in the lowest income decile are energy poor and 32% for the second income decile, compared to below 1% for the highest two income deciles.[121]

When looking at households with low absolute spending on energy as a possible indicator of energy rationing (hidden energy poverty, PEc), the distribution amongst income deciles is more even. The fact that higher incomes are able to invest in energy savings and thereby reduce their absolute energy expenditure may be one explanation.[122]

[121] Removing the filter of looking at only the first five income deciles (imposed by the indicator) does not significantly alter the outcome of this indicator.

[122] Since 2016, the Energy Poverty Barometer is no longer able to identify households with this investment capacity, as the questions that identify housing as energy efficient or not are no longer included in the Belgian Survey of Income and Living Conditions questionnaires.

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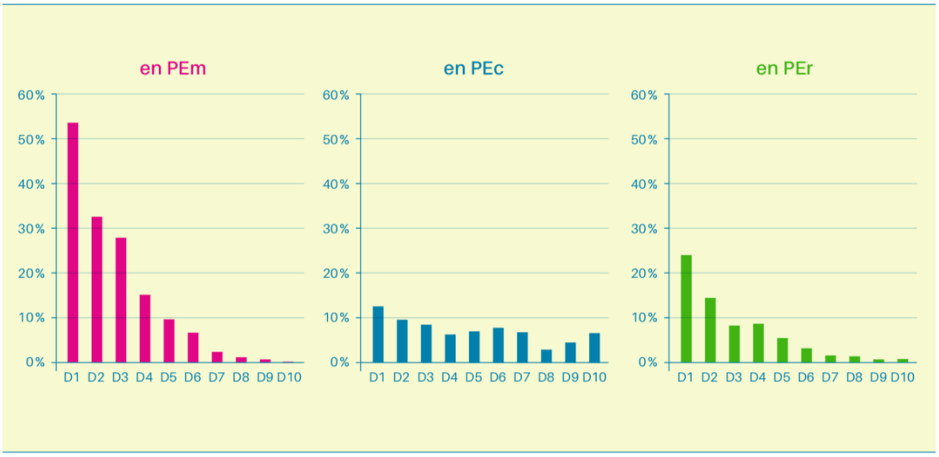
Figure 10: Proportion of Belgian households in PEm (measured energy poverty), PEc (hidden energy poverty) or PEr (perceived energy poverty) by income decile (equivalised).



Source: Belgian Energy Poverty Barometer

Household composition

Single-person households account for one-third of all households in Belgium. The proportion has been growing since 2013 and is projected to rise from 34% in 2017 to 42% in 2070. Single-person households are significantly overrepresented in the energy-poor population. More than 61% of energy-poor households (under the high energy expenditure indicator, PEm) are single person and around 45% for the just hidden energy poverty (PEc) and perceived energy poverty (PEr) indicators. Therefore, over one-third of single-person households in the Belgian population suffer energy poverty (under at least one indicator).

Seniors (65 and over) and women appear to be more vulnerable to energy poverty overall. More than 41% of single women over the age of 65 suffer from some form of energy poverty.

Figure 11: Household type in Belgium and energy poverty

Types of households	% of household type in measured energy poverty (PEm)	% of household type in hidden energy poverty (PEc)	% of household type in perceived energy poverty (PEr)	% of household type in energy poverty (all forms)
Single person	26.3%	(6.4%)	(8.5%)	36.1%
Single parent	(19.4%)	(8.9%)	(13.2%)	34.5%
2 adults without children	8.8%	(2.8%)	(3.0%)	13.4%
2 adults with children	(4.2%)	(3.4%)	(5.0%)	11.4%
Other	(5.7%)	(2.0%)	(5.3%)	(11.3%)

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Types of households	% of household type in measured energy poverty (PEm)	% of household type in hidden energy poverty (PEc)	% of household type in perceived energy poverty (PEr)	% of household type in energy poverty (all forms)
Total	14.0%	4.5%	6.2%	21.7%

** The sum of the percentages of the three forms of energy poverty does not correspond to the percentage in the last column as some households accumulate several forms of energy poverty.*

** The percentages in parentheses are given as an indication because the weakness of the sample does not guarantee the accuracy of the result.*

Translated and reproduced from the Belgian Energy Poverty Barometer

Single-parent households, the vast majority of which are mothers with children, remain significantly more vulnerable to energy poverty than couples with dependent children. They are amongst the households with the lowest incomes (and the gap is still widening when the composition of the household with equivalent incomes is considered). More than 37% of single-parent households depend on nonwork income, and more than 54% are tenants. Single-parent households make up only 7% of the Belgian population, but almost one-third are in energy poverty.

Overall, it is households of two people without dependent children who are the least affected by energy poverty.

Tenure

One-third of households in Belgium are tenants (22.5% in the private sector, 10.5% in the social sector), and two-thirds are homeowners (35.3% without a mortgage, 31.7% with a mortgage).

Energy poverty is two to three times higher amongst tenants as those who own their homes. Private-sector tenants account for between one-third and one-half of energy-poor households whilst they are only 22% in the global population. Between 2013 and 2017, the proportion of social renting households in energy poverty has grown steadily (from 10.8% to 12.7%). For private tenants there has been a particularly strong upward movement in energy poverty rates between 2016 and 2017 (from 9.7% to 13.9%).

Amongst homeowners, households without mortgages (often elderly) are significantly more at risk of energy poverty. Due to the predominance of householders without a mortgage in the population (35.3%), they represent the largest group of households in energy poverty (39%). In contrast, energy poverty amongst homeowners with a mortgage has been falling since 2013 (from 7% to 4.7%).

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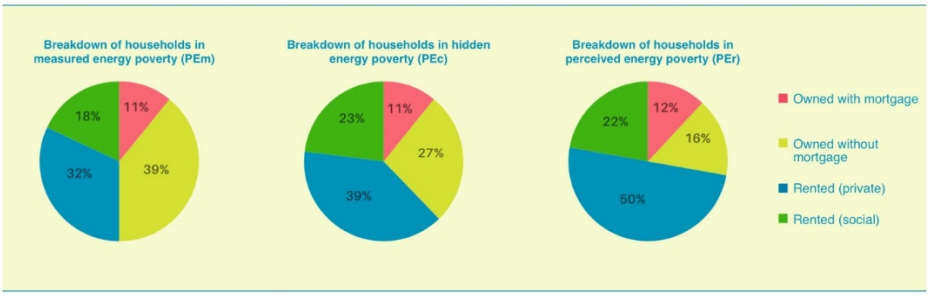
Figure 12: Tenure in Belgium and energy poverty



Source: Belgian Energy Poverty Barometer

Dwelling condition and type

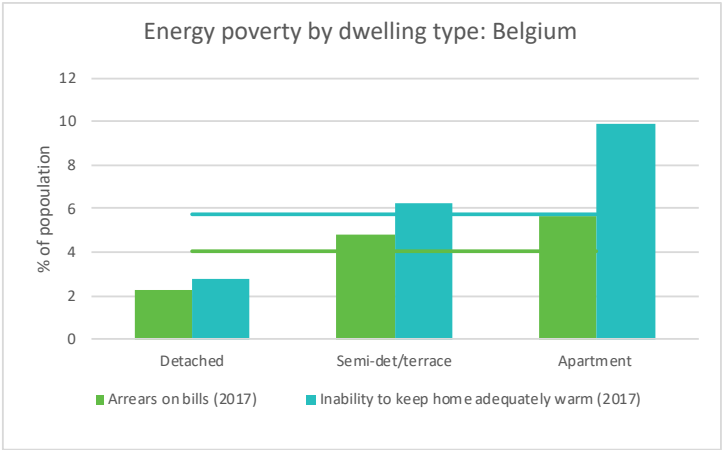
Energy-poor households more often live in dwellings with the presence of leakage, damp or rot. This is particularly visible under the Perceived Energy Poverty indicator (PEr), which shows twice as many energy-poor households living in inadequate housing compared to the general population.

This statistic from the Belgian Energy Poverty Barometer is supported by evidence from the Energy Poverty Observatory indicator on presence of leaks, damp or rot, which shows that the percentage of the Belgian population living in homes with leaks, damp or rot is around 40% higher than the EU average.

The Belgian Energy Poverty Barometer does not disaggregate energy poverty statistics by dwelling type. Therefore Figure 13 shows a disaggregation by dwelling type for two of the Energy Poverty Observatory indicators (arears on utility bills and inability to keep the homes adequately warm) for Belgium.

The results show that households living in smaller dwellings are significantly more likely to suffer energy poverty than average for the population. This data supports findings from the Energy Poverty Barometer that a rise in rental costs for smaller and low-cost homes has contributed to energy poverty in recent years.

Figure 13: Energy poverty by dwelling type in Belgium



(Horizontal lines show averages for each indicator)

Source: EPOV

Policies to mitigate energy poverty

Although energy poverty is not defined by law and there are neither federal nor regional targets for the eradication of energy poverty, Belgium is one of the EU countries that recognises energy poverty and provides support cross a range of policies.

The draft National Energy and Climate Plan[123] contains a range of measures at both the federal and regional level that address energy poverty. At the federal level, protection for low-income or vulnerable households is provided through a policy designed to make energy bills more affordable through direct or indirect financial support, including:

- a social tariff for electricity and natural gas, this discounted tariff is calculated every 6 months on the basis of the lowest market price;
- a gas and electricity fund, used to take preventive and remedial action;
- a social heating fund (heating oil fund), used to subsidise heating oil bills; and
- a deferred payment scheme allowing heating oil bills to be paid in instalments.

All three regions (Brussels, Flanders and Wallonia) have some type of disconnection protection during winter to prevent indebted households from being exposed to cold temperatures.[124] Flanders has perhaps the most advanced approach to energy poverty of the three Belgian regions. In 2016 the Flemish government introduced an energy poverty plan consisting of 34 action points for tackling energy poverty at the source and is part of the Flemish Poverty Reduction Action Plan 2015–2019.

Furthermore, a range of measures has also been adopted by the regional governments to protect low-income households and help them pay their energy bills, including:

- installation of power limiters/prepayment meters;
- public welfare services provided in the event of non-payment (e.g. minimum delivery in winter);
- financial incentives for reasonable energy consumption or home improvements;
- support measures to reduce energy consumption or energy costs (awareness raising, energy advisors, energy training for social workers, free energy audits).[125]

There are also a good number of regional and local initiatives that are targeted to help energy-poor households or that provide some provision to incentivise participation in mainstream energy efficiency programmes. The Energy Poverty Observatory holds a database of these initiatives, which can be found here. The ASSIST project (section 3.1.3 of the report on Replicable Best Practice) also outlines the

[123] Belgium's draft integrated National Energy and Climate Plan, 2018.

[124] Energy Poverty Observatory. (2019). Member State Report: Austria. Available at: https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_belgium.pdf

[125] Belgium's draft integrated National Energy and Climate Plan, 2018.

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range of programmes that provide assistance for energy efficiency of the home through advice or support to install energy efficiency measures.

4.2.6 CONCLUSIONS

Energy poverty in Belgium is largely a winter phenomenon, in line with the temperate climate and high energy use in dwellings for space heating.

In 2017, 21.7% of Belgian households were affected by at least one of the forms of energy poverty. Since 2013, the rates of energy poverty in Belgium have been relatively steady but in 2017 have begun to rise, perhaps due to the rise in energy prices, particularly electricity, in this period. Levels of energy poverty vary amongst the three regions, with Wallonia and Brussels-Capital suffering similarly high rates at around 28% and Flanders experiencing lower levels of energy poverty at 15.9%.

Energy poverty in Belgium is closely correlated with income poverty, with rates of energy poverty in the first three income deciles being particularly high.

Twice as many energy-poor households are living in inadequate housing (presence of leaks, damp and rot) compared to the national population. The percentage of the Belgian population reporting living in homes with leaks, damp or rot is just under 40%, higher than the EU average. Belgium's old building stock may be a significant contributor.

Over one-third of single-person households in the Belgian population suffer energy poverty (under at least one indicator). This is significant as around a third of Belgian households are single person. Furthermore, single-parent households make up only 7% of the Belgian population but almost one-third are in energy poverty.

Energy poverty has a strong gendered aspect in Belgium, with women most commonly heading single-parent households and older women being particularly vulnerable to energy poverty. More than 41% of single women over the age of 65 suffer from some form of energy poverty.

Seniors (65 and over) appear to be more vulnerable to energy poverty overall, and amongst homeowners, households without mortgages (often elderly) are significantly more at risk of energy poverty.

Energy poverty is two to three times higher amongst tenants than those who own their own homes. Private-sector tenants account for between one-third and one-half of energy-poor households, whilst they are only 22% in the global population.

Households living in smaller dwellings are significantly more likely to suffer energy poverty than average for the population.

Energy-poor households are more heavily impacted by poor health and chronic illness than the average population (18.3% of energy-poor households reported to have poor or very poor health compared to a population average of just 6.5%).[126]

[126] King Baudouin Foundation, 2017.

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4.3 CROATIA CONTEXT

4.3.1 INTRODUCTION

Croatia has a continental climate in the north, an alpine climate in central regions and a Mediterranean climate in the coastal regions.

According to the latest 2011 census, 4,284,889 inhabitants lived in the Republic of Croatia, of which 4,246,313 or 99.1% are in private households and 38,576 or 0.9% are in institutional households (nursing homes, dormitories, orphanages, social housing communities and similar). The number of private households in 2018 is 1.47 million.[127] Household composition is broken down in Table 18.

Table 18: Household composition in Croatia, 2018

Single adult	0.37m (25% of total)
Single adult with children	0.028m (2% of total; 8% of single adults)
Couple	0.55m (38% of total)
Couple with children	0.29m (19% of total; 52% of couple)
Other type	0.56m (38% of total)

The number of single adult households aged 65 and more in 2018 was 0.22 million (15% of total; 59% of single adults).[128]

From 2017 to 2018, the population of Croatia declined by -0.9%.[129] Projections until 2100 also show a negative population growth rate.[130] The proportion of the total population that is aged 65 years and more has increased from 17.8% in 2010 to 20.1% 2018.[131] Projections for 2030 and 2050 show a further increase in the older age population to 25.6% and 31.6% respectively.[132]

In 2018, the employment rate, which corresponds to the number of people aged 20 to 64 in employment divided by the total population of the same age group, equalled 65.2%.[133] The mean income in 2018 was €7,382 and the median income was €6,690.[134]

Table 19 shows the impact of the 2008 economic crisis on the real GDP growth rate (percentage change on previous year) [135] and the employment rate, 2007–2012 and 2018. In Croatia, there is a trend of outward migration of the working population and a low birth rate because of a poor economic situation (high costs and low incomes) due to the economic crisis. As a result, the proportion of people who are not in active

[127] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en
[128] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en
[129] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow
[130] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en
[131] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en
[132] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en
[133] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en
[134] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en
[135] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

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employment is increasing, and pension policy problems could arise in the near future. That will potentially put a considerable number of pensioners at high risk of poverty and thus energy poverty.

Table 19: Impact of 2008 economic crisis on GDP growth rate and employment in Croatia

	2007	2008	2009	2010	2011	2012	2018
1. Real GDP growth rate	5.3	2.0	-7.3	-1.5	-0.3	-2.3	2.6
2. Employment rate (%)	63.9	64.9	64.2	62.1	59.8	58.1	65.2

4.3.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

Croatia's draft Energy and Climate Plan (NECP) states the emission reduction target of 7% for non-ETS sectors and 43% for ETS sector by 2030 (compared with 2005 level). The indicative national target for increasing energy efficiency, expressed as the absolute amount of direct energy consumption in 2020, is 291.3 PJ (6.96 Mtoe). The corresponding target expressed as the absolute amount of primary energy in 2020 is 448.5 PJ (10.71 Mtoe). The target for 2030 for the share of renewable energy in direct consumption is 36.4%; the target for primary energy consumption is 344.38 PJ and for direct energy consumption is 286.91 PJ.[136]

Measures outlined in the NECP in the residential building sector are in line with the long-term strategy to encourage investment in the reconstruction of the national publicly owned buildings (owned by the Republic of Croatia). The first Long-Term Buildings Renovation Strategy was adopted in 2014 (Official Gazette 74/14), amended in 2017 and adopted in early 2019 (Official Gazette 28/19). The document states that the priority group of buildings with regard to the total area, condition of the envelope of the heated space and energy needs is a select group of buildings constructed before 1987. In addition to the potential energy savings of 293.48 kWh/m^2/year, single-family homes are also a priority category for renovation to combat energy poverty. The estimated impact of the integrated renewal programme on energy savings by 2030 is around 67.0 PJ, which is approximately 82% in the context of reaching end-use targets. By 2050, energy savings of approximately 131.5 PJ are possible, which is approximately 62% of the total energy savings target in the building sector. The effect on reducing CO_2 emissions by 2030 is around 3,197.0 kt, or by 2050 around 6,277.0 kt.[137]

4.3.3 RESIDENTIAL BUILDING STOCK

There are two million dwellings/units in Croatia. Thermal regulations for residential buildings were first introduced in 1980 when Croatia was part of the former Socialist Federal Republic of Yugoslavia. Sixty-three percent of all dwellings/units were built before 1980, which means that a large proportion of buildings in Croatia were built with no or minimal requirements for the thermal protection of buildings.

[136] https://ec.europa.eu/energy/sites/ener/files/documents/croatia_draftnecp_hr.pdf

[137] https://mgipu.gov.hr/vijesti/donesena-nacionalna-strategija-za-obnovu-zgrada-do-2050-godine/9039

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Half of the Croatian stock is made up of single-family homes:

- The number of single-family homes is 1.00 million (50% of the total number of dwellings/units);
- The number of multifamily homes is 0.65 million (32.5% of the total number of dwellings/units);
- The number of apartment blocks (i.e., high-rise buildings that contain several dwellings and have more than four storeys) is 0.35 million (17.5% of the total number of dwellings/units);
- The number of owner-occupied dwellings/units is about 1.79 million (around 90% of the total number of dwellings/units);
- The number of privately rented dwellings/units is around 0.04 million (2%);
- The number of social housing dwellings/units about 0.17 million (9%).[138]

According to 2018 data, 29.2% of the total population lives in cities, 32.3% lives in towns and suburbs and 38.4% lives in rural areas.[139]

4.3.4 ENERGY MARKET

In 2017, households in Croatia consumed about:

- 578.7 × 106 m^3 of gas;
- 6265.7 GWh of electricity; and
- 5.564 PJ of heat from district heating.

Unofficial sources state that about 43% of households are heated by firewood, but there is no information on its cumulative consumption.

The average price per kWh of energy for the household category in 2018/2019 was:

- Gas: 0.0348 €/kWh (0.2596 HRK/kWh);[25]
- Electricity: 0.1166 €/kWh (0.87 HRK/kWh);[26]
- District heating: from 0.02279 €/kWh for energy (0.17 HRK/kWh).[27]

The energy market in Croatia has been liberalised since 2003. The Croatian Energy Regulatory Agency (HERA) is the institution for energy regulation on a national level. HERA ensures that the energy markets are transparent and competitive, advises public authorities on the functioning of markets and ensures the development of network infrastructure.

[138] Pezzutto, S., et al. (2018). Hotmaps Project, D2.3 WP2 Report—Open Data Set for the EU28. Available at: www.hotmaps-project.eu; and EU Building Stock Observatory. Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/eubuildings

The majority of building stock data refer to the year 2016.

[139] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en

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4.3.5 ENERGY POVERTY

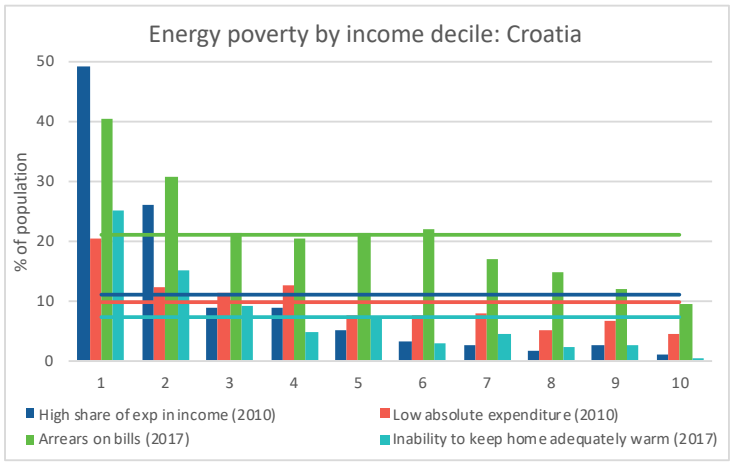
At the national level, there is still no official definition of energy poverty. An open partner/stakeholder dialogue was organized and launched in February 2019 by the Ministry of Construction and Physical Planning, aimed at defining the criteria for determining an energy-poor household, but the process is still in progress.

In Croatia, there is no definition of who is energy poor or who is in danger of becoming energy poor. There is no defined method for identifying and monitoring energy poverty and there is no regulatory framework for combating it. Energy-poor households often do not have access to a modern form of energy, such as electricity, or are unable to meet the cost of essentials for living in acceptable conditions.

Implementation of the Internal Market in Electricity and Gas Directives (2009/72/EC and 2009/73/EC) in the Croatian legislative framework took place in 2015. This energy law defines consumers under special protection—protected and vulnerable customers. Utilities have information about the status of vulnerable customers and household consumption and location of vulnerable customers but no data on the size of dwellings, the financial status of households or the number of household members.

Analysis of the EPOV indicator for Croatia illustrate that energy poverty is closely linked to poverty. The rate of energy poverty under all indicators is above average in the two lowest income deciles. This is particularly notable for the high share of expenditure in the income indicator and the arrears on the bills indicator, although it should be noted that average or above average rates of arrears are found in all but the four highest income deciles.

Figure 14: Energy poverty by income decile in Croatia



(Horizontal lines show averages for each indicator)

Households living in rented properties also appear to be at higher risk of energy poverty, in particular those living in subsidised housing (although both rented tenures make up only 12% of the population).

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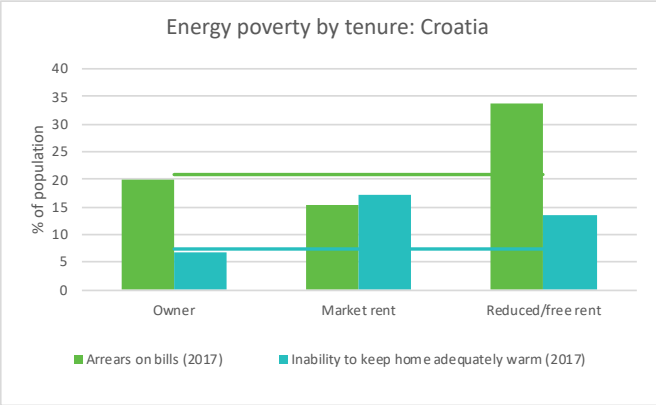
Figure 15: Energy poverty by tenure in Croatia



(Horizontal lines show averages for each indicator)

Energy poverty appears to be more prevalent in rural or thinly populated areas with three of the four primary indicators showing above average rates of energy poverty in thinly populated areas (Figure 16). This is supported by the analysis of energy poverty in different dwelling types (Figure 17), which illustrates that, for both the self-reported indicators of arrears on bills and inability to keep dwellings adequately warm, energy poverty appears to be higher in detached homes.

Figure 16: Energy poverty and urban density in Croatia

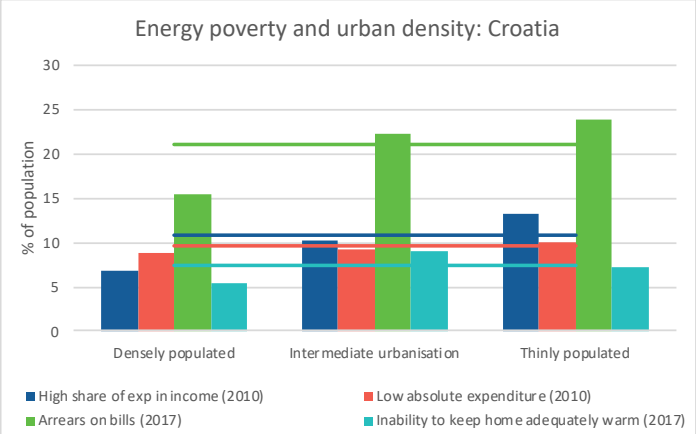
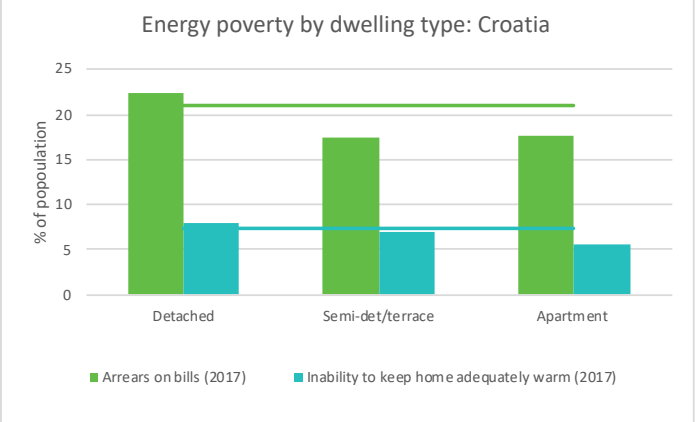


Figure 17: Energy poverty by dwelling type in Croatia



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Policies to mitigate energy poverty

In December 2018, the Croatian government, through amendments to the Energy Efficiency Law, transposed Article 7 of the Energy Efficiency Directive and implemented an energy efficiency obligation for energy suppliers. The Rulebook on the Energy Efficiency Obligation System came into force only in May 2019.

The Energy Efficiency Law[140] and the Rulebook on the Energy Efficiency Obligation System[141] oblige energy suppliers to implement energy efficiency measures to achieve energy savings as a matter of priority in energy-poor households as part of the EEO scheme. Given that the mentioned obligation only recently entered into force, there is currently no information on systematic programs for mitigating energy poverty by the obligated parties (energy suppliers) through energy efficiency projects and RES or innovative schemes. For 2019 the obligated parties are energy suppliers/utilities that delivered more than 300 GWh of energy to end customers in 2017. The savings that suppliers have to make are about 1.5% of the energy delivered to final customers (with possible additional reductions) in the previous year. 50.1% of the national energy savings target must be met by obligated parties and 49.1% by alternative measures provided by the state/government. Eligible energy efficiency measures are defined in the Rulebook on a System for Monitoring, Measuring and Verifying Energy Savings.[142]

There are some other policies provided from public social care services, local and national authorities that deal with the problem for low-income households. Energy poverty in Croatia is addressed primarily through direct financial assistance. The Guaranteed Minimal Support programme provides financial assistance to households to meet their basic needs and cover their housing costs, including costs for electricity, gas and heating. In addition, more targeted financial support is available for energy costs. Vulnerable consumers (Guaranteed Minimal Support beneficiaries) are entitled to receive support for their electricity costs up to a certain limit, and those who use wood for heating and receive social benefits can receive a firewood allowance. Furthermore, one-time support may be granted in extenuating circumstances when extra costs, such as higher heating costs in winter or repairs/replacements for heating equipment, are incurred by residents.[143]

One of the measures to protect vulnerable customers is that the supplier, in accordance with the legal provision (the Gas Market Law, General Gas Supply Conditions), has no right to request the suspension of gas supply to the end customer who has the status of a vulnerable/protected customer. The electricity allowance for vulnerable consumers should be collected in a way that customers of the household category pay around €0.004/kWh (HRK0.03/kWh) of solidarity charge for each kWh of energy consumed. In September 2015, the three largest electricity suppliers took over

[140] https://narodne-novine.nn.hr/clanci/sluzbeni/2018_12_116_2291.html

[141] https://narodne-novine.nn.hr/clanci/sluzbeni/2019_04_41_847.html

[142] https://narodne-novine.nn.hr/clanci/sluzbeni/2015_06_71_1368.html

[143] https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_croatia.pdf

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payment of the solidarity charge on behalf of the citizens. It can be said that the only measure implemented by the supplier, related to energy poverty, is covering electricity costs for vulnerable customers.

Croatia also has multiple schemes to improve the energy performance of houses, many of which are part of larger energy renovation programs. The energy renovation programme for family homes includes financial support for building insulation, replacement of old heating systems and the installation of renewable energy systems. Although not directly targeted at energy-poor households, the co-financing rate for these renovation programmes increases for the less-developed regions of the country. The energy renovation programme for residential apartment buildings provides financial aid for energy audits, energy efficiency renovations and individual metering systems for district heating. The introduction of individual energy consumption metering is important when it comes to improving energy efficiency activities in buildings as it gives consumers enhanced control over their energy bills.[144]

Table 20: Energy poverty policy measures in Croatia

Selected measures	Type of measure	Organisation	Target groups
Subsidy for outer envelope restoration, energy audits, heat metering and renewable energy	Building insulation, energy audits, heating system, renewable energy	National government, local government	Landlords, owner-occupants, apartment buildings
Electricity allowance for vulnerable consumers	Energy bill support	National government	Households on social benefits, disabled
Firewood allowance	Energy bill support	National government, local government	Households on social benefits, low-income households
Selected measures	**Type of measure**	**Organisation**	**Target groups**
One-time support	Social support	National government	Households on social benefits, vulnerable households, low-income households
Guaranteed Minimal Support (GMS)	Social support	National government, local government	Low-income households
Housing cost support	Social support	National government, local government	Households on social benefits, vulnerable households, low-income households

Reproduced from EPOV Member State report on Croatia[145]

[144] https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_croatia.pdf

[145] https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-

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There are 83,989 beneficiaries of Guaranteed Minimal Support and 61,958 households and individuals that benefit from electricity allowance (solidarity charge).[146]

Some projects—such as energy consulting for energy-poor households and solar electrification of households in rural areas that are not connected to the public grid—were implemented with funding from the Environmental Protection and Energy Efficiency Fund, non-profit associations (DOOR[147]), local authorities and UNDP.

An Integrated Energy and Climate Plan for the coming period anticipates and describes initiatives, such as energy consulting for energy-poor citizens, establishing a system of measuring and monitoring energy poverty indicators at the national level and establishing a system of increasing energy efficiency at the level of energy-poor households and households at risk of energy poverty.[148]

4.3.6 CONCLUSIONS[149]

Energy poverty (according to research) affects about 30% of Croatian citizens. A solidarity tariff is being used in Croatia to combat energy poverty, but it should be noted that such a solution is half-hearted and of questionable long-term effect. Direct subsidizing of energy bills does not encourage reduced consumption or improve housing conditions. Also, this mechanism does not solve the cause of the problem. To properly address the issue of energy poverty in Croatia, it is necessary to establish a framework for combating energy poverty. Lists for priority energy renewal of vulnerable households should also be drawn up. The implementation of energy efficiency measures should serve as a first step in the fight against energy poverty.

06/member_state_report_-_croatia.pdf

146 https://mdomsp.gov.hr/pristup-informacijama/statisticka-izvjesca-1765/statisticka-izvjesca-za-2018-godinu/10185

147 DOOR is an association of experts dedicated to promoting sustainable development in two strategic areas: mitigating climate change and combating energy poverty. Available at: http://door.hr/

148 https://ec.europa.eu/energy/sites/ener/files/documents/croatia_draftnecp_hr.pdf

149 http://www.door.hr/wp-content/uploads/2016/04/Energetsko-siromastvo-u-Hrvatskoj-1.pdf; and https://mdomsp.gov.hr/izvjesce-o-provedbi-mjera-za-2016-godinu-programa-provedbe-strategije-borbe-protiv-siromastva-i-socijalne-iskljucenosti-u-republici-hrvatskoj-2014-2020-za-razdoblje-od-2014-do-2016-godine-10109/10109

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4.4 FRANCE CONTEXT

4.4.1 INTRODUCTION

The climate of France is temperate and can be divided in four areas. Western France is influenced by an oceanic climate. Central and eastern France have a continental climate. South-eastern France has a Mediterranean climate. Regions above a 600- to 800-metre altitude show an alpine climate.

The number of private households in 2018 was 29.80 million;[150] 29 million in 2015 (INSEE, the French Statistics Agency, 26 March 2019[151]).

Table 21 reports household composition in 2018 and in 2015.

Table 21: Household composition in France in 2018 and 2015

	2015 (INSEE)	2018 (Eurostat)
Single adult	10.25m (35% of total)	12.53m (42% of total)
Single adult with children	2.57m (9% of total; 20% of single adult)	1.93m (6% of total; 15% of single adults)
Couple	7.4m (25.5% of total)	14.02m (47% of total)
Couple with children	7.4m (25.5% of total; 50% of couple)	6.15m (21% of total; 44% of couple)
Other type	1.38m (4.8% of total)	3.25m (11% of total)

The number of single-adult households aged 65 and over in 2018 was 4.32 million (14% of total; 34% of single adults).[152]

From 2017 to 2018, the population in France grew slightly, by 0.2%,[153] and projections to 2100 also show a positive population growth rate.[154]

The proportion of the total population that is aged 65 years and over has increased from 16.6% in 2010 to 19.7% in 2018.[155] Projections show a continuing aging of the population to 2030 and 2050, with a further increase in the proportion of older people to 23.8% and 26.2%, respectively.[156]

In 2018, the employment rate, which corresponds to the number of persons aged 20 to 64 in employment divided by the total population of the same age group, equalled

[150] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en

[151] INSEE tables on the French economy "Tableaux de l'économie française" Chapter Households-Families

[152] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en

[153] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow

[154] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en

[155] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en

[156] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en

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71.3%.[157] The mean income in 2017 was €25,642. The median income in 2017 amounts to €22,095, which compares favourably to the EU-28 average of €16,926.[158]

Table 22 shows the impact of the 2008 economic crisis on (1) the real GDP growth rate (percentage change on previous year) [159] and (2) the employment rate, 2007–2012 and 2018.

Table 22: Impact of the 2008 economic crisis on GDP growth rate and employment in France

	2007	2008	2009	2010	2011	2012	2018
1) Real GDP growth rate	2.4	0.3	-2.9	1.9	2.2	0.3	2.3
2) Employment rate[160]	69.9	70.5	69.5	69.3	69.2	69.4	71.8

4.4.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

In France, there have been different policies and regulations since 2005, with targets for reducing CO_2 emissions, reducing final energy consumption and increasing the share of renewable energy consumption. These are outlined below.

The Law Establishing the Guidelines for Energy Policy, 2005 (*Loi de Programmation fixant les Orientations de la Politique Énergétique*) includes:

- Implementation of EED Article 7, via EEOS (CEE for Certificat d'Economie d'Energie or Energy Savings Certificate) on utilities (energy retailers);
- GHG emissions divided by four (i.e., -75% in 2050) (updated by the Energy-Climate Act, 2019 – see below)

Under the European Union climate and energy package (2007)—the targets for France are:

- Reduction of CO_2 emissions: -17%;
- Energy savings: 20%;
- Share of renewable energy: 23%.

The Energy Transition Law for Green Growth, 2015 (*Loi de transition énergétique pour la croissance verte*), includes:

- Reducing final energy consumption by 50% in 2050 compared to the 2012 baseline, whilst aiming for an intermediate target of 20% in 2030.

The Decree of 22 March 2017 on the thermal characteristics and energy performance of existing buildings (*Arrêté du 22 mars 2017 modifiant l'arrêté du 3 mai 2007 relatif aux caractéristiques thermiques et à la performance énergétique des bâtiments existants*) defines Minimum Energy Performance Standards (MEPs) for retrofitting housing.

The Multiyear energy programming (*Programmation pluriannuelle de l'énergie* 2019–

[157] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en
[158] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en
[159] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en
[160] For France metropolitan

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2028, PPE) includes:

- Final energy consumption: -7% in 2023 and -14% in 2028 compared to 2012;
- Renewable heat consumption: 196 TWh in 2023, between 218 and 247 TWh in 2028. GHG emission from energy consumption: 277 $MtCO_2$ in 2023 and 227 $MtCO_2$ in 2028 (-14% in 2023 and -30% in 2028 compared to 2016).

The Energy-Climate Act, 2019 (*Loi Energie-Climat*) set targets to:

- Achieve carbon neutrality by 2050 (net zero emission), with at least GHG emissions divided by six in 2050;
- Reduce primary energy consumption of fossil fuels by 40% in 2030 compared to the 2012 baseline;
- Renovate all inefficient buildings within 10 years:
    - Make the retrofitting of buildings identified as 'thermal sieves' mandatory by 2028. Sanctions applicable in the event of noncompliance of the obligation will be defined in 2023;
    - Tighten the rules on decent housing and indecent housing that leads to extremely high energy consumption, and thus empower tenants to obtain renovations from landlords.

4.4.3 RESIDENTIAL BUILDING STOCK

In 2018, there were 36.33 million dwellings/units in France (mainland France and overseas territories) or 35.4 million in mainland France alone (including 29.7 million main dwellings, i.e., dwellings occupied during most of the year).

Table 23: Breakdown of dwellings in France

	1998		2018		
	No. of dwellings (x 1000)	Distribution (%)	No. of dwellings (x 1000)	Distribution (%)	**Average annual evolution (%)**
All dwellings in France (mainland & overseas territories)	**26,097**		**36,330**		**1.1%**
Main dwellings	21,462	82.2%	29,744	81.9%	1.1%
Secondary & occasional dwellings	2,703	10.4%	3,519	9.7%	0.9%
Vacant dwellings	1,932	7.4%	3,067	8.4%	1.6%
All dwellings in mainland France	**25,660**		**35,407**		**1.1%**
Main dwellings	21,086	82.1%	28,984	81.9%	1.1%
Secondary & occasional dwellings	2,683	10.5%	3,475	9.8%	0.9%
Vacant dwellings	1,891	7.4%	2,948	8.3%	1.5%

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	1998		2018		
All dwellings in French overseas territories	**437**		**923**		**2.5%**
Main dwellings	375	85.9%	760	82,4%	2.4%
Secondary & occasional dwellings	21	4.7%	44	4.7%	2.5%
Vacant dwellings	41	9.4%	119	12.9%	3.6%

Data field: France, excluding Mayotte

Data sources: Insee (French Statistics Agency), Data and Statistical Studies Department (SDES)—Ministry of Ecological and Solidarity Transition, annual estimates of the housing stock on 1 January.

The residential building stock (for primary dwellings in mainland France) has the following age distribution[161] (note that thermal regulations were introduced in 1974 [decree of 10 April 1974], meaning that around 58% of the building stock was built before any thermal requirements):

- Before 1945: 7.6m (26% of the total number of dwellings/units);
- Between 1945 and 1969: 4.8m (16% of the total number of dwellings/units);
- Between 1970 and 1979: 4.9m (16% of the total number of dwellings/units);
- Between 1980 and 1989: 3.8m (14% of the total number of dwellings/units);
- Between 1990 and 1999: 2.5m (9% of the total number of dwellings/units);
- Between 2000 and 2010: 4m (14% of the total number of dwellings/units);
- After 2010: 1.4m (5% of the total number of dwellings/units).

The total number of primary dwellings in mainland France is 28.98 million. Just over half of the dwellings/units in France are single-family homes (56%, 19.7m). Multifamily homes, including high-rise apartment blocks, make up the remainder of the stock (44%) (INSEE, 2018).

Sixty-five percent of French households are owner occupied, whilst 19% are in the private rented sector and 16% in the social rented sector; 44% of the total French population lives in cities, 32.6% lives in towns and suburbs, and 23.4% lives in rural areas (INSEE, 2018).

4.4.4 ENERGY MARKET

The household consumption of energy in France is dominated by gas and electricity, followed by wood and fuel oil, respectively.

[161] Pezzutto, S., et al. (2018), Hotmaps Project, D2.3 WP2 Report – Open Data Set for the EU28. Available at: www.hotmaps-project.eu; and EU Building Stock Observatory. Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/eubuildings

The majority of building stock data refer to the year 2016.

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Table 24: Energy consumption in the residential sector in France

In TWh	All end-uses	Space heating	Hot water	Cooking	Appliances	Cooling
Electricity	**143.4**	**34.5**	**23.3**	**11.1**	**73.6**	**0.8**
Natural gas	**149.7**	**124.8**	**16.0**	**8.9**		
Fuel oil	48.2	42.4	5.8			
LPG	9.0	3.3	0.8	4.9		
District heating	17.6	13.8	3.8			
Coal, others	2.8	2.6	0.2			
Wood	87.3	86.8	0.4			
Total*	**452.5**	**305.2**	**48.8**	**24.0**	**73.6**	**0.8**

** Total is not equal to the sum of due to differences in units.*

Real climate in TWh hhv (gas) and TWh lhv (other energies and total)

Source: MTES[162]

The opening up of energy markets to competition was initiated in 1996, with the adoption of a first European Directive on electricity, followed in 1998 by the directive on gas. The latest directives, now in force, are Directives 2009/72/EC and 2009/73/EC of 13 July 2009 concerning common rules for the internal market in electricity and natural gas. From 2000 to 2006, several laws gradually transposed European Directives into national law. The market has opened up to competition first for industry and then, gradually, for all consumers. Since 1 July 2007, the electricity and gas markets have been open to competition for all customers (i.e., 30 million).[163]

Since its creation on 24 March 2000, the Energy Regulation Commission (Commission de regulation de l'énergie [CRE]) has been responsible for ensuring that the electricity and gas markets in France function properly, to the benefit of final consumers and in line with energy policy objectives.[164]

Energy price trends for domestic consumers

In 2018, the average price including VAT of electricity on the residential market in France was €171/MWh and the average price (including VAT) of natural gas was 76 €/MWh HHV[165] (CGDD[166]). Both electricity and gas prices have risen significantly over the last decade.

[162] http://www.statistiques.developpement-durable.gouv.fr/consommation-denergie-par-usage-du-residentiel?rubrique=20&dossier=168

[163] National Energy Ombudsman, http://www.energie-info.fr

[164] Energy Regulation Commission (CRE), http://www.cre.fr

[165] LHV (lower heating value), HHV (higher heating value).

[166] Electricity prices in France and the European Union in 2018 Coll. Data Lab Essential, Office of the Commissioner General for Sustainable Development (Commissariat Général au Développement Durable) CGDD / Data and Statistical Studies Department (Service de la Donnée et des Etudes Statistiques) / Energy Statistics, June 2019

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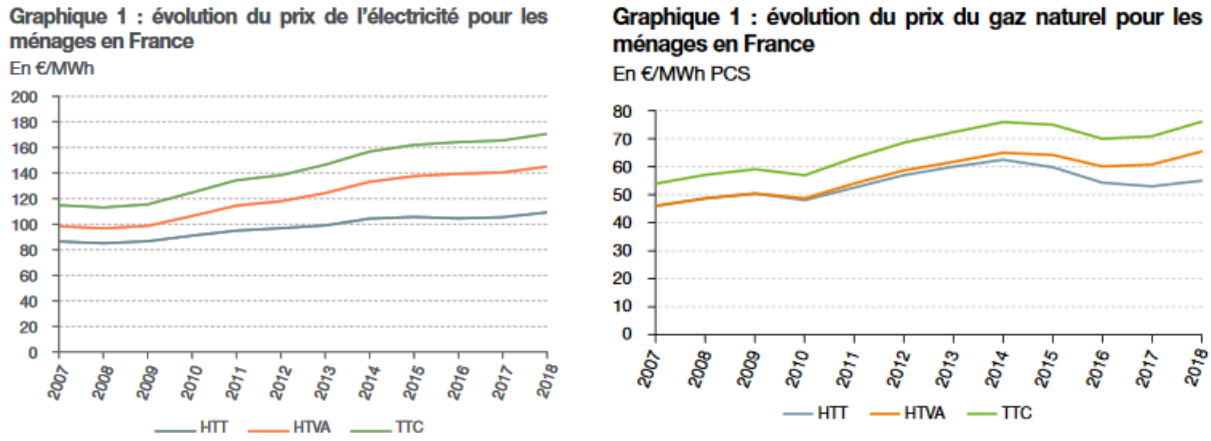
Figure 18: Electricity (left) and gas (right) price evolution for households in France



(TTC = inc. VAT, HTVA = excl. VAT but inc. others taxes, HTT = exc. all taxes).

Source: CGDD

Adoption of Energy Efficiency Directive (EED), Article 7

The French energy efficiency obligation (EEO) and Certificat d'Economie d'Energie (CEE) scheme was introduced in June 2006 thanks to the 2005 POPE Law (JORF 2005). The French EEO scheme is now used to comply with Article 7 of the EED. In its notification to the Commission, France indicated that the annual savings will be achieved through the EEO. Based theoretically on a three-year time frame, the EEO scheme has seen its level of obligation revised upwards each period and presently the scheme is in the middle of its fourth period (2018–2020). It is important to note that in 2016, an EEO obligation dedicated to fuel poverty was added to the historical obligation.[167]

Table 25: French EEO national obligation and delivery

period	years	Obligation (TWhc)		EEOs delivered (TWhc)		Cumulative deviation from obligation (TWhc)	
		standard	Low-income	standard	Low-income	standard	Low-income
1st	2006–2009	54.0	none	65.2	–	+11.2	–
Intermediate	2010	–	none	99.1	–	+110.3	–
2nd	2011–2013	345.0	none	297.8	–	+63.1	–
Extension	2014	120.0	none	172.0	–	+113.1	–
3rd	2015–2017	700.0	150.0	646.0	174	+59.1	+24.0
4th	2018–2020	1,200.0	400.0	ongoing		–	–

TWhc: TWh cumulated over lifetime and discounted (4%)

Source: Osso et al., 2019

[167] Osso, D., Laurent, M., and Nösperger, S. (2019, June). Evolutions of the French EEO scheme through the ages according to emblematic measures: A testimony from within of a continuous work in progress. ECEEE Summer Study, at Presqu'Ile de Glens, France, 467–476. Available at: https://www.researchgate.net/publication/333719587_Evolutions_of_the_French_EEO_scheme_through_the_ages_according_to_emblematic_measures_a_testimony_from_within_of_a_continuous_work_in_progress

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4.4.5 ENERGY POVERTY

The law of 12 July 2010 sets out a legal definition of fuel poverty:

> *A person in a fuel poverty situation [...] is a person who has particular difficulties in his or her home in having the necessary energy supply to meet basic needs due to inadequate resources or living conditions.*

This definition provides a broad vision of the phenomenon, integrating the notion of meeting basic needs, as well as the inadequacy of household resources and/or housing conditions.[168]

To measure fuel poverty, the ONPE (National Observatory of Fuel Poverty, set up in 2011169) uses principally three indicators:

Energy effort rate (EER): Any household that spends more than 8% of its income on energy expenses and belongs to the first three income deciles (the poorest 30% of French households) is considered to be in a fuel poverty situation (EER = TEE_3D_8% on graph below).

Low income, high costs indicator (LIHC): Households are considered to be in a fuel poverty situation under two conditions: their incomes are low (below the poverty line, i.e., below 60% of the national median) and their energy expenditure, relative to the size of the housing (m²) or the family composition (UC – consumption unit, as defined by OCDE) is high (above the national median).

The feeling of discomfort, as an indicator of cold: The feeling of cold is determined by the survey question: During the last winter, did you suffer from the cold for at least 24 hours in your dwelling?

This choice of indicators is in line with the desire to adopt a broad approach, focusing on households with the lowest resources.[170]

In the framework of the French EEO scheme, a household is considered to be in fuel poverty when its reference tax income is below a threshold set by order of the Minister for Energy (Energy Code, see below)—taking into account the composition of the household (number of persons) and the location (in Île-de-France region near Paris or elsewhere). EEO actions carried out for the benefit of very low-income households (e.g., 'fuel poor') also benefit from an uplift in the system (multiplication by two of the EEOS allocated).

[168] Projet VERSO. (2018). *La précarité énergétique en France, en Belgique et en Italie*. Synthèse.

[169] Observatoire National de la Précarite Énergétique, https://onpe.org

[170] Projet VERSO, 2018.

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Table 26: Income conditions in the EEO scheme in France, 2019.

Income threshold in Île-de-France region (near Paris)			Income threshold in other regions		
Number of persons in the household	Very low-income household (€)	Low-income household (€)	Number of persons in the household	Very low-income household (€)	Low-income household (€)
1	20,470	24,918	1	14,790	18,960
2	30,044	36,572	2	21,630	27,729
3	36,080	43,924	3	26,013	33,346
4	42,128	51,289	4	30,389	38,958
5	48,198	58,674	5	34,784	44,592
Per additional person			Per additional person	4,385	+ 5,617

Source: ANAH[171]

Estimate of national number of households in energy poverty

According to the national fuel poverty observatory (ONPE)[172]:

- 11.6% of French people spend more than 8% of their income to pay the household energy bill and are amongst the low-income households (first 3 income deciles);
- 15% of French people declare that they have suffered from the cold during the winter 2017 for at least 24 hours. For 4 out of 10 households, it is because of poor insulation of the dwelling;
- 572,440 households were subject to an intervention by an energy supplier (power reduction, suspension of supply, termination of contract) in 2018 following arrears on energy bills;
- 3.6 million of households received an energy cheque (see below section on funding and programmes for energy poverty) from the French government;
- 122,949 households benefitted from the housing solidarity fund (see below section on funding and programmes for energy poverty) for the payment of energy bills in 2017.

[171] ANAH, National Agency for Housing, http://www.anah.fr

[172] ONPE. (2019). *Tableau de bord de la précarité énergétique* (Dashboard of fuel poverty). Available at: http://onpe.org/sites/default/files/tableau-de-bord-juin2019.pdf

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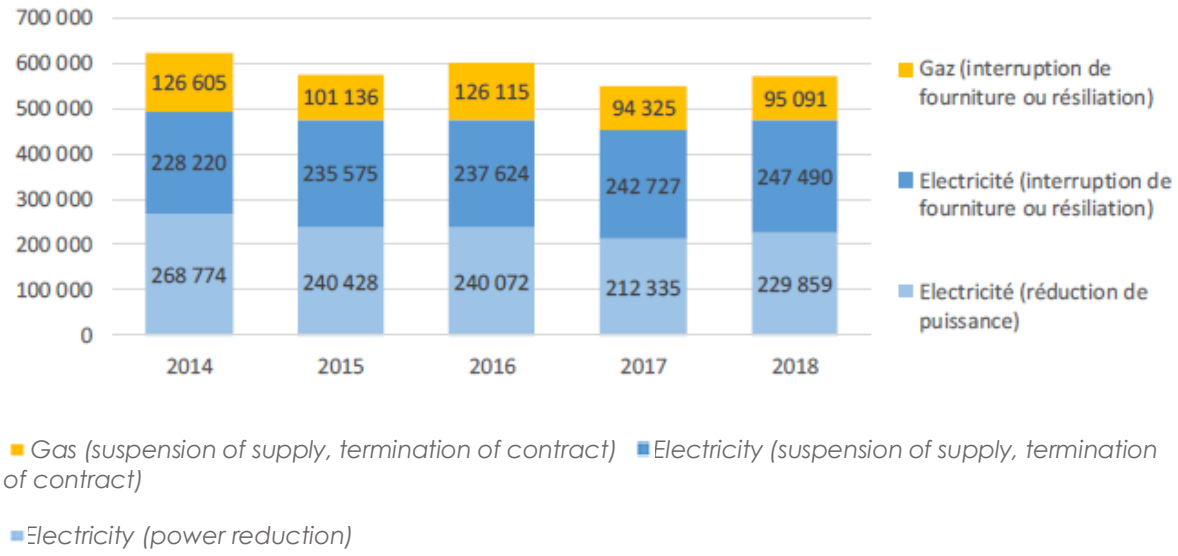
Figure 19: Number of interventions by energy suppliers following energy arrears in France



Source: ONPE, 2019

According to the ONPE dashboard, the proportion of households in fuel poverty (according to the energy effort rate indicator) decreased between 2013 and 2017 from 13.8% to 11.9% in mainland France (i.e., 3.3 million households representing 6.7 million people), taking into account the climate correction (i.e., how winter temperatures differed from year to year).

According to the annual survey carried out by the MNE (National Energy Ombudsman), 15% of households suffered from feeling cold during the winter of 2017–2018. For 40% of them, the feeling of discomfort came from poor insulation in their homes and for 28% from an insufficient heating system.

Moreover, according to the FAP (Abbé Pierre Foundation), France has about 600,000 substandard housing units—that is, 900,000 to 1,300,000 people live in very difficult or degraded conditions[173] that threaten their health and safety. Fifty percent of households living in these dwellings are homeowners.[174]

173 Threatening their health and safety (electricity, humidity, risk of poisoning).

174 Fondation Abbé Pierre, L'habitat indigne en France, http://www.fondation-abbe-pierre.fr/documents/pdf/infographie_habitat_indigne_2019_v2.pdf

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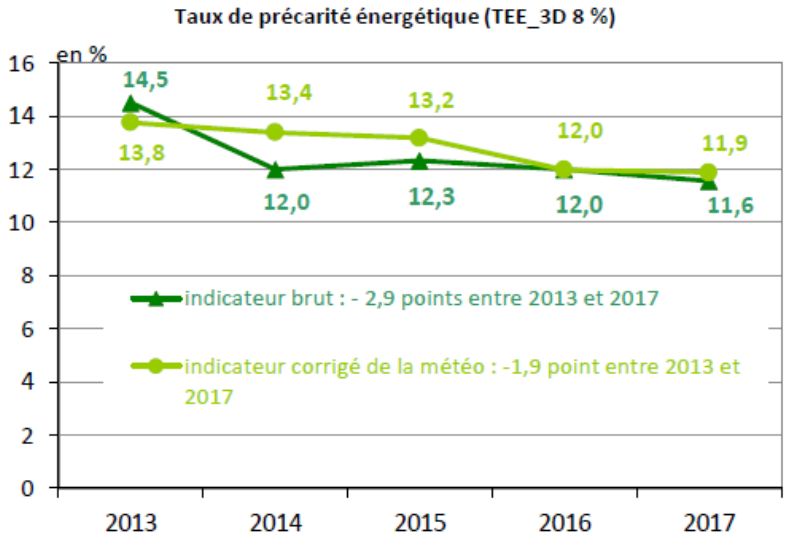
Figure 20: Fuel poverty rate in France



(EER 3D 8%): light green is the climate corrected indicator; dark green is the gross indicator

Source: OPNE, 2019[175]

In January 2015, INSEE (French statistics agency) carried out a study on energy vulnerability based on 2008 data. The scope of the study was broad and included space heating and mobility and set the expenditure threshold at 8% on household energy and 4.5% for mobility. With these criteria, 22% of households are in a situation of energy vulnerability, with an overrepresentation of rural residents, farmers and pensioners.[176]

Energy vulnerability is defined by INSEE as:

> *a household whose energy expenditures are above a certain threshold. This threshold corresponds to twice the median of the energy effort rate observed in metropolitan France during the year in question. However, the richest households in vulnerable households are excluded, i.e. those with an income per consumption unit that is more than twice the median income per consumption unit.*

[175] https://onpe.gouv.fr

[176] Insee Première, Vulnérabilité énergétique, janvier 2015, n°1530.

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Figure 21: Energy vulnerability according to housing or transport in France

	Proportion of households in a situation of energy vulnerability (%)			
	For housing	**For mobility**	**For either one**	**For both**
Type of area				
Major centres	10,7%	4,3%	13,8%	1,2%
Major centre rings	16,9%	18,8%	31,8%	3,9%
Medium and small centres	18,5%	6,9%	24,0%	1,4%
Medium & small centre rings	23,8%	16,2%	35,7%	4,3%
Multipolarized territories	23,9%	23,0%	40,9%	6,0%
Outside urban areas	28,6%	30,6%	49,6%	9,5%
Socio-professional category				
Farmers	26,1%	32,1%	46,6%	11,6%
Craftsmen, shops, business leaders	13,7%	11,5%	21,7%	3,5%
Managers, higher intellectual professions	3,9%	5,9%	9,0%	0,9%
Intermediate professions	7,5%	13,4%	18,8%	2,1%
Employees	11,2%	12,2%	20,8%	2,5%
Workers	10,4%	19,8%	26,8%	3,4%
Retired people	19,2%	3,1%	21,1%	1,1%
Other people	42,1%	11,9%	44,2%	9,8%
All	**14,6%**	**10,2%**	**22,2%**	**2,6%**

Data field: metropolitan or mainland France

Data sources: Insee (French Statistics Agency), population census, ERFS (survey on tax and social income) and RDL (localized respendable income) for 2008; Statistics Department of the Ministry of Housing (SOeS); National Housing Agency (ANAH)

Source: INSEE, 2015[177]

[177] Cochez, N., Durieux, E., and Levy, D. Energy vulnerability. INSEE Premiere, N°1530. Available at: https://www.insee.fr/fr/statistiques

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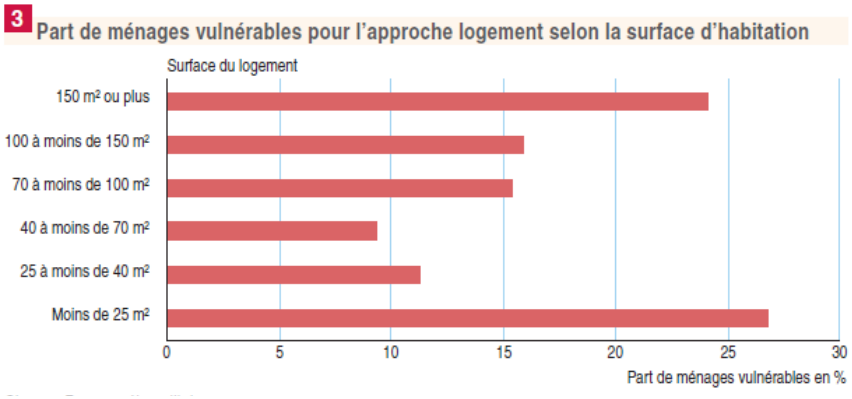
Figure 22: Energy vulnerability by dwelling size in France



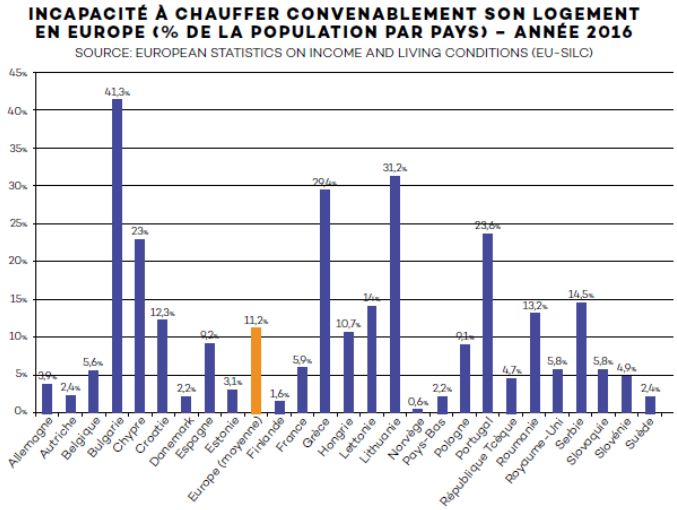
Data field: mainland France

Data sources: Insee (French Statistics Agency), population census, ERFS (survey on tax and social income) and RDL (localized respendable income) for 2008; Statistics Department of the Ministry of Housing (SOeS); National Housing Agency (ANAH)

An older assessment (by EDF in 2009)[178] indicates that households in fuel poverty (three million) represented:

- 12.7% of French households;
- 12% of owners; 13% of tenants;
- 15% of single-family homes; 9% of multifamily homes; 24% of farms/agricultural operations;
- 14% of single-family home owners; 6% of multifamily home owners;
- 21% of single-family home tenants; 11% of multifamily home tenants.

Figure 23: Inability to adequately heat one's home in Europe (% of the population per country), 2016



Source: Réseau RAPPEL[179]

[178] EDF internal report. (2009). HE-12-2009-01005, 51.

[179] Réseau RAPPEL. (2018). Focus précarité énergétique n°20, la lettre du réseau rappel aux professionnels de la précarité énergétique.

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As fuel poverty is sometimes linked to the quality of a dwelling, INSEE studied housing defects by age of dwelling. Households that report suffering from cold weather are more likely to live in dwellings built between 1949 and 1975. This is the case for 17.7% of them, compared to 14.8% for all households. The date of construction of a dwelling therefore influences its thermal comfort, a fact that remains true when the characteristics of these households and the quality of the dwelling are taken into account. However, economic and social dimensions are also very decisive in terms of fuel poverty.[180]

Table 27: Presence of defects in the dwelling according to the date of construction in France

❸ **Présence de défauts dans le logement selon la date de construction**

en %

Date de construction	Infiltrations	Fuites	Bruit dans les agglomérations > 100 000 habitants	État moyen ou mauvais de la façade	Fenêtres en mauvais état	Pas de double vitrage	Toit non isolé	Humidité sur les murs
Avant 1948	6,5	2,8	18,6	48,6	36,9	42,9	22,2	30,9
Entre 1949 et 1967	4,6	2,5	18,2	44,8	34,2	38,1	10,2	20,5
Entre 1968 et 1974	4,7	2,3	15,7	39,3	33,1	41,7	9,7	18,5
Entre 1975 et 1981	4,3	2,1	11,1	39,6	28,5	29,0	10,2	15,2
1982 et après	4,3	2,4	7,7	23,9	13,5	7,1	5,3	11,5

Lecture : 42,9 % des logements construits avant 1948 n'ont pas de double vitrage.
Champ : France métropolitaine.
Source : Insee, enquête nationale Logement 2006.

Reading: 42.9% of dwellings built before 1948 don't have double glazing windows; data field: mainland France

Source: INSEE, National Housing Survey, 2006

A recent publication, using an English methodology,[181] studied the impact of retrofitted housing on health. The study did not directly study fuel poverty, but its findings are relevant. The paper concluded that, 'on average, financial savings to the health system represent a significant part of the renovation investment. For the poorest households living in inefficient dwellings, the financial savings exceed the retrofit investment. In the context of a "medium" ambition energy renovation, the financial gains generated to the French health system are at least 30% of the annual cost of the renovation program. This rate turns out to be much higher if one can target the poorest households living in energy inefficient housing. It then climbs to 90% of the annual amount of the renovation program. It even exceeds it for even poorer households (below the poverty line) for which the savings are much higher than the annual costs.[182]

[180] Devalière, I. (2011). La précarité énergétique: avoir froid ou dépenser trop pour se chauffer. INSEE Premiere, N°1351.

[181] Ezratty, V., Ormandy, D., Laurent, M., Duburcq, A., Lenchi, C., Courouve, L., Boutiere, F., Cavanes, P., and Lambrozo, J. (2017). Adapting an English methodology to assess health cost benefits of upgrading energy inefficient French dwellings. ECEEE Summer Study 2017 Partners. Available at: https://tinyurl.com/vxfws57

[182] Laurent, M., Ezratty, V., Ormandy, D., Boutière, F., and Duburcq, A. (2018). Energy renovation of poorly efficient French dwellings: Does it help to reduce costs for the French health system? 2018 International Energy Policy & Programme Evaluation Conference, Vienna, Austria.

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Policies to mitigate energy poverty

In France, there is a wide and diversified range of schemes to mitigate and alleviate energy poverty. In recent years, these have evolved from an essentially curative approach (providing support for payment of energy bills, social tariffs) to a preventive approach (improving the energy performance of housing).

These two different types of measures dedicated to improving housing (retrofit of dwelling, improvement of comfort) and helping people pay invoices (energy bills, rent) are implemented at different geographical levels (national, regional, departmental[183]). In 2018, according to the ONPE, there were about 17 national measures to alleviate fuel poverty, including raising awareness, mediation, direct aid and various assistance measures (technical, legal, financial).

Concerning the specific topic of the energy efficiency obligation and fuel poverty, two approaches are used in the French EEO scheme:

- **Mandatory approach:** Obligated parties (utilities) must deliver actions to low-income households (additional obligation: +30% compared to historical obligation without fuel poverty target);
- **Incentive approach:** A bonus factor (times two) is applied to actions implemented by obligated parties in households meeting very low-income criteria amongst the eligible low-income households.

It is important to note that there are links with other schemes, as the EEO scheme funds various programmes (e.g., ANAH programmes).

Funding and programmes for social actions/energy poverty

There are too many local programmes across France to cover comprehensively in this study so only national-level programmes have been presented. Programmes dedicated to social landlords have also been omitted.

Fuel poverty schemes to retrofit housing

- National Housing Agency (ANAH) and the Living Better programme (Habiter Mieux) provide:
  - funds to improve the thermal insulation of private housing (FART);
  - 50% of the cost of retrofitting, excluding VAT (maximum of €10,000 plus a bonus of €2,000);
  - Energy suppliers also provide funding into the Habiter Mieux programme as part of their EEO;
  - These funds can be combined with other schemes (EEO, tax credit, soft loan).

[183] In mainland France: 11 regions, 96 departments, 34,839 municipalities.

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- EEO programme called Helping Hand: The Energy Savings Bonus, 2019–2020[184] (Les primes Coup de pouce économies d'énergie 2019–2020) provides:
  - Energy savings bonus to increase retrofit;
  - Incentives to cover the rest of the costs that would otherwise be borne by fuel-poor households.
- Tax credit (2020) for low-income households:
  - The credit is paid at the time of a retrofit;
  - The tax credit could be extended to include:
    - *Labour cost for the installation of renewable heating equipment;*
    - *Removal of fuel tank.*
- Energy Renovation Guarantee Fund (FGRE):
  - Counterguarantee to facilitate the provision by banks of soft loans to low-income households (eco-PTZ Habiter Mieux);
  - Financing of the FGRE provided by an EEO programme.

Schemes dedicated to bills (but not only for energy)

- Energy cheque (chèque énergie) for all energy types (replacing the social tariffs, which were only for electricity and natural gas) since 2018[185]:
  - Annual subsidies for the payment of energy bills (all energies): €150 on average for 3.6 million households in 2018.[186] In 2019, the energy cheque was increased by €50 and benefits an additional 2.2 million households, helping nearly 5.8 million households;[187]
  - Funding: state budget.
- Solidarity Fund for Housing (FSL) or Energy (FSE):
  - Expenses related to entering new accommodation: security deposit, first month's rent, agency fees, moving expenses, insurance, purchase of essential furniture;
  - Expenses related to maintaining housing: rent and charges debts, electricity, gas, water (ESF) and telephone bills, bailiff's fees;
  - Funding: various partners (including Departmental Council, Family Allowance Fund [CAF], energy suppliers [ENGIE and EDF], local energy unions [SDEC Energie, etc.]).
- Aids for the payment of energy debts:

[184] See Annex: A4.3 Helping Hand: The Energy Savings

[185] To be eligible for the energy cheque, a household's annual reference tax income (RFR) must be less than €10,700 per consumption unit, see http://www.service-public.fr/particuliers/vosdroits/F33667

[186] Réseau RAPPEL, Piqûre du Rappel #2, Janvier 2019, www.precarite-energie.org.

[187] MTES, http://chequeenergie.gouv.fr/

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- Family Allowance Fund (CAF), pension funds, Communal Social Action Centres (CCAS).

- Charitable associations distributing financial aids for energy.

Loan schemes

Home improvement loans:

- Family Allowance Fund (CAF);
- Financial assistance in carrying out retrofit to improve living conditions.

Housing microloans:

- Savings banks and Abbé Pierre Foundation (FAP);[188]
- Financing of the rest to be paid for housing renovation work, in particular for thermal home improvement.

Retrofit loans for energy efficiency in housing:

- For employees in the private sector;
- Soft loan, maximum of 10 years, maximum amount of €5,000.

4.4.6 CONCLUSIONS

Energy poverty in mainland France is largely a winter phenomenon in line with the climate and high energy use in dwellings for space heating.

The number of French households suffering from fuel poverty decreased slightly between 2013 and 2017, although the fuel-poor group represents at least 11.9% of the households located on the French mainland.

There are several programmes or actions under the EEO scheme to improve the energy efficiency of dwellings for all households and, among them, some programmes are enhanced (with additional bonus) or are specifically targeted to low-income or very low-income households. These programmes or actions offering financial assistance for households are either national or at the regional, departmental or commune level.

Particular challenges that still need to be addressed include: How to encourage more landlords to improve the energy efficiency of their dwellings; and, to provide more assistance to low-income households to apply for existing financial assistance and to reduce the up-front cost of energy efficiency works.

[188] The Abbé Pierre Foundation has committed itself to the fight against substandard housing with its SOS Slums programme. It operates throughout France through a network of local partners to support people who are poorly housed and to provide financial support for work carried out on poor owner-occupiers' homes. Since 2012, 2,000 of them have received work assistance and are now living in decent and safe conditions in their homes (http://www.fondation-abbe-pierre.fr/).

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4.5 GREECE CONTEXT

4.5.1 INTRODUCTION

Greece is located in the south-eastern part of Europe and has special geographical features, as it is surrounded by sea and has peninsulas, many mountainous areas and numerous islands. Greece's climate is predominantly Mediterranean, with cold and wet winters and summers that are usually very hot and dry. During the winter much of Greece may have snow. In addition, Greece has a remarkable range of microclimates with local variations.

The population of Greece is 10.8 million (2011 census). Parts of Greece are barely inhabited, whilst the vast majority of Greece's population lives in urbanised areas rather than rural ones, with 39.6% living in cities, 30.9% in towns and suburbs and 29.4% in rural areas.[189] The Athens Wider Urban zone is the most densely populated area.

The number of private households in 2018 amounts to 4.38 million. The composition of Greek households is shown in Table 28. One-third of households are occupied by single adults, with 44% of the single adults' households aged over 65 years old (which actually amounts to 0.66 million households in total).[189]

Table 28: Household composition in Greece, 2018

Single adult	1.49m (34% of total; 7% of which are single adults with children)
Couple	2.06m (47% of total; 45% of which are couples with children)
Other type	0.83m (20% of total)

Overall, 12.9% of the Greek population is estimated to be living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor, which is similar to the EU average.

Greece has a declining population rate which is -0.25% (2017–2018), whilst the proportion of the population aged over 65 years and more has increased from 19.0% in 2010 to 21.8% in 2018. The population's decline can also be linked to the severe financial crisis and the brain drain that followed.

Projections for 2030 and 2050 show a further increase (to 33.8% in 2050) in the proportion of the population aged 65 years and over, and projections on the total population show a further population decline in 2040 and 2050. Moreover, the old-age dependency ratio amounts to 34.1 in 2018, which means that there are 34.1 persons aged 65 years or over for every 100 persons of working age. The ratio is projected to increase to 42.2 in 2030 and 63.4 in 2050.[190]

[189] Eurostat Database: https://ec.europa.eu/eurostat/data/database

[190] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow

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Greece's economy is mainly based on the service sector, where tourism, the public sector and shipping dominate, and to a smaller extent on the industrial and agricultural sectors. Following the Greek debt crisis, the economy now shows signs of recovery. Greece's GDP rose by 0.2% in 2016 and 1.4% in 2017; this growth can be primarily attributed to tourism and increased industrial production.[191]

The employment rate in 2018 is estimated to be 59.5%. At a household level, the median income in 2018 is estimated to be €7,875, which is almost half of the estimated average income in the EU-28 (€17,385). However, income has marginally increased in the last two years.[189] Table 29 shows the impact of the 2008 financial crisis on the real GDP growth rate (percentage change on previous year) and the employment rate for the periods of 2007–2012 and 2018.[189]

Table 29: Impact of 2008 financial crisis on GDP growth rate and employment in Greece

	2007	2008	2009	2010	2011	2012	2018
1. Real GDP growth rate	3.3	-0.3	-4.3	-5.5	-9.1	-7.3	1.9
2. Employment rate	65.8	66.3	65.6	63.8	59.6	55	59.5

4.5.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

In terms of the energy policy framework in Greece, the draft Energy and Climate Plan for Greece for the period 2021–2030 includes national objectives, and planned policies and measures, for five key dimensions: decarbonisation; energy efficiency; security of energy supply; internal energy market; and research, innovation and competitiveness—as well as an evaluation of their impact. The structure and dynamics of the Greek economy, employment and demographic conditions are expected to significantly impact the energy sector since these determine the level of energy demand. The target for 2030 is to reduce greenhouse gas emissions by at least 16%, compared to 2005, for non-ETS sectors. [191] The largest impact is expected to come from energy efficiency measures in the residential and tertiary sector, emission reductions of fluorinated gases and treatment of organic waste. Key planned policies and measures include promoting the use of natural gas in all sectors, as well as increasing renewable energy production and energy efficiency.[192]

Furthermore, Directive 2012/27/EC on energy efficiency was transposed to Greek legislation by Law 4342/2015. Overall, the requirements under Article 7 of the directive will be achieved in Greece by combining an energy efficiency obligation scheme and implementing alternative policy measures. More specifically, under Article 9 of 4342/2015, an energy efficiency obligation scheme is established. The adoption and implementation of the energy efficiency obligation scheme was established under Ministerial Decision YA174063/2017. Thus, from 1 January 2017 to 31 December 2020, an energy efficiency obligation scheme is in place that ensures that energy distributors and/or retailers, defined as obligated parties operating in the Greek territory, will achieve a specific cumulative end-use energy savings target. When

[191] https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_el_necp.pdf
[192] https://ec.europa.eu/energy/sites/ener/files/documents/gr_swd_en.pdf

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calculating energy savings, the implementation of technical and/or behavioural measures in vulnerable households are accounted for with an increase factor of 1.4. In addition to this, Article 7 of Law 4342/2015 refers to the exemplary role of public buildings and introduces the requirement to renovate 3% per annum of the total floor area of heated and/or cooled buildings owned and occupied by the central government.

Furthermore, there are numerous laws and plans that aim to increase energy efficiency and promote renewable energy production, indicatively:

- Article 70(1) of Law 4602/2019 (replacing Article 8(1) of Law 4122/2013, transposing Directive 2010/31/EU), states that as of 1 January 2021, all new buildings must be nearly zero-energy buildings, whilst for new buildings owned by the state and the public sector and intended for housing services, this obligation shall enter into force on 1 January 2019. The Minister of Environment and Energy can define specific cases that are exempt from this requirement (depending on a cost-benefit analysis);
- Law 4122/2013 transposes Directive 2010/31/EU on the energy performance of buildings and sets minimum requirements for new buildings and existing buildings that are radically renovated. Under Article 10(2), it also provides for measures, funding programmes and other means to improve the energy efficiency of new and existing buildings;
- The national plan for increasing the number of nearly zero-energy buildings (2017) aims to define nearly zero-energy buildings and describe the policies and actions that need to be adopted for increasing the number of nearly zero-energy buildings, in accordance with the requirements in Article 8(2) and (3) of Law 4122/2013;[193]
- Article 10(3) of Law 3851/2010 requires the use of solar thermal systems to cover a portion of hot water needs. The minimum percentage of the solar share on an annual basis is set at 60%. Moreover, it states that, from 31 December 2019, all new buildings shall cover their primary energy consumption with renewable energy systems, heat cogeneration, and district heating systems, as well as heat pumps. For new buildings that are used to provide public services, this obligation shall enter into force no later than 31 December 2014;
- An infrastructure fund has been set up with Decision 6269/1895A1/28.11.2017, which offers favourable terms to the private and public sector for financing small- and medium-sized projects, with an emphasis on energy, environment and urban development.

Interestingly, Greece has also introduced Law 4513/2018, which enables the establishment of energy communities. Members of energy communities may be individuals, public and private legal entities and/or local authorities. Energy communities can be engaged in numerous activities, such as production, storage, self-consumption, sale of energy produced from RES or High Efficiency Combined

[193] https://ec.europa.eu/energy/sites/ener/files/documents/greece_en_version_2017.pdf

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Heat and Power located within the region that the energy community is established, as well as procurement of products, appliances and installations that reduce energy consumption, reduce the use of conventional fuel and improve energy efficiency. Energy communities can receive certain financial incentives and can distribute profits among its members under certain conditions.

4.5.3 RESIDENTIAL BUILDING STOCK

Greece has approximately 6.86 million residential dwellings, 8% of which were built before 1945, whilst 50% were built before 1980 (new dwellings/buildings built in Greece after 1980 are expected to be insulated due to the Thermal Insulation Regulation). The number of apartment blocks (i.e., high-rise buildings that contain several dwellings and have more than four storeys) amounts to 1.65 million, which represents 24% of the total number of dwellings.[194]

In terms of the tenure distribution, data from 2018 indicate that 73.5% of the population own their own home, whilst only 21.3% rent a house at market prices and almost 5.2% rent at a reduced or free rent.[189]

4.5.4 ENERGY MARKET

Final energy consumption in the Greek residential sector is derived largely from oil and petroleum products (51.9%) and electricity (28.9%).[189] Table 30 shows the share of energy consumption by fuel type in the residential sector in Greece.

Table 30: Share of fuels in final energy consumption in the residential sector in Greece in 2017 (%)

Electricity	28.9
Derived Heat	0.3
Natural gas	7.4
Solid fuels	1.2
Oil and petroleum products	51.9
Renewables and biofuels	10.3

Compared to the EU average, Greece households have high energy usage, mainly due to a high consumption for space heating.[195]

It should be noted that the average electricity price in Greece is below the EU-28 average, whilst the average gas price is marginally higher than the EU-28 average. Figure 24[189] shows average electricity and gas prices for Greek household consumers from 2014 to 2019. As can be seen, average prices are quite stable with a trivial variation in gas prices the last few years.

[194] EU Building Stock Observatory, https://tinyurl.com/vklnbwc

[195] European Environment Agency. (2019). 'Energy consumption by end use per dwelling, 2016' [chart]. Available at: https://www.eea.europa.eu/data-and-maps/daviz/energy-consumption-by-end-uses-3#tab-chart_1

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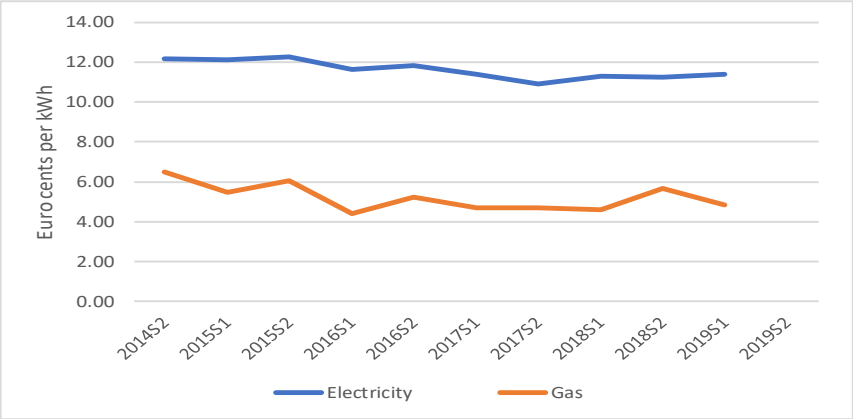
Figure 24: Electricity and gas prices for households' consumers in Greece, biannual data, 2014–2019



The liberalization of the electricity market was first regulated in Greece with the introduction of Law 2773/1999, enacted for the transposition of Directive 96/92/EC and later revised by L3175/2003, and L3426/2005. The law established the independent Regulatory Authority for Energy (RAE) and initiated the deregulation of the electrical energy market. Key electricity actors include the Independent Power Transmission System Operator (IPTO), the Operator of Electricity Market (LAGIE), the Regulatory Authority for Energy (RAE) and the Hellenic Electricity Distribution Network Operator (HEDNO), in addition to electricity providers, such as the Public Power Corporation (PPC).

The liberalization of the natural gas market was first regulated in Greece with the introduction of Law 3428/2005, which integrated into national legislation the provisions of Directive 2003/55/EC and the EC Regulation 1775/2005. This law was replaced in its majority by Law 4001/2011, which relates to the operation of Energy Markets for Electricity and Natural Gas (and its subsequent amendments, such as Law 4512/2018 concerning the restructuring of the Greek energy market). Numerous additional laws were introduced to further liberalize the natural gas market in Greece via the restructuring of the natural gas distribution framework (e.g., Law 4336/2015, Law 4337/2015 Law 4414/2016, article 55 of Law 4423/2016, article 15 of Law 4425/2016). The main stakeholders Include the Hellenic Gas Transmission System Operator (DESFA), the Distribution Network Natural Gas Company (DEDA), the Operators of the Natural Gas Distribution Network (EDAs) the Public Gas Company (DEPA) and gas supply companies.

Law 4001/2011 also created a new state authority to coordinate and promote hydrocarbon activities, known as the Hellenic Hydrocarbon Resources Management (HHRM). Following the restructuring of the HHRM in 2016, the company now has a leading role in exploration and production concessions.[196]

Finally, it should be noted that the energy efficiency obligation schemes are in the second year of implementation. As such, energy providers are responsible for attaining in total 10% of the overall national target for cumulative end-use energy savings by 2020, that is, 333 ktoe (100 ktoe in 2017, 133 ktoe in 2018, 67 ktoe in 2019

[196] https://www.iene.eu/articlefiles/executive%20summary%201.pdf

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and 33 ktoe in 2020).[191]

4.5.5 ENERGY POVERTY

In Greece there is no formal definition of energy poverty, nor specific indicators for monitoring the phenomenon. Different definitions have been used, for example, a household is often considered to be energy poor if it spends more than 10% of its income on energy needs, considering also other social and geographical criteria.

An attempt to define energy poverty was made by the Greek Ombudsman. In summary it defines energy poverty as the inability to access modern energy services. A household that is unable to access the most basic energy services for adequate heating, cooking, lighting and the use of home appliances is considered energy poor. A household is considered to be experiencing energy poverty, when its residents cannot keep it sufficiently heated at a reasonable cost based on their income.[197]

Article 9 of Law 4342/2015 requires the development of an Action Plan to Alleviate Energy Poverty that will outline actions for improving energy efficiency, as well as other social policy or energy pricing measures. This plan is currently under development and is expected to include a definition for energy poverty.

A Greek Energy Poverty Observatory has also been established by the Greek Centre for Renewable Energy Sources and Saving (CRES).

In addition to this, vulnerable consumers have been defined. According to the new Decision ΥΠΕΝ/ΔΗΕ/78337/224/06.11.2018, the criteria, conditions and procedure for including electricity customers in the Vulnerable Customers Registry were defined. More specifically, residential electricity customers may be included in the Vulnerable Customers Registry if they belong to one of the following categories:

- Category A: Customers included in the Social Residential Tariff;
- Category B: Customers whose household includes a member or members who need life support medical equipment at home and meet the income criteria currently applied for the inclusion of customers in the Social Residential Tariff;
- Category C: Customers who have reached the age of 70, provided that there is no other adult member in the household who has not reached the above-mentioned age limit and who meets the same income criteria currently applied for the inclusion of customers in the Social Residential Tariff, increased by €8,000.

Social Residential Tariff beneficiaries include:

- Anyone who meets the criteria for the Social Solidarity Payment (that is meeting specific maximum income thresholds and maximum asset value thresholds, as well as two key residence criteria, i.e. have a legal and permanent residence status in Greece);
- Anyone with an actual or deemed total annual income below specific thresholds.

Several studies have been carried out to measure energy poverty in Greece in which

[197] https://gr.boell.org/sites/default/files/energeia_final.pdf

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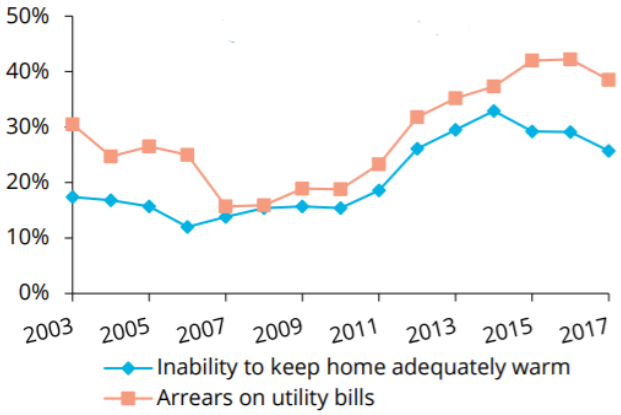
both quantitative and qualitative indicators have been used, as well as the energy performance of buildings, through the use of statistics from Energy Performance Certificates. For example, a recent study reported that, in 2016, 58% of Greek households are energy poor and 75% have reduced other essentials in favour of energy needs.[198]

Two of the prevailing energy-poverty indicators used to capture energy poverty is the inability to keep a home adequately warm and to have arrears on utility bills. When considering these indicators, Greece scores worse than the EU average, with 25.7% of households unable to keep the home adequately warm in 2017 and 38.5% in arrears on utility bills. As shown in Figure 25 below, energy poverty in Greece has fluctuated since 2004 and worsened since 2011, which is likely due to the financial crisis.[199]

Figure 25 Energy poverty over time in Greece



It can be seen that the number of households that are not adequately warm has significantly increased from 2010. A more remarkable increase (approximately double the percentage in 2010) can be observed in households that are in arrears on bills.

The next few figures present the Energy Poverty Observatory indicators for Greece, compared to the EU average. As it can be seen for the figure below, more than one-third of households are in arrears on energy bills. It is also evident that summertime energy poverty is an issue in Greece, with more than one-third of households unable to keep comfortably cool during the summer. As expected, Greece has amongst the highest rates of air-conditioning units in 2012 (52.8%). Moreover, the number of households unable to keep comfortably cool has increased from 29.4% in 2007 to 34.0% in 2012.[200]

198 https://www.sciencedirect.com/science/article/pii/S0301421516301720

199 https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_greece.pdf

200 https://www.energypoverty.eu/sites/default/files/downloads/publications/18-08/paneureport2018_final_v3.pdf

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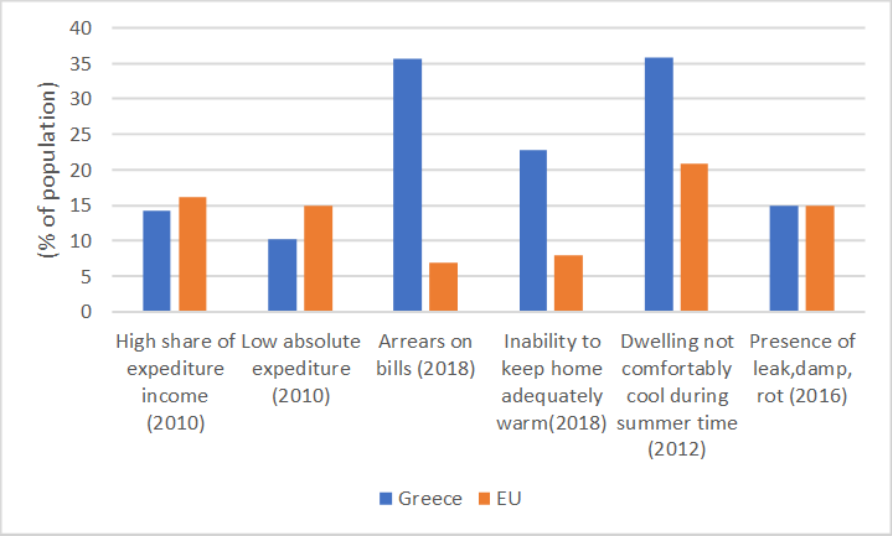
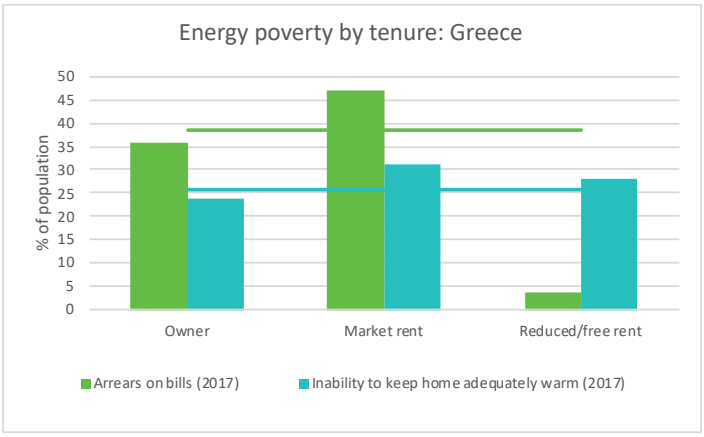
Figure 26: Results of EPOV indicators: Four primary and two selected secondary indicators in Greece



In terms of the expenditure-based indicators, these are lower in Greece than the EU average. More specifically, in 2010 14.2% of households had a high share of energy expenditure in income, whilst 10.3% of households had a low share of energy expenditure in income.[199] Overall, energy poverty in Greece is strongly correlated with low income.

As shown in Figure 27, disaggregated data on indicators reported per tenure suggest that energy poverty is particularly a problem in households that rent dwellings at market rate.

Figure 27: Energy poverty by tenure in Greece



Furthermore, Figure 28 shows that energy poverty in Greece is higher than average for single-parent families for both indicators.

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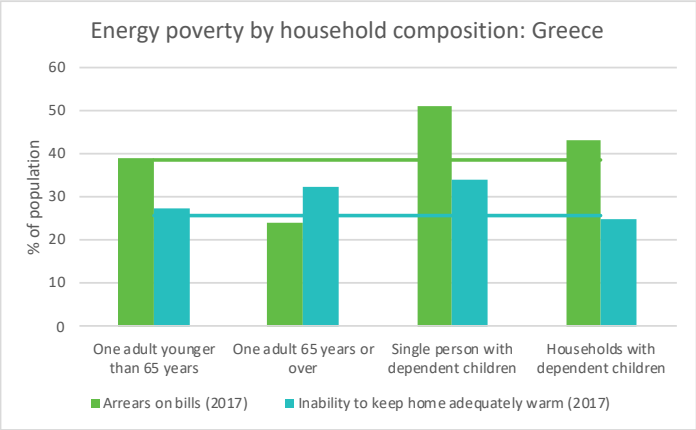
Figure 28: Energy poverty by household composition in Greece



Energy poverty is addressed indirectly in national policies in the form of special protective measures for vulnerable consumers, such as partial and interest-free payment of bills and suspension of the supplier's right to issue a disconnection order due to overdue payments during the winter period and the summer period.

Besides this, subsidies are also available for vulnerable consumers. For example, a social tariff for low-income households and vulnerable households is provided by power suppliers in the form of a discount on supply charges, to help households pay their bills, in accordance with the relevant Ministerial Decisions. Moreover, a heating oil allowance has been introduced to cover heating oil costs of low-income households during the winter months (according to the relevant Ministerial Decision each year). One-off special allowances are also given to support low-income consumers who have been disconnected from the electricity supply network due to overdue debts, according to the relevant Common Ministerial Decision that specifies the provisions of Article 36 of Law 4508/2017.

According to Article 45 of N4320/15, regions may also develop and implement social policy actions and schemes to provide relief for vulnerable people. For the implementation of these actions, they may enter into contracts with public organisations and utilities, as specified in Law 3429/2005.

In addition to this, national programmes have been developed to improve the energy efficiency of housing in low-income households. The most important measure is the Energy Efficiency at Household Buildings Programme (I & II), which provides funding for the energy upgrade of dwellings. The percentage of funding depends on specific income criteria, whilst there is the possibility of obtaining a loan with a subsidised interest rate for the remaining cost of the intervention.[201] Furthermore, the cost for replacing heating oil boilers with natural gas boilers is subsidized, in particular for dwellings and buildings located in areas with lower property values/zone rates.[202]

[201] https://exoikonomisi.ypen.gr/opheloumenoi

[202] http://www.ypeka.gr/Default.aspx?tabid=895&locale=el-GR&language=en-US

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4.5.6 CONCLUSIONS

In Greece there is no official definition of energy poverty, although there is a definition available for vulnerable consumers.

Energy poverty in Greece affects the ability of people to keep their home adequately warm during the winter and comfortably cool during the summer. Furthermore, energy poverty is strongly correlated with low incomes, and it seems to affect more people that rent dwellings and single-parent families. It is also important to note that more than one-third of households are in arrears on energy bills. Overall, energy poverty levels have notably increased since 2011, which is likely due to the financial crisis.

When one also considers that 50% of residential dwellings were built before 1980, it is clear that in most cases, when energy efficiency measures have not been implemented, the dwelling characteristics and condition exacerbate energy poverty.

National social policies mostly indirectly address energy poverty in the form of special protective measures and subsidies, such as a social electricity tariff and the heating oil allowance. As such, policies are not designed to tackle energy poverty but to temporarily provide a relief to energy-poor households, so these do not have a long-lasting impact.

In addition to this, national programmes have been developed to improve the energy efficiency of housing in low-income households. These programmes help alleviate energy poverty as they reduce energy consumption in the long run. Such programmes need to be extended and expanded, whilst in parallel these need to be more effectively designed to specifically target energy-poor citizens.

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4.6 IRELAND CONTEXT

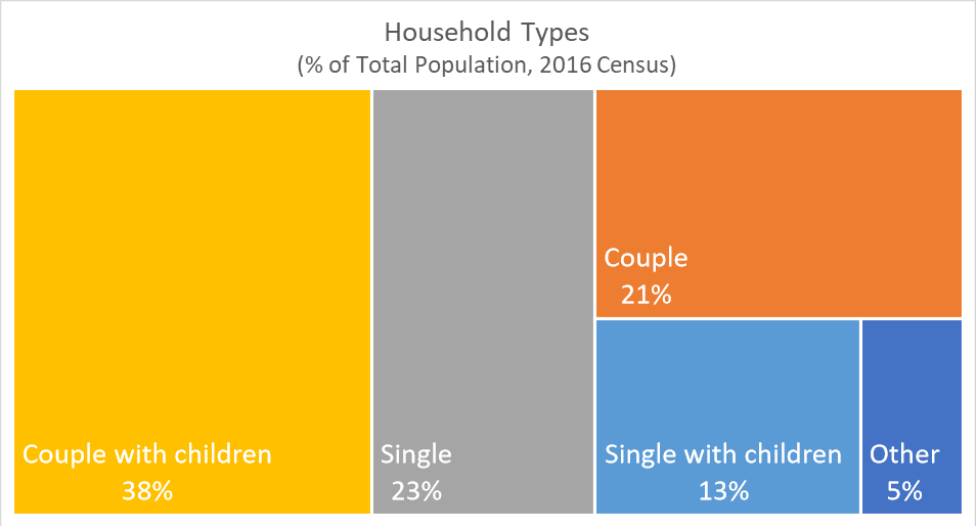
4.6.1 INTRODUCTION

Ireland has a mild, temperate climate and does not experience the weather extremes of other countries on the same latitude. Winters are mild whilst, summers are cool. Long-term average temperatures range from 9 to 12°C from northeast to southwest. Summer temperatures range from 8 to 20°C and average about 8°C in winter.[203]

The 2016 Census recorded a total population of 4.76 million, an increase of 3.8% over the previous count in 2011.[204]

There were 1.7 million households in Ireland in 2016, up 2.9% from the previous census. Figure 29 depicts how the different family types are composed. Couples with children form the biggest single cohort.

Figure 29: Irish household composition as recorded in the 2016 census



Source: CSO, 2017a[204]

Whilst couples with children make up the single largest cohort, almost 25% of households are single people living alone, over 40% of which are over 65 years of age. Of the 220,000 one-parent families, the vast majority (189, 000) were female. Over half (126,000) had just one child. Fathers in this family type tended to be much older, with 68% aged 50 or over, compared to just 38.3% of mothers. Fewer than half of parents in one-parent families were at work (47.8%), compared to 70.2% of two-parent families.[205]

[203] Met Eireann. (2019). Long Term Averages (LTA 1981–2010). Available at: https://www.met.ie/climate/what-we-measure/temperature

[204] CSO. (2017a). Census 2016 Presentations. Central Statistics Office.

Available at: https://www.cso.ie/en/census/census2016reports/census2016presentations/

[205] CSO. (2017b). 'Press Statement Census 2016 Results Profile 4—Households and Families'. Central Statistics Office. Available at: https://www.cso.ie/en/csolatestnews/pressreleases/2017pressreleases/pressstatementcensus2016resultsprofile4-householdsandfamilies/

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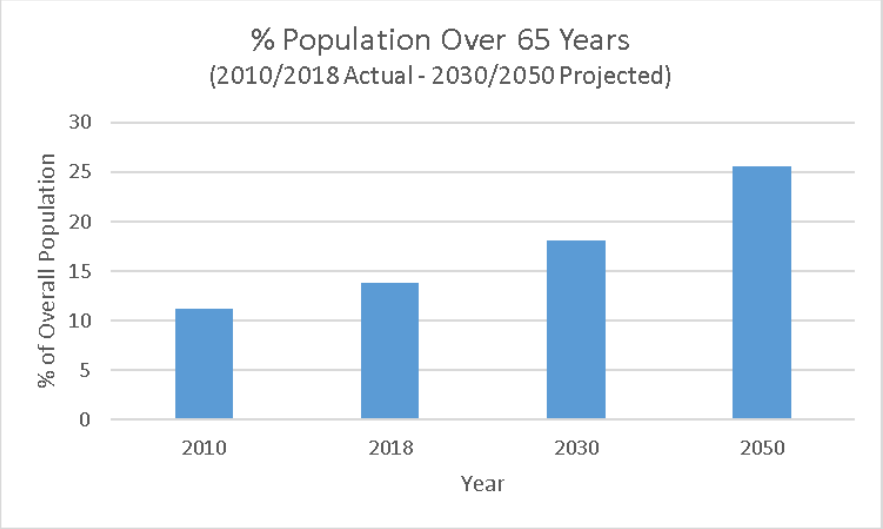
The 3.8% increase in population in the 2016 Census reflects a continued steady increase since the early 1960s. However, growth is not evenly distributed: whilst overall population has increased by nearly 70% in the period 1961–2016, urban population has doubled but rural areas have seen a 25% increase only. Some counties in 2016 saw small net population decreases, reflecting a continuing trend of rural depopulation in some areas.[206]

Since the 2016 Census, population has increased at approximately 1% annually[207] and is projected to increase for most of the 21st century to 5.2 million in 2030, 5.9 million in 2050 and 6.3 million by the end of the century.[208]

The population is aging and, over time, will create a growing dependency on the younger, working population. The proportion of the total population that is aged 65 years and more has increased from 2010 to 2018[209] and is projected to increase in the future (more than double from 2010 to 2050),[210] as depicted in Figure 30.

Figure 30: Proportion of people age 65 and older in the population in Ireland



Source: Eurostat, 2019b[209], and Eurostat, 2019c[210]

The old-age dependency ratio has increased from 2010 to 2018[211] and is projected to increase in the future[212] as depicted in Figure 31. The old-age dependency ratio is

[206] CSO, 2017a.

[207] The World Bank. (2019). Population growth (annual %). Available at: https://data.worldbank.org/indicator/SP.POP.GROW?locations=IE

[208] Eurostat. (2019a). Population on 1st January by age, sex and type of projection'. Available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en

[209] Eurostat. (2019b). Population: Structure indicators. Available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en

[210] Eurostat. (2019c). Demographic balances and indicators by type of projection. Available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en

[211] Eurostat. (2019d). Old-age-dependency ratio. Available at: https://ec.europa.eu/eurostat/databrowser/view/tps00198/default/table?lang=en

[212] Eurostat. (2019e). Projected old-age dependency ratio. Available at: https://ec.europa.eu/eurostat/databrowser/view/tps00200/default/table?lang=en

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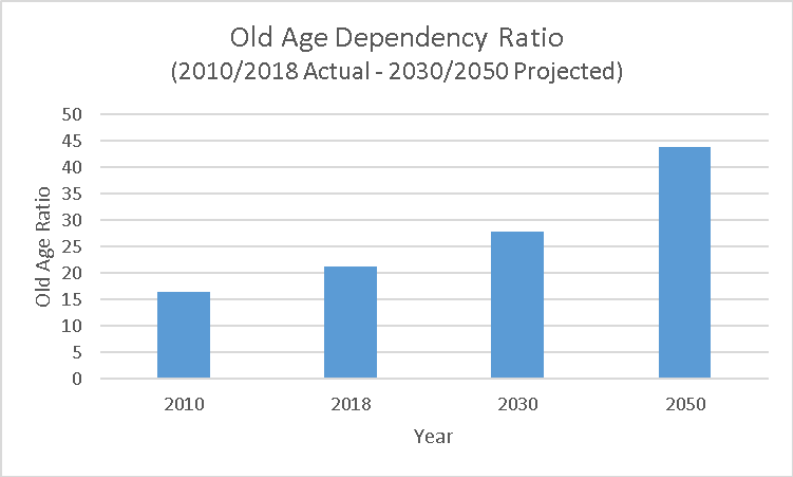
defined as the ratio between the number of persons aged 65 years and more and the number of persons of working age (15–64 years). The value is expressed per 100 persons of working age. Thus, in 2010 there were 16.5 persons aged 65 years or over for every 100 persons of working age, but this is projected to rise to 43.9 per 100 by 2050.

Figure 31: Old Age Dependency Ratio in Ireland



Source: Eurostat, 2019d[211], and Eurostat, 2019e[212]

Economy: Key indicators and outlook

Starting in the mid-1990s, and for a period of over 10 years, Ireland enjoyed sustained GDP growth, with some years showing double-digit increases.[213] However, the global financial crisis in 2008 and its impact in Ireland ended the run and ushered in a period of economic contraction and near-zero growth rates for several years.[214] Since the crash, a robust programme of economic retrenchment and long-term political stability in Ireland has seen the slow but steady return of economic growth in recent years. Table 31 depicts the changing GDP rate over the period.

Table 31: Impact of the 2008 economic crisis on GDP growth rate and employment in Ireland

	2007	2008	2009	2010	2011	2012	~	2016	2107	2018
Real GDP growth rate	5.3	-4.5	-5.1	1.8	0.3	0.2	~	3.7	8.1	8.2

Source: Eurostat, 2019f[214]

Consequently, unemployment rates, which had risen to over 15% in the years following the crash, have recovered well, with the downward slope now flattened out at around 5% unemployment amongst 15- to 74-year-olds.[215] This is at a level that many

[213] OECD. (2019). Gross Domestic Product (GDP). Available at: https://data.oecd.org/gdp/gross-domestic-product-gdp.htm

[214] Eurostat. (2019f). Real GDP growth rate—volume. Available at: https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

[215] CSO 3. (2019c). Monthly Unemployment. Available at:

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authorities take as an indication of full employment, and it compares favourably with the EU-28 average of 6.8% for 2018.[216]

The mean Irish income rose just over 13% from €23,965 to €27,006 between 2010 and 2017, broadly in line with the EU-28 average percentage increase for the same period. The median income rose 11.5% from €20,512 to €22,879, behind the EU-28 average of almost 14% over the same horizon.[217]

Income distribution in Ireland is not perfectly equal, recording a GINI coefficient of 30.6 for 2017. The coefficient is a number between zero and 100, where zero represents perfect income equality and 100 perfect income inequality. The current Irish coefficient is comparable with the EU-28 average.[218] Interestingly, this measure for Ireland has remained largely unchanged since 2007 in spite of the severe economic crash and subsequent slow recovery.

A local home-grown housing crisis continues to absorb government time and attention. The almost complete cessation in house building after the crash in 2008 has meant that now, as the economy begins to recover, there is a chronic shortage of affordable accommodation to rent or buy. As far back as June 2017, the National Competitiveness Council complained that this emerging problem was beginning to adversely affect the Irish economy, pushing up wage demands, threating inward investment and hampering local business expansion plans.[219]

4.6.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

In July 2019 the Irish government unveiled its plan to tackle the growing issues of greenhouse gas emissions in a document titled 'Climate Action Plan 2019'.[220]

Under the Programme for Government, a Citizens' Assembly was established to examine the challenge, and it has signposted the way for radical reform. An All-Party Committee was established that held lengthy hearings and has issued a comprehensive set of recommendations. This report has since been unanimously endorsed by the Dáil Éireann (Irish Parliament), whilst at the same time declaring a Climate and Biodiversity Emergency.

The built environment accounted for 12.7% of Ireland's greenhouse gases in 2017.[221]

https://www.cso.ie/en/statistics/labourmarket/monthlyunemployment/

[216] Eurostat. (2019g). Unemployment Rates. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics#Longer-term_unemployment_trends

[217] Eurostat. (2019h). Mean and median income by household type—EU-SILC and ECHP surveys. Available at: https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

[218] Eurostat. (2019i). Gini coefficient of equivalised disposable income—EU-SILC survey. Available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12&

[219] National Competitiveness Council. (2017). Cost of doing business in Ireland. Available at: http://www.competitiveness.ie/Publications/2017/NCC-Costs-of-Doing-Business-2017-Report.pdf

[220] Department of Communications, Climate Action 7 Environment. (2019). Climate action plan to tackle climate breakdown. Government of Ireland. Available at:
https://www.dccae.gov.ie/en-ie/climate-action/topics/climate-action-plan/Pages/climate-action.aspx

[221] Ibid.

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The plan highlights the need to improve the energy efficiency of buildings, including homes, workplaces and schools, by meeting higher energy performance standards and by increasing retrofit activity. This will not only reduce Ireland's dependence on fossil fuels but will also improve living standards by making buildings and homes more comfortable, healthier, safer and less costly to heat.

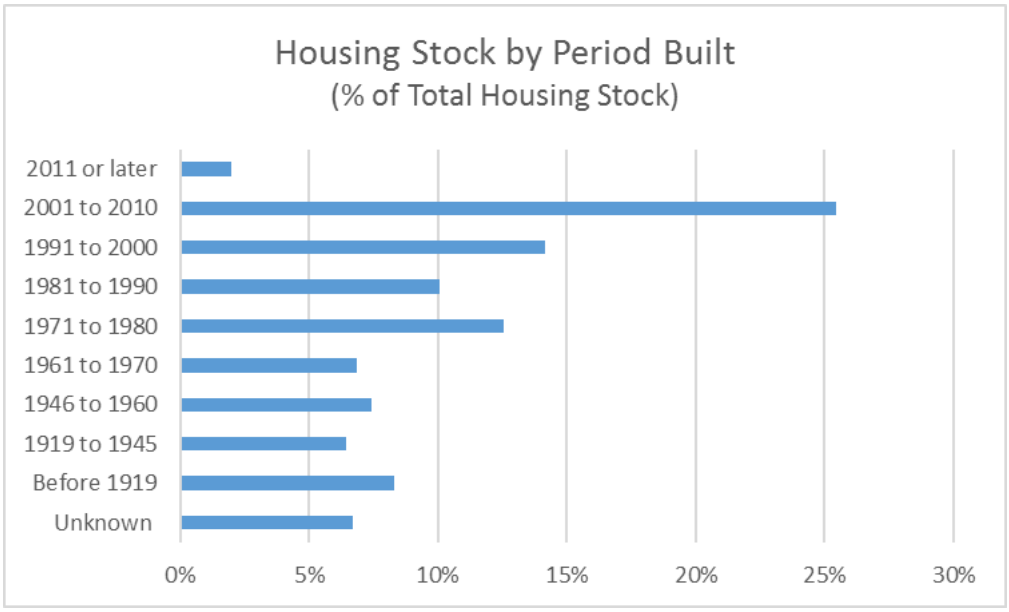
Meeting the required level of emissions reduction by 2030 in the residential sector will require a move away from fossil fuels. To achieve this, the plan aims to complete 500,000 building retrofits to a minimum B2 Building Energy Rating (BER) rating. In addition, it plans to install 600,000 heat pumps (400,000 of which are to be installed in existing buildings).

The 'Climate Action Plan' also highlights the need to increase the number of Sustainable Energy Communities (a community approach to tackling energy inefficiency) to 1,500 (currently at 300); complete the rollout of the Support Scheme for Renewable Heat (SSRH), including support for biomass and anaerobic digestion heating systems; and deliver two initiatives of municipal scale, which have the potential to provide heat equivalent to the needs of about 50,000 homes.

4.6.3 RESIDENTIAL BUILDING STOCK

The housing stock in Ireland is relatively old with almost half (45%) of all dwellings built before 1980 and just 2% built since 2011.[222] Figure 32 shows the percentage of private dwellings by period built.

Figure 32: Irish housing stock by period built



Source: CSO, 2017d222

This situation is exacerbated by the relatively late introduction of building regulations in Ireland. Although legislation was enacted as early as the mid 1960s, formal national

[222] CSO (2017d). Census 2016. Available at: https://www.cso.ie/en/census/

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regulation of building standards did not come into force until 1992 and included the introduction of rules specifically addressing thermal standards.[223]

Today, the requirements relating to conservation of fuel and energy for dwellings are laid out in Part L of the Second Schedule to the Building Regulations 1997 (S.I. No. 497 of 1997), as amended by the Building Regulations (Amendment) Regulations 2007 (S.I. No. 854 of 2007).

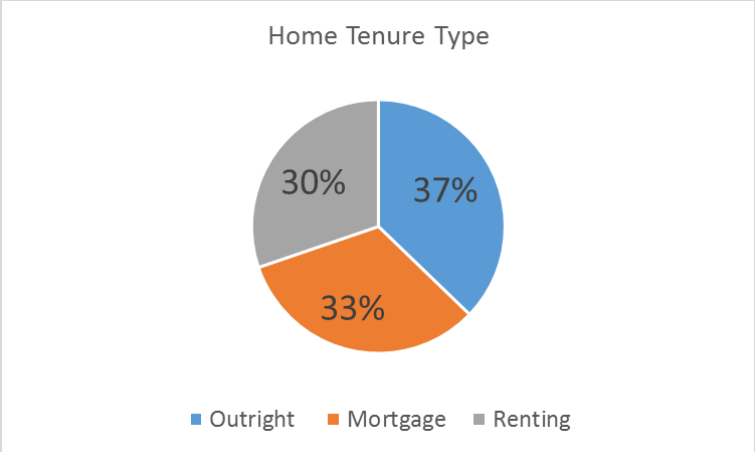
However, given the large stock of old houses in Ireland, much work will be required to deep retrofit these to a minimum B2 BER energy rating.[224] This is part of the government's plan but will only be achieved over a prolonged period of time. Significantly, Budget 2020 has ring-fenced some of the increase in next year's carbon tax for direct use in fuel-poor homes.[225]

In the meantime, there will need to be a continued focus on identifying people suffering fuel poverty and having relevant remedial schemes in place to address particular situations. This may be in the form of income supplements and/or home improvements.

Home Tenure

Figure 33 illustrates the percentage of Irish homes that are either owned outright, mortgaged or rented.[226]

Figure 33: Home tenure by Type in 2016 in Ireland



Source: CSO, 2017d222

The total number of households with a mortgage dropped by 8% when compared with 2011. In contrast, homes owned outright increased by 8%. This was a reversal of

[223] Government of Ireland. (2019). *Conservation of fuel and energy—dwellings.* Available at: https://www.housing.gov.ie/sites/default/files/publications/files/tgd_l_dwellings_2019.pdf

[224] BER (Building Energy Rating) refers to a building's overall energy performance and is rated on a scale of A–G. A-rated homes are the most energy efficient and will tend to have the lowest energy bills. G-rated are the least energy efficient.

[225] https://www.rte.ie/news/budget-2020/2019/1008/1081870-carbon-tax-to-be-increased-by-6-per-tonne/

[226] CSO, 2017d.

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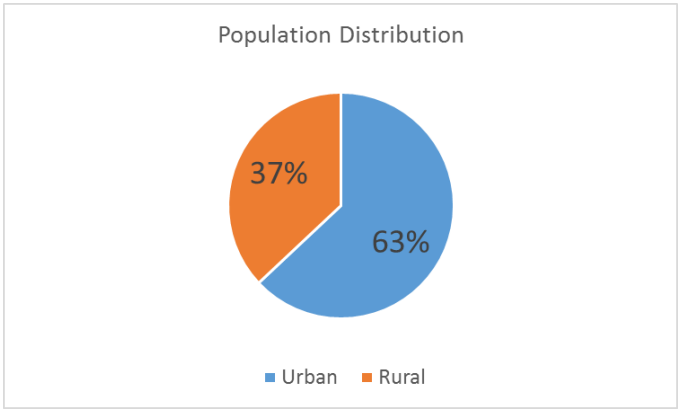
trends seen in the 2002, 2006 and 2011 censuses, where owner occupiers with a loan were the largest tenure category throughout the State.

Rented accommodation has continued its upwards trend with an increase of 4.7% on 2011. This means that renting is the tenure status for 30% of all of occupied dwellings.

Rural/urban distribution (and trends)

The distribution of population across urban and rural regions is shown in Figure 34.[227]

Figure 34: Population distribution across urban and rural in Ireland in 2016

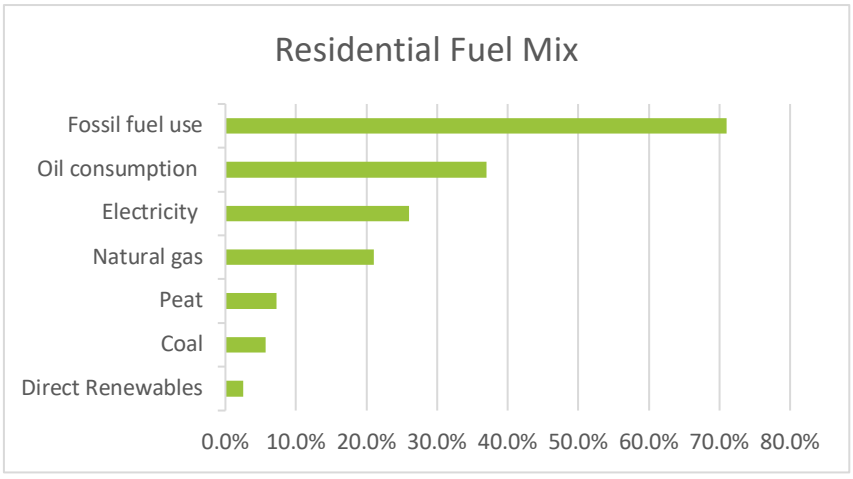


Source: CSO, 2017d222

4.6.4 ENERGY MARKET

In 2018 the Sustainability Energy Authority of Ireland produced a report on 'Energy in Ireland'[228] including the residential fuel mix on which Figure 35 below is based.

Figure 35: Residential Fuel Mix in Ireland in 2018



Households could record use of more than one fuel type.

Source: SEAI, 2018228

[227] Ibid.

[228] SEAI (2018). *Energy in Ireland 2018 Report*. Available at: https://www.seai.ie/resources/publications/Renewable-Energy-in-Ireland-2012.pdf

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Domestic electricity prices in Ireland were below the EU between 2016 and 2018. In the second half of 2018, household electricity prices in Ireland increased by 12%, imposing further strain on households in fuel poverty. Household gas prices increased by 21% in the second semester of 2018, increasing the burden on this cohort, especially dual-fuel households.[229]

In adopting Article 7 of the EU Energy Efficiency Directive, Ireland introduced an Energy Efficiency Obligation in 2014. Obligated parties are all energy suppliers (all fuels – electricity, gas and oil) that sell over an annual threshold (600GW/year). SEAI is the implementing body with enforcement by the Department for Communications, Climate Action and Environment.

Savings from both residential and non-residential sectors are eligible. Of the overall target (defined in primary energy equivalent), 20% must be achieved in the residential sector and 5% in fuel poor households. Obligated energy suppliers can use partnerships with other parties to deliver eligible measures to meet their obligations. They can also pay into a fund and exchange savings between suppliers. Eligible measures in the residential sector are included in a list of around 50 standardised actions for which deemed savings specific to the measure and dwelling type are provided. Measures in the non-residential sector are assessed individually using a calculation tool appropriate to the complexity of the proposed project.[230]

4.6.5 ENERGY POVERTY

Definition

Energy poverty is defined in Ireland as when:

> a household's energy spend is greater than 10% of disposable income (equivalised for housing costs). Thresholds are used to determine severity: severe energy poverty when spending is 15% of income and extreme energy poverty when spending is 20% of income.[231]

Extent and Drivers of Fuel Poverty

Energy poverty is a real and entrenched issue in Ireland.

There are currently circa 370,000 households in receipt of the fuel allowance (established since the 1940s), which is a good barometer of both the scale and persistence of the problem. However, there are households in fuel poverty that have not yet come to the attention of the authorities.

A pivotal government-sponsored study in 2015 titled *Bottom-up analysis of fuel poverty*

[229] SEAI. (2019a). Prices. Available at: https://www.seai.ie/data-and-insights/seai-statistics/key-statistics/prices/

[230] SEAI (online resource) Energy Efficiency Obligation Scheme. Available at: https://www.seai.ie/business-and-public-sector/business-grants-and-supports/energy-efficiency-obligation-scheme/

[231] European Commission. (2016). *Working Paper on Energy Poverty*. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/working_paper_on_energy_poverty_0.pdf

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in Ireland estimated the extent of fuel poverty in Ireland and also established a set of key predictors of energy poverty.[232] Using the objective definition above of energy poverty at the 10% threshold, it concluded that 28% of Irish households were in fuel poverty.

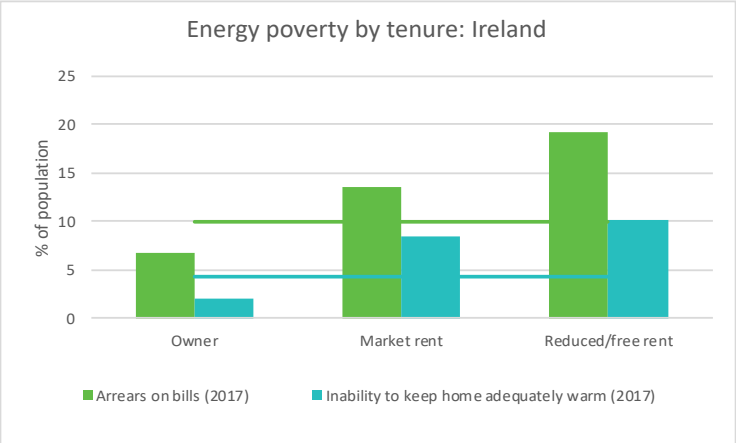
In addition, it established that the key determinants of fuel poverty were the type and state of the housing stock, along with household tenure and householder employment status. In this regard, again operating at the 10% threshold, the study concluded:

- Almost 70% of households living in social rented homes are in fuel poverty (owners are least exposed);
- Almost half (47%) of households living in G-rated homes are in fuel poverty;[233]
- Over 40% of households living in detached homes are in fuel poverty (apartment dwellers are least exposed);
- Over 40% of household heating with oil are in fuel poverty (houses heating with electricity are least exposed);
- Between 50% and 60% of households occupied by unemployed, retired or people otherwise 'not in the workforce'[234] are in fuel poverty (working employees are least exposed).

Selected Key Measurements

The link between socially rented homes and fuel poverty, identified in the 2015 report, is supported by the Eurostat data, compiled by EPOV, in Figure 36.

Figure 36: Energy poverty by tenure in Ireland



** Horizontal lines show averages for each indicator.*

Source: Eurostat

[232] Element Energy. (2015). *Bottom-up analysis of fuel poverty in Ireland*. EU Energy Poverty Observatory. Available at: https://www.energypoverty.eu/publication/bottom-analysis-fuel-poverty-ireland

[233] This is the lowest rating on the Building Energy Rating (BER) scale.

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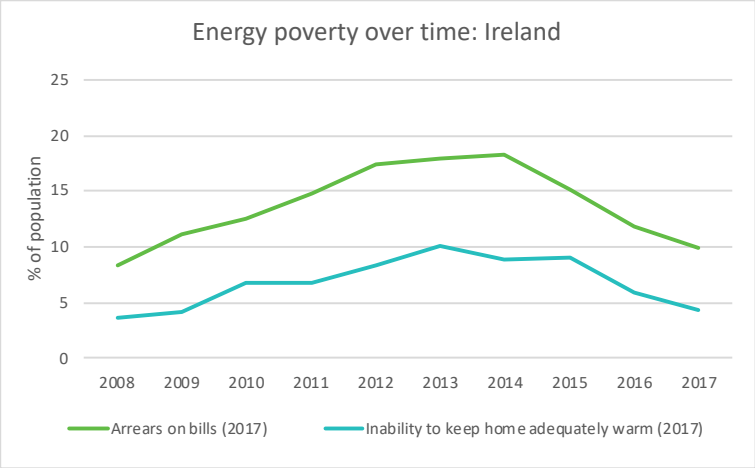
This graph also depicts the two related economic drivers of energy poverty—inability to adequately heat the home and falling into utility bill arrears.

When these economic predictors are tracked since the economic crash in 2008, it is clear that they follow the general trends of the economy over that horizon as evidenced from the Eurostat/EPOV data in Figure 37. This would suggest that some elements of energy poverty are driven by economic hardship, independently of the set of drivers identified above.

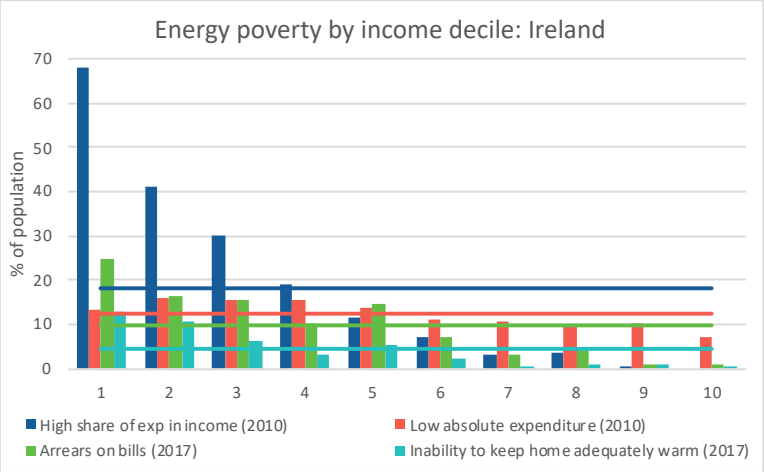
Figure 37: Energy Poverty trends in Ireland since the 2008 Crash



Source: Eurostat

That is, a household in hardship is not likely to be able to adequately heat the home and may well fall into energy bill arrears whether households own or rent their home or heat with oil or electricity. This simple reality is further evidenced by the clear link between income levels and fuel poverty, as shown in the Eurostat/EPOV data in Figure 38.

Figure 38: Energy Poverty by income decile in Ireland



** Horizontal lines show averages for each indicator.*

Source: Eurostat

Here, when compared to higher-income households, lower-income households

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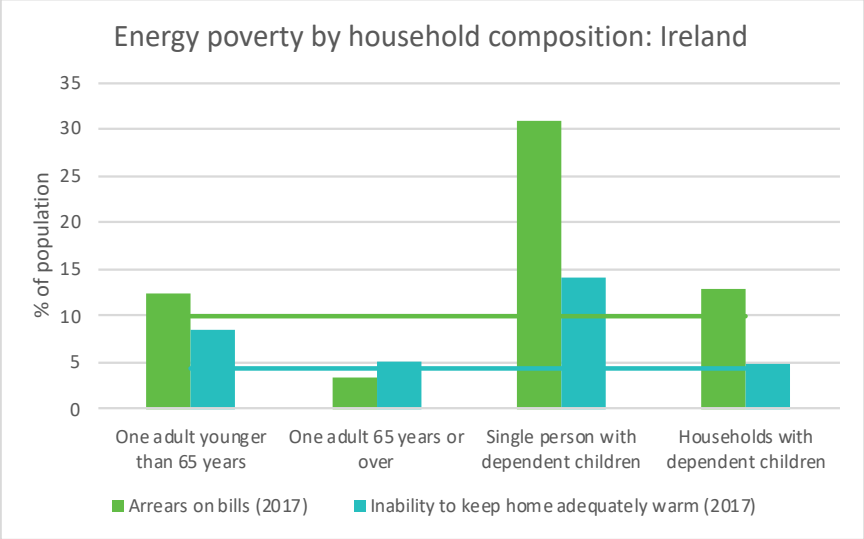
spend disproportionately more on fuel whilst still not managing to adequately heat their homes and run higher risks of falling into utility bill arrears.

The well-established link in Ireland between energy poverty and those in receipt of long-term social support is supported by the Eurostat/EPOV data depicted in Figure 39.

Figure 39: Energy poverty by household composition in Ireland



** Horizontal lines show averages for each indicator.*

Source: Eurostat

Single people with dependent children are less likely to be working full-time and, therefore, are more exposed to the two major economic indicators of fuel poverty—inability to adequately heat the home and falling into utility bill arrears. Sixteen percent of Irish households in the 2016 Census were headed by single people with dependent children.[235]

Policies and programmes to mitigate energy poverty

Fuel poverty policies in Ireland are a mix of long-standing government interventions going back to the 1940s and a set of more modern initiatives, either national or energy-supplier based, all of which have been given an impetus in recent years by the growing issue of climate change.

Winter fuel allowance (1942 onwards)

As far back as 1942, the Irish government made an early intervention to relieve fuel poverty by issuing fuel vouchers to needy citizens to tide them over the winter heating months. That scheme, which continues today in the shape of the Winter Fuel Allowance, has recently been extended to cover a 28-week period and provides a total payment of €630 for fuel products. The scheme helped 370,000 householders in

[235] CSO, 2017b.

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the winter of 2018–2019.[236] Interestingly, this number aligns broadly with a 2015 government estimate of some 461,000 Irish households (28%) in fuel poverty.[237] However, the degree to which the scheme addresses the issue must be qualified by the fact that the two cohorts are not defined in the same way (the scheme is paid only to long-term social welfare recipients whereas the estimate is based on a 10% income spend threshold) and, in any event, the scheme is intended only as a targeted financial support rather than answer to the core issue of fuel efficiency.

Energy efficiency schemes

- Warmer Home Scheme (2001 onwards)

This scheme provides free energy upgrades to householders in receipt of certain state benefits, including the Winter Fuel Allowance outlined above.[238] Traditionally, interventions have been 'shallow' (roof and cavity wall insulation, draught proofing and lagging jacket), but this is changing, and the 2019 programme has a budget of €24 million. In 2018, 5,500 homes were treated, and since programme inception, some 140,000 homes have benefitted.[239] For volume comparison purposes only, this number is approximately 30% of the estimated 461,000 households in fuel poverty in 2015.[240]

- Better Energy Communities (2014 onwards)

This SEAI-administered programme is a national retrofit scheme that supports local communities through capital funding, partnerships and technical support. In 2019, the scheme expects to support 57 projects with a total budget of €65.8m. Since inception, the programme has supported retrofits in 18,200 homes and 2,570 nondomestic buildings.[241]

- Fabric Upgrade Scheme (2013 onwards)

This government scheme is administered by local government and has been running since 2013. It is divided into four parts:

- Phase 1: Shallow retrofit—roof and cavity wall insulation, draught proofing and lagging jacket for hot water cylinder;
- Phase 2: Windows and doors and external wall insulation;
- Phase 3: Upgrade heating and heating controls;
- Phase 4: Install renewables where appropriate.

In the 2019 Budget, €20 million is being allocated to upgrade social housing in the midlands. This area has and will be subject to many job losses over the coming months

[236] Houses of the Oireachtas. (2019). Fuel allowance data. Dáil Éireann Debate. Government of Ireland. Available at: https://www.oireachtas.ie/en/debates/question/2019-03-13/338/

[237] Element Energy, 2015.

[238] Kore. (2019). Warmer homes scheme. Available at: http://www.warmerhomes.ie/free-home-insulation-kore-warmer-homes-scheme/

[239] SEAI. (2019b). *Fuel Poverty in Ireland: Current Situation and Irish Approach*. Unpublished.

[240] Element Energy, 2015.

[241] SEAI. (2019c). Community grants. Available at: https://www.seai.ie/grants/community-grants/

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due to the phasing out of peat harvesting in the area.

Strategy to Combat Energy Poverty (2016–2019)

This initiative arose from the government's 2015 Energy White Paper titled 'Ireland's Transition to a Low Carbon Energy Future' and reflects the growing connection between alleviating the fuel poverty issue and achieving national climate change objectives. The multiyear programme committed the government to a broad set of measures, including:

- Establishing an Energy Poverty Advisory Group;
- Targeting those suffering acute health conditions living in poorly insulated homes (€20 million budget);
- Implementing a new SEAI-led pilot community-led approach to addressing fuel poverty (€20 million budget);
- Expanding the eligibility criteria for grants to include those in basic deprivation (on the assumption that these are likely to be in fuel poverty);
- Undertaking a public consultation on the implementation of minimum energy efficiency standards for rental accommodation.[242]

Energy efficiency obligation scheme (EEOS) (2014 onwards)

The Energy Efficiency Directive imposes a legal obligation on Member States to achieve new savings each year from 1 January 2014 to 31 December 2020 of 1.5% of the annual energy sales to final customers of all energy distributors or all retail energy sales companies by volume, averaged over the most recent three-year period prior to 1 January 2013.

Ireland has chosen to combine an Energy Efficiency Obligation Scheme with alternative measures in order to meet the national target as the Minister believes that to impose the full 1.5% obligation on energy suppliers would result in operational and cost challenges for the industry. Therefore, a reduced target obligation is being implemented on designated energy suppliers.

Obligated parties' targets will be based on the annual sales volume of each obligated party as a percentage of the total sales volume of all obligated parties ([Supplier Annual Sales / Total Eligible Supplier Sales] x Total Obligated Parties' Target).

Prepayment Meter Provision

The electricity supply companies will also facilitate customers who are experiencing difficulty in paying their bills by offering industry pay-as-you-go meters and spreading arrears over a prolonged period of time.

4.6.6 CONCLUSIONS

In winter, fuel poverty is more prevalent in Ireland due to the inclement weather, the

[242] Department of Communications, Climate Action & Environment, 2015.

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temperate summer climate doesn't impose any burden in terms of cooling requirements.

Energy poverty rates are significantly higher in social rented accommodation and lowest in owner occupied households. Statistics indicate that fuel poverty is more prevalent in detached houses and least so in apartments.

- Fuel Poverty in Ireland is an extensive and entrenched social problem:
  - There are currently circa 370,000 households in receipt of the fuel allowance;
  - Government programmes and initiatives began in the 1940s and is on-going ever since.
- Fuel Poverty is prevalent in specific social cohorts, build types and geographies:
  - Almost 70% of households living in social rented homes are in fuel poverty;
  - Almost half (47%) of households living in "G" rated homes are in fuel poverty;[243]
  - Over 40% of households living in detached homes are in fuel poverty;
  - Over 40% of household heating with oil are in fuel poverty;
  - Between 50% and 60% of households occupied by unemployed, retired or people otherwise "not in the workforce"[244] are in fuel poverty;
  - Outside major urban areas are more susceptible to fuel poverty.
- The key indicators of fuel poverty are inability to adequately heat the home and falling into utility bill arrears:
  - The percentage of the national population who are unable to adequately heat their homes varied from 4% to 10% during the years 2008 to 2017;
  - Over the same period the percentage of homes falling into utility bill arrears ranged from 8% to 18%.
- Among the key drivers of fuel poverty are factors relating to the social, housing and economic factors:
  - Poor quality housing stock – almost half of the stock (45%) was built before 1980 and just 2% since 2011;
  - Rented accommodation – both private and social renters are more exposed to fuel poverty – social renters who had utility bill arrears in 2017

[243] This is the lowest rating on the Building Energy Rating (BER) scale.

[244] The 'Other not in the labour force' employment type was the single largest category in percentage terms and included heads of household who were Looking after someone at home, A student/pupil and Unable to work due to permanent sickness/disability. The household budget survey reports that this 'Other' category has the lowest average income of all the categories, which is why its extent of fuel poverty is high.

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represented almost 20% of the national population;

- The relatively late introduction of housing regulations (thermal regulations 1992);
- In the six years following the economic crash in 2008 the numbers of bill arrears or inability to heat the home rose sharply from 4% to 10% and from 8% to 18%, respectively;
- The cost of electricity rose by 12% in 2018 and gas prices increased by 21% in the second semester of 2018;
- Over 40% of households living in detached homes are in fuel poverty.

› Government has a long-established programme of initiatives to tackle energy poverty:

- Introduction of Winter Fuel Allowance in 1942 the current manifestation of which supported 370,000 households in the winter of 2018/19;
- The early 1990's saw the introduction of the first building regulation specifically addressing thermal considerations for constructing residential properties;
- In 2001 the Warmer Home Scheme was introduced to specifically tackle fuel poverty through free energy efficiency upgrades for households on certain state benefits;
- 2014 saw the introduction of the Better Energy Communities programme, building on the Warmer Home Scheme to broaden the scope to buildings across the community including, fuel poor and non-fuel poor sector schools, community halls, etc. Supported by a budget of €65.8m in 2019;
- In June 2019 the Government introduced its Climate Action Plan with a view to tackling Climate change. While the plan does not specifically address fuel poverty, its targets and measures for the built environment will inherently tackle many of the drivers of fuel poverty. For example, the targets include the completion of 500,000 building retrofits to a Better Energy Rating of B2 and increasing the number of sustainable energy communities to 1,500.

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4.7 ITALY CONTEXT

4.7.1 INTRODUCTION

Italy has an extensive coastline and predominantly hilly terrain with some mountainous and lowland areas. The average altitude is approximately 337 metres above sea level. Due to its latitude, Italy's climate ranges from a Mediterranean subtropical climate in the South (where temperatures can exceed 40°C in summer) to a continental temperate climate in the North (where temperatures can fall to -20°C in winter).

The global solar radiation incident on a horizontal surface is also affected by the different latitudes in Italy. Therefore, there are difficulties in defining clear building and technical standards and solutions that can be adapted to the diverse conditions.

The Italian population is more than 60.36 million[245] (-0.2% compared to 2017 and -0.66% compared to 2014), with 25.93 million[246] households (2018). Table 32 illustrates household composition.

Table 32: Household composition in Italy, 2018.

Single adult	9.38 million (36% of total)
Single adult with children	0.72 million (3% of total; 8% of single adult)
Couple	10.79 million (42% of total)
Couple with children	5.39 million (21% of total; 50% of couple)
Other type	5.75 million (22% of total)

The number of single-adult households aged 65 and over in 2018 amounted to 4.38 million (17% of total; 47% of single adult).[247] In fact, the Italian population is growing old[248]: by 2065, life expectancy will have increased five years, up to 90.2 years for women.[249] Fecundity could, however, increase to 1.6 child per woman (+18.7%) between 2017 and 2065.

In recent years (2010–2018), the proportion of the total population aged over 65 years has increased from 20.4% to 22.6% and is expected to grow to 34.8% by 2050.[250] Another indicator of the importance of population aging is the ratio between older people (65 years and over) and working-age people (15–64 years). In 2018,[251] this ratio is 35.2 older people for every 100 of working age, with projections predicting that the

[245] ISTAT: https://www.istat.it/en/archivio/232013
[246] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en
[247] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en
[248] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en
[249] ISTAT: https://www.istat.it/en/archivio/214235
[250] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en
[251] ISTAT: https://www.istat.it/it/files//2019/02/Report-Stime-indicatori-demografici.pdf

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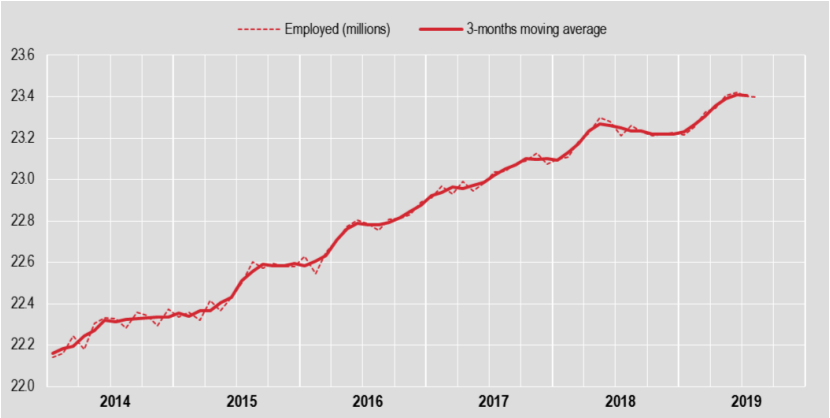
ratio will increase to 44.9 in 2030 and 64.7 in 2050.[252]

The Italian economy is static, driven by export and households' consumption.[253] Industrial production reduced in 2018–2019, after a few years of recovery.[254] In August 2019, the total employment rate[255] of people aged 15 to 64 years was 59.2% (68.2% amongst men and 50.2% amongst women) , in a positively growing trend since 2014 (see Figure 40), and the unemployment proportion was 9.5% (8.7% amongst men and 10.5% amongst women).

Figure 40: Employment in Italy, January 2014–August 2019



**Absolute values in millions, seasonally adjusted data.*

The mean income in 2018[256] (€19,208) varied among macroregions. In Northern Italy, the mean income in 2018 was €24,356 (the leading region is Lombardy with €26,494: men with €30,689 and women with 20,920€); in Central Italy €21,189 and in Southern Italy €16,113 (Calabria is the worst region, where women earn, on average, €9,475).[257] In comparison, the EU estimated mean income for 2018 was €21,156.

An index that measures these inequalities (and others) is the Gini coefficient. This value varies between zero (perfect income equality) and 100 (perfect income inequality). For 2018, the Italian Gini index was 33.4 (fifth in the EU zone). The EU Gini index in 2017 was 30.6.

Another key factor in the Italian economy has been the 2008 crisis. Figure 41 shows the impact of the 2008 economic crisis on the real GDP growth rate (percentage change on previous year)[258] and on the unemployment rate, between 2007 and 2018.

[252] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tps00200/default/table?lang=en

[253] Banca d'Italia: https://www.bancaditalia.it/pubblicazioni/economia-italiana-in-breve/2019/iteconom_150_ita.pdf

[254] ISTAT: https://www.istat.it/it/files//2019/10/industrial-production082019.pdf

[255] ISTAT: https://www.istat.it/it/files//2019/09/Employment-and-unemployment_201908.pdf

[256] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en

[257] IlSole24Ore: https://www.ilsole24ore.com/art/stipendi-d-italia-ecco-retribuzioni-nord-sud-milano-testa-vibo-valentia-coda-AE09I96E

[258] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

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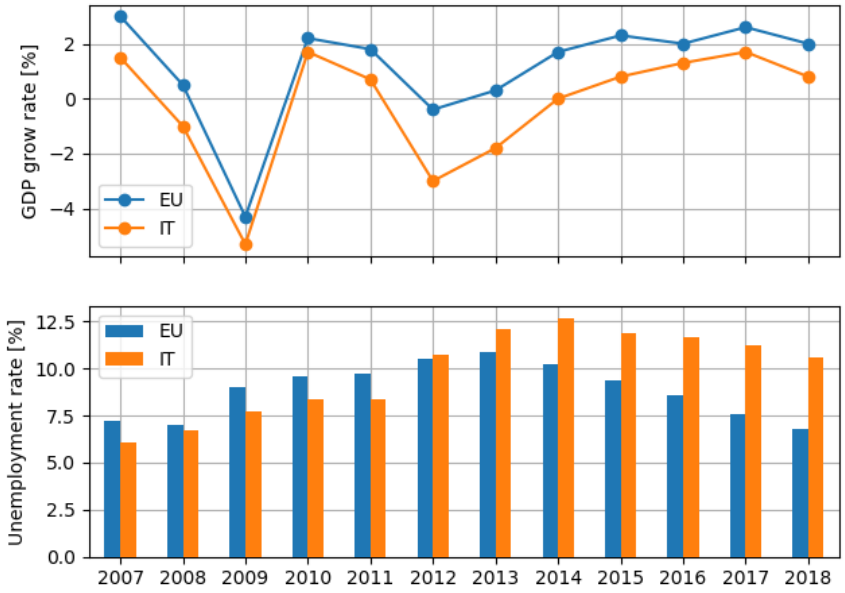
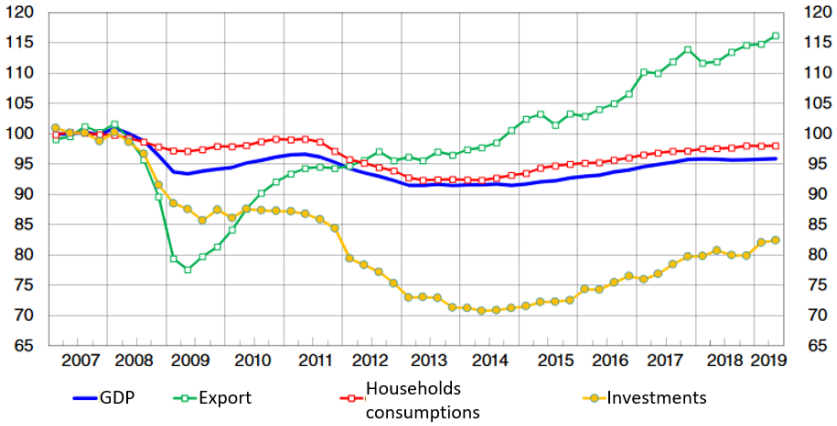
Figure 41: Impact of 2008 economic crisis on GDP growth and unemployment rate in Italy



As the EU GDP started to grow again just after 2013, the average unemployment rate amongst EU Member States simultaneously began to decrease. In Italy, this reduction started later and at a slower rate: in 2018, whilst EU GDP growth rate was 2%, in Italy it was less than half at 0.8%. The unemployment rate, which before the 2008 crisis had been better in Italy than in the EU, was much higher in 2018, 10.6% in Italy versus 6.8% in the EU. This reflects on energy poverty, as the next paragraphs show: a clear correlation exists between the delayed decrease in unemployment, compared with the EU, and the arrears on bills indicator, shown in Figure 48.

The measures to combat the crisis put into practice by the Italian government after 2008 improved the export and employment rate (Figure 40), whilst investments remained stagnant (Figure 42).

Figure 42: GDP and main demand components in Italy



**Three months data; index 2007 = 100.*

Source: ISTAT

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4.7.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

To mitigate climate warming, the EU (2016/0375) established that Italy should reduce its greenhouse gas emissions by 33% in 2030 compared to 2005, to honour the COP 21 conference held in Paris (2015). Italy is currently developing the so-called PNIEC,[259] the energy and climate national plan: 30% renewable energy gross consumption and 21.6% in transportation; 43% energy reduction (on 2007 levels) and greenhouse gases cut by 35% (this plan should be ready by the end of 2019).

In this framework, Italy was able to start a major building renovation plan to reduce residential consumption and increase energy efficiency, thanks to several incentives. These aids, in the form of cost deductions, are still available for 2019 and encourage the construction of energy efficient buildings (Ecobonus) and the renovation of buildings (Bonus Casa).

These deductions reimburse part of the renovation expenses, spread over 10 years. For example, 50% cost deduction for door and window replacement and biomass boilers is offered through this incentive, payable in equal instalments over 10 years (5% of total installation each year). The cost of heat pumps, building thermal shielding, solar collectors and microgenerators can be reduced by 65%. Up to 85% would be returned for residential building fabric insulation or thermal shielding, coupled with earthquake mitigation measures.

Alternatively, through the GSE,[260] the national energy services agency, Italy provides the so-called *conto termico*, a nonrepayable measure to directly help households to increase energy efficiency or install small thermal production systems (i.e., solar collectors). GSE allocated €900 million per year for these incentives, of which €700 million is for private households. Up to €5,000 per household can be awarded, made available over the course of two months for heat pumps, biomass boilers, solar collectors and hybrid systems.

Between 2014 and 2018, the ENEA[261] collected data about how these funds were used and about specific interventions and technologies. For instance, more than €1.2 billion were used to upgrade doors and windows in 2018 and €7.3 billion since 2014.

In 2018, in terms of energy savings, the main contribution came from upgrading doors and windows (426 GWh per year), whilst one-third of savings came from improving wall insulation.

These translated into 2,500 GWh saved per year and 1,650 GWh per year for doors and windows and wall interventions, respectively, during 2014–2018. Installing condensing boilers allowed a savings of 880 GWh per year and was the third main operation.

[259] Piano Nazionale Integrato per l'Energia e il Clima (PNIEC)

[260] Gestore dei Servizi Energetici (GSE), national energy services agency

[261] National agency for new technologies, Energy and Sustainable Economic Development (ENEA)

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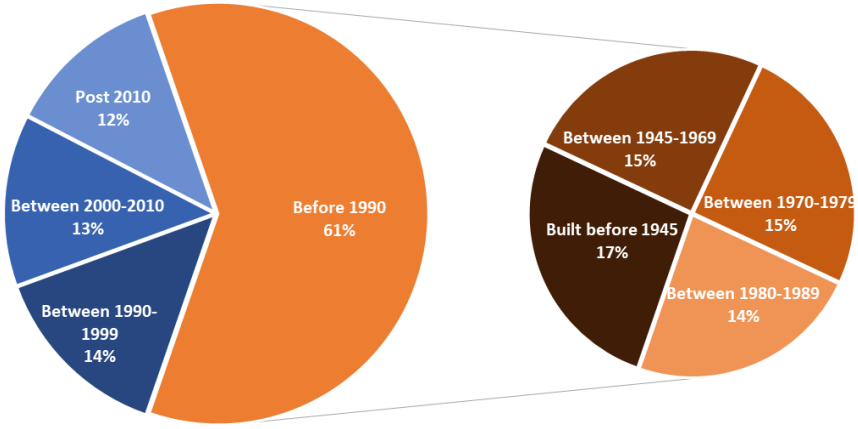
4.7.3 RESIDENTIAL BUILDING STOCK[262]

Italy has 31.96 million dwellings, most of which were built before 1945 (16%), as seen in Figure 43. More generally, 60% of all dwellings/units were built before 1990. The civil sector accounts for 41.1% of total final energy consumption. Of the civil sector, residential buildings comprise 27.9%, and the remaining 13.2% is in the service sector. Therefore, the existing building stock is the sector with the highest potential for energy savings.

Figure 43: Italian building stock type



Thermal regulation

New construction and building renovation must follow energy consumption control guidelines. In each building, or part of it, thermal losses occur from the building elements. To limit energy consumption not coming from renewable sources, the law[263] obliges a series of precautions, controls and tests, such as how heat is dispersed through the building shell (determined by walls adjacent to the external façade and the roof) or how the heating system is performing.

After the 2005 law was instituted, new construction (either buildings to be demolished and rebuilt or to be expanded by more than 15%, or more than 500 m^2), as well as significant shell renovations (more than 25% of dispersive surface) and energy renovations, has to follow these rules.

For buildings built before this new decree, some investments were used to improve energy efficiency: almost 77% of 2018 investments (€2.56 billion over 3.3 total) were used on buildings built before the 1980s (see Table 33); 35% (€1.1 billion) was invested in buildings built before the 1960s; and about 36% (€1.2 billion) was invested in detached dwellings. Finally, 50% of investments (€1.7 billion) were in terraced houses

[262] Simon Pezzutto et al. (2018), Hotmaps Project, D2.3 WP2 Report – Open Data Set for the EU28, online accessible at: www.hotmaps-project.eu; and EU Building Stock Observatory, online accessible at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/eubuildings

The majority of building stock data refer to the year 2016.

[263] D.lgs 191/2005 from EU guideline 2002/91/CE about energy savings.

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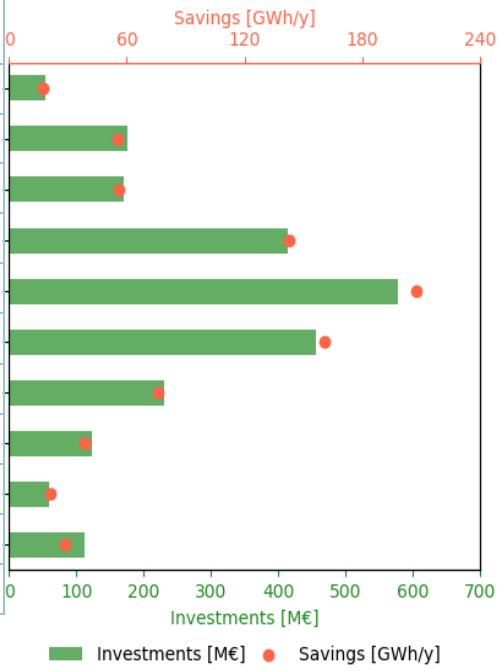
or residential building stocks with more than three floors above ground floor.[264]

Table 33: Investments and energy savings from building renovations per year of construction in Italy

	Investments		Savings	
Year of construction	M€	%	GWh/y	%
Not specified	54,8	2.3%	17,4	2.2%
< 1919	176,0	7.4%	55,4	6.9%
1919–1945	171,3	7.2%	56,1	7.0%
1946–1960	413,3	17.4%	142,7	17.8%
1961–1970	578,4	24.3%	207,6	25.8%
1971–1980	456,4	19.2%	160,7	20.0%
1981–1990	231,4	9.7%	75,8	9.4%
1991–2000	123,4	5.2%	38,6	4.8%
2001–2005	59,7	2.5%	20,9	2.6%
> 2006	112,0	4.7%	28,5	3.5%
TOTAL	**2376,7**	**100,0%**	**803,7**	**100,0%**



Source: ENEA

Investments for building renovations were highest in buildings built in the 1960s, with €578 million and more than 207 GWh per year saved.

Prior to these new procedures, thermal regulations for residential buildings were introduced in 1991 (Dlgs 10/1991). Italy was divided into climatic referral areas for which the dwelling heating patterns — and therefore the energy consumption—are limited during seasons.

By 2017, each residential building stock with a central heating system was provided with thermostatic valves placed on each radiator (households could deduct 50% of the cost of these valves). These valves allow residents to regulate the temperature between 20°C and 22°C (values determined by the law).

Dwelling types, location and tenure distribution

The number of single-family homes amounts to 6.68 million (21% of the total number of dwellings/units). There are a further 15.18 million multi-family buildings (47% of total). The number of apartment blocks (i.e., high-rise buildings that contain several dwellings and have more than four storeys) amounts to 10.10 million (32% of the total number of dwellings/units).

Most of dwellings/units are owned by households (73%, 23.36 million); the remaining third is either rented (14%, 4.57 million) or in a social housing contract (13%, 4.03 million).

[264] L'efficienza energetica, rapporto annuale 2019, ENEA.

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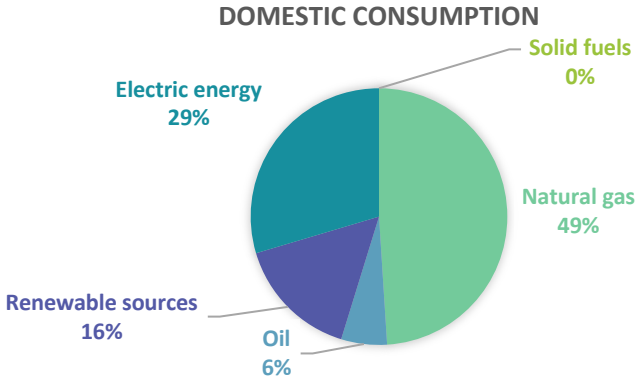
Population distribution in 2018 is generally within towns and suburbs (41.2% of households), whilst 34.3% live in cities (down by 21.5% since 2009) and 24.5% live in rural areas (up 51% since 2009).[265] The EU 2018 average was 41.9% (-8.3% since 2011) in cities, 31.1% (+9.1% since 2011) in towns and 27% (+4.7% since 2011) in rural areas.

4.7.4 ENERGY MARKET

Fuel penetration

The Italian energy market is strongly dependent on natural gas fluctuations, more than what could eventually be with oil or solid fuels. In fact, as shown in Figure 44, almost half of household consumption relies on natural gas, whereas far fewer households use oil (6%), and none rely on solid fuels. One-third of residential consumption relies on electricity and one-sixth on renewable sources. Amongst these sources, district heating and biomass are noteworthy.

Figure 44: Fuel mix of household consumption in Italy



District heating systems generate heat in several ways (from fossil fuels to renewable sources). Italy is amongst the EU Member States with the lowest distribution of district heating, with 6% of the population served.[266] Since the 1970s, district heating distribution has increased by 6.7% every year from 2000 to 2017 in terms of cubic meters and by four times in terms of grid extension. Since 2017, both increases have slowed down. However, the population accessing this heating source is mainly living in the North (98%), especially in Piedmont and Lombardy (68%).

Regarding biomass, 21.4% of families use wood to heat their dwellings,[267] especially in mountain areas and generally in the Northeast (37.9% self-produced) In the North, just 4.1% use wood pellets.

Ninety-eight percent of families have a heating system in their dwellings (all families in the North, whilst in Sicily 11.6% of families do not have a heating system). And 99% have water heating systems.

On the contrary, 29.4% of household have cooling systems running on the electric grid

[265] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en

[266] Relazione Annuale, Stato dei Servizi 2019, ARERA, Vol. 1.

[267] ISTAT: https://www.istat.it/it/files/2014/12/Ungaro.pdf

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(or on renewable sources, if present): 40% in the Northeast, 23.4% in the Northwest and 47.5% in Sardinia. No cooling is found in mountain areas, yet.

Market structure

The electric market, liberalized[268] in 1999, is composed of four segments: production, transmission, distribution and retail.

Terna, one of the main operators in Europe, works in a regulated monopoly within a regulated market managed by ARERA, the energy, grid and environment regulation authority.[269] Terna is responsible for transmitting and maintaining electric power in the grid but is not involved in production, distribution and retail.

Households buy their electricity through two different markets: regulated and free. Regulated market prices are defined every three months by ARERA, whilst free market prices are determined by retailers, according to guidelines established by ARERA.

Similarly, gas is distributed through both a regulated and a free market. Two authorities manage the infrastructure for distributing gas: one on a national scale, the RNG,[270] managed by SNAM,[271] and a regional authority called RRT.[272] SNAM is the major regulated utility in Europe and administers the gas infrastructure (the most extensive system in Europe), the natural gas stock and the gasifiers.

On 1 July 2020 , the regulated market for both electricity and gas will end, and all households will have to move to the free market.[273] To meet this agreement and help households make an easier transition, ARERA has introduced several commitments for retailers and for the Ministry of Economics, which include the activation of a portal where households can compare offers from retailers, a list of retailers that operate on the market and regulated-market-like offers.[274]

Energy price trends for domestic consumers

In Figure 45 and Figure 46 the prices[275] for electricity and natural gas are shown. All data shown in these figures are relative to a typical domestic user with 2,700 kWh or 1,400 m^3 of natural gas consumption per year.

In the last three years, whilst excise duties and distribution components did not vary much, the energy and tax components fluctuated significantly. Moreover, around 60% of the bill is made up of distribution and taxes, not energy.

[268] DL Bersani 79/99.

[269] Autorità di Regolazione per Energia, Reti e Ambiente, ARERA.

[270] Rete Nazionale dei Gasdotti (RNG).

[271] Società Nazionale Metanodotti (SNAM), or national methane pipeline society.

[272] Rete Regionale di Trasporto (RRT).

[273] Dlgs 91/2018.

[274] Free market offers similar to regulated market ones. Prezzo Libero A Condizioni Equiparate di Tutela, PLACET.

[275] Relazione annuale – Stato dei Servizi, ARERA, 31 Marzo 2019, Vol. 1.

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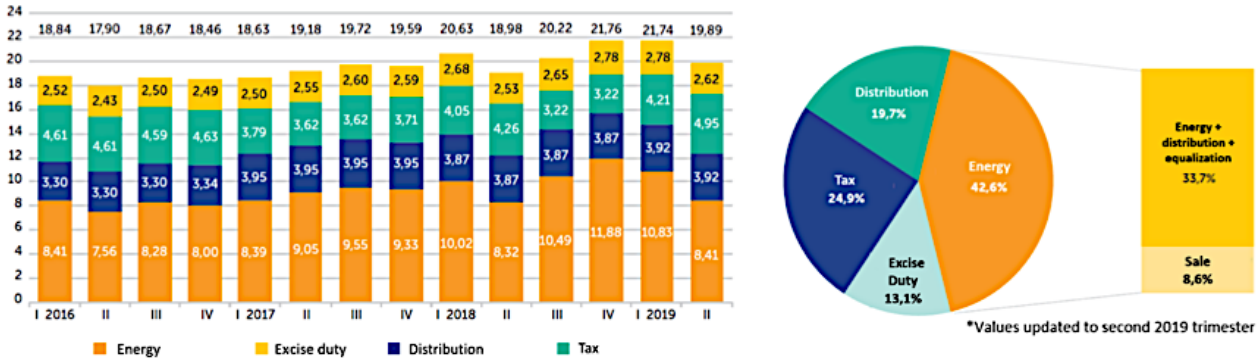
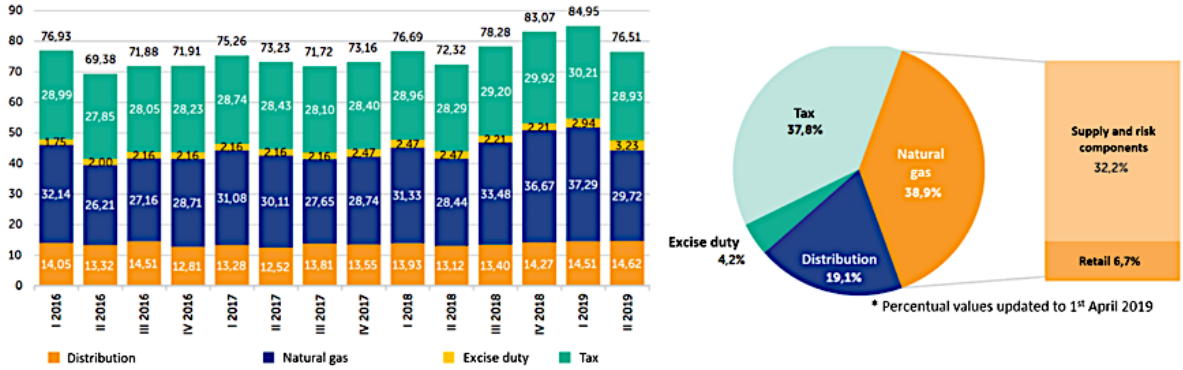
Figure 45: Electricity prices in Italy per year and their breakdown.



**Electric prices in euro cents per kWh from 2017 to October 2019, broken down into its four components for a typical domestic user with 2,700 kWh per year and power up to 3 kW*

Source: ARERA

Figure 46: Natural gas prices in Italy per year and their breakdown



** Natural gas prices in c€ per m3 for a typical domestic user: household with private heating and 1,400 m3 annual consumption.*

Source: ARERA

The gas market, shown in Figure 46, is averaged over regions in Italy, unlike the electricity market, which is on a national scale. Both prices are evaluated in terms of electricity and gas only.

Household energy consumption

In 2013, households spent more than €42 billion on electricity, with an average expense of €1,635 per family per year—ranging from €1,387 in the South to €1,872 in the Northeast (+30% than in the South).[276] Yearly expenditures change by areas, climatic conditions and the consequent use of heating or cooling.

[276] ISTAT: https://www.qualenergia.it/sites/default/files/articolo-doc/Consumi%20energetici%20delle%20famiglie%20-%2015-dic-2014%20-%20Testo%20integrale%282%29.pdf

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These variabilities strongly depend on several energy sources available. Also, the larger the family the greater the expenses: from €1,358 for single households to €2,102 for families with five or more members (+55% than families with one component).

Homes with older adults spend slightly more, whether the household has one or more members (for instance, a family with both an older member and children) because heating in these homes is often kept at a higher temperature.

A large proportion of expenses go to electricity (35.5% on average, but 45% in the South), which is mainly used for lighting, electric appliances and cooling systems, less frequently for heating.

Adoption of Article 7: Actions for energy efficiency obligation schemes (EEOS)

Italy has an ongoing energy efficiency obligation Scheme (EEOS), and several measures have been implemented. For the period 2005–2016, the overall final energy savings resulting from the measures analysed (white certificates, tax relief, thermal energy account, legislative decree 192/2005, eco incentives and EU regulations and other measures, such as replacing large domestic appliances) amounted to around 11.6 Mtoe/year at 2016, with 6.72 Mtoe/year savings from the residential sector.[277] The next target, set for the period 2016–2020, has already been partially achieved in 2016 (37% of 2020 target). In total, the residential sector at 2016 accomplished 84% of the target set for 2020.

The residential sector dominated savings from the Italian EEOS until 2012, when a change in the calculation methodology—valuing the benefits of longer-lived measures—caused a shift to industrial measures.[278] However, this change has not resulted in zero investments in the residential segment (EEOS have primarily been used to deliver relatively low-cost energy efficiency measures,[279] for instance: the obligation to include renewable energy sources in new buildings and buildings undergoing major renovations; or the requirement to include a clause informing the purchaser or lessee about the building's energy certification as part of a property sale or leasing agreement).

In fact, and according to 2030 objectives, Italy aims to reduce primary energy consumption by 43% (with respect to values in 2007). To reach this goal of energy efficiency (EEOS has supported a growing market for ESCOs[280]), building renovation becomes increasingly important, with €3.3 billion invested between 2014 and 2018, most of which were used for buildings built before the 1980s.

Other investments—through Ecobonus and Bonus Casa—have been specifically targeted for renovating doors and windows and also for installing condensing boilers

[277] Italian Energy Efficiency Action Plan, June 2017,
https://ec.europa.eu/energy/sites/ener/files/documents/it_neeap_2017_en.pdf

[278] Fawcett, T., Rosenow, J., and Bertoldi, P. (2019). Energy efficiency obligation schemes: Their future in the EU. Energy Efficiency 12(1): 57–71. Available at: https://link.springer.com/article/10.1007%2Fs12053-018-9657-1#Fn5

[279] D.lgs 28/2011 for the promotion of use of energy from renewable sources.

[280] Energy Service Company (ESCo) offers services for energy diagnostics and finds the best interventions to deal with the energy efficiency.

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and heat pumps. These deductions are still available for households who might want to make their dwellings more energy efficient.

Italian authorities have also made other bonuses accessible to help people who are having difficulty paying their electric, natural gas and water bills. This help is available to eligible households; eligibility is based on household income, household size (number of members) or electromedical device needs.

In the last years (2015–2018), electricity bonus distribution has increased, especially amongst households living in the South, whilst gas bonus assignments have not changed much, in part because the gas infrastructure serving Italy's southern islands is incomplete (see Figure 55). Therefore, less gas is available in Sicily and especially in Sardinia and consumption is lower than in other regions. With less gas available, fewer bonuses are used. In 2018, the total amount of both bonuses was more than €1.3 million (+6.8% than 2017).

4.7.5 ENERGY POVERTY

According to the Italian Ministry of Economic Development, the definition energy poverty should include 'difficulty in purchasing a minimum of energy goods and services' or, alternatively, 'a sense of energy vulnerability, when access to energy services implies a distraction of resources below a normal value'.[281]

Unfortunately, this description has not been updated since 2017 and is not yet a formal national definition. Furthermore, there are no policy-regulated indicators to determine energy poverty.

Nevertheless, the Italian Energy and Sustainable Economic Development Agency (ENEA) specified[282] that an energy poverty definition must include:

- a high level of energy expenditure;
- an amount of overall expenditure (net of energy costs) below the relative poverty threshold; and
- a zero value for the purchase of heating products for families with a lower total cost to the median.

Estimate of national number of households in energy poverty

In Italy, estimates about the number of households in energy poverty have varied between a minimum of 2.1 million (8.7% of total), with a peak of 8.5% in 2016 (+0.1%) and an incidence of 14% in the South, as underlined by the Italian Energy Strategy Agency (SEN) in 2017,[283] to a maximum of 4.4 million (17%), as indicated by the

[281] Italian Ministry of Economic Development MISE: National Energy Strategy SEN 2017.

[282] ENEA, *Energy Efficiency Annual Report*, RAEE 2018; UK Government and after Banca D'Italia Faiella e Lavecchia: Low Income High Costs LIHC.

[283] Faiella, I., Lavecchia, L., Miniaci, R., and Valbonesi, P. (2019). *Rapporto sullo stato della povertà energetica in Italia*. OIPE. Available at:
http://oipeosservatorio.it/wp-content/uploads/2019/06/Rapporto_OIPE_sulla-_povert%C3%A0_energetica_2019.pdf

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European Commission.

The approach followed by SEN and by the European Union, based on economic variables, family incomes and expenses, does not consider other factors, such as behaviours and perceptions. Energy poverty is multidisciplinary: a more exhaustive estimation should include income and consumption levels, family size and composition, energy costs, dwelling energy efficiency, geographic localization and climatic differences, health and how individuals perceive their wealth and lifestyle.

Within this estimate, one should notice that 19% of elderly people fall into the energy-poor group and 15% fall into the energy-vulnerable group.[284] Therefore, one-third of older people are energy poor or vulnerable.

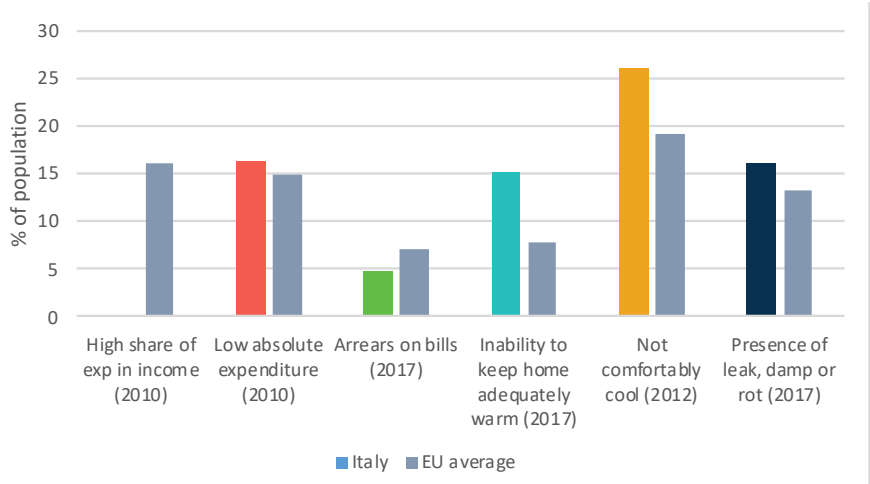
Results of EPOV indicators

The Energy Poverty Observatory (EPOV) suggests a series of four primary and two secondary indicators for energy poverty, of which two primary indicators are based on self-reported experiences of limited access to energy services and the other two secondary indicators consider household income or energy costs.[285]

From these indicators (Figure 47), more than 16% of the Italian population (2010) had difficulty affording energy expenditure, and 14% of the population found it hard to keep the home adequately warm during winter (2017). Fewer people (4.8% of population) reported arrears on utility bills.

The two selected secondary indicators assess the ability of the household to keep comfortably cool, which affects more than 26% of population, and the presence of leaks, damp or rot in dwellings (which affected 16% of the population in 2017). Another secondary indicator, not presented in the chart, shows a poverty risk of 30% of the population (whilst the EU average is 23.5%).

Figure 47: Results of EPOV indicators in Italy: four primary and two selected secondary indicators



[284] *European Domestic Energy Poverty Index—Edepi* (Open Exp, January 2019).

[285] High share of expenditure in income indicator is not available for Italy.

Before the world economic crisis, in which affected Italy in 2010, the ability to pay bills was improving amongst the population, as indicated by people's capability to keep their homes adequately warm in wintertime (Figure 48). Then, after 2010, especially under this second indicator, energy poverty grew quickly and has still not reached the pre-crisis levels.

The arrears on bills indicator did not increase significantly, but savings of Italian households declined (Figure 49)[286] and came to a historic low in 2017 (from almost 14% in 2008 to 4.8%).

Figure 48: Energy poverty over time In Italy

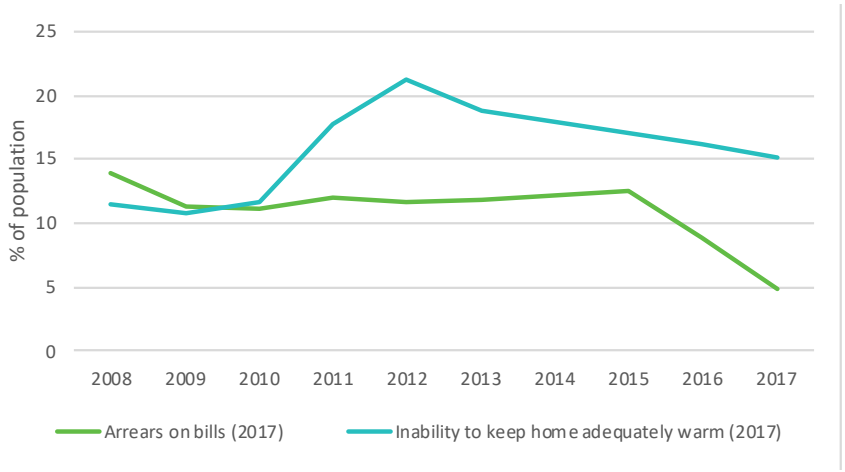


Figure 49: Italian gross savings per year

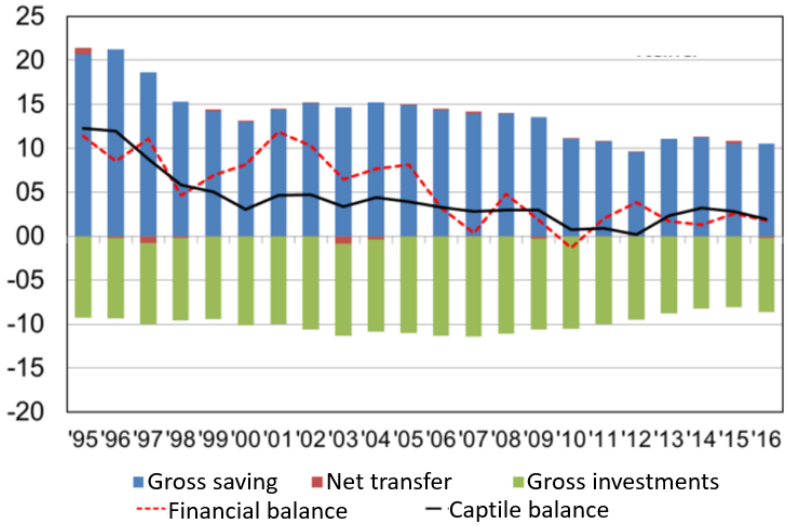


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Figure 50 shows the arrears on bills and inability to keep the home warm indicators ranged over income groups (income decile 1 being the lowest income and 10 the highest). As expected, the two indicators decrease as household income increases, especially the ability to keep the home warm. There is, however, a threshold level

[286] D. Caprara et al., *Questioni di Economia e Finanza*, Nov. 2018, 470, Banca d'Italia, p. 18

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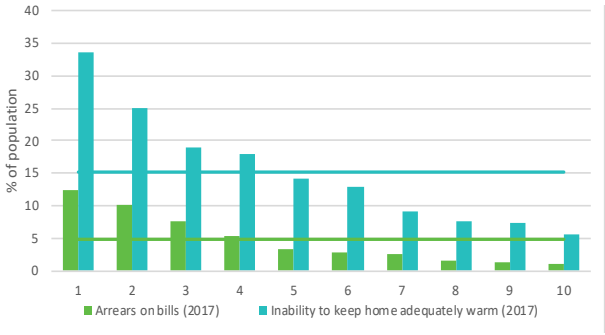
under which it seems no one can go: Italian dwellings are quite old and the awareness or desire to improve energy efficiency is not widespread amongst the population. Even high-income households potentially face difficulties paying bills or keeping their homes warm.

Figure 50: Energy poverty by income decile in Italy

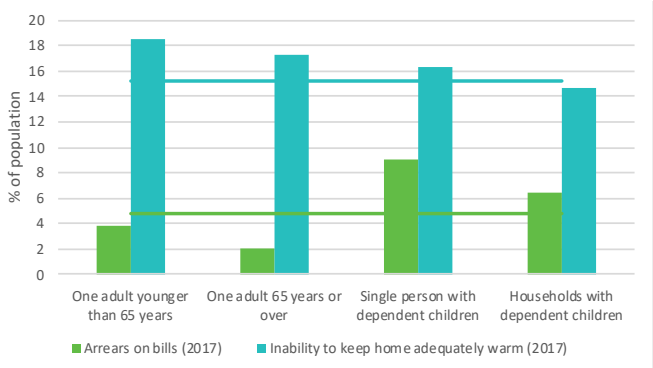


**Horizontal lines show averages for each indicator.*

In Figure 51 two population groups are shown: households with and without children. This bar chart illustrates how households with children are better able to keep the home warm than those without children. Eventually, however, households with children can have greater difficulty paying bills, consequently that indicator is higher for these groups. In addition, families with children have more expenses.

In single households, there appear to be greater difficulties in keeping the home warm, but these households are less in arrears on bills. Both these circumstances could be attributed to the likelihood that single adults—and especially adults over 65—live in apartments (see Figure 54). It should also be noted, as indicated previously, that one-third of older adults are energy poor or vulnerable.

Figure 51: Energy poverty by household composition in Italy



**Horizontal lines show averages for each indicator.*

Owners have a better welfare (Figure 52) and more energy efficient dwellings than tenants or reduced rent households. In fact, reduced rent families might benefit by having social and energy bonuses, but still, more than 20% have a high inability to keep home warm, and struggle paying bills to a similar extent to that of market tenants. Energy poverty appears to be high, under both indicators, for households who rent their homes at market rates.

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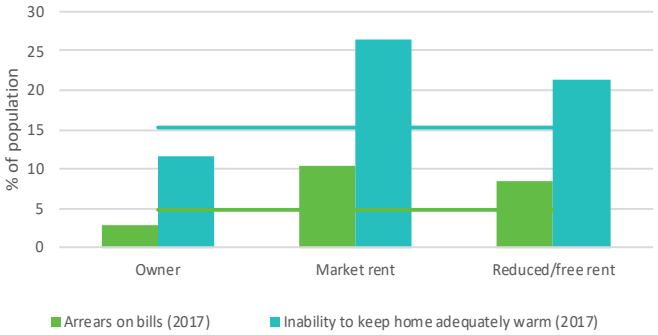
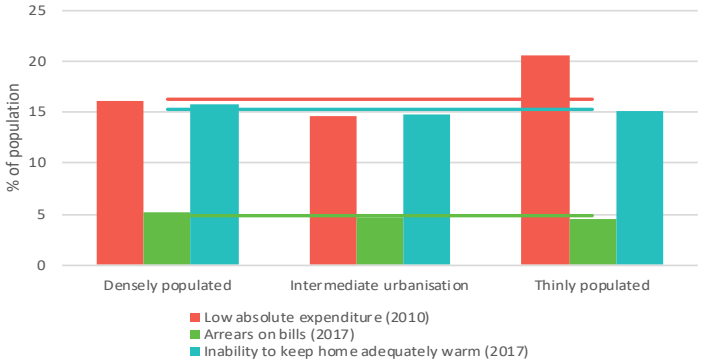
Figure 52: Energy poverty by tenure in Italy



**Horizontal lines show averages for each indicator.*

The low absolute energy expenditure indicator (Figure 53 in red) could indicate a household dangerously under-consuming energy or reveal households in dwellings with high energy efficiency standards. Under this indicator, households living in thinly populated areas are more at risk of energy poverty.

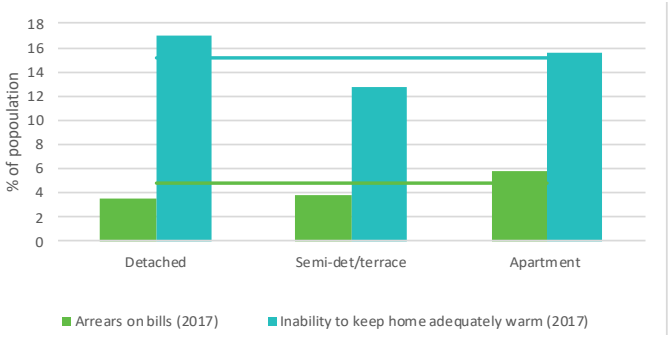
Figure 53: Energy poverty and urban density in Italy



**Horizontal lines show averages for each indicator.*

Seventeen percent of the population reports finding it hard to keep detached dwellings warm, which may be due in part to the fact that detached dwellings are usually older than other types (Figure 54). Arrears on bills appear to be higher in apartments.

Figure 54: Energy poverty by dwelling type in Italy



**Horizontal lines show averages for each indicator.*

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Policies to mitigate energy poverty

All policies signed by the Italian government to mitigate energy poverty are part of the electric energy and gas bonus (TIBEG[287]). To access these bonuses, a potential beneficiary has to be subject to one of the following mandatory conditions (valid for both electricity and gas):

- equivalent economic status indicator (ISEE[288]) not more than €8,107.5 per year;
- households with three or more children and an ISEE lower than €20,000 per year;
- households who receive basic income or basic retirement income.

The electricity bonus is also available for households with members suffering from a disability or long-term illness who might need life-maintaining electric-powered devices; whilst the gas bonus is even for householders with, at most, a G6 gas meter (for domestic users only).

The electricity bonus has a higher uptake than the gas one (Figure 56). The electricity bonus has been accessed by 2.9 million householders at least once before 2019, and 1.8 million householders have accessed the natural gas bonus.[289]

However, despite all the engagement projects instituted by the authorities, only 30% of potential beneficiary households have taken advantage of the electric bonus, and 35% of the gas bonus. Bonuses have increased over time as the number of interested households has increased. Economic disadvantage is the main route to eligibility for the bonuses.

Geographically, beneficiary householders in Northern and Central Italy are fewer than in the South (Figure 55) which is surprising as the southern areas are served by an incomplete gas grid and awareness among potentially interested households is limited. Remarkably given the inadequate gas infrastructure in Sardinia, in this island and in the whole South-islands area, bonusses were given to just under half of the eligible households (45%), whereas eight out of ten eligible households receive bonusses in the northern areas. Households receiving the bonus are rising from 2015 to 2018 (Figure 57).

[287] Testo Integrato Bonus Energia elettrica e Gas (TIBEG), Allegato A, 26/09/2013. Available at: https://www.autorita.energia.it/allegati/docs/13/402-13all.pdf

[288] Indicatore della Situazione Economica Equivalente, ISEE.

[289] MISE, *Bonus sociale elettrico e gas 2018*, Relazione 279/2019/I/COM.

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Figure 55: Number of households in Italy receiving gas and electricity bonuses per area

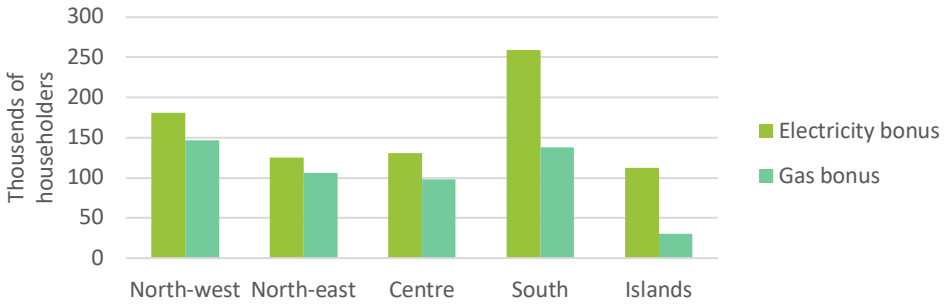


Figure 56: Electricity and gas bonuses in Italy in the last four years

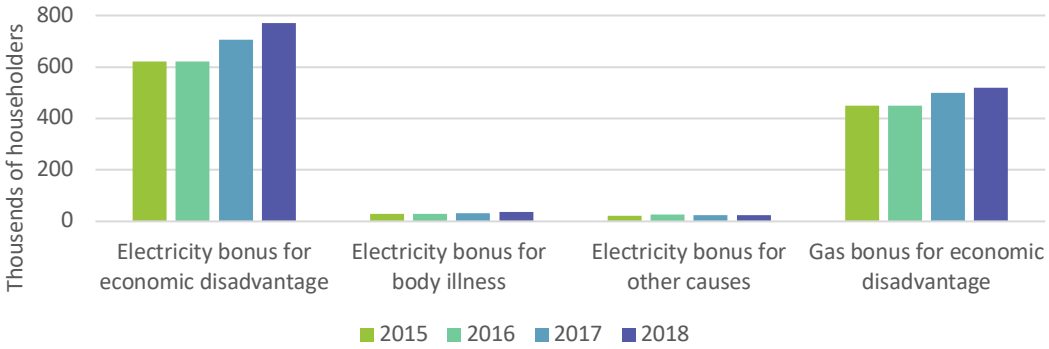
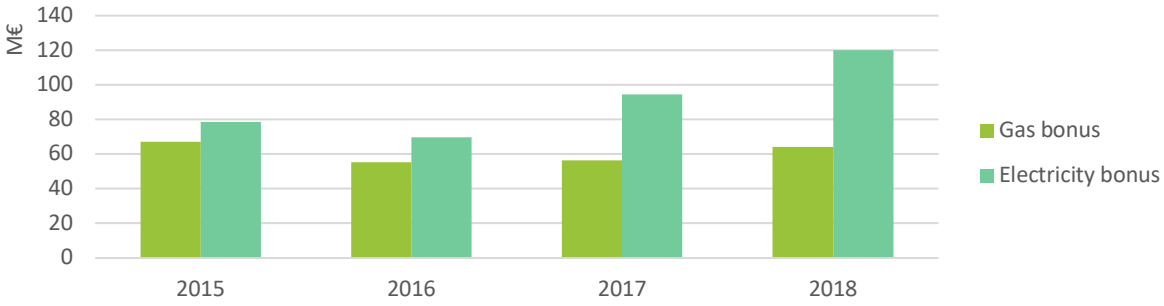


Figure 57: Gas and electricity bonuses investment value in Italy since 2015



4.7.6 CONCLUSIONS

Italy does not have a clear definition of energy poverty. One definition suggested by the Ministry of Economic Development concerns the difficulty in purchasing a minimum of energy goods and energy vulnerability, but this description has not changed since 2017 and does not include any policy-regulated indicators. It also lacks information about energy expenditure and relative poverty thresholds.

The EPOV suggested some indicators to be included to determine energy poverty. In Italy, the arrears on bills and the inability to keep adequately warm in wintertime and cool in summer were predominantly presented to describe an actual cross-section of Italian society.

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In fact, these indicators suggest that urban density (Figure 53) or dwelling type (Figure 54) affect energy poverty, but not as strongly as other factors, such as household income and energy expenditures (Figure 50), if the dwelling is owned or rented (Figure 52) and the family composition and size (Figure 51).

The world economic crisis affected Italian society since 2010, especially in the ability of households to keep the home warm enough, even though there is a slow but remarkable positive trend (Figure 48).

Italian authorities have enabled policies to improve energy efficiency and face energy poverty. Two main bonuses (regarding electric energy and gas) have shown to be helpful to reduced rent households, even though they cannot completely alleviate energy poverty.

Other aids, include amongst others cost deductions to incentivise energy efficiency and building renovation, especially for buildings built before 1980, have saved more than 4.5 TWh per year.

Global warming will worsen the effects on energy poverty, especially during warm summers or cold winters. The warmth/cold effects vary significantly in Italy because of widely varying altitude levels and climates. Energy poverty could be more consequential in summertime when blackouts might occur (and energy-poor households suffer the most, trying to keep their dwellings cool) or in wintertime, with the gas price fluctuation (which can also determine the price of electricity).

Global warming will have large consequences on these two aspects, and Italy should make more efforts to cope with them. In fact, in line with the need to mitigate climate change globally, Italy should reduce its primary energy consumption by 43% (with respect to 2007) and its greenhouse gas emissions by 35% by 2030.

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4.8 LATVIA CONTEXT

4.8.1 INTRODUCTION

Latvia has a continental climate with hot summers and cold winters. The population of Latvia is 1.9 million (2019)[290] made up of 0.85 million households.[291]

Table 34: Household composition in Latvia, 2018

Single adult	0.38m (45% of total)
Single adult with children	0.06m (7% of total; 16% of single adult)
Couple	0.26m (31% of total)
Couple with children	0.12m (14% of total; 46% of couple)
Other type	0.21m (29% of total)

Latvia has a shrinking population (from 2017 to 2018, the population of Latvia declined by -0.8%).[292] Projections until 2100 also show a continuing negative population growth rate.[293] The proportion of the total population that is aged 65 years and over has increased from 18.1% 2010 to 20.1% in 2018, and future estimates indicate a further aging of the population, with 24.7% in 2030 and 28.7% in 2050.[294]

The number of single-adult households aged 65 and over in 2018 amounts to 0.15 million (18% of total; 39% of single adults).[295]

The old-age dependency ratio amounts to 31.4 in 2018,[296] which is just above the EU-28 average of 30.5%. The old-age dependency ratio is defined as the ratio between the number of persons aged 65 years and over and the number of persons of working age (15–64 years). The value is expressed per 100 persons of working age. Thus, there are 31.4 persons aged 65 years or over for every 100 persons of working age. The ratio is projected to increase to 41.4 in 2030 and 51.6 in 2050.[297]

Latvia's economy is relatively weak compared to other EU countries, despite a high employment rate, which was 76.8%[298] in 2018 compared to the EU-28 average 73.2%. Low productivity is one of the main challenges. The mean income in 2018 was €8,740. The median income in 2018 was €7,322,[299] which is well below average for the EU-28

[290] https://www.csb.gov.lv/lv/statistika/statistikas-temas/iedzivotaji/iedzivotaju-skaits/galvenie-raditaji/iedzivotaju-skaits-ta-izmainas-un-blivums

[291] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en

[292] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow

[293] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en

[294] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en abd Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en

[295] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en

[296] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tps00198/default/table?lang=en

[297] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tps00200/default/table?lang=en

[298] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en

[299] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en

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(€17,385).

The economic crisis in 2008 has a significant impact on Latvia's economy, as seen in Table 35.

Table 35: Impact of 2008 economic crisis on GDP growth rate and employment In Latvia

	2007	2008	2009	2010	2011	2012	2018
1. Real GDP growth rate	10.0	-3.5	-14.4	-3.9	6.4	4.0	4.8
2. Employment rate	75.2	75.4	66.6	64.3	66.3	68.1	76.8

4.8.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

Latvia's government has yet to complete the draft National Energy and Climate Plan (NECP), but key numbers are already available. Table 36[300] presents the NECP's proposed targets for renewable energy.

Table 36: RES targets in the Latvian National Energy and Climate plan.

Decarbonization politics results from RES subdimension	Actual	Target				
	2017	2020	2022	2025	2027	2030
RES end-user consumption (%)	39,01	40	41,8	44,3	46,5	50[301]
RES electricity production (%)	54,36	59,8				>60
RES heat and cooling production (%)	54,58	53,4	55,2	56,08	56,69	57,59
RES transport sector (%)	2,5	10%	-	-	-	7

The NECP has broadly envisioned energy efficiency targets, but more precise numbers have been drafted specifically for state buildings. The 2030 targets are defined as[302]:

- the average thermal energy consumption for heating will be at least 30% lower than in 2020;
- at least 2,000 multiapartment residential buildings and at least 5,000 private houses will have been renovated, with non-emission RES technologies installed;
- the energy efficiency of public and local government buildings will be improved;
- A long-term solution for improving the energy efficiency of the residential sector will be developed and implemented.

For public and local government buildings, a target has been set to renovate 3% of these buildings every year, eventually reaching an average heat consumption of 100 kWh/m^2/year by 2030.

[300] https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

[301] EK rekomendācijās stingri ieteiktā mērķa vērtība (https://em.gov.lv/files/attachments/lv_rec_lv.pdf)

[302] https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

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4.8.3 RESIDENTIAL BUILDING STOCK

The total number of dwellings/units is 1.04 million; 64% of all dwellings/units were built before 1990. Only 10 to 15% of all residential buildings in Latvia have been built over the last 10 to 15 years and are considered to be modern and well-established dwellings. Many old apartment buildings will become uninhabitable over the next two decades if no action is taken. Multiapartment buildings suffer from inaction on energy efficiency due to the bureaucratic and complicated process of improvement, the number of parties involved and the need to have a majority of dwelling owners agree on such decisions, which is hard to achieve.

Most buildings have high energy consumption and have significantly lower thermal performance than can be achieved by currently available technologies. The average energy consumption[303] for heating of different types of single-dwelling buildings is 139 kWh/m^2 per year; for multiapartment buildings, it is 137 kWh/m^2.

There are 0.8 million single-family houses and low-rise multifamily houses, which represents 86% of all dwellings. The number of apartment blocks—high-rise buildings that contain several dwellings and have more than four storeys—amounts to 0.15 million (14% of the total number of dwellings/units).

Eighty-one percent of the Latvian population own their own home (2018). Around 10% of the population rents at market prices, and a similar percentage lives in social housing. Most of the population lives in cities (43.4%); 19.4% live in towns and suburbs, and 37.2% still live in rural areas.[304]

4.8.4 ENERGY MARKET

In Latvia, more than 70% of all heat consumed is delivered centrally. In 2018 more than 633 boiler houses and 175 cogeneration plants provided heat in Latvia, delivering 6,998 GWh of heat to consumers. Latvia ranks third in the EU for the percentage of buildings using district heating.

The three main sources of heat are solid biomass (41.5%), district heating (30.5%) and natural gas (8.9%). District heating mainly uses biomass (61.2%) and natural gas (37.6%) as fuels for heat-only boilers; in cogeneration plants the main fuel is natural gas (58.5%).[305]

Energy consumption per dwelling in Latvia is near the EU average, and the largest proportion of energy is used for space heating. Total energy consumption of households and emissions are increasing every year.

The electricity market has been liberalized for households since 2015 and for natural gas since 2017. After electricity market liberalization, power was no longer subsided and prices initially increased but have since been more stable.

[303] Construction Information System Summary of the register of energy certificates for buildings to 5 September 2019.

[304] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en

[305] https://www.em.gov.lv/lv/nozares_politika/energoefektivitate_un_siltumapgade/siltumapgade/

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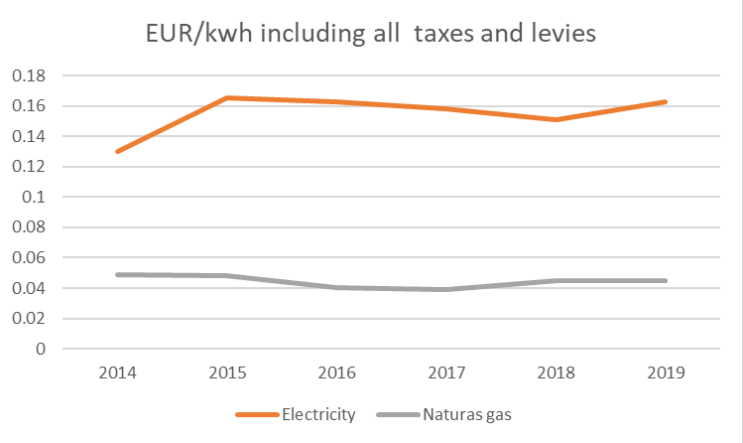
Figure 59: Electricity and gas prices for household consumers in Latvia, 2014–2019



Source: Eurostat

Energy efficiency obligation scheme (EEOS)

The EEO was introduced in May 2017. Currently, the EEO is limited to retail electricity operators, which are 14 in total. At present, the EEO covers a small number of energy suppliers; consequently, the scheme's mandatory obligation to implement energy efficiency improvement measures, both in the suppliers' operations and in their customers' activities, applies only to a small number of economic operators. After 2021 the government plans to expand the EEO to cover suppliers of thermal energy, fuel for transportation, natural gas and electricity. Twenty-seven additional energy suppliers are expected to deliver the EEO: 14 transportation energy suppliers, three thermal energy suppliers, three natural gas suppliers and seven electricity suppliers. Obligated parties are encouraged to disseminate information about energy efficiency and engage in other measures that would have a direct impact on energy consumption, particularly in the business sector.[306]

4.8.5 ENERGY POVERTY

There is no clear definition of energy poverty in Latvia. A new Horizon 2020 project called STEP,[307] which includes Latvia in its coverage, aims to define energy poverty.

A stated goal of Latvia is to continually reduce the energy poverty rate to 2030, ensuring it is below the average EU rate, so Latvia currently has a goal to reduce the energy poverty rate to less than less than 7.5% in 2030.[308]

Analysis of the EPOV primary indicators for Latvia shows that, in 2017, the inability to keep the home adequately warm was problematic for 9.7% of all households, which was worse than the EU average of 7.8%. However, in 2018 that indicator for energy poverty dropped to 7.5% in Latvia, lower than the EU 2018 average of 8%.

306 https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

307 STEP project website available at: https://www.stepenergy.eu/en/

308 https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

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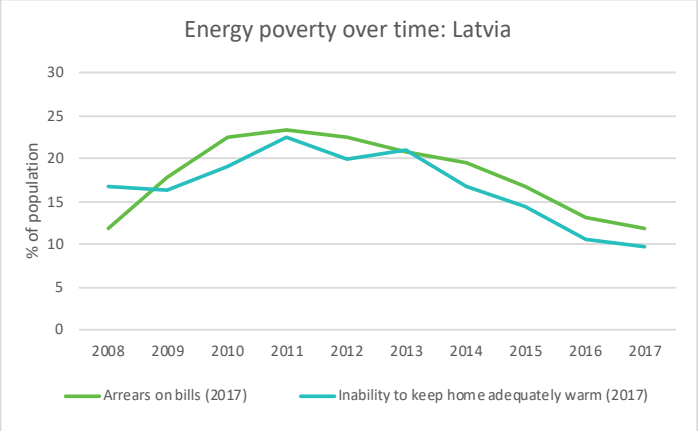
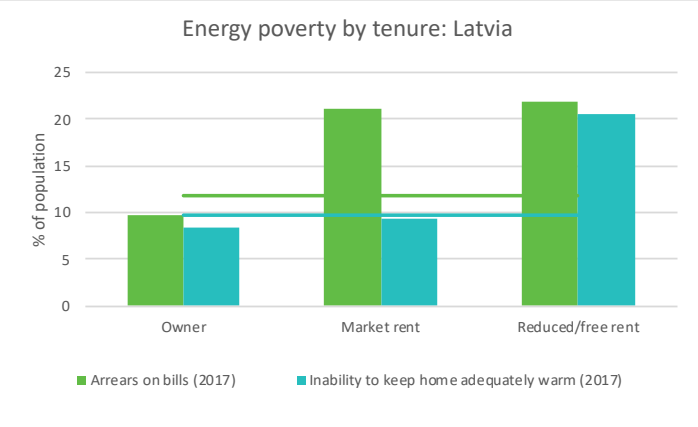
Long-term, this indicator in Latvia has generally improved since 2008, but during the period 2009–2013 energy poverty increased as a result of the economic downturn. For example, in 2009 18% of the population could not heat their home due to lack of money, rising to 21% in 2013.

Figure 58: Energy poverty in Latvia over time



Energy poverty in Latvia is a particular problem for households living in social houses/apartments, where this rate almost reached 21% in 2017. In Figure 59[309] one can see that owners of dwellings on average are less likely to be affected by energy poverty.

Figure 59: Energy poverty in Latvia by tenure



** Horizontal lines show averages for each indicator*

Analysing dwelling type, households living in detached dwellings have significantly lower energy poverty levels compared to those in semi-detached houses and apartments.

[309] EPOV indicators.

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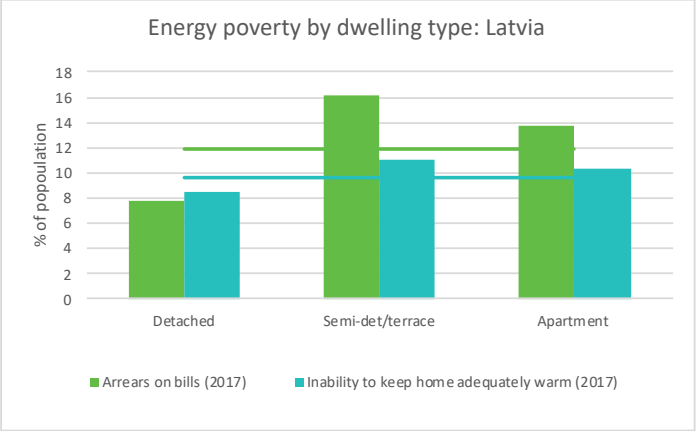
Figure 60: Energy poverty by dwelling type in Latvia



**horizontal lines show averages for each indicator.310*

In 2016, 22.7% of the population at risk of poverty could not afford to keep their homes warm, which is more than twice compared to the average of the total population.

Moreover, the situation is different when analysing certain types of households, where some types of households also show significant differences from the EU-28 indicator. Table 37[311] shows the household types that had the most difficulty to keep their homes adequately warm compared to the EU-28 average. Households with single adults, single adults over 65 years and poor families with two and three children are more likely to face heating difficulties compared to the EU-28 average.

Table 37: Latvian households that could not afford to keep their homes adequately warm because of insufficient income (%)

	Single adult (from all)		Single adult (from poor)		Single adult >65y (from all)		Single adult >65y (from poor)		2 adults with 2 children (from poor)		2 adults with 3 children (from poor)	
	LV	EU	LV	EU	LV	EU	LV	EU	LV	EU	LV	EU
2016	20.1	10.9	27.8	19.3	22.6	10.5	34.5	20.6	15.8	17.6	28.4	21.7
2017	16.8	10.7	23.8	19.7	19.6	10.7	27.8	20.3	23.5	16.8	26.8	18.4

Policies to mitigate energy poverty

In Latvia energy for specific end users is subsided by the state for electricity and by the municipality for heat.

Poor households (municipalities submit data about poor households), disabled people or families with disabled children receive 100 kW of electricity at a subsidized price of €0.03758/kWh for each calendar month. For a multi-child family, 300 kWh of

310 EPOV indicators.

311 https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

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electricity is provided at a price of €0.03758/kWh per calendar month. In addition, part of the fixed network and feed-in tariff is compensated depending on connection volume.

This level of support for vulnerable households will continue until 2030. Currently, only half of all eligible households benefit from reduced prices because the system for awarding these subsidies is not automated. The state plans to develop a Protected User Information System that will automatically identify individuals or families eligible for protection, thereby ensuring that a maximum number of eligible users receive the reduced tariff and that this tariff will be available from any electricity seller (presently only one provider offers the reduced tariff).

In Latvia, municipalities provide funds to help poor people cover part of their household costs, including heating costs. In 2017, 93.7 thousand people, or 4.8% of the population, received benefits; the average annual benefit per person is €177. Last year, municipalities spent €16.5 million on benefits to support poor and low-income households.[312]

Investing in energy efficiency is another way to alleviate energy poverty. From now to 31 December 2023, €166 million is available to Latvian citizens through the EU energy efficiency programme. The fund is targeted to improve the energy efficiency of buildings, including €136 million for renovating multiapartment housing. It is estimated that around 600 buildings (3%) or 20,000 dwellings will benefit. But households in multiapartment houses that are in debt cannot apply for a grant, which means many energy-poor households will not benefit from the fund.

4.8.6 CONCLUSIONS

- Energy poverty in Latvia is most critical in winter because of low temperatures and high energy use in dwellings for heating;
- In Latvia energy poverty has not been defined yet but this is becoming a priority;
- Energy poverty in Latvia is worse than the EU average for single adults, particularly those over 65, and families with two or three children. Single seniors (65 and over) appear to be vulnerable to energy insecurity;
- Households living in detached houses have a lower energy poverty rate compared to semidetached or apartment houses;
- On average, owners of dwellings can better handle payments and keep adequate levels of warmth. Households in rented premises, and especially if the premises are rented at a reduced rate, are particularly vulnerable to energy poverty. More than 20% of households renting at reduced rates report being in arrears on bills and an inability to keep the home adequately warm;
- Only about 10 to 15% of all residential buildings can be considered to be modern and well-established dwellings. Multiapartment houses dating from the

[312] https://em.gov.lv/lv/nozares_politika/nacionalais_energetikas_un_klimata_plans/

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Soviet era present huge challenges as they are not only inefficient energy-wise but are also in danger of being beyond repair if they are not renovated soon;

- Currently, municipalities support poor people with space heating benefits; the main criteria for getting support is a low income;
- For electricity consumers there is a reduced tariff for disabled persons, for households with disabled children, for poor households and for families with three or more children;
- There are EU funds available to renovate multiapartment houses. The programme will end in late 2023. It targets about 3% of multiapartment buildings in Latvia.

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4.9 THE NETHERLANDS CONTEXT

4.9.1 INTRODUCTION

The Netherlands is a country in North-western Europe, consisting of 12 provinces that border Germany to the east, Belgium to the south and the North Sea to the northwest. The Netherlands has a temperate maritime climate, which is influenced by the North Sea and the Atlantic Ocean, so, it is cool, cloudy and humid for most of the year.

The current population of the Netherlands is 17.18 million and the number of private households in 2018 was 7.83 million.[313]

The Netherlands is the 27th most densely populated country in the world, with a surface area of just 41,526 square kilometres.[314] The geographically small region of the Netherlands, along with its population of nearly 17 million people, leads to a population density of 488 per m^2, which is the highest in the European Union. 56.4% of the inhabitants live in cities, 32.9% in towns and suburbs and the rest in rural areas[315]. Forty percent of the population lives in the Randstad, a megalopolis consisting of Amsterdam, Rotterdam, The Hague and Utrecht.[316] Table 38 reports household composition in 2018. The number of single-adult households aged 65 and over in 2018 amounts to 1.02 million (13% of total households; 31% of single adult).[317]

Table 38: Household composition in the Netherlands, 2018

Single adult	3.26m (42% of total)
Single adult with children	0.34m (4% of total; 10% of single adult)
Couple	3.89m (50% of total)
Couple with children	1.61m (21% of total; 41% of couple)
Other type	0.68m (9% of total)

From 2017 to 2018, the population growth rate of the Netherlands equalled 0.6%.[318] The very slow 2019 annual growth rate of 0.28% is expected to continue decreasing, until it hits a standstill at 0% around 2040, before beginning a very slow decline. Because the rate is slow in either direction, population numbers are not expected to change significantly into the foreseeable future.[319]

[313] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en
[314] World Population Review: http://worldpopulationreview.com/countries/netherlands-population/
[315] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en
[316] https://www.holland.com/global/tourism/information/facts-and-figures.htm
[317] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en
[318] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow
[319] World Population Prospects: https://population.un.org/wpp/

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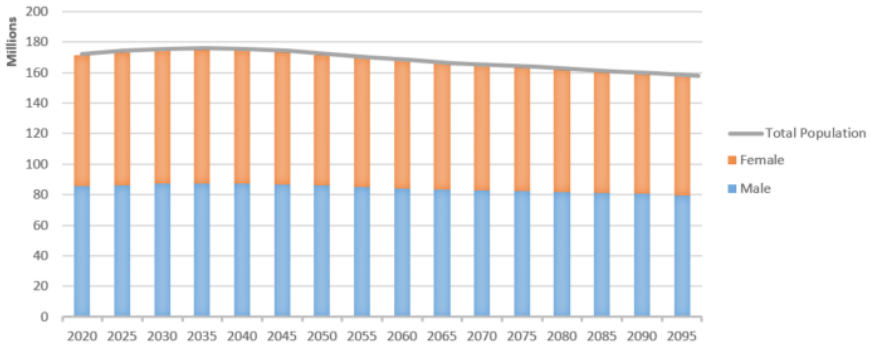
Figure 61: The Netherlands population by year (projections)



The proportion of the total population that is aged 65 years and over has increased from 15.3% in 2010 to 18.9% in 2018.[320] Projections for 2030 and 2050 show a further increase to 23.8% and 26.6% respectively.[321]

Despite the population growth, the potential workforce has stabilised in recent years, mainly due to the aging population. However, the retirement age is expected to increase to 68 by 2030, which will cause the potential workforce to increase in the years to come but gradually decrease beyond 2025.[328]

Economy: Employment and income distribution

The Netherlands has an extremely robust economy and is the 18th largest in the world. The economy is known for having a high GDP per capita and low unemployment.

More specifically, in 2018 the employment rate, which corresponds to the number of persons aged 20 to 64 in employment divided by the total population of the same age group, equalled 79.2%, which is above the EU-28 average of 73.2%, making the Netherlands one of the countries with the highest employment rate in Europe.[322]

The mean income in 2018 amounted to €26,872,[323] comparing favourably with the EU-28 average of €19,907. The 2018 mean income is significantly higher than before 2015, which was less than €24,000. This means that the Netherlands managed to fully overcome the financial crisis of 2008 without severe implications, as shown in Table 39, which presents the impact of the 2008 economic crisis on (1) the real GDP growth rate (percentage change on previous year)[324] and (2) the employment rate, 2007–2012 and 2018.

Private homeowners spend 27% of their net income on total housing costs (net mortgage, energy, local taxes).[325] In 2016, this enabled Dutch households to save

[320] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en
[321] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en
[322] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en
[323] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do
[324] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en
[325] Woon (2015). WoonOnderzoek Nederland. See www.woononderzoek.nl

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money (around 14% of their net income, putting them in sixth place in the EU[326,327]) and keep their household investment rate the second highest across the continent (11.3%).

Table 39: Impact of 2008 economic crisis on GDP growth rate & employment in the Netherlands

	2007	2008	2009	2010	2011	2012	2018
1. Real GDP growth rate	3.8	2.2	-3.7	1.3	1.6	-1.0	2.6
2. Employment rate	75.5	76.9	76.8	76.2	76.4	76.6	79.2

4.9.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

According to the draft NECP for 2030,[328] the Netherlands will be implementing measures to achieve a 49% reduction in greenhouse gas emissions by 2030, compared to 1990. The 49% target means a reduction of approximately 49 Mt of carbon dioxide equivalents by 2030. Table 40[17] shows how this reduction will be allocated among various sectors.

Table 40: Dutch indicative allocation of the 49% reduction target (in Mt of carbon dioxide equivalents as of 2030)

Sector	
Industry	14.3
Mobility	7.3
Built environment	3.4
Electricity	20.2
Agriculture and land use	3.5

The overall target in the Netherlands is a fossil-free (CO_2 neutral) built environment by 2050, which would require the retrofitting of approximately 200,000 dwellings per year. Nevertheless, there are still several barriers in the Dutch building market that need to be overcome in order to achieve the renovation capacity and subsequently the energy efficiency and climate targets for the building sector. These challenges include primarily lack of capacity (insufficient qualified contractors to meet this ambitious goal); economic, financial and technical barriers; lack of leadership; split incentives; lack of information and knowledge; and institutional barriers.

In 2012 the Building Decree[329] was re-evaluated to include new requirements related to safety, health, usability, energy efficiency and the environment, for both new buildings and for refurbishing existing properties. The minimum thermal standard

[326] Note that data for Greece, Croatia, Hungary, Malta, Romania and the United Kingdom are not available.

[327] For more information, see:

https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20180427-1?inheritRedirect=true

[328] European Commision (NECPs): https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

[329] https://business.gov.nl/regulation/building-regulations/

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requirements are only for new elements added to an existing building. Otherwise, the standards for total renovations are the same as for new dwellings. Local authorities do not have the power to demand regulations stricter than the national standards.[330]

As of 1 January 2020, all permit applications for new buildings, both residential and non-residential, must meet the requirements for nearly zero-energy buildings (NZEBs).[328] Energy performance for nearly zero-energy buildings is determined based on three requirements: (1) maximum energy consumption in kWh/m^2 of useful floor area per year; (2) maximum primary fossil energy consumption in kWh/m^2 of useful floor area per year; (3) minimum share of renewable energy.

Towards this purpose, in 2013 the programme Stroomversnelling[331] was introduced with an aim to create nearly zero-energy buildings (NZEB) by 2020. The target was to help refurbish 111,000 existing rental properties. In the period 2012–2016 about 3,150 NZEBs were created: two-thirds were refurbished rental properties and one-third newly constructed homes.[332] The annual share of residential buildings undergoing major renovation in the Netherlands was 1.1% in 2014.[333]

A major barrier to retrofitting a household to become NZEB is the high cost, which was almost €130,000 per unit in 2010 for the first pilot. However, these costs are expected to fall as low as €40,000 per unit.[334]

4.9.3 RESIDENTIAL BUILDING STOCK[335]

Domestic building stock type, age and condition

The total number of households in the Netherlands is 7.83 million (2018), and since 2000 it has been increasing steadily by 0.8% year. The growth in the number of one-person households (+1.5% per year between 2000 and 2018), and two-person households (+0.8% per year between 2000 and 2018) are the main drivers for the increase in the total number of households in the Netherlands. Figure 62 illustrates the residential building stock by age and by single-family and multifamily buildings. Almost 65% of the housing stock consists of single-family homes, with the rest being multifamily ones.

330 Murphy, L., Meijer, F., and Visscher, H. (2012). A qualitative evaluation of policy instruments used to improve energy performance of existing private dwellings in the Netherlands. Energy Policy 45, 459-468.

331 https://stroomversnelling.nl/

332 RVO. (2017). Monitor Energiebesparing Gebouwde Omgeving 2016. Rijksdienst voor Ondernemend Nederland. Utrecht. Available at: https://www.rvo.nl/sites/default/files/2018/03/Monitor-Energiebesparing-Gebouwde-Omgeving-2016.pdf

333 Zebra. (2018). Equivalent major renovation rate, Zebra2020 datatool. Available at: http://www.zebra-monitoring.enerdata.eu/overall-building-activities/equivalent-major-renovation-rate.html#equivalent-major-renovation-rate.html

334 European Construction Sector Observatory. (2018). Country profile Netherlands: Ref. Ares(2018)3389007— 26/06/2018.

335 Pezzutto, S., et al. (2018). Hotmaps Project, D2.3 WP2 Report—Open Data Set for the EU28. Available at: www.hotmaps-project.eu and EU Building Stock Observatory. Available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/eubuildings

The majority of building stock data refer to the year 2016.

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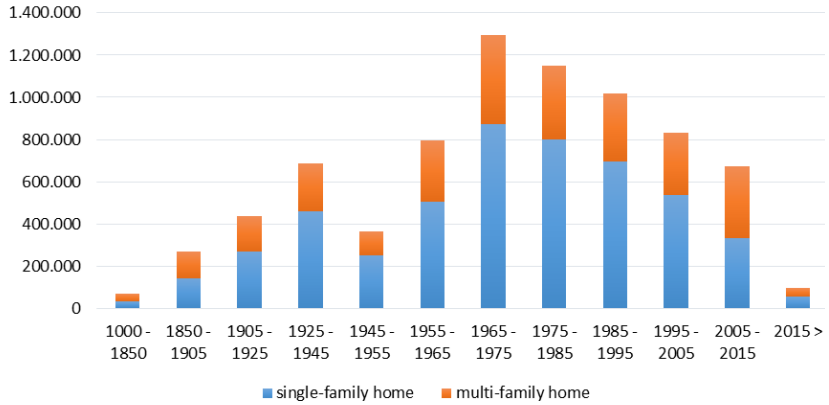
Although gradually decreasing, the share of dwellings built before 1985, generally considered as less energy efficient, is still about two-thirds of the total building stock.

Figure 62: Building stock in the Netherlands by age



Sixty-nine percent of the dwellings in the Netherlands are privately owned.[336] Home owning in the Netherlands has fluctuated around 67% to 69% for the period 2010–2019, in line with the European average of 66%.[337] The rest of the market is rental property (private or social rental). The rental properties are either owned by a social housing association or other private owners. It is important to recognize that social housing associations in the Netherlands (*woningcorporaties*) are private non-profit organisations with a legal task to give priority to housing households with lower incomes.

Changes in the housing stock

The housing stock changes due to the construction of new buildings, splitting existing dwellings, demolishing old dwellings and other changes, such as merging buildings or changing the functions of buildings. In the period 2012–2017, the number of newly constructed dwellings was 45,000 to 63,000 per year, corresponding to a rate of new constructed buildings of 0.6% to 0.8% per year. Although this number is increasing, it has not reached 80,000 newly constructed dwellings per year, which was the case in 2007–2009. Additions to existing buildings add 27,000 to 63,000 dwellings to the housing stock annually. The number of demolished buildings in the period 2012–2017 ranged from 10,000 to 14,000 per year, corresponding to a demolition rate of 0.1 to 0.2% per year; 14,000 to 31,000 dwellings were removed from the housing stock due to other reasons. The net changes roughly range from 45,000 to 90,000 per year (Figure 63).

336 https://tradingeconomics.com/netherlands/home-ownership-rate

337 https://tradingeconomics.com/netherlands/home-ownership-rate

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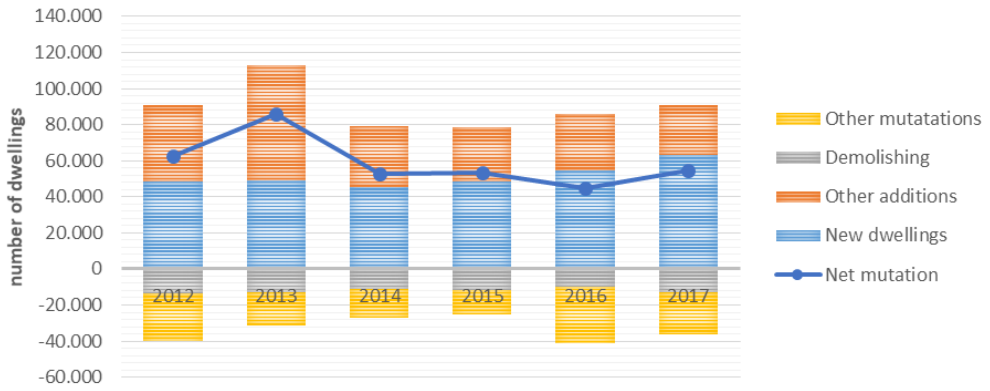
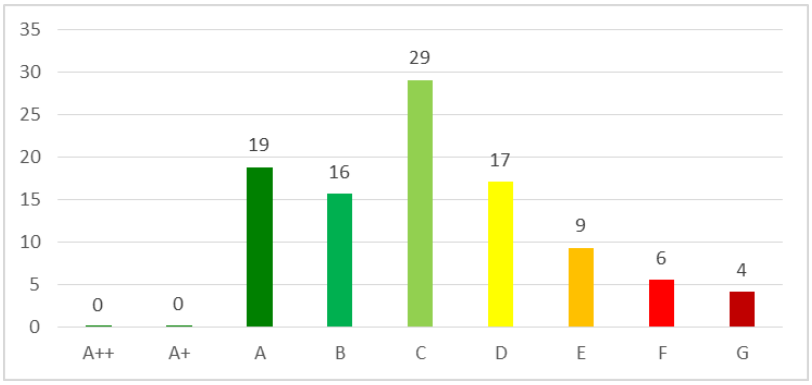
Figure 63: Changes in the Dutch housing stock 2012–2017



Energy Performance Certificates

The energy performance certificates (which reflects energy use rather than GHG or climate-related aspects) for residential buildings was introduced in 2007. It provides a quick insight into the energy use of a building. In 2016 about three million residential buildings had an energy performance certificate.[338] The Netherlands keeps an open database of these labels, either on an aggregate level or based on ZIP codes.[339] The distribution of energy performance certificates, based on the statistics of the database for 2019, is presented in Figure 64.

Figure 64: Percentage of Energy Performance Certificates in the Netherlands.



4.9.4 ENERGY MARKET

Overview

The Dutch power sector is unbundled, led by a transmission system operator (TSO),

[338] In general, the energy performance certificate appears to have some predictive power for the energy use of dwellings. However, dwellings with a better label (A–B) category do not significantly use less gas than dwellings in poorer label categories (F–G). See Majcen (2016) for more information on the relation between the energy performance certificate and the actual energy of dwellings.

[339] https://www.rvo.nl/onderwerpen/duurzaam-ondernemen/gebouwen/hulpmiddelen-tools-en-inspiratie-gebouwen/ep-online

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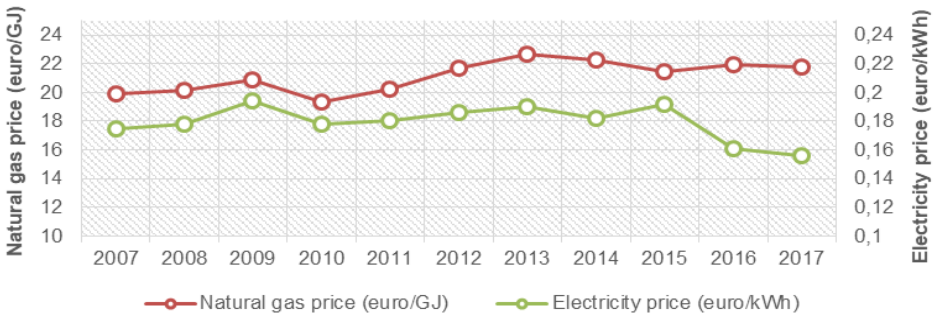
eight distribution service operators (DSO), over 25 producers and 35 electricity retailers. Electricity generation and heating is heavily dependent on natural gas, which will continue to dominate production until 2030. Dependence on fossil fuels accounts for more than 70% of energy use. However, there is a plan to phase out coal-based electricity generation by 2029.[340] As of 2017, production of electricity from renewable sources accounted for 10%.[341] Wind turbines generated the largest share of this total, with 58 percent, followed by biomass with 29 percent. Almost 13 percent was generated by solar panels.[33] A nuclear power plant accounts for almost 3% of the total production.

Energy prices

Electricity prices for domestic consumers increased during the period 2010–2015, from €0.17/kWh to almost €0.2/kWh. Since then, the electricity price has returned to the usual level of €0.17/kWh as of 2018, showing a slight increase from 2017, when the price was below €0.16/kWh.[342] Figure 65 shows the trend in retail electricity and natural gas prices for Dutch households in the past 10 years.[343]

Figure 65: Energy prices in the Netherlands



Energy consumption

A significant drop in household energy consumption was observed between 2000 and 2016, from 32.2 GJ to 26.4 GJ, driven by continuing efforts to save energy. As is shown in Figure 66 [344] the energy carrier mostly used by households is natural gas (75%), which is consistent with the production pattern mentioned above. In addition to this, significant drop on consumption has been observed since 2000.[344] Overall, households in the Netherlands are heavily dependent on natural gas to keep their homes adequately warm. Therefore, efforts to save energy could also focus on mitigating dependence on natural gas.

[340] Europe Beyond Coal: https://beyond-coal.eu/wp-content/uploads/2018/11/Overview-of-national-coal-phase-out-announcements-Europe-Beyond-Coal-November-2018.pdf

[341] IEA: https://www.iea.org/statistics/

[342] Statista: https://www.statista.com/statistics/418106/electricity-prices-for-households-in-netherlands/

[343] CBS StatLine: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81309NED/table?ts=1550138411254

[344] CBS: https://longreads.cbs.nl/trends18-eng/economy/figures/energy/

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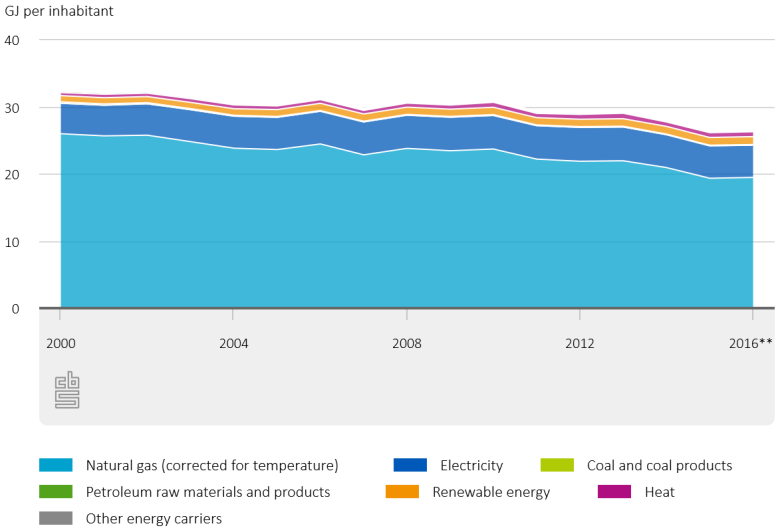
Figure 66: Household energy consumption in the Netherlands per energy source since 2000



4.9.5 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

Article 7 of the Energy Efficiency Directive

Article 7 of the Energy Efficiency Directive obliges the Netherlands to achieve an efficiency improvement of 1.5% per year in the period 2014–2020, as a cumulative target. For the Netherlands, this means a target of at least 482 PJ savings of final energy consumption, wherein the Netherlands has chosen not to create an obligation scheme but to achieve the targets through alternative policies[345].

There is no specific reference to measures concerning the mitigation of energy poverty.

During the period 2014–2017 the Netherlands fell short on the energy savings target by 18%.[346] Recently, an addendum agreement[347] was published with the aim to ensure that the ETS sector achieves 9 petajoules of additional energy savings by 2020.

National climate policy

The **National Climate Agreement** (Klimaatakkoord)[348] contains agreements with various sectors to help reduce emissions by 2030. The participating sectors are: electricity, industry, built environment, traffic and transport, and agriculture.[349] Some of the agreements contain measures relevant to the domestic building stock and

[345] European Commission: https://ec.europa.eu/energy/sites/ener/files/documents/article7_en_netherlands.pdf

[346] Zangheri, P., Economidou, M., and Labanca, N. (2019). Progress in the implementation of the EU Energy Efficiency Directive through the lens of the National Annual Reports. *Energies 12*(6): 1107.

[347] https://www.rijksoverheid.nl/documenten/regelingen/2017/04/24/addendum-meerjarenafspraak-energie-efficientie-ets-ondernemingen-mee

[348] https://www.klimaatakkoord.nl/

[349] https://www.government.nl/topics/climate-change/climate-policy

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households, for example:

- **Natural gas phase-out**: During the first part of the phase-out process, from 2019 to 2022, the heating system of 100,000 houses will be converted in order to use alternative energy supply solutions (e.g. heating grid, all-electric, hybrid). The major transformation of 1.5 million houses is envisaged by 2030, leading to natural gas being phased out by the residential sector in a cost-effective manner by 2050. However, according to a report[350] of the Netherlands Environmental Assessment Agency (PBL) assessing the measures in the Agreement, it was estimated that 250,000 to 1,050,000 houses could be made "sustainable" by 2030 as a result of these measures, falling short from the initial target;[351]
- **Building efficiency**: The sustainability of 1.5 million houses will be improved through better insulation and other carbon efficient measures.

Financial schemes

The aforementioned measures are supplemented by financial schemes such as the:

- Energy Investment Allowance for landlords[38]: €50 million per year from 2020 to 2023 to landlords to invest in energy efficiency;
- Energy Investment Allowance[352] (EIA): A tax reduction scheme for companies and entrepreneurs who invest in energy efficiency and sustainable energy. The total budget for 2019 is €1747 million and offer an average tax reduction of 11%;
- Environmental Investment Rebate (MIA) and Arbitrary depreciation of environmental investments (VAMIL): Funding for companies to invest on new technologies and facilities to create environmentally friendly products.

4.9.6 ENERGY POVERTY

There is no official definition for energy poverty in the Netherlands.[328] However, a description of vulnerable customers exists. Specifically, legislation states that a household is regarded as vulnerable for whom cessation of supply of electricity or gas would result in very serious health risks for a member of the household. For these households, disconnection is not permitted, unless a case of fraud has been proved.[353]

Social attention on the affordability of the energy bill has increased in recent years. The Netherlands Environmental Assessment Agency (PBL)[354] showed that the amount of an energy bill and household income are not the only determinants of

[350] PBL: https://www.pbl.nl/sites/default/files/downloads/pbl-2019-effecten-ontwerp-klimaatakkoord_3619_1.pdf

[351] https://www.oxfordenergy.org/wpcms/wp-content/uploads/2019/07/The-great-Dutch-gas-transition-54.pdf

[352] https://english.rvo.nl/subsidies-programmes/energy-investment-allowance-eia

[353] EU Energy Poverty Observatory: https://www.energypoverty.eu/sites/default/files/downloads/publications/18-08/paneureport2018_final_v3.pdf

[354] https://www.pbl.nl/publicaties/betaalbaarheid-energierekening-in-breder-perspectief

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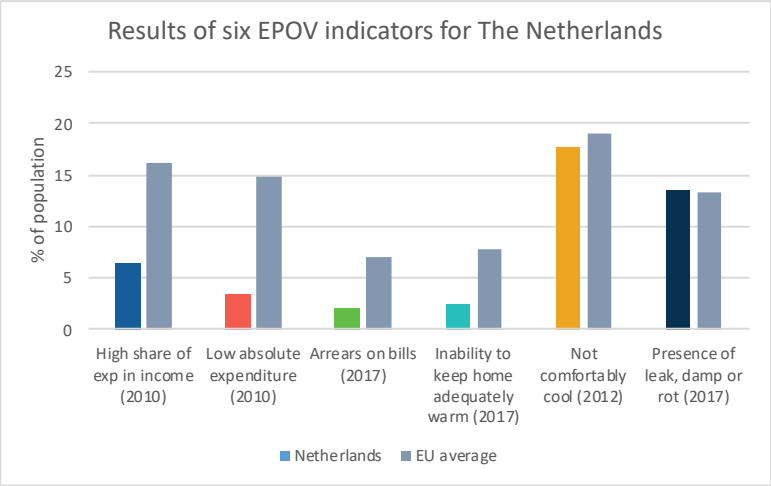
whether or not a household can afford to pay the bill; housing costs and other costs also play an essential role in the affordability issue.

Because there is no universal indicator, it is difficult to estimate accurately the total number of energy-poor households. According to PBL about 900,000 households spend either a relatively large share of their income on energy costs or are at risk of being unable to afford housing costs, including energy costs[355]. The Energy Poverty Observatory (EPOV) primary indicators reveal energy poverty rates of between 2.1% and 6.5%, which is between 0.35 to 1.1 million households with a median value of 0.75 million.[356] In 2015, 16.4% of the population of the Netherlands were at risk of poverty or social exclusion, which corresponds to 2.8 million people.[357]

Results of EPOV indicators

Against EPOV's four primary indicators, the Netherlands performs considerably better than the EU average. More specifically, the share of the population not able to keep their homes adequately warm amounted to 2.2% in the Netherlands, being among the lowest countries in the European Union. However, the Netherlands does not perform well against the EU average in the 'not comfortably cool' and 'damp, leak and rot' indicators (Figure 67).

Figure 67: Results of EPOV indicators for the Netherlands: four primary and two selected secondary indicators.



As shown in Figure 68, the levels of energy poverty suggested by the two household reported indicators in the primary indicator set, 'arrears on bills' and the 'inability to keep home adequately warm', remain fairly low for the period of 2008–2017, with values fluctuating between 1% and 3%.

Figure 68: Energy poverty over time in the Netherlands

[355] PBL. (2018). Meten met twee maten. Een studie naar de betaalbaarheid van de energierekening van huishoudens. Planburea voor de leefomgeving.

[356] EU Energy Poverty Observatory: https://www.energypoverty.eu/observatory-documents/netherlands

[357] European Energy Network: http://enr-network.org/wp-content/uploads/EnR-Possition-Paper-Energy-poverty-2017.pdf

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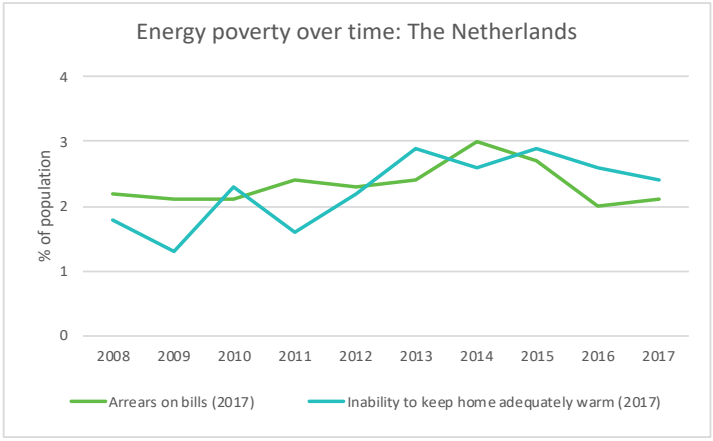
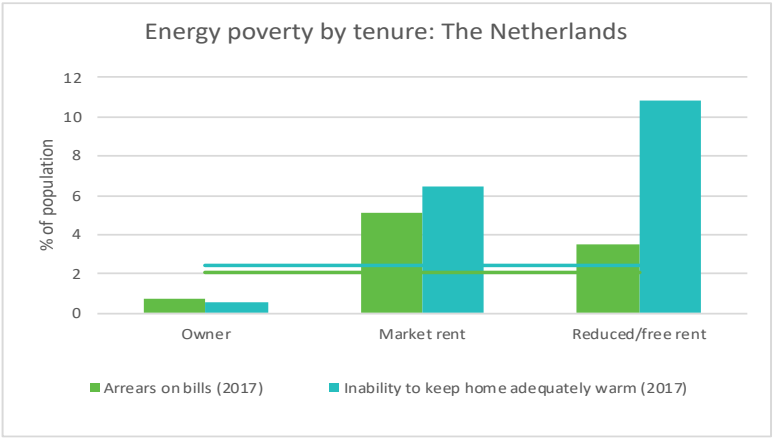


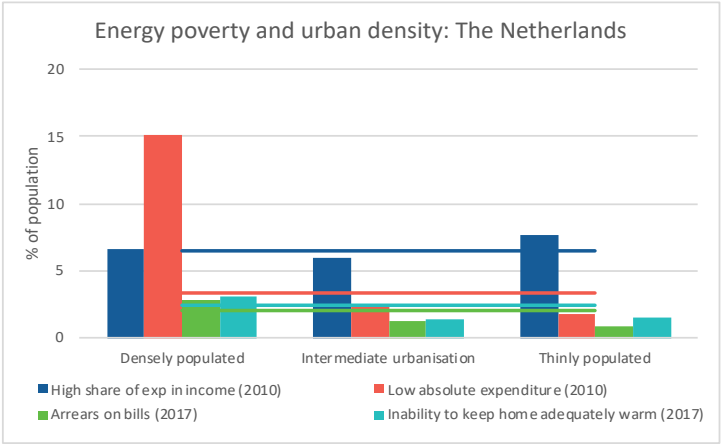
The EPOV data suggest that **energy poverty is a larger problem for households in the rental sector**, especially in social housing, as shown in Figure 69, as well as for those located in densely populated areas (Figure 70). Households living in apartments are more susceptible to energy poverty than those living in other types of dwellings (Figure 71).

Figure 69: Energy poverty by tenure in the Netherlands



**Horizontal lines show averages for each indicator*

Figure 70: Energy poverty and urban density in the Netherlands



**Horizontal lines show averages for each indicator*

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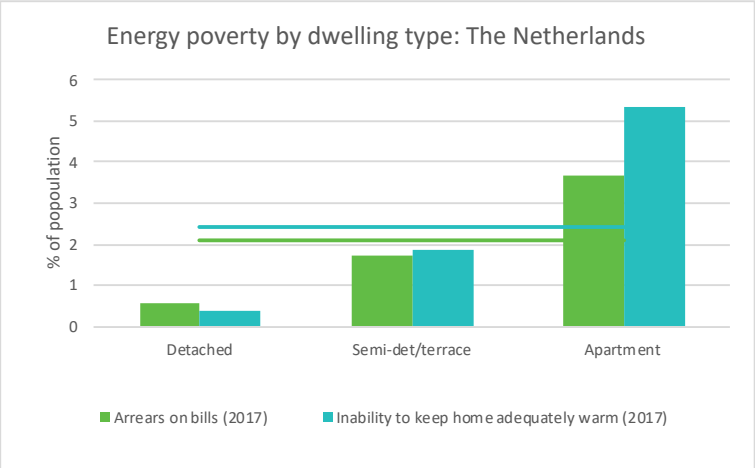
Figure 71: Energy poverty by dwelling type in the Netherlands



**Horizontal lines show averages for each indicator*

Policies to Mitigate Energy Poverty

In the Netherlands, energy poverty is mainly addressed through social policies. Recently, NGOs have tried to raise awareness of energy poverty on a national scale. At a municipal level, energy advisors offer free advice on how to pay energy bills, as part of debt mitigation programs such as Energy Box (EnergieBox).[358]

Funding and programmes for social actions or energy poverty alleviation

- The Dutch government has implemented two schemes that target rental properties with the aim to retrofit homes and improve their energy efficiency. **The energy savings Fund for the rental sector (FEH)** offers low-interest loans for landlords to make their rental properties more energy-efficient and the **Energy Performance Incentive scheme for the rental sector (STEP)** enables landlords to improve the energy performance of their rental properties;[359]
- The Dutch government has also made agreements to make rental housing more energy-efficient. Under an agreement with the construction, engineering and energy sectors, 300,000 existing homes and other buildings will be made more energy-efficient every year. Local authorities and businesses are also working together on 14 projects to make at least 33,500 homes more energy-efficient;[360]
- The government also introduced the **Electricity tax reduction for basic needs** programme, which provides a fixed tax reduction of €300, to cover basic needs;
- **Disconnection protection for households** further protects vulnerable households by prohibiting disconnection during winter. A household consumer is considered vulnerable if the termination of the supply of electricity or gas would result in very

358 https://www.energiebox.org/

359 https://www.government.nl/topics/renewable-energy/central-government-promotes-energy-savings

360 https://www.government.nl/topics/renewable-energy/central-government-promotes-energy-savings

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serious health risks to the consumer or a member of the same household;

- The government also launched a **website**[361] for citizens to be able to easily check if they are eligible for subsidies;
- Alongside governmental efforts, the non-profit organisation Stichting Energiebank was established in 2015 and collaborated with the grid operator to launch **Energy Bank** (EnergieBank). Energy Bank, a programme focusing on low-income households, provides short-term financial support, energy advice and small measures to improve energy efficiency. **Energy Box** is another initiative that aims to address energy poverty by providing energy advice through energy advisors who visit households. It has been estimated that these projects led to savings per household from €56 to €113 per year;[362]
- **Energy Leap (EnergieSprong)**[363] is an innovative scheme with the aim to implement zero-energy buildings. The first stage of this initiative was focused on social housing, aiming to fund investments in retrofitting through bill savings, ensuring no net additional cost to tenants.

4.9.7 CONCLUSIONS

The overall target in the Netherlands is a fossil-free (CO_2 neutral) built environment by 2050, which would require the retrofitting of approximately 200,000 dwellings per year. Nevertheless, there are still several barriers in the Dutch buildings' market (lack of leadership, split incentives, lack of information or knowledge, technical barriers, economical barriers and institutional barriers) that need to be overcome to achieve the capacity to renovate and subsequently reach energy efficiency and climate targets in the building sector.

With regard to the building sector, the Netherlands has been undergoing constant change over the last several years and has made significant strides pursuing targets and providing funding. For existing buildings, in order to comply with the Energy performance of buildings directive (EPBD), major renovations must have a building permit that meets minimum requirements for building components. Furthermore, EPCs have been in place since 2008, and more than 3.5 million EPCs have been registered with a growing trend towards higher labels. For new buildings, energy performance requirements in the Netherlands are updated regularly with a shift towards nearly zero-energy buildings (NZEB). Next to these mandatory schemes and labels, there are several subsidy and grants schemes in the Netherlands related to the renovation of buildings, with different target groups and financing terms.

Article 7 of the Energy Efficiency Directive obliges the Netherlands to achieve an efficiency improvement of 1.5% per year in the period 2014–2020, as a cumulative target. More specifically, the Netherlands chose not to create an obligation scheme

361 https://www.energiesubsidiewijzer.nl/

362 https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_netherlands.pdf

363 https://www.energypoverty.eu/measure-policy/energy-leap

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but to **achieve the targets through alternative policies**.

Since there is **no official definition of energy poverty in the Netherlands**, it is difficult to estimate the specific percentage of energy-poor households.

Through an analysis of the building stock characteristics (age, ownership and others) and the average income level, it is evident that the Netherlands is medium to highly urbanized, with mainly privately owned properties and with the majority of the building stock dating to the 1960s and 1970s. Households living in social and rented houses in urban areas are mostly affected by energy poverty. Home owners appear to be less susceptible. Furthermore, about 900,000 households spend a relatively large share of their income on energy costs.

There are already some measures in place for alleviating energy poverty, but there is room for improvement. In the Netherlands, energy poverty is mainly addressed through **social policies** (funds and agreements to make rental housing more energy-efficient, etc.). There are also other initiatives for energy-poor households, including disconnection protection measures, energy advisors, the Energy Bank programme and so on.

A recent study of health, wellbeing and energy poverty across 32 European countries found that health differences between the energy-poor and non-energy-poor populations in the Netherlands were the second-largest among these countries.[364] Therefore, even though the Netherlands performs better on energy-poverty indicators than the average values in Europe, it is still of vital importance to target energy-poor households and implement actions to mitigate energy poverty.

Despite the importance of policies for energy poverty in the residential sector and the transposition of the EPBD regulations, according to market and policymakers' surveys (for instance Energy Efficiency Watch 3 project), progress is still considered slow.

364 Thomson, H., Snell, C., and Bouzarovski, S. (2017). Health, well-being and energy poverty in Europe: A comparative study of 32 European countries. International Journal of Environmental Research and Public Health 14(6): 584.

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4.10 ROMANIA CONTEXT

4.10.1 INTRODUCTION

Romania's climate is temperate-continental in transition, with four distinct seasons, marked by some oceanic, continental, Scandinavian-Baltic, sub-Mediterranean and Black Sea climatic influences. A Mediterranean climate prevails in the southwest (Banat and Oltenia), characterized by mild winters and stronger rainfalls (especially in autumn). The southeast, has a Black Sea climate with rare but torrential rains. In Eastern regions, the continental influence is more pronounced. In the North of the country (Maramures and Bukovina), the effect of the Scandinavian-Baltic influence is felt, resulting in a wetter and colder climate with cold winters. In the West of the country a more pronounced influence of low-pressure systems generated over the Atlantic are felt, which causes more moderate temperatures and richer precipitations. The mountain ranges of the Carpathian arc have a cool mountain climate with high humidity throughout the year.[365]

The average annual temperatures drop slightly from south (10°C to 11°C) to north (8.5°C to 9°C). Also, the temperature decreases with increasing altitude (decreases by 6°C at every 1,000 m). The average annual maximum temperatures range from 22°C to 24°C during summer, to -3°C and -5°C in winter.

Summer is an extremely hot season, which lasts from early May to mid-September in the south and west plains. In the south of Romania there are over 40 tropical days (with temperatures above 30°C) and over 90 days of summer (with temperatures over 25°C). Autumn is a shorter, transitional season, with long dry periods alternating with rainy seasons. Winter is a cold season, when cold air masses from the east bring temperatures down to -20°C or even lower. Snow is not abundant compared to other European states, both due to the lack of precipitation and frequent temperature increases. Spring is another season of transition, relatively short.

Precipitation in Romania is moderate; the average annual rainfall is 637 mm. The average annual number of days with rainfall varies across the country between less than 100 to 200.

The number of private households in 2018 amounted to 7.49 million. Table 41 reports the composition of Romania's households in 2018.[366]

[365] National Meteo Administration: www.meteoromania.ro

[366] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en

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Table 41: Household composition in Romania, 2018.

Single adult	2.34m (31% of total)
Single adult with children	0.18m (2% of total; 8% of single adult)
Couple	3.03m (40% of total)
Couple with children	1.53m (20% of total; 50% of couple)
Other type	2.12m (28% of total)
Other type with children	0.88m (12% of total; 41% of other type)

One-third of Romanian households are single adults, out of which 50% are aged 65 and over (1.16 million).[367]

Due to migration and demographic decline, the Romanian population decreased by 113,719 people in 2017 to 19.53 million inhabitants on 1 January 2018, out of which 48.9% are men and 51.1% women. From 2017 to 2018, the population fell by -0.6%.[368] Projections until 2100 also show a negative population growth rate.[369]

The process of demographic aging has continuously increased since 2010, with the population aged 65 and over reaching 18.2% in 2018, compared to 16.1% in 2017,[370] and it is projected to further increase to 21.7% in 2030 and 29.9% in 2050.[371] The old-age dependency ratio amounts to 27.5 in 2018.[372] The ratio is projected to increase to 34.3 in 2030 and 53.6 in 2050.[373]

The Romanian economy is relatively strong, based mainly on industry and services, and has had a sustained growth since the 2008 economic crisis. Romania recorded a 4.1% economic growth in 2018, down from 7.1% in 2017. However, private consumption, not investments, has accounted for most of the strong growth over the past few years, a dynamic that generates imbalances and limits the development potential in the medium and long term.

Labour market conditions improved, owing to strong economic growth. Unemployment declined further and reached 4.2% in 2018,[374] the lowest level in more than 20 years. Employment growth is robust, and in 2018, the employment rate, which corresponds to the number of persons aged 20 to 64 in employment divided by the total population of the same age group, equalled 69.9%.[375] The mean equivalised net

[367] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en
[368] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow
[369] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en
[370] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en
[371] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en
[372] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tps00198/default/table?lang=en
[373] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tps00200/default/table?lang=en
[374] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do
[375] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en

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income in 2018 amounted to €3,825. The median equivalised household income in 2018 was €3,284, which is more than five times lower than the average for the EU-28 (€17,386).[376] Although the Gini coefficient decreased after the crisis, it started to rise again from an already higher level compared to the EU, and in 2018 it was 35.1.[377]

4.10.2 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

The main legislation for energy efficiency in Romania is Law 121/2014 on energy efficiency, amended and completed by Law 160/2016, which transposes into national legislation the European Union regulations set out under the Energy Efficiency Directive, 2012/27/EU. The main purpose of the law is to establish a coherent legislative framework for the development and application of the national energy efficiency policy in order to achieve the national target for increasing energy efficiency.

Romania has set as an indicative target for 2020 to reduce by 19% domestic primary energy consumption, compared to the PRIMES 2007 baseline scenario, which means achieving a primary energy saving of 10 million toe in 2020, for a forecasted primary energy consumption of 52.99 million toe. Achieving this target implies that in 2020 primary energy consumption will be 42.99 million toe, whilst total energy consumption will be 30.32 million toe.[378]

Romania's contribution to the EU's energy efficiency target of 32.5% for 2030 is estimated to be a reduction of 37.5% in primary energy savings compared to the PRIMES 2007 baseline scenario.[379]

The Government Emergency Ordinance (GEO) 13/2016, which amended and completed Law 372/2005 regarding the energy performance of buildings, requires that starting from 2020 all new buildings are nearly zero-energy buildings (NZEB) under the Energy Performance of Buildings Directive (EPBD) definition. The ordinance also introduces the obligation on mayors from urban areas with more than 5,000 inhabitants to initiate multiannual local plans to increase the number of new and existing nearly zero-energy buildings.

The Ministry of Regional Development and Public Administration (MDRAP) prepared a Plan for Increasing the Number of Nearly Zero Energy Buildings (October 2013), which provides a methodology for estimating the economic effectiveness of the technical solutions that can ensure new and existing buildings meet the energy performance of NZEB-type buildings.

The Multi-annual National Programme for improving the Energy Performance of Blocks of Flats was created and implemented based on the provisions of GEO 18/2009 (modified by Law 231/2017) and aims to reduce the annual specific consumption for

[376] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en

[377] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12&

[378] Romania's IVth National Energy Efficiency Action Plan. (Romanian version), available at: https://ec.europa.eu/energy/sites/ener/files/documents/ro_neeap_ro.pdf

[379] Romania's draft integrated National Energy and Climate Plan. (2018). English translation. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/romania_draftnecp_en.pdf

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heating to below 100 kWh/m^2/year. Eligible buildings for this programme are multilevel blocks of flats built before 31 December 2005.[380] The following actions are funded for achieving the purpose of the programme: thermal rehabilitation of a buildings' envelope, thermal rehabilitation of its heating system, repairing and upgrading of the heat distribution system (ducts or pipes), thermal rehabilitation of the system supplying hot water for consumption and, where applicable, installation of systems for production of energy from renewable sources.

According to the provisions of Article 4 of the Energy Efficiency Directive, MDRAP developed the 'Strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private, existing at national level', which indicates a set of policies and measures to stimulate cost-effective deep renovations of the existing building stock.

The Environmental Fund Administration manages a number of financing programmes for energy efficiency, such as the Photovoltaic systems for isolated households programme and the Green House Classic programme, which funds the installation of heating systems using RES (solar systems and heat pumps), including the replacement of conventional heating systems with such installations.

4.10.3 RESIDENTIAL BUILDING STOCK

In Romania the number of dwellings has increased in recent years, reaching 9.03 million housing units at the end of 2018 (+0.6% higher compared to the end of 2017).[381]

More than half of the Romanian households (60.9%) live in separate individual dwellings, the percentage being strongly influenced by the rural areas; the rest of the households are in buildings with multiple dwellings (37.9%). Existing dwellings are almost entirely detached-houses in the rural areas (97.4%) and, predominantly, apartments in multi-layered buildings (69.8%) in the urban areas.[382]

More than half of the population lives in urban areas (28.9% in cities and 25.4% in town and suburbs), whilst 45.7% lives in rural areas.[383] Of residential buildings 96.4% are private property. 4% of Romanians rent their homes, with one-third of the tenant households renting at market prices and two-thirds renting at a reduced or free rent.[384]

For the design of new buildings (residential and non-residential), technical rules are set out in the code for the thermal calculation of building elements C 107-2005, with further amendments in 2010 and 2012. In 2016, the code was amended by setting the NZEB performance levels for primary energy demand and CO_2 emissions for different building categories and winter temperature zoning, and also the minimum contribution of renewable energy. Seventy-seven percent of all dwellings in Romania

[380] GEO 18/2009 regarding the increasing of energy performance of blocks of flats including modifications by Law 231/2017.

[381] National Institute for Statistics (INS): Fondul de locuințe 2018 (The dwellings stock 2018).

[382] National Institute for Statistics (INS): Condiții de viață ale populației din România 2018 (Life conditions of the Romanian population 2018).

[383] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en

[384] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho02&lang=en

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were built before 2000 and therefore before thermal regulations.

4.10.4 ENERGY MARKET

Penetration of fuels

In Romania the household sector is the largest energy consumer (33.1%). In 2017, the final energy consumption in the household sector amounted to 7.7 Mtoe. About 86% of Romania's final energy consumption comes from firewood and biomass, natural gas and electricity (Table 42).

Table 42: Share of fuels in final energy consumption in the residential sector, 2017.385

Type of fuel	Consumption	
	ktoe	%
Lignite	34.2	0.45
Firewood (including biomass)	**3,050.4**	**39.59**
LPG and petroleum products	281.7	3.65
Natural gas	**2,445.6**	**31.74**
Renewable energy	3.5	0.05
Electricity	1,084.2	14.07
Heat	804.9	10.45

Market structure

By adopting Law 123/2012 with its subsequent amendments and completions, Romania transposed both European Directives 2009/72/EC, concerning common rules for the internal market in electricity, and 2009/73/EC, concerning common rules for the internal market in natural gas.

The Romanian Energy Regulatory Authority (ANRE) is the regulatory authority for both the electricity and natural gas sectors with the mission to create and implement the appropriate regulatory system to ensure the proper functioning of the electricity and natural gas sector and markets. ANRE approves the prices and tariffs for the following year.

In 2010 ANRE took over the activity of the Romanian Agency for Energy Conservation (ARCE), therefore assuming the responsibility of monitoring and implementing energy efficiency measures and promoting the use of renewable energy sources to the final consumer.

The Romanian electricity market is made of a regulated market and a competitive market. The structure of the Romanian electricity market is made up of a wholesale electricity market and a retail electricity market. The structure of the retail electricity market is presented in Figure 72.

[385] National Institute for Statistics (INS): Energy balance of Romania in 2017.

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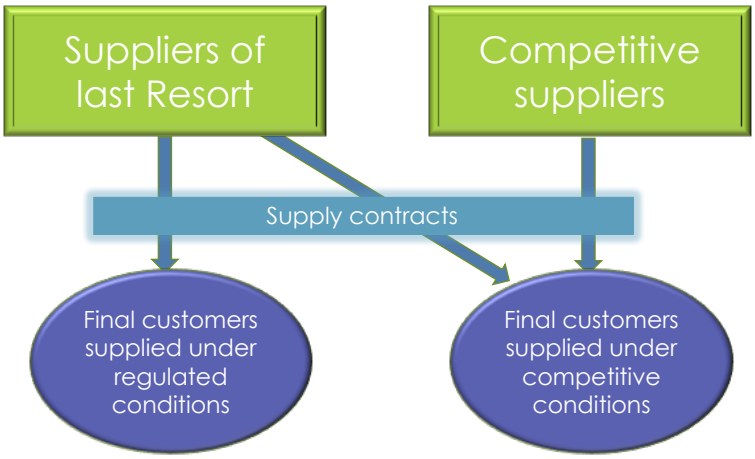
Figure 72: Retail electricity market structure 2018.[386]



In 2018, 97 holders of licenses for the provision of electricity participated in the retail market, of which five are suppliers assigned by ANRE as suppliers of last resort and 25 also hold licenses for the commercial exploitation of power generation capacities.[387]

The electricity market in Romania has been fully liberalized since January 2018. The whole process of price deregulation started in 2007. The regulated prices were fully removed by the end of 2013 for business consumers. For household consumers, the process went in stages. Starting July 2013, the final price of captive household clients was comprised of regulated tariff and a competitive market component (CPC). The CPC tariff gradually increased up to full removal of the regulated tariffs, and finally the price deregulation process ended in 2018. Starting in July 2018, following the completion of the liberalisation calendar, ANRE no longer approved regulated tariffs, and consumption of domestic customers was billed at the prices for the universal service approved by ANRE. As a result, domestic customers were able to enter into a supply contract with any supplier active on the electricity market. However, at the end of 2018, the Romanian government adopted GEO 114/2018. According to the provisions of this ordinance, 'during the period March 1, 2019–February 28, 2022, for the domestic customers the electricity supply will be carried out under regulated conditions by ANRE'.

As regards the natural gas market, the residential consumers will be supplied with domestic natural gas at regulated prices in accordance with GEO 114/2018 until 31 March 2020, and then the share of gas at regulated prices will be reduced to 50% in a transitory stage until 31 March 2021. Finally, residential consumers will be supplied with natural gas purchased by suppliers from the market as of April 2021, when the market will be fully liberalised.

[386] ANRE: Report on the results of the electricity market monitoring in June 2019.

[387] ANRE: National Report 2018.

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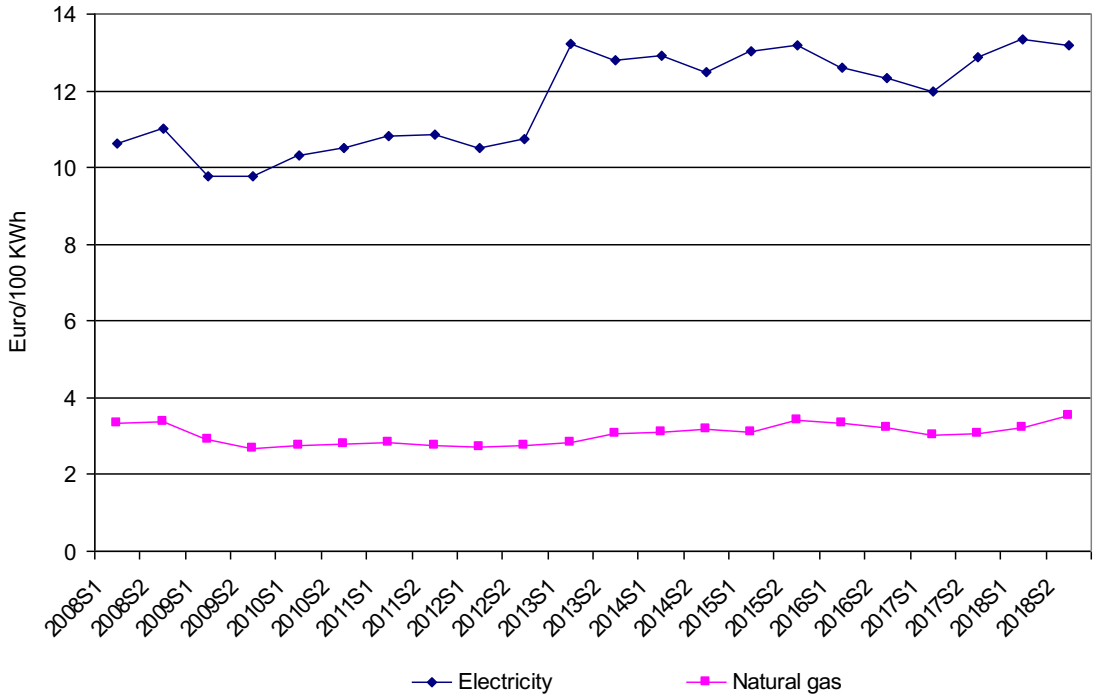
Energy price trends for domestic consumers Figure 73 shows average electricity prices[388] (for a household with an annual consumption of between 2,500 and 5,000 kWh and including taxes) and average gas prices[389] (for a household with an annual consumption of between 20 and 200 GJ of gas and including taxes) for Romanian household consumers from 2008 to 2018.

Figure 73: Electricity and gas prices for household consumers in Romania, biannual data from 2008 to 2018



On average, household electricity prices in Romania increased to €13.17/100 kWh (+2.17%), between the second half of 2017 and the second half of 2018. Nevertheless, the average Romanian household electricity price in the second half of 2018 was €0.02/100 kWh lower than the previous 10-year high in the second half of 2015.

Household gas prices increased, on average by 14.94%, to €3.54/100 kWh between the second semester of 2017 and 2018. This is the highest level of gas prices in Romania in the last 10 years.

Taxes and levies in Romania made up on average over a quarter (26.8%) of the electricity price charged to households in the second half of 2018 and about 16% of the gas price.

In 2018, Romania had the second lowest price in the EU for natural gas for households after Hungary (€3.47/100 kWh). For electricity, Romania had in 2018 the fifth lowest average price in the EU for households after Bulgaria (€10.05/100 kWh), Lithuania

[388] Household electricity consumers (2,500 kWh < annual consumption < 5,000 kWh, taxes and levies included) Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en (2,500 kWh < annual consumption < 5,000 kWh, taxes and levies included).

[389] Household gas consumers (20 GJ < annual consumption < 200 GJ, taxes and levies included). Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_202&lang=en

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(€10.97/100 kWh), Hungary (€11.18/100 kWh) and Malta (€13.06/100 kWh).

Adoption of Energy Efficiency Directive, Article 7

Romania has not opted for an energy efficiency obligation scheme under Article 7 of the EED but for a range of alternative policy measures to be achieved through specific energy efficiency programmes, such as:

- Establishment of an energy efficiency investment fund able to tap into private funds, structural funds, auctioning revenues under EU-ETS provisions and the state budget;
- Conducting energy audits by internal experts or energy auditors and carrying out quality assessments on these audits;
- Training programmes of energy auditors;
- Consumer awareness raising and advice campaigns regarding the benefits of energy audits aiming at increasing the adoption of energy efficient technology or techniques and, consequently, the reduction of end users' energy consumption;
- Regulations or voluntary agreements aiming at increasing the adoption of energy efficient technologies or techniques; and
- Supporting the development of ESCOs.

There are no specific provisions for social actions or energy poverty, but there are a few national programmes for the renovation of residential buildings that can benefit energy-poor households. The most relevant national programmes are:

- **Multiannual National Programme for Improving the Energy Performance of Blocks of Flats** (based on the provisions of GEO 18/2009, modified by Law 231/2017). According to this programme, 60% of the cost is covered by governmental and EU Cohesion Policy Funds, whilst 40% should be covered by the owner-associations or by using other funds available locally. Eligible buildings for this programme are multilevel blocks of flats built before 2005;[390]
- **Thermal rehabilitation of residential buildings financed by bank loans with government guarantee** (based on the provisions of GEO 69/2010). Through this programme, building owners can access loans for thermal rehabilitation that are supported by a government guarantee, which generates a lower interest rate for the lenders. The loan amount can cover a maximum of 90% of the total costs; it cannot exceed €1,850 per room in residential blocks and €7,400 for individual residences, and at least 10% of the costs should be financed by the beneficiaries. Eligible buildings must have been built before 2000;[391]
- **Call for projects for thermal rehabilitation of blocks of flats under the Regional Operational Programme (2014–2020)** for improving energy efficiency in public

[390] GEO 18/2009 on increasing the energy performance of blocks of flats including modifications by Law 231/2017.

[391] MDRAP: https://www.mdrap.ro/prezentarea-programului-de-reabilitare-termica-a-cladirilor-de-locuit-cu-finantare-prin-credite-bancare-cu-garantie-guvernamentala

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buildings, residential buildings and public lighting.

4.10.5 ENERGY POVERTY

Currently, there is no official definition for energy poverty in Romania. The primary law (Law 123/2012 on energy and natural gas), with its subsequent amendments and completions, does not define energy poverty as a distinct term but defines vulnerable clients as 'the final customer belonging to the category of household customers who, for reasons of age, health or low incomes, are at risk of social exclusion and who, to prevent that risk, benefit from social protection measures, including those of a financial nature'. Social protection measures, as well as the eligibility criteria for these, are established by normative acts.

In the former Romanian Energy Strategy 2016–2030, with an Outlook to 2050, it was specified that energy poverty refers to the situation of households that cannot heat their homes to a sufficient level and/or cannot cover the costs of other basic energy services. However, the strategy was not adopted by the Romanian parliament and was replaced with a new one that does not include a definition of energy poverty, i.e. the Energy Strategy of Romania 2019–2030, with an Outlook to 2050, which is currently under public debate.

A 2015 study requested by ANRE and carried out by the Romanian Academy defines energy poverty as 'the impossibility of a person or household to meet the minimum energy needs: lighting, optimum house heating during the cold period, use of cooking facilities and hot water preparation, as well as the use of the energy-based communication means'.[392] However, this definition was only partially adopted in Law 196/2016 regarding the minimum income for inclusion, where energy poverty was defined as the impossibility of a vulnerable consumer or household to meet their minimum energy needs for the optimal heating of the home during the cold season. Nevertheless, this law is not active yet; it will come into force in April 2021.

Energy poverty is caused mainly by three distinct sources: a low level of income, the lack of the necessary infrastructure and technologies or the inaccessibility to the energy system for reasons other than lack of money, as well as living conditions that do not ensure the efficient use of energy (especially a home with energy deficits).

In Romania the indicators for measuring energy poverty are based exclusively on household income, not on the share of energy expenditure in household income or on the technical status of the home and the heat requirements. In practice, the income indicator is reflected only in the heating aids granted by the Ministry of Labour.[393]

The final price of energy in Romania is considerably below the European average,

[392] Romanian Academy: Eficiența energetică – prioritate națională pentru reducerea sărăciei energetice, creşterea calității vieții şi siguranța consumatorilor de energie, 2015 (Energy efficiency—national priority for reducing energy poverty, improving the quality of life and for the safety of energy consumers).

[393] Center for the Study of Democracy: Sărăcia energetică şi consumatorul vulnerabil; Evidențe din România şi Europa, 2016 (Energy poverty and the vulnerable consumer; Highlights from Romania and Europe).

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both for natural gas and electricity. Romania has one of the lowest average prices of electricity for households in the EU. However, given the relatively low purchasing power, price affordability is a major problem, leading to a high level of energy poverty.

The average purchasing power in Romania is also well below the European average. The GDP per capita in Romania, at purchasing power parity, is 64% of the EU average.[394] At the same time, Romania has one of the greatest degrees of inequality in income distribution across the EU, after Bulgaria, Lithuania and Latvia, with a Gini coefficient of 35.1 in 2018, significantly above other EU countries.

An aspect that cannot be neglected in the analysis of energy poverty in Romania, in addition to covering heating costs in winter and accessing energy services, is the high share of electricity costs as a percentage of overall energy costs of households (urban 46%, rural 81%, first income decile 87%). Additionally, according to the 2011 census in Romania, 287,434 homes (3.4% of the total conventional housing at national level) appear not to be equipped with an electrical installation. This category of housing may also include homes that are not connected to the electricity network.

This data suggest that Romania does not face a structural problem of high energy prices, as other European countries do, but rather a structural problem of energy poverty. A 2016 study by the Centre for the Study of Democracy (CSD)[395] shows that 23% of households in Romania are affected by energy poverty, that is, they are having difficulty in ensuring their energy needs at affordable costs. Also, the social protection policy in place and the regulated energy prices have been inefficient and of limited effect.

The CSD study shows, for the period 2013–2015, the level of energy poverty in Romania if expenditure-based indicators were applied. The results are presented in Table 43.

Table 43: The share of population receiving heating aid compared to the share identified as energy poor when using expenditure-based indicators in Romania

Indicator	2013		2014		2015	
	% in energy poverty according to indicator (of the total households)	% overlap between the current beneficiaries and those identified by the indicator	% in energy poverty according to indicator (of the total households)	% overlap between the current beneficiaries and those identified by the indicator	% in energy poverty according to indicator (of the total households)	% overlap between the current beneficiaries and those identified by the indicator
Heating aid	*7.40%*	*100%*	*6%*	*100%*	*4.60%*	*100%*

[394] Eurostat: https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00114&plugin=1

[395] Center for the Study of Democracy: Sărăcia energetică şi consumatorul vulnerabil; Evidențe din România şi Europa, 2016 (Energy poverty and the vulnerable consumer; Highlights from Romania and Europe).

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Indicator	2013		2014		2015	
	% in energy poverty according to indicator (of the total households)	% overlap between the current beneficiaries and those identified by the indicator	% in energy poverty according to indicator (of the total households)	% overlap between the current beneficiaries and those identified by the indicator	% in energy poverty according to indicator (of the total households)	% overlap between the current beneficiaries and those identified by the indicator
High share of energy expenditure in income (2M)	11.90%	14.86%	19%	33.33%	12.10%	17.39%
Low income high costs (LIHC)	**12.30%**	**27.02%**	**16.90%**	**41.66%**	**9.90%**	**30.43%**
Low absolute energy expenditure (M/2)	12.20%	24.32%	18.70%	16.66%	13.50%	32.60%

The three expenditure-based indicators show similar shares of households in energy poverty but significantly above the share of those currently receiving heating aid.

The correlation between the expenditure-based indicators used for identifying households in energy poverty and the indicator of those currently receiving heating aid is low for all indicators. In other words, the category of households currently considered being in energy poverty on the basis of granting heating aid only partially overlaps with the category of households identified in energy poverty by applying each of the three indicators. Moreover, as can be seen in Table 43, only a small share of households identified as energy poor according to each of the three indicators currently benefits from heating aid. The largest overlap is in the case of the LIHC indicator, the highest for 2014 (41.66%).

To accurately measure the level of energy poverty in EU Member States, the EU Energy Poverty Observatory (EPOV) uses four primary indicators. The indicators for which there is sufficient data available at country and EU level and are based on self-reported experiences of limited access to energy services are the percentage of arrears on utility bills and the inability to warm the household at an adequate level. The other two indicators, the high share of energy expenditure in income (2M) and the low absolute energy expenditure (M/2), are calculated using household income and/or energy expenditure data. The following data and charts are taken from the EPOV analysis.[396]

In 2018, Romania performed worse than the EU average on the household-reported indicators (Figure 74). In 2018, 9.6% of households were unable to keep the home adequately warm, and 14.4% were in arrears on utility bills. Romania also scores above the EU average for the expenditure-based indicators: 18.6% of households' share of energy expenditure in income was more than twice the median, and 17.5% of

[396] Energy Poverty Observatory indicators and data available at: https://www.energypoverty.eu/indicators-data

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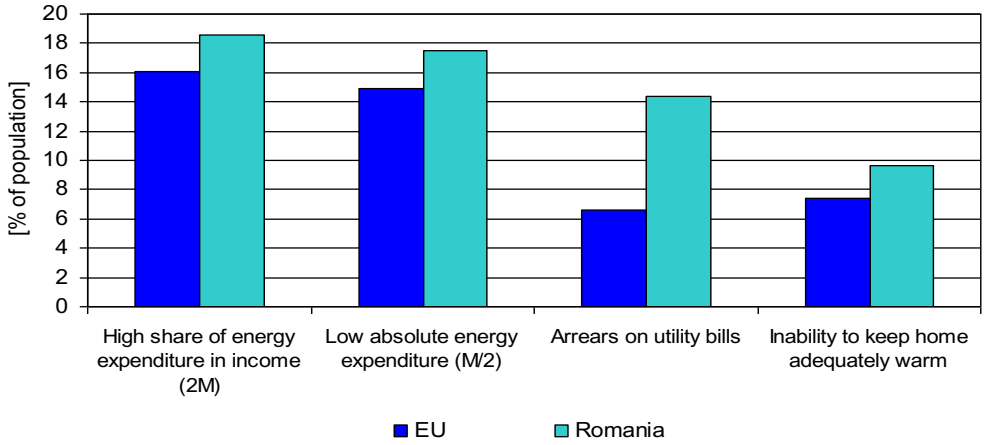
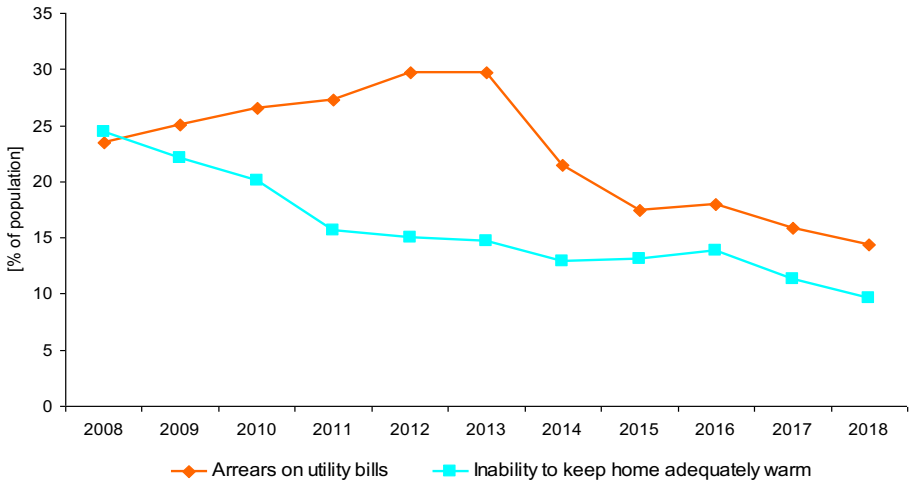
households spend less on energy than half the median.

Figure 74: Results of EPOV primary indicators in Romania, 2018



Analysing the household-reported indicators for the last 10 years (Figure 75), it can be seen that, in Romania, the percentage of households unable to keep the home adequately warm has decreased in recent years, from 24% in 2008 to almost 10% in 2018. The number of households in arrears on utility bills increased from 24% in 2008 to 30% in 2013 but decreased more recently to 14% in 2018.

Figure 75: Energy poverty over the last 10 years in Romania



Income

In Romania, the indicators for measuring energy poverty are based exclusively on the measurement of household income. As stated in the Romanian Energy Strategy 2016–2030, with an outlook to 2050, in 2015, a good portion of 7.5 million homes in Romania were heated only partially: about 90% in rural areas and almost 20% in urban areas. Especially for home heating in urban areas, the inability of families living in dwellings to ensure the necessary level of thermal comfort is correlated with the low available income for paying the bills. The average net monthly income per household in 2017

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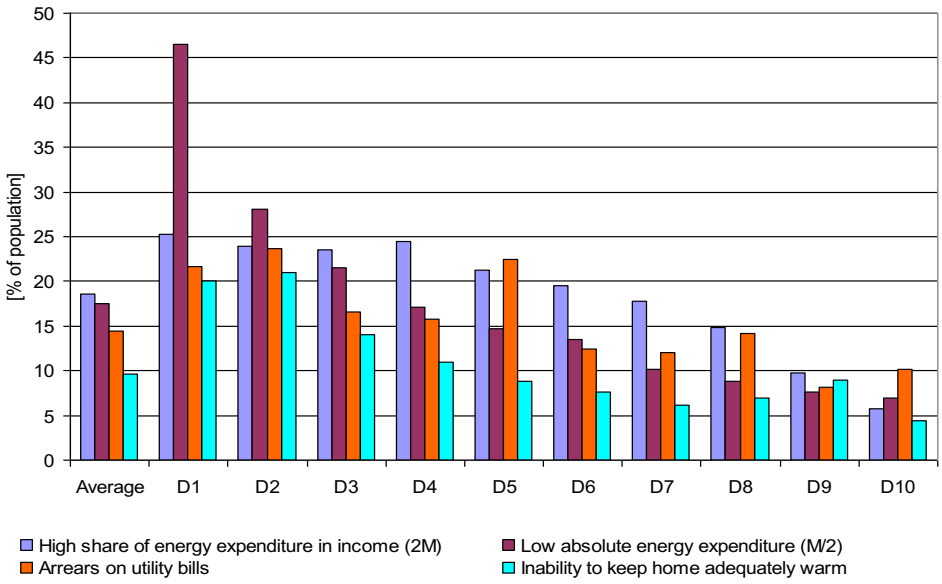
was about €742 (urban €837, rural €618), whilst the energy costs made up for 17.1% of the average net household income (urban 16.7%, rural 17.7%).[397]

In Romania energy poverty is closely correlated with income poverty. Figure 74 presents the energy poverty by income deciles in 2018. The M/2 indicator (low absolute energy expenditure) is the most sensitive to the household equivalised income. Under this indicator, more than 45% of the households in the lowest income decile are energy poor and almost 30% in the second income decile, compared with only 7% in the highest income decile.

For the 2M indicator (high share of energy expenditure in income), the households from the first and the fourth income deciles are the most energy poor (about 25%), whilst in the highest income decile only around 6% spend more than twice the national median.

The highest share of population having arrears on utility bills is in the second and the fifth income deciles (23%), followed closely by the first income decile with 22%. Almost 21% in the lowest two income deciles are unable to keep their house warm.

Figure 76: Energy poverty by income deciles in Romania, 2018



Household composition

The energy poverty by household composition data, presented in Figure 77, shows that 14.4% of Romanian households had recurring arrears on utility bills, mainly due to low-income. However, only 3.5% received aid for home heating in 2018.[398] Although it was less than in 2017 (15.9%), the rate of energy poverty in 2018 was more than twice the average at the European level (6.6%).[399]

[397] National Institute for Statistics (INS): Coordonate ale nivelului de trai in Romania 2017 (Coordinates of living standards in Romania 2017).

[398] Calculation made based on data from the Romanian Ministry of Labor and Social Justice.

[399] EPOV: https://www.energypoverty.eu/indicators-data

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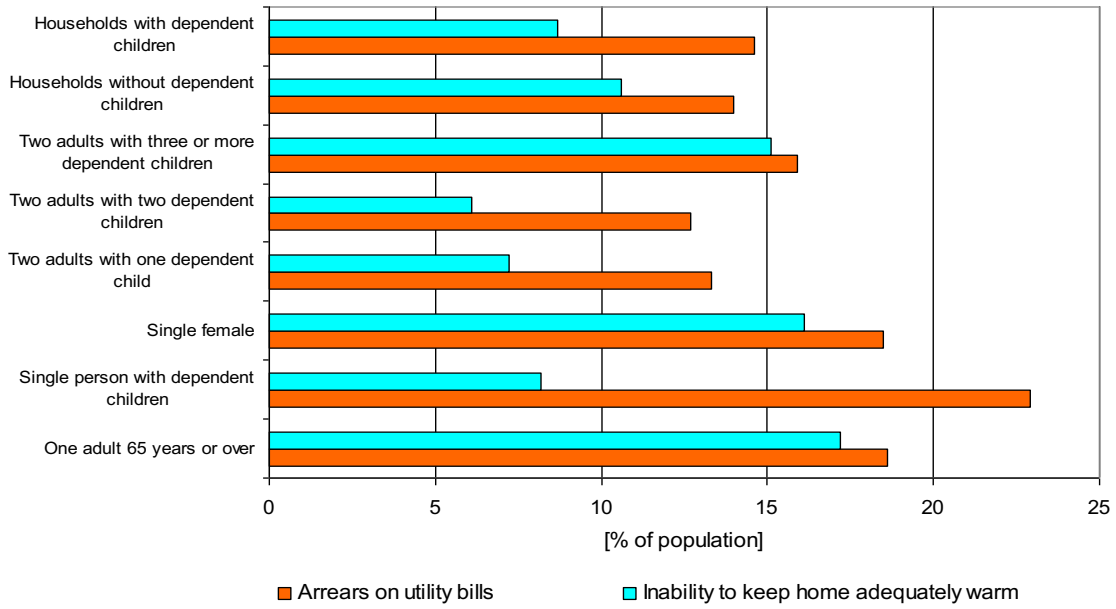
Single-parent households are the most vulnerable to energy poverty (22.9%). These are mostly mothers with dependent children and are significantly more vulnerable than couples with dependent children (14.6%). Single-parent households account for only 2% of the Romanian population, but almost one-quarter are in energy poverty. Other types of households that face the highest difficulty in paying utility bills are those with members aged 65 years or over and single female households (18.5%) and those with two adults with three or more dependent children (15.9%).

Households of three or more people are the least affected by energy poverty (10.2%) followed by households of couples with two dependent children.

In terms of the inability to keep the home adequately warm, the most affected are adults 65 years or over (17.2%) and single females (16.1%).

Figure 77: Energy poverty by household composition (selected household types) in Romania, 2018



Tenure

In 2018, the majority of households owned their homes and only 4% were tenants. The share of rented households is higher by 1.9% in the urban area compared to the rural area.

Disaggregated data of the household-reported indicators suggest that energy poverty in Romania is a larger problem for households that rent. Energy poverty in terms of arrears on utility bills is more than twice higher amongst Romanian tenants than those at EU level (6.6%).

As shown in Figure 78, 22% of private tenants and 20% of social housing have difficulty paying utility bills, whilst 16% of those with reduced or free rent and 12% of those renting at market price are unable to keep their home adequately warm.

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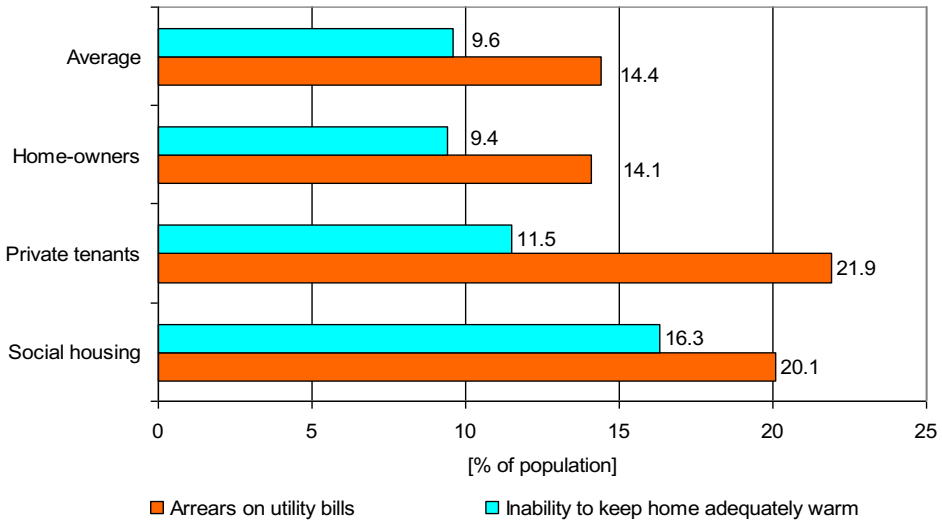
Figure 78: Energy poverty by tenure, 2018.



Dwelling condition and type

Romania ranks first among EU Member States in terms of private ownership of a home (96% compared to the EU-28 average of 70% in 2018). However, this situation has certain disadvantages, including difficulties in the maintenance of houses by some owners.

Almost one in seven Romanian households is facing one or more serious problems related to the quality of housing. The evidence from the National Institute for Statistics (INS) on the presence of leaks, damp or rot shows that the percentage of the Romanian population living in homes with leaks, damp or rot is 13%, which is only a little less than the EU average of 15%. This is more common in rural areas where 17.5% of households are affected, whilst in urban areas these problems are faced by 9.3% of households. Amongst the most common problems affecting the quality of housing are damaged window frames, walls and floors (53.5% of households report such problems), leaks in the roof or walls (29.4%) and damp walls, floors or foundations (48.0%).[400] The comparison between residential areas shows that, generally, in rural areas, the share of households with housing problems, especially those related to damaged walls, floors or windows and dampness, is higher than in the urban area. This is understandable to a certain extent, considering the construction characteristics of individual houses that are found predominantly in rural localities.

The disaggregation by dwelling type of the household-reported indicators presented in Figure 79 points to semidetached housing (closely followed by apartments) as being the dwelling type most susceptible to energy poverty. The results show that households living in smaller dwellings are significantly more likely to suffer energy poverty.

[400] National Institute for Statistics (INS): Condițiile de viață ale populației din România în anul 2018 (Living conditions of the Romanian population in 2018).

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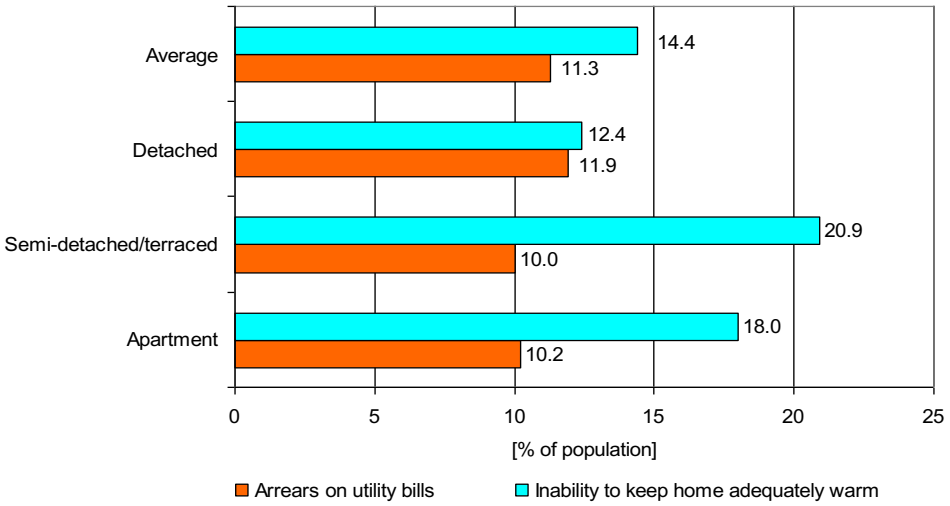
Figure 79: Energy poverty by dwelling type in Romania, 2018



Policies to mitigate energy poverty

Though the primary law (123/2012) does not provides a definition for energy poverty, it does provide for the drafting and implementation of a national action plan for energy poverty. Although the law dates from 2012, in 2019 this action plan has still not been elaborated, published or adopted.

The financial measures for social protection applied in Romania for vulnerable consumers are regulated by GEO 70/2011 with its subsequent amendments and completions.

Help for home heating is granted on the basis of a request from the vulnerable consumer and a self-declaration of household composition and income. To obtain this subsidy the main condition is that the income of the applicant must be lower than certain income levels set by GEO 70/2011. Thus, the higher the income per family member (up to certain maximum eligibility thresholds, which vary depending on the fuel used), the lower the compensated percentage.

The subsidy for home heating during the cold season is granted regardless of the type of heating that is used: centralized heating, natural gas, solid fuels (wood, coal) or electricity (when the home has no other form of heating). Electricity was included in 2013 by GEO 27/2013 as an eligible fuel to be subsidized.

Also, local authorities may provide, by council decision, monthly subsidies from the municipal budget, in addition to that provided from the state budget. The amount of the heating cost covered by local authorities decreases or increases in correlation with the average net monthly income.

For consumers connected to district heating, the subsidy can be obtained by families with an average net monthly income per family member of up to 786 lei (about €170) and by single people with an average net monthly income not exceeding 1,082 lei (about €230). For natural gas, electricity, wood, coal and petroleum consumers to be eligible, the maximum average net monthly income per person (single person or

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family member) cannot be more than 750 lei (about €158).[401] This level was increased from 615 lei (about €130 Euro) in the beginning of 2019 by GEO 114/2018.

A **social tariff** for electricity was also applied in the past, but since January 2018, it was removed by ANRE linked to market liberalization. From July 2018, following the approval of ANRE Orders 26/2018 and 39/2018, a new system price was approved but without a social tariff.

Law 196/2016 that will come into force in 2021 and that will repeal and replace GEO 70/2011 provides for a **subsidy for inhabitancy** granted for covering all or part of the costs for household heating during the cold season. This will replace the 'help for home heating'. This assistance will be granted to individuals or families with incomes up to an adjusted monthly net income of 600 lei (€125/person) and to single persons at least 60 years of age, up to an adjusted monthly net income of 800 lei (€167).[402]

There are also nonfinancial protection measures for the vulnerable consumers. The **National Programme First Light** was sent for approval to the Romanian parliament this year. This programme proposes the establishment of a voucher system for families not connected to the electricity grid who cannot afford to cover the high costs of connection due to the great distance from the nearest point of electricity distribution or due to the fact that the respective families fall into the category of vulnerable consumers. The targeted households will receive a 7,000 Lei (about €1475) voucher to purchase a green electricity generation system (photovoltaic, hydro or wind), or where the solution is possible and more cost-effective, they will be able to connect to the public electricity distribution grid.

Another measure ensures that vulnerable customers are **not disconnected for non-payment** of the bill; they have the opportunity to pay the amount in instalments. Also, consumers with health problems who are dependent on electrical equipment can receive **additional power supply equipment** from the distributor in order to ensure a continuous power supply and have priority on reconnection in case of unplanned outages.

4.10.6 CONCLUSIONS

Energy poverty, understood as the difficulty in paying utility bills but also as poor access to modern means for ensuring home comfort, is an important factor of social marginalization. The existence of arrears on utility bills or lack of access to modern energy technologies generates obstacles in the socioeconomic course of individuals and can lead to higher levels of poverty and exclusion in a broader sense.

In Romania, energy poverty is a rather unclear concept in terms of its definition and inclusion in public policy or legislative documents. Since there is no official definition, the identification and monitoring of areas, populations, or households affected by energy poverty is very difficult.

Energy poverty during winter is a more significant issue in Romania, considering the

[401] Romanian government: GEO 70/2011 regarding social protection measures during the cold season.

[402] Romanian government: Law 196/2016 regarding the minimum income for inclusion.

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high use of energy for space heating. Especially for home heating in urban areas, the inability of families to adequately heat their dwellings is correlated with low income and difficulty in paying bills.

In Romania, the indicators for measuring energy poverty are based exclusively on the measurement of household income. Therefore, on a national level, energy poverty is addressed mainly through financial support to low-income households.

In recent years, energy poverty in Romania rose in 2013 reaching 30%, and then decreased to 14% in 2018, despite the rise in energy prices, particularly electricity, during this period.

An analysis of energy poverty indicators for 2018 shows the following:

- Romania performs worse than the EU average on all indicators;
- The distribution of energy poverty across income deciles shows that almost 50% of the households in the lowest income decile are energy poor under the low absolute energy expenditure indicator, but generally, the first five income deciles have the highest rates of energy poverty;
- Single-parent households account for only 2% of the Romanian population but almost one-fourth are in energy poverty. On the other hand, 16 to 17% of single females and adults over 65 suffer from some form of energy poverty;
- Evidence suggests that energy poverty rates are significantly higher for households living in the rented sector;
- Semidetached housing (closely followed by apartments) is the dwelling type most susceptible to energy poverty. Households living in smaller dwellings are significantly more likely to suffer energy poverty than the population average ;
- Romania ranks first among EU member countries in terms of private ownership of a home, but not all owners are able to maintain their housing to adequate living standards. Thirteen percent of the Romanian population lives in homes with leaks, damp or rot, which is only a little less than the EU average. This situation is more common in rural areas due, to a certain extent, to the construction characteristics of individual houses in those areas.

It is expected that Romania's transition to the single European energy market will lead, in the next period, to an almost doubling of energy prices. The rise in energy prices will be borne not only by the economy but also by family budgets, and it will have an even stronger impact on the poor segment of the population.

Romania lacks a strategic approach on energy poverty reduction. Energy poverty is only briefly addressed in Romanian policies and programmes; therefore, an adequate legislative framework should be developed and efficient protection measures should be adopted in the near future. The first step is drawing up an action plan on energy poverty required by the legislation already in force. In the action plan, it is important to clarify the methodological tools by which relevant data is collected and aggregated for the identification of energy-poor households.

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4.11 SPAIN CONTEXT

4.11.1 INTRODUCTION

In 2018 the population in Spain was 46.6[403] million people. The number of private households was 18.58 million.[404] From 2017 to 2018, Spain's population grew by 0.3%,[405] and projections show a continued population growth rate until 2050.[406] Table 44 illustrates the household composition in 2018.

Table 44: Household composition in Spain, 2018

Single adult	5.38m (29% of total)
Single adult with children	0.63m (3% of total; 12% of single adults)
Couple	8.27m (45% of total)
Couple with children	4.25m (23% of total; 51% of couple)
Other type	4.93m (27% of total)

The number of single-adult households aged 65 and over in 2018 was 2.09 million (11% of total and 39% of single adults).[407] This data is relevant since single adults, single adults with children and older people are more vulnerable to energy poverty (see section on energy poverty below).

The older age population is growing, and as older age is a risk factor for energy poverty, it is likely that energy poverty will also rise. The proportion of the total population that is aged 65 years and over has increased from 16.8% in 2010 to 19.2% in 2018.[408] Projections for 2030 and 2050 show a further increase to 24.1% and 32.4%, respectively.[409]

Another factor linked to energy poverty is low income as a result of unemployment. In this regard, in 2018, the employment rate, which corresponds to the number of persons aged 20 to 64 in employment divided by the total population of the same age group, equalled 67.0%.[410] The median income in 2018 was €14,785, which is below the EU-28 average median income of €17,386.[411]

Table 45 shows the impact of the 2008 economic crisis on GDP growth (percentage change on previous year) [412] and the employment rate, 2007–2012 and 2018.

[403] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en
[404] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhnhtych&lang=en
[405] The World Bank: https://data.worldbank.org/indicator/sp.pop.grow
[406] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18np&lang=en
[407] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhaceday&lang=en
[408] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en
[409] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_18ndbi&lang=en
[410] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tesem010/default/table?lang=en
[411] Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di04&lang=en
[412] Eurostat: https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

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Table 45: Impact of 2008 economic crisis on GDP growth rate and employment in Spain

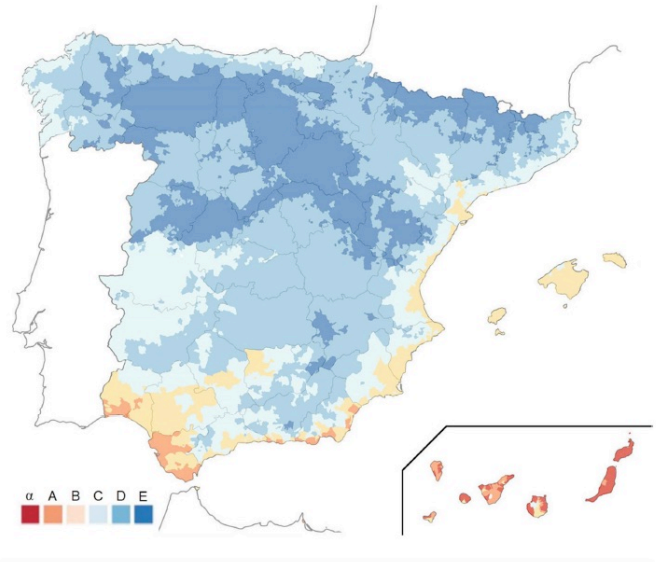
	2007	2008	2009	2010	2011	2012	2018
1. Real GDP growth rate	3.6	0.9	-3.7	0.1	-0.8	-3.0	2.4
2. Employment rate	69.7	68.5	64.0	67.6	67.3	67.2	69.7

The study *Energy poverty in Spain: Approximation from an income perspective*[413] shows a correlation between energy poverty and GDP.

With respect to climatology, Spain has different climate zones due to its geographical situation and orography conditions. The southern coastal regions have a Mediterranean climate, and the northern coastal regions have an oceanic climate. The central plateau has a continental climate, and the mountain regions have an alpine climate.

This climatic diversity has implications for the energy demand of dwellings and that is contemplated in the Technical Building Code establishing climatic zones alfa, A, B, C, D, E, in increasing order of severity. The technical building code also assesses the climatic severity in summer giving rise to four numbers from 1 to 4.

Figure 80: Climate zones in Spain set by the Technical Building Code



Source: National Strategy of energy poverty, 2019

4.11.2 RESIDENTIAL BUILDING STOCK[414]

There are 26.56 million dwellings/units in Spain. The residential building stock has the

[413] http://www.fundacionnaturgy.org/wp-content/uploads/2019/11/estudio-pobreza-energetica_ieb-ub_fundacion-naturgy.pdf

[414] Pezzutto, S., et al. (2018). Hotmaps Project, D2.3 WP2 Report—Open Data Set for the EU28. Available at: www.hotmaps-project.eu; and EU Building Stock Observatory. Available at:

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following age distribution:

- Built before 1945: 4.12m (16% of the total number of dwellings/units)
- Between 1945–1969: 3.70m (14% of the total number of dwellings/units)
- Between 1970–1979: 3.41m (13% of the total number of dwellings/units)
- Between 1980–1989: 3.84m (14% of the total number of dwellings/units)
- Between 1990–1999: 3.80m (14% of the total number of dwellings/units)
- Between 2000–2010: 5.16m (19% of the total number of dwellings/units)
- Post 2010: 2.53m (10% of the total number of dwellings/units)

Forty-three percent of all dwellings/units were built before 1980, before the enactment of the first laws to include insulation requirements for buildings. The aforementioned study *Energy poverty in Spain: Approximation from an income perspective* analyses the age of dwellings in Spain and its influence on energy poverty. The study concluded that there was no correlation between the age of a dwelling and energy poverty. However, the renovation and retrofitting of buildings is needed to reduce energy consumption and, at the same time, increase people's housing comfort.

Looking at tenure distribution, 79% of dwellings (20.93m) are owner occupied, 12% are privately rented and 9% are social housing.

Just over half of the Spanish population (50.7%) lives in cities, 25.9% in rural areas and the remaining 23.4% in towns and suburbs.[415]

Spain's National Strategy against Energy Poverty (2019–2024) shows that the four indicators chosen reveal higher levels of energy poverty in rented houses with an old rental agreement, which is a specific kind of housing rent. In this regard, policies should take into account that many of the people in energy poverty are not home owners, and therefore, the measures and initiatives proposed should consider how to motivate landlords to retrofit their houses.

Furthermore, policies should take into account that rural areas have a higher number of households in energy poverty (24%).

4.11.3 POLICIES, REGULATIONS AND TARGETS FOR ENERGY EFFICIENCY AND RENOVATION

Regarding policies and regulation in the building sector, in compliance with the provisions of Article 4 of the Energy Efficiency Directive 2012/27/EU (EED), the Ministry of Fomento published in 2014 the *Long-term strategy for energy renovation in the building sector in Spain* (ERESEE 2014[416]), and in 2017 it prepared the *Update of the*

https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/eubuildings

The majority of building stock data refer to the year 2016.

[415] Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_lvho01&lang=en

[416] https://www.fomento.gob.es/recursos_mfom/pdf/772D26EF-6906-4AD9-9253-775615069E34/130070/ESArt4ENENER20140100900000ENTRA00.pdf

long-term strategy for energy rehabilitation in the building sector in Spain (ERESEE 2017[417]).

ERESEE 2014, in addition to fully satisfying all the requirements of the directive, was an important starting point for the promotion of energy renovation of the building sector in Spain, as well as providing a roadmap for the sector, which is still in force. It provides a guide for the different stakeholders involved in carrying out the retrofitting, in their respective spheres of activity. This strategy was considered to be fully compliant to the requirements of Article 4 of the EED and scored the highest in terms of compliance, according to the assessment report developed by the JRC of the European Commission.[418]

According to Article 4 of the directive, the strategy was updated in 2017. ERESEE 2017 has a marked qualitative character, since there is no available new relevant statistical information that would allow a quantitative update. The update therefore focused on the analysis of the impact of the measures already implemented to boost energy efficiency in buildings, as well as identifying new measures that are considered necessary for the sector to continue advancing in Spain.

The main contents of ERESEE 2017 are an analysis of how energy consumption in the building sector and renovation of the building stock in Spain has evolved, a follow-up of energy renovations implemented, an analysis of the main structural challenges and proposed new measures and axes of action.

4.11.4 ENERGY MARKET

The residential sector is an important consumer of energy in Spain, accounting for 18%[419] of end-use energy consumption.

Final energy consumption in the Spanish residential sector amounts to 15.227 ktoe, derived largely from electricity (40%), gas (25%), renewable energy (18%) and oil products (17%).[420]

417 https://www.fomento.gob.es/recursos_mfom/paginabasica/recursos/es_building_renov_2017_en.pdf.

418 https://publications.jrc.ec.europa.eu/repository/bitstream/JRC97754/syntesis%20report%20building%20renovation%20strategies_online%20fin.pdf

419 IDAE: http://sieeweb.idae.es/consumofinal/bal.asp?txt=2017&tipbal=t

420 IDAE: https://idae.es/estudios-informes-y-estadisticas

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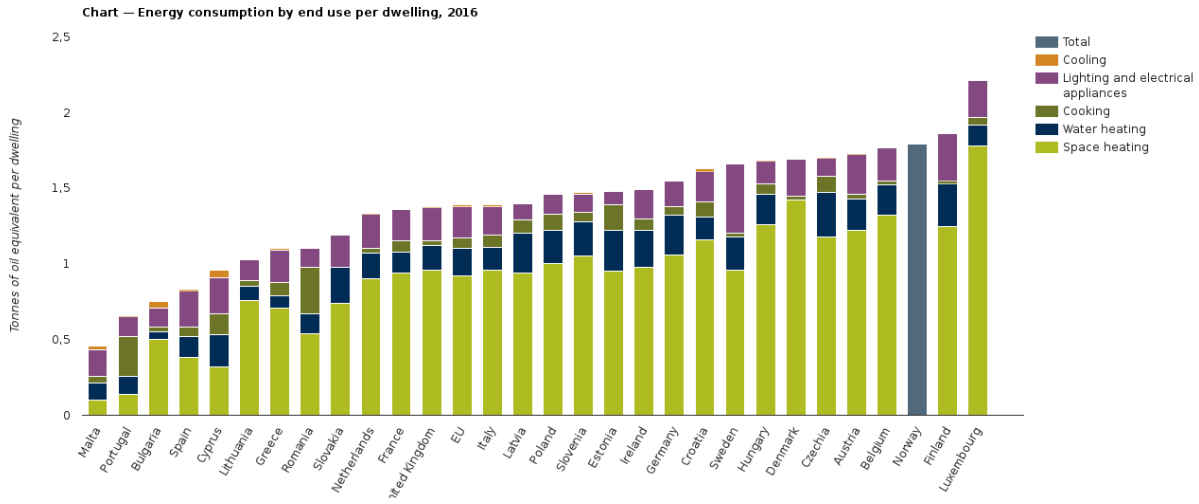
Figure 81: Energy consumption by end use per dwelling, 2016



Energy consumption per dwelling in Spain is relatively small, principally due to moderate climate conditions. Space heating needs and water heating are smaller in comparison to the rest of Europe.

In the Spanish market, electricity and natural gas consumers have the ability to freely choose suppliers from a wide range of electricity and gas marketers. In this case, the conditions of the service are reflected in the supply contract. In addition, smaller consumers (consumers connected to low voltage with contracted power less than or equal to 10 kW) have the option of using the so-called reference marketers, through a regulated mechanism—the voluntary price for the small consumer (PVPC). Gas consumers, consuming up to 50,000 kWh per year, have the same option of using reference marketers[421] through a last resort fee.

In December 2017, 58% of electricity consumers and 79% of gas consumers purchased energy in the free market.

Regarding prices, electricity prices have increased significantly, as shown in Figure 82, which shows average electricity prices[422] and average gas prices,[423] with taxes and levies, for Spanish household consumers from 2007 to 2019.

[421] Electricity retail market supervision report of CNMC published in February 2019.

[422] Household electricity consumers (2,500 kWh < annual consumption < 5,000 kWh, taxes and levies excluded). Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en (2,500 kWh < annual consumption < 5,000 kWh, taxes and levies included).

[423] Household gas consumers (20 GJ < annual consumption < 200 GJ, taxes and levies included). Eurostat: https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

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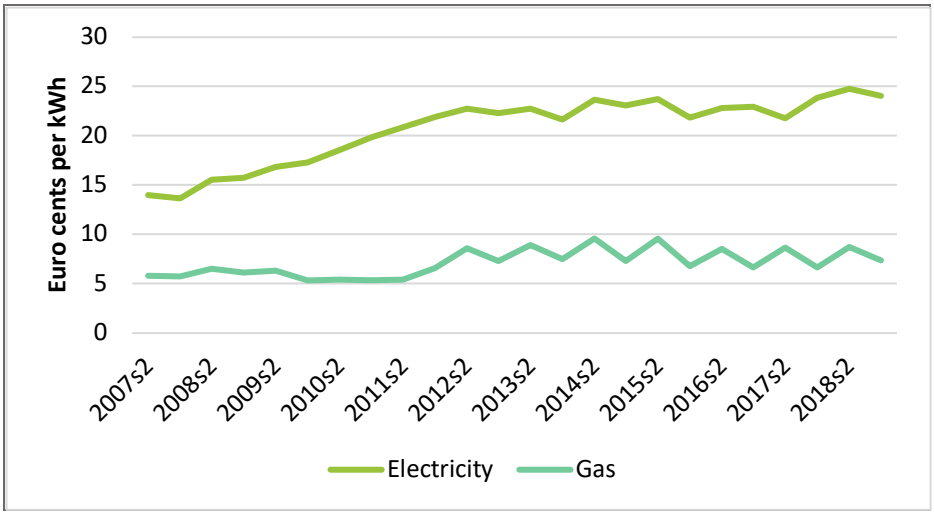
Figure 82: Electricity and gas prices for household consumers in Spain, biannual data from 2007–2019



Source: Eurostat

Obviously, higher energy prices don't help energy poverty. Some of the increases of prices, especially in electricity, were caused by increases in taxes during the crisis years.

4.11.5 ENERGY POVERTY

Spain's National strategy against energy poverty (2019–2024)[424] is the official and most recent study by the Ministry of Ecological Transition of the government of Spain. Its conclusions were complemented by the study *Energy poverty in Spain: Approximation from an income perspective*,[425] published by Naturgy Foundation and prepared by the Chair of Energy Sustainability at the IEB-University of Barcelona, April 2019.

The study defined energy poverty as:

> *the situation in which a household finds itself in which the basic needs of energy supplies can't be met, as a consequence of an insufficient income level and that, in this case, it can be aggravated by having energy inefficient housing.*

The strategy used all four EPOV primary indicators, adjusted for variables such as climate, the size of the household, the income quintile per consumption unit, the activity situation and the type of household.

Table 46: Evolution of indicators of energy poverty in Spain

INDICATOR (% population)	2008	2014	2015	2106	2017	2018
High share of expenditure in income (2M)	15,9	16,6	16,6	16,7	17,3	16,9

[424] National Strategy against Energy Poverty https://www.energypoverty.eu/publication/national-strategy-against-energy-poverty-2019-2024

[425] http://www.fundacionnaturgy.org/wp-content/uploads/2019/11/estudio-pobreza-energetica_ieb-ub_fundacion-naturgy.pdf

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INDICATOR (% population)	2008	2014	2015	2106	2017	2018
Hidden energy poverty (M/2)	14,6	13,2	12,2	12,6	11,5	11
Inability to keep home adequately warm	5,9	11,1	10,6	10,1	8	9,1
Arrears on utility bills	4,6	9,2	8,8	7,8	7,4	7,2

Source: National Strategy against energy poverty[426]

The economic recession that began in 2008 resulted in a significant increase in energy poverty in Spain between 2008 and 2014, as revealed by the main indicators of the European Energy Poverty Observatory (EPOV). However, since 2014 there has been a relative improvement in some indicators as a result of the economic recovery.

Overall, it can be concluded that currently between 7.2% and 16.9% of the Spanish population is in fuel poverty. This corresponds to between 3.3 and 7.8 million people.

Energy poverty is, in part, one more manifestation of poverty: for households with lower-income levels the inability to keep the home adequately warm and the reported arrears on bills are markedly higher.

Single adults, low-income households and households with unemployed members or members aged 65 and over show higher levels of energy poverty, according to the four indicators, so these can be considered vulnerability factors.

For all the indicators except the Hidden Energy Poverty (M/2) indicator, a relevant and apparently contradictory territorial factor can also be observed: those living in areas with a more benign climate experience more energy poverty as a consequence of, among other factors, poor housing insulation.

In the Spanish context the indicator on inadequate housing temperature in summer is relevant. Twenty-six percent of respondents declared having difficulty maintaining a comfortable home temperature in summer. Generally speaking, the incidence of discomfort is reduced in northern communities with Atlantic climates and the Canary Islands, whereas it reaches its highest levels in southern communities.

In addition, the study *Energy poverty in Spain: Approximation from an income perspective* reinforces the idea that energy poverty is another dimension of poverty in general, and though using a different indicator, the conclusions are similar.

The main conclusions of the study are:

- Rural areas or those with a lower population density have a greater number of households in energy poverty (24%) compared to households that are not in this situation (13%). In addition, homes located in rural areas, with a greater proportion of large or single-person households, show a clear correlation with the rate of energy poverty;
- More than two-thirds of energy-vulnerable households live in homes built 25 years

[426] National Strategy against Energy Poverty https://www.energypoverty.eu/publication/national-strategy-against-energy-poverty-2019-2024 and its actualization https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-pobreza-energetica/actualizaciondeindicadorespobrezaenergetica2019_tcm30-502983.pdf

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ago or more. According to the study, 50% of the Spanish residential buildings were built before the 1980s, when the energy efficiency of a house was not contemplated in building construction regulations;

- Of the households in energy poverty, 4.9% have a single head of family (often a woman) and 38.1% are single-person households. Households formed by a single person, therefore, show a greater probability (6%) of being energy poor. Households with a single parent with dependent children are 7.2% more likely to be poor in energy;
- In general, households in energy poverty tend to have lower levels of educational attainment; only 13.8% of energy-poor households have a member who has completed higher education studies, compared to 36% of households that are not energy poor;
- Rental tenancy is a more widespread phenomenon among families identified as energy poor (18.8%) compared to the rest of the population (16.5%).

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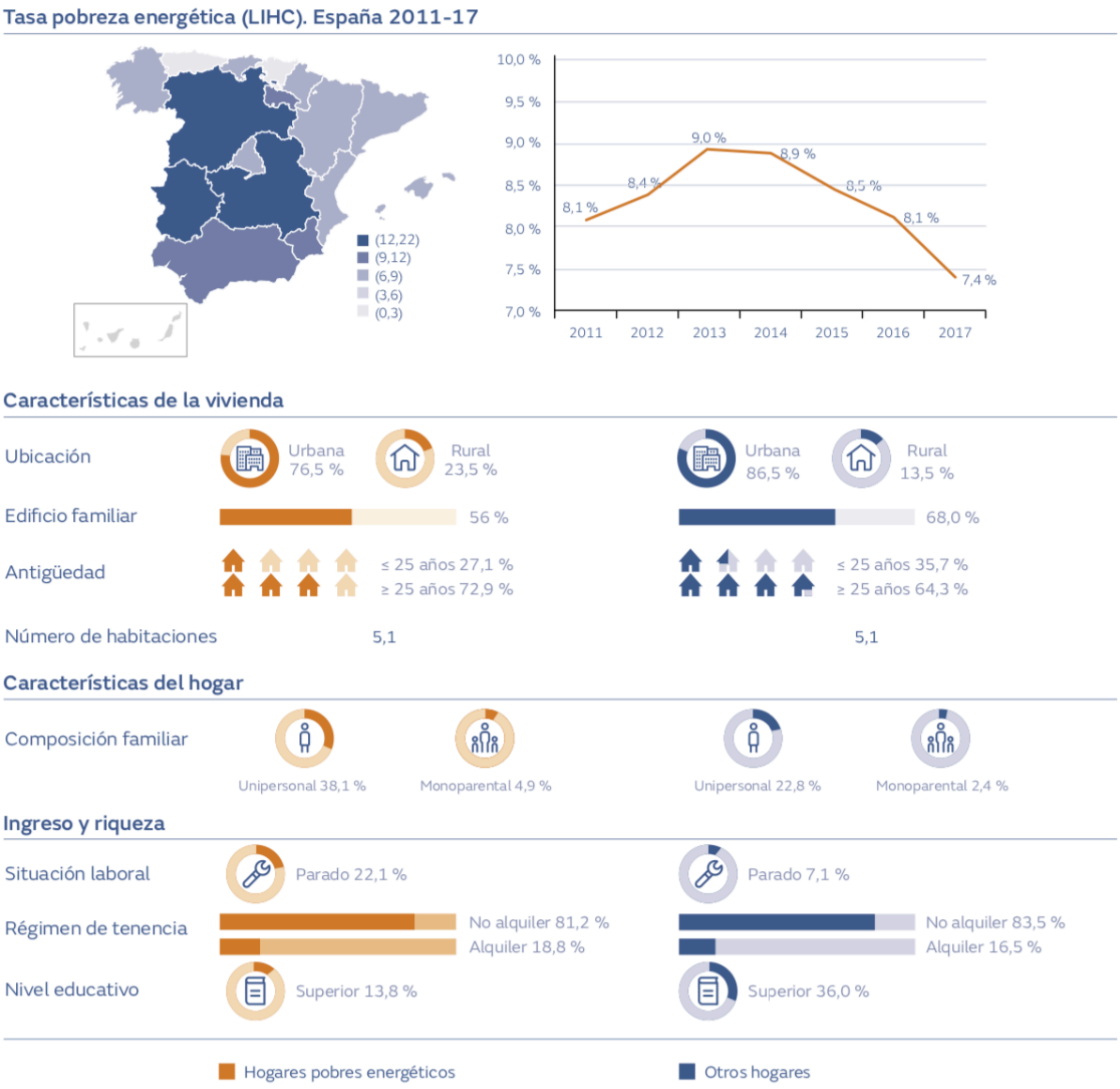
Figure 83: Characterisation of energy poverty in Spain



Source: (NATURGY Foundation, 2019) [427]

Policies to mitigate energy poverty

From a policy point of view, Spain has made progress in meeting the requirements of European Directives in relation to consumer protection and, in particular, vulnerable consumers.

The main measure of protection for vulnerable consumers is the Electric Social Bonus, which was introduced in 2009 and has been undergoing several modifications until its last modification through Royal Decree-Law 15/2018, on 5 October 2019. At present, the Electric Social Bonus is a 25% or 40% discount on the electricity rate for customers

427 http://www.fundacionnaturgy.org/wp-content/uploads/2019/11/estudio-pobreza-energetica_ieb-ub_fundacion-naturgy.pdf

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who meet certain requirements, based mainly on income level but also on personal circumstances. Customers can qualify as either vulnerable clients or severely vulnerable clients. This royal decree approved, for the first time, the thermal social bonus as a single annual payment to those customers who already received the social electric bonus on 31 December 2018.

Additionally, at the Autonomous Administration level, some autonomous communities have established funds to help vulnerable consumers pay their bills. They also coordinate with energy companies through agreements to ensure that these consumers are protected against a suspension of supply.

At the local administration level, energy poverty is an issue that increasingly takes up time and resources. Short-term impact measures are promoted, such as bill payment, and other medium- and or long-term measures are also promoted, such as energy audits, training for changing habits and some retrofit of buildings. The local administration plays a very important role in the detection of people in vulnerable situations.

In Spain, Article 7 of the Energy Efficiency Directive was transposed, creating a system of obligations on energy suppliers. Compliance with these obligations is achieved through the creation of the National Energy Efficiency Fund (FNEE) into which the obligated parties manually contribute the amount designated by the ministry. The Institute for Diversification and Energy Saving (IDEA), which is an institute attached to the Ministry for Ecological Transition, designs energy efficiency measures and plans to be funded through the National Energy Efficiency Fund and other funds from other sources such as the European Regional Development Fund (ERDF).

Recently, the National Strategy against Energy Poverty established the following schemes grouped into action axes. These axes are not yet implemented as the strategy was only approved in April 2019, but they present the types policies related to energy poverty in the coming years.

Axis I: Improve the knowledge on energy poverty

- Periodic calculation of the indicators: annual update;
- Publication of indicators by the government before 15 October 2019;[428]
- Study of household thermal and electrical expenditure: panel of vulnerable households.

Axis II: Improvements in subsidy mechanisms

- Review of the current social bonus status and proposed mechanisms, new social energy bonus, minimum vital supply with power reduction;
- Establishing protection in extreme weather situations: disconnection prohibition for the vulnerable.

[428] Actualization of indicators os National Strategy against Energy Poverty
https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-pobreza-energetica/actualizaciondeindicadorespobrezaenergetica2019_tcm30-502983.pdf

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Axis III: Structural changes

- Reduction of the number of people in energy poverty;
- Low-cost retrofit and change of technical equipment (short term);
- Promotion of public housing under social rent with subsidy for energy supplies (medium term);
- Replacing appliances and heating and cooling systems with more energy efficient ones (medium term);
- Integral rehabilitation of buildings (long term);
- Measures derived from the Long Term Strategy for Energy Rehabilitation in the Building Sector in Spain (ERESEE[429]).

Axis IV: Protection and social awareness

- Protocol of performance for healthy professionals;
- Information and training of consumers: web, use smart meters, energy efficiency, news communication channel;
- Regulatory improvements for consumer protection with Inclusion of the Energy Poverty perspective in regulation.

In addition, the study Energy poverty in Spain: Approximation from an income perspective made the following recommendations:

- In the workplace, harmonize the regional minimum insertion income and implement active policies for job creation or aid to companies to incorporate unemployed;
- At an education level, take measures to avoid early school leaving or provide consumers with tools, such as understanding the energy bill and information on their rights to access aid, such as the social bonus;
- In relation to single-parent households, offer tax incentives, such as the possibility of deducting a caregiver's expense in the annual income tax return;
- Regarding single-person households, consider age, gender and regional differences in the design of policies aimed at reducing energy poverty, or introduce innovative measures such as incentives for intergenerational home sharing to share expenses;
- Adopt measures that influence household spending, mainly focused on improving energy efficiency.

Overview of funding and programmes for social actions / energy poverty

At the local administrative level, there are some *diputaciones o deputations*, which are institutions that provide service to municipalities, that have programs offering

429 https://www.fomento.gob.es/el-ministerio/planes-estrategicos/estrategia-a-largo-plazo-para-la-rehabilitacion-energetica-en-el-sector-de-la-edificacion-en-espana

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energy consultants to households. These energy consultants review people's energy contracts, give recommendations to improve household consumption habits and suggest possible home renovations.

In the private sector, Naturgy Foundation has an energy vulnerability programme with more than 20 initiatives such as: low-cost retrofits, workshops on energy bills and efficient consumption habits, vulnerable customer service and special debt payments conditions.

4.11.6 CONCLUSIONS

- Spain's national strategy against energy poverty (2019–2024) is an official document that brings light on the diagnosis and policies of energy poverty;
- The study *Energy poverty in Spain: Approximation from an income perspective* has a complementary vision on tackling energy poverty and reaches similar conclusions;
- Energy poverty is one more manifestation of poverty: households with lower-income levels, the unemployed, those living in rural areas, single-person households, households with members over 65 years old and large families with more than five members are all vulnerable;
- In Spain, energy poverty is also a problem in the summertime;
- Housing insulation conditions significantly influence energy poverty;
- The measures to alleviate energy poverty must be combined with social policies that allow increasing the income of families and with energy efficiency policies that promote energy interventions and achieve energy cost reductions.

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5 GOOD PRACTICE POLICIES, ACTIONS AND PROGRAMMES TO MITIGATE ENERGY POVERTY

The table below presents 21 examples of programmes that deliver different types of support for energy poverty alleviation, broken down by country and by type of support offered. In the selection of these examples, programmes delivered by or in partnership with an energy company have been prioritised. Click on the measure type heading or on the individual programme name to link to the relevant chapter.

Measure type / Country	A1: Bill support and disconnection prevention	A2 Energy saving and energy bill advice (with low-cost measures)	A3: Provision of low-cost physical measures	A4: Energy efficiency and renewable energy measures and investment
Austria		A2.1 DoppelPlus A2.2 Ombudsman for energy poverty A2.3 VERBUND-Stromhilfefonds der Caritas		
Belgium		Gratis Energiescan		
Croatia	A1.1 Electricity cost subsidy			A4.1 Solar PV and LED lighting for off-grid homes
France				A4.2 Helping Hand: The Energy Savings
Germany		A2.5 Stromspar-Check		
Greece	A1.2 Electricity bill payment support		A3.1 LED lamps kits	
Ireland			A3.2 Heating controls	A4.3 Whole-house retrofit
Italy				A4.4 PV for disadvantaged families
Latvia				A4.6 Renovation of multiapartment buildings
The Netherlands				A4.5 Energy performance incentive for the rental sector
Romania	A1.3 Cold weather bill support A1.4 Disconnection protection for health reasons			
Spain		A2.6 Naturgy Energy School A2.7 Corporate volunteering		A4.7 Solidarity fund for energy retrofit
UK				A4.8 Affordable Warmth in ECO3

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APPENDIX: GOOD PRACTICE CASE STUDIES

A1: BILL SUPPORT AND DISCONNECTION PREVENTION

A1.1 ELECTRICITY COST SUBSIDY

Name of programme	Utilities and Croatian government agreement on measures to combat energy poverty
Country	Croatia
Reference or website	https://vlada.gov.hr/vijesti/potpisan-sporazum-o-mjerama-suzbijanja-energetskog-siromastva-od-listopada-najsiromasnijim-obiteljima-200-kuna-vaucera/17660
Organisation responsible	Government and three biggest energy supplier companies in Croatia (HEP, RWE, GEN-I)
Duration	Started 2015, ongoing

Short description

In 2015, the Croatian government adopted a regulation that stipulates a monthly fee to be used for vulnerable energy customers. The regulation obliges household customers to pay a solidarity charge of around €0.004/kWh (0.03 kn/kWh) for each kWh of energy consumed. The money raised is used to cover the electricity costs of vulnerable energy customers. Vulnerable household customers can have electricity supplied through a compulsory public service within the universal service and a compulsory public gas supply service or tariff for heat supply.

In 2015, the three largest Croatian electricity suppliers made an agreement with the government to take on the payment of the solidarity charge on behalf of consumers, geared proportionally to the market share of customers. By this measure, electricity suppliers have prevented the increase of costs to all household customers and provided the resources to cover the full electricity costs of vulnerable customers in all geographical areas of Croatia.

The funds are secured from the regular operating income of the electricity supplier companies. The measure is purely fiscal in nature and does not generate final consumption energy savings nor can it contribute to the achievement of a social goal within the energy efficiency obligation.

Objectives

The programme or measure aims to help the most vulnerable citizens who do not earn sufficient income to cover basic living needs and prevent the price of electricity from increasing for other citizens.

Target beneficiaries

Target beneficiaries of these measures are poor households and individuals who are also

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beneficiaries of the Guaranteed Minimal Support provided from the welfare system.

Guaranteed Minimal Support beneficiaries (social welfare beneficiaries) are households that have at least one member who

- has been identified by bodies responsible for social affairs as being at risk and in need of this form of social assistance; and
- has been determined to have a certain degree of disability, a person with special needs or a person with poor health status who may be at risk of life or health due to a restriction or suspension of energy supply.

Delivery stakeholders

Delivery partners are the three biggest electricity suppliers in Croatia: HEP, RWE and GEN-I.

Delivery/activities

The right to a subsidy on electricity costs can be used when paying bills for electricity costs in the branches of the state-owned financial agency (FINA)[430] for each month within six months from the end of the month to which the right to the subsidy applies. Vulnerable customers from social welfare receive a Status Decision, a document that enables them to access FINA support at the branches to help them handle their expenses.

Results/outcomes

The programme provides solely financial assistance to poor citizens and does not affect the reduction of electricity consumption or behavioural change of end-use consumers from the aspect of energy efficiency. Statistics from the Social Welfare Centre (March 2018) indicate that the number of households eligible for the solidarity charge scheme/electricity bill compensation for vulnerable energy customers was 61,958. SocialWatt partner, HEP, has been systematically paying the electricity bill costs for about 50,000 users/poor households every month since 2015, which is in line with its market share of customers.

A1.2 ELECTRICITY BILL PAYMENT SUPPORT

Name of programme	Bill payment support to energy-poor households
Country	Greece
Reference or website	Bilateral contract (agreement) between PPC and Attica Region
Organisation responsible	Region of Attica
Duration	2016–2017, completed

Short description

The measure provides electricity bill payment support to households located in the Region of Attica that are eligible for the Social Residential Tariff and who have a valid debt

[430] https://www.fina.hr/en/homepage

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settlement arrangement.

The measure was implemented through the cooperation of the Region of Attica and Public Power Corporation S.A. (PPC). Almost 95% of the households eligible for the Social Residential Tariff are customers of PPC. A bilateral agreement was made between the two organizations, whereby PPC provided the overall administrative cost of the measure and the region provided the financial bill support to the eligible vulnerable households. The financial support was funded by the Regional Development Fund of the Region of Attica.

The measure was implemented both in 2016 and 2017. The support was provided once directly from PPC. The amount was €100 per household in 2016 and €150 in 2017.

Objectives

The objective of the measure was to support those vulnerable households that were eligible for the Social Residential Tariff and in particular those that, although they faced difficulties paying their energy bills, they were making a systematic effort to cover their debt settlement arrangement.

An initial amount was provided by the region and this was directed to the eligible households.

Electricity utilities have difficulties in dealing with customers who are eligible for the social residential tariff in two ways: (1) the majority of eligible customers do not pay their bill systematically, leading to an increasing amount of debt, and (2) there is a delay in the repayment to utilities from the ministry of the amount that corresponds to the discount of the electricity price included in the Social Residential Tariff.

Therefore, the measure was a win-win solution to bill payment support for all involved parties.

Target beneficiaries

As explained previously, the target beneficiaries were the households eligible for the residential social tariff with no debt to the utility or with valid debt settlement arrangements.

Social Residential Tariff beneficiaries include:

- Anyone who meets the criteria for the Social Solidarity Payment (that is meeting specific maximum income thresholds and maximum asset value thresholds, as well as two key residence criteria, i.e. have a legal and permanent residence status in Greece)
- Anyone with an actual or deemed total annual income below specific thresholds

Delivery stakeholders

The delivery stakeholders were the Region of Attica and the Public Power Corporation S.A.

Delivery/activities

The measure had two timelines: end of August and end of October of each year, where PPC had to inform the region of the households eligible for payment support, based on its information system.

Upon approval by the region, PPC informed the eligible households. The region transferred the money directly to PPC, and the amount was credited directly to customers' accounts.

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Results/outcomes

There has been no formal evaluation of the measure therefore there are no available indicators or results. However, it was a measure well received by the community, since it helped households to settle their overdue energy bills.

Lessons

The measure as mentioned previously was designed and implemented within the framework of the social policy of the regional government, and is not related with Article 7 of Directive 27/2012. It was a measure that was positively discussed in the media. The measure was replicated in 2017 by the Region of Central Greece.

For several years now, both practice and theory have demonstrated the power of local and regional measures and initiatives in addressing local problems, meeting local needs and achieving the energy transition. However, although payment support is important for energy-poor households, more efficient measures for increasing the energy efficiency of poor households are needed to achieve long-term lasting impacts and not just to provide financial relief for beneficiaries.

A1.3 COLD WEATHER BILL SUPPORT

Name of programme	Social protection measures during the cold season
Country	Romania
Reference or website	N/A
Organisation responsible	Ministry of Labour, Family and Social Protection
Duration	Started 1 November 2013, ongoing

Short description

Romania has a national programme of compensation for heating costs, funded by state and local budgets. The beneficiaries are individuals or families who cannot cover the full expenses related to the heating of the house from their own means and whose income is within the limits provided by the legislation:

- Electricity: average monthly net income per family/individual between 155 lei (€33) and 750 lei (€159), benefits from financial aid of between 20 lei (€4.3) and 240 lei (€51);
- Gas: average monthly net income per family/individual between 155 lei (€33) and 750 lei (€159), benefits from financial aid of between 20 lei (€4.3) and 262 lei (€55.7).

Objectives

The programme aim is to ensure social protection during the cold season for vulnerable consumers who use electricity or natural gas as a source for heating the home.

Target beneficiaries

Target beneficiaries are families and single persons with a domicile or residence in Romania who do not benefit from other forms of support for the heating of the house, granted under employment contracts or other specific regulations, as well as under the law.

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Delivery stakeholders

Stakeholders are city halls, social assistance services within city halls, county agencies for payments and social inspection.

Delivery/activities

Between the beginning of November and the end of March, the eligible persons in the programme pay the electricity/gas provider only the difference between the consumption costs and the aid value.

Initiated by a request from a vulnerable consumer, the local authority establishes its right to receive heating aid and the eligible amount of aid. The local authorities provides to electricity/gas providers the list of eligible persons in the programme as well as the amount of the monthly aid that is granted for the heating of the house, mentioning the value that is granted from the state budget and the value that is granted from the local budget.

Electricity and gas invoices for energy consumption in each of the cold season months (November to March inclusive) issued to vulnerable persons declared eligible by the authorities are offset by the amount of the monthly aid granted. Thus, the participants will have to pay the electricity/gas provider only the difference between the value of the monthly consumption of electricity/gas and the value of the monthly aid granted. The amount of aid granted may not exceed the amount of electricity/gas consumption.

On a monthly basis, the electricity/gas provider prepares the documentation with electricity/gas consumption, the value of the aid granted and submits it to the mayors for approval, then submits it to the county agencies for payment and social inspection in order to collect the aid granted.

The aid is granted on the basis of a request by the individual/household and a self-declaration of the composition of the family and its income, including movable and immovable property. Eligibility is based on supporting documents (proving, for example, household composition, income, etc.) and a check by the public social assistance service that considers also the verification of the heating system used (in the case of heating with electricity).

This programme helps energy-poor customers to heat domiciles with electricity or gas. Romania also has a system of aid for thermal energy provided under a centralized regime/district heating and also individual heating with wood, coal and oil fuels.

Results/outcomes

The key result is ensuring financial aid during the cold season for vulnerable consumers who use electricity/natural gas as a source for heating the home.

The SocialWatt partner organisation, CEZ Vanzare, has provided the following figures related to the provision of the support. CEZ Vanzare supplies around 18% of the Romanian population and in 2016–2017 around 0.1% of CEZ Vanzare's customers received the aid, dropping to 0.04% in 2018–2019.

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Electricity	# CEZ Vanzare beneficiaries	Amount (lei) requested through local or state budget by CEZ Vanzare	Amount requested in Euros
2016–2017	1,273	1,080,084.31	229,805.17
2017–2018	877	737,474.45	156,909.46
2018–2019	544	457,766.53	97,397.13

Gas	# CEZ Vanzare beneficiaries	Amount (lei) requested through local or state budget by CEZ Vanzare	Amount requested in Euros
2017–2018	130	133,587.00	28,422.77
2018–2019	148	115,372.00	24,547.23

Lessons

The measure helps vulnerable consumers to pay their bills through financial aid during the cold season, ensuring partial bill payment. However, partial bill payment is not sufficient to eradicate energy poverty. Also, electricity is a basic necessity, and to avoid being disconnected, consumers should pay the bills even if this is a considerable effort.

A1.4 DISCONNECTION PROTECTION FOR HEALTH REASONS

Name of programme	Protection of vulnerable customers for health reasons
Country	Romania
Reference or website	N/A
Organisation responsible	Ministry of Energy
Duration	Started 2012, ongoing

Short description

Romania has a national programme that ensures the rights in relation to the continuous supply of electricity of vulnerable customers for health reasons. Funding is provided by distributors (for UPS equipment). Customers with health issues (who need to be kept alive by electrical appliances) are eligible for the service.

Objectives

The programme aims to avoid situations that can endanger the life of customers with health problems.

Target beneficiaries

Target beneficiaries are customers with health problems who use electrical appliances to maintain their lives.

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Delivery stakeholders

Stakeholders are:

- ANRE: the National Energy Regulatory Authority;
- Health field institutions (state institutions with social protection competences, hospitals, specialized doctors);
- Electricity distribution operators;
- Energy providers.

Delivery/activities

The responsibilities of the distributors/providers in relation to customers who are vulnerable for health reasons are:

- to register the address or place of consumption as a special installation for humanitarian reasons;
- to take all measures to avoid disconnection of the respective place of consumption;
- to solve with priority the unplanned interruptions affecting the respective place of consumption;
- to provide an additional source of power for the respective place of consumption;
- to provide an emergency telephone number;
- to allow, if applicable, the relationship with the vulnerable customer to be carried out through a third party, empowered by the contract supply/distribution owner for the respective place of consumption;
- to protect vulnerable customers when the power supply is interrupted;
- to mediate the execution of works when they affect vulnerable consumers. The distribution operator will establish, together with the customers, a convenient programme for both parties for development, retooling and maintenance work.

In addition, the distribution operator must inform the providers of vulnerable customers about the date, time and duration of necessary power interruptions, in writing or by telephone, with a minimum of 15 working days before the start date of the work and relay the announcement regarding the date of interruption five working days before the start date of the work.

It is forbidden to disconnect vulnerable customers from the electricity grid, even in situations of energy crisis.

Customers who are vulnerable because of health reasons are marked in the database of the providers/distributors so that those customers can benefit from the aforementioned rights.

The owners of the electricity supply contracts inform the distributor/provider that a vulnerable person with health issues resides at a specific location. These customers and others who rely on electrical life support medical equipment must provide a medical confirmation form from a specialist doctor, endorsed by the family doctor.

This programme supports vulnerable customers through a specific set of measures that gives

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certain rights to customers for health reasons.

Results/outcomes

The key outcome is avoiding a power interruption for vulnerable customers dependent on electromedical devices.

The SocialWatt partner organisation, CEZ Vanzare, supplies electricity to around 18% of the population and has 36 vulnerable customers with health problems registered (around 0.003% of customers).

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A2 Energy saving and energy bill advice (with low-cost measures)

A2.1 DoppelPlus

Name of programme	DoppelPlus
Country	Tyrol, Austria
Reference or website	https://www.doppelplus.tirol/en/home/
Organisation responsible	Klimabündnis Tirol (lead)
Duration	October 2017–September 2020
Financing	The project is a part of the LIFE ClimAct project and so mainly financed by the EU LIFE Program

Short description

DoppelPlus is a campaign in the Bundesland Tyrol (Federal State) run within the framework of the LIFE ClimAct project[431] and led by Klimabündnis Tirol (Climate Alliance Tyrol). It has set up a network of volunteers who are coached to show low-income households tailored ways to save energy and adopt more climate-friendly travel, shopping and food.

At the end of the project in 2020, DopplePlus should become part of the region's Tirol 2050 autonomous energy strategy[432]—in recognition that the programme can make a lasting contribution to the state's energy and climate policies.

Objectives

The Initiative DoppelPlus aims to enable people with low incomes to make their own contribution to the goals set by local energy and climate strategy, whilst at the same time improve their financial situation and quality of life.

Target beneficiaries

The main target beneficiaries are low-income households.

Delivery stakeholders

- Klimabündnis Tirol (lead);
- Energie Tirol (local energy agency);
- Caritas Tirol (local social organisation);
- komm!unity Wörgl (association for the promotion of youth, integration and community work);
- alpS GmbH: alpS (an international engineering and consultancy firm that strengthens companies, communities and countries in their sustainable development and in dealing with the consequences, opportunities and risks of climate change).

[431] LIFE ClimAct project: https://www.doppelplus.tirol/en/i-am-in/who-we-are/

[432] https://www.tirol2050.at

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Activities

To achieve its goals, the project employs several approaches:

Home visits

The project reaches out to households who are most vulnerable to energy poverty, whose houses suffer from low energy efficiency, or who have limited means of travel. Such households are invited to register for a free coaching session. Participants receive a free starter kit of items that can be installed around the house, including LED lamps, thermometers and humidity sensors. Coaching sessions are geared towards showing that small changes, especially during the winter months, can help lower the financial strains of a family with a low income.

Network of climate trainers

DopplePlus's training programme for volunteers helps coach low-income households by providing advice on saving energy, lowering bills, improving diet and using alternative ways to travel. In return, volunteers gain valuable experience, which can help them find their first job or get back into the job market.

DopplePlus also runs a follow-up train-the-trainers course. This is to ensure that the programme's efforts will continue to ripple out into the community and the wider Tyrolean region.

As a side activity, the project has organised 15 training courses on the environmental basics for beginner German speakers. DopplePlus continues to extend its regional outreach with social partners, including Tiroler Soziale Dienste (an institution for the care of asylum seekers), Diakoniewerk Tirol (Welfare organization close to the Evangelical Church) and Innsbrucker Immobiliengesellschaft (a local real estate company). The project reaches out to households who are most vulnerable to energy poverty. Such households are invited to register for a free coaching session.[433]

Results/outcomes

The brochure 'Climate Protection Even on the Tightest Budget'[434] demonstrates how to use energy and resources efficiently, without making life any less comfortable. The brochure is available in German, English, Turkish, Farsi and Arabic.

The entire project budget costs about €1 million. To date, 35 people have participated in the training course, nearly 300 houses have been visited from the target group, and 520 households have been advised. By the end of the project around 1,080 households should receive support and about 350 tonnes of CO_2 emissions—equivalent to the average annual consumption of 350 Tyrolean households—is expected to be saved.

About 62 people have received training, but only one person stayed in the project and worked as a coach.

Lesson

It is not easy to get in touch with affected households. Poverty and especially energy

[433] https://www.doppelplus.tirol/en/what-is-it-all-about/energy-climate-coaching/

[434] https://www.doppelplus.tirol/uploads/tx_bh/dp_energiespar_profi_doppel_plus_web.pdf?mod=1517399248

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poverty is not a topic that is openly communicated.

The brochure, which was created for this project, can also be used within Social Watt.

A2.2 OMBUDSMAN FOR ENERGY POVERTY

Name of programme	Ombudsman for energy poverty
Country	Vienna, Austria
Reference or website	www.wienenergie.at https://www.sozialmarie.org/de/projects/2149
Organisation responsible	Angela Vaverka, Dipl. Sozialarbeiterin; Wien Energie
Duration	Started 2012, ongoing

Short description

The energy supply company Wien Energie created a point of contact for customers with payment difficulties called the Ombudsstelle (Ombudsman). Specially trained employees devote time to resolve the concerns of customers, thus contributing to creating solutions in the interests of all. The basis for the implementation is a legal requirement in the ELWOG.[435]

With the ombudsman, Wien Energie is expanding its customer service with its own organizational unit for social hardship cases, that is, those in special life situations. The Ombudsman's Office is to become a fixed component of Wien Energie's customer care and to act comprehensively. The consideration is for electricity, gas and (district) heat.

Many years of customer service experience combined with social competence and a holistic approach characterize the strengths of this model. The ombudsman develops and enables individual solutions together with the people concerned and the social institutions involved.

Objectives

The aim of the programme is to provide a sustainable energy supply to the customer group which is in social hardship. Wien Energie actively deals with problems, wider contexts and requirements of customer groups that are on the margins of society. The topics and customer care go far beyond energy supply and energy costs. The ombudsman recognizes motives for action and priorities among customers. Achieving realistic solutions in individual customer situations requires intensive networking and cooperation, for example with all social institutions from the public sector to private organizations. The ombudsman is the central point of contact for these institutions. Another goal is to set up a network to provide individual and meaningful support to the customer and work together to develop realistic measures/solutions.

[435] ELWOG: Elektrizitätswirtschafts- und –organisationsgesetz 2010: This is the Austrian regulation that transferred the main part of the Energy efficiency Directive to national legislation.

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A common language between energy suppliers and social services promotes efficient action, giving time to social services to use their scarce care resources as efficiently as possible, for the benefit of those seeking help.

Target beneficiaries

Wien Energie customers who are having difficulty paying their energy bill. The Ombudsman decides if the household is in need of combined support from public and/or private social institutions and Wien Energie. These people fall into the group of social hardship or poverty-endangered households and are affected by energy poverty.

Delivery/activities

The staff of the Ombudsman of Wien Energie combine many years of experience in customer care and complaint management, as well as expertise in the social sector, as the team is led by an experienced graduate social worker. This new, atypical structure within an energy supply company improves the ability of the company to meet the needs of this customer group.

Staff from the energy company working together with an experienced social worker is essential to the success of the Ombudsman project. The three-person team has the following priorities:

- To be a first point of contact, with specially trained experts that seek a common solution for the client. The help offered includes assistance in relation to energy use and energy bills, but support can also be offered to help navigate the social services system and get support from third sector organisations;
- Establishing the new department:
    - Developing the care model (definitions, process);
    - Networking with social institutions (for example, MA 40, the social department of the city of Vienna; Volkshilfe, a charitable and nondenominational charitable organization; Fonds Soziales Wien, Fund of the City of Vienna for the fulfilment of charitable purposes; Caritas, Hilfswerk Association, provider of social services and debt counselling; and MA 11, Vienna child and youth welfare);
    - Developing the definition of social hardship;
    - Working on the acceptance of this new department and its measures within the energy supplier;
    - Establishing the structure, tasks and limitations of the position (Organizational Handbook);
    - Linking energy topics with social topics;
    - Trialling the use of prepayment meters for energy poor households;
    - Developing support for customers on life support devices;
    - Preparing the first 'social project' (NEVK, sustainable energy supply through local energy consulting, networking and cooperation).

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Results/outcomes[436]

Having an experienced social worker as a team leader positively affected how those in need access assistance, as the social worker views a low-income household's situation differently than an energy company employee, who is tasked with settling an energy debt. Through this approach, a holistic view of people in precarious life situations is cultivated, going beyond just energy needs. In addition, the energy company establishes and develops

- intensive networking with social institutions;
- clear contact persons;
- a common understanding of the concerns of the customer group;
- individual support and solutions;
- continuous support, not just a one-time contact;
- a renewed focus on sustainable energy supply.

Lessons

This approach could be exemplary for all energy suppliers in Europe. However, a legal framework is necessary to broadly implement it in Europe (each country needs to establish its own point of contact).

A2.3 VERBUND-Stromhilfefonds der Caritas

Name of programme	VERBUND-Stromhilfefonds der Caritas
Country	Austria
Reference or website	https://www.caritas.at/verbund-stromhilfefonds/
Organisation responsible	Caritas Austria
Duration	Started October 2009, ongoing

Short description

The project VERBUND-Stromhilfefonds der Caritas was established in 2009 as a cooperative venture between VERBUND AG (Austria's largest electricity supplier) and Caritas Austria (a social aid organisation). The main goals of the project are to support energy-poor households in Austria with financial as well as material aid (such as free household appliances), to provide them with the knowledge and tools to understand sustainable energy consumption (energy consultancy) and to help them to free themselves from energy poverty permanently. The project can be accessed in six dioceses in Austria.

Objectives

The VERBUND electricity assistance fund of Caritas helps households in Austria who have a

[436] A report on the number of counselling cases, the associated energy costs and so on was requested but is not available yet.

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high energy expenditure or are unable to maintain an adequate energy supply.

Target beneficiaries

The target group is primarily households that have difficulty paying their energy bills and are willing to cooperate with social services on this issue. In many cases, households are referred by the supplier to Caritas.

Delivery stakeholders

- VERBUND AG (Austria's largest electricity supplier);
- Caritas Austria (social aid organisation).

Delivery/Activities

The 10-year story of VERBUND-Stromhilfefonds der Caritas is built on three pillars:

1. Immediate financial relief: alleviating the pressure of a large electricity bill that cannot be paid, as well as helping clients establish long-term payment schemes with their energy provider;
2. Energy consultancy: two energy visits at the home of the client to ensure that the information and support is tailor-made for each situation;
3. Replacing broken, old or energy-inefficient household appliances, such refrigerators, stoves, washing machines, with new ones of higher quality and better energy efficiency.

The duration of the household's participation in VERBUND-Stromhilfefonds der Caritas is one year. The first contact with the client occurs at a local social counselling centre of Caritas. Subsequently, the first visit takes place that provides tailor-made energy advice to the client. The second energy visit takes place about one year after the first to identify the additional support the household's needs, as well as review the success of the measures that have been suggested.

Given that there was little to no data regarding energy poverty when the project first started, collecting data has been a key for monitoring the success of the measures, as well as for enabling the programme to respond to new emerging needs of participating households.

Aside from personal data, VERBUND-Stromhilfefonds der Caritas collects both qualitative and quantitative information from each household, including but not limited to:

- Building quality of the domicile: year built, renovation needs, available systems, presence of mould, and so on;
- Energy source and services: providers, energy consumption, whether there have been issues with payment before;
- Behaviour: use of energy-saving lighting systems, stand-by mode on appliances, how rooms are aired out, and so on;
- Subjective fears and struggles: paying the bill on time, inability to read the energy bill;
- Knowledge about energy saving: after being provided with information, do household members change their behaviour? Do they invest more in sustainable, energy-saving devices?

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This data allows for a more nuanced picture regarding energy poverty in Austria.

Results

Results are available in the annual project report of 2018.[437]

Over the course of 2018, 491 households with a total of 1,243 individuals have been supported. There has been a significant increase in clients (close to 100 more than the year before), showing clearly that energy poverty is still a very real problem in Austria.

More than 70% of the client contacts are women, who either support their own household or are the ones responsible for household issues in their families.

Seventy-eight percent of the clients live in rented accommodations. This means they frequently have only a limited say on which renovations can be done on the house and often can't decide to implement energy-saving measures, like insulation or blinds, themselves.

More than 60% of the clients live in dwellings built between 1919 and 1980; an additional 11% live in buildings that date before 1919. This means the buildings may have a number of issues (leaks, poor insulation), and most of them are not up to standards, especially in regards to keeping cool in summer. For the most part, clients want to improve insulation and install new windows and heating systems.

Only 16% of households have mentioned that one or more rooms have issues with mould, which is a drop from 25% in 2017. The rooms most likely to be mouldy are bathrooms/washrooms and bedrooms.

The primary energy sources were gas (39%) and district heating (36%), followed by wood (10%).

The average temperature for these households is 21.58.

The main worries and stressors for clients are payin energy bills (mentioned by 75% of the households), as well as general monetary issues. Fifty percent of the clients mentioned using the lights sparingly to save money; 48% are afraid of receiving a payment demand letter from their energy provider.

The energy advice provided mostly focused on the correct use of the heating system (65% of the cases), energy consumption in general (60%) and how to save energy whilst using household appliances (54%), as well as understanding the energy bill and correctly airing out rooms.

Client feedback allows for a better understanding of whether measures implemented actually help households over the course of a year. Seventy percent said they had invested in energy-saving appliances or lightbulbs after receiving the energy advice, as well as doing small repairs, such as insulating a draughty window. Sixty-six percent of clients directly mentioned being more aware of their behaviour, such as switching off lights in a room that is not being used, not keeping the window open all day whilst heating and not keeping appliances in stand-by mode. These numbers show that clients received the right knowledge and tools to change their situation for the better and to be confident in doing

[437] Results received via personal communication from SocialWatt project partner Caritas Austria.

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so, as they learned which measures have the biggest effect in their specific living situation.

Ninety-six percent of clients gave an excellent rating for the energy advice received. Upon being asked whether they feel they now have better control over their energy consumption, 76% of clients answered yes in 2018.

Key results

Over the course of 10 years, over 4,600 households were offered support via VERBUND-Stromhilfefonds der Caritas, the numbers ranging from 400 to 600 clients a year. During the last year about €260,000 was spent in the program.

Over 3,400 energy visits have taken place, and more than 2,300 old and broken household appliances were exchanged for new, energy-efficient ones. This amounts to an approximate saving of 6,100 MWh or 850 t CO_2-equivalent.

Lessons

Client feedback shows the success of providing both monetary aid and knowledge. The monetary aid alleviates current difficulties whilst consulting gives energy-poor households the tools needed to further improve their situation. This leads to more confidence in managing energy consumption in general and empowers households to help themselves and maintain a safe, secure living environment.

A2.4 GRATIS ENERGIESCAN

Name of programme	Gratis energiescan (free domestic energy scan)
Country	Belgium, Flanders
Reference or website	https://www.vlaanderen.be/gratis-energiescan https://www.fluvius.be/nl/thema/besparen-op-energie-en-water/energiescan
Organisation responsible	Distribution network operator (Fluvius)
Duration	Started 2007, ongoing

Short description

The free domestic energy scan is a programme to reduce energy poverty in the Flemish region. Only vulnerable groups are eligible to benefit from the programme (see target beneficiaries). A domestic energy scan is a basic screening of the energy consumption of a household in order to give advice on potential energy-saving behaviours and measures and to immediately implement small efficiency improvements for free, such as energy-saving lamps, energy-saving showerheads and draught excluders for windows.

The distribution network operator in the Flemish region, Fluvius, is the responsible organisation as part of its public service obligation is to encourage more rational energy use among its customers. The programme costs are carried by the public budget (although previously were incorporated into the tariff).

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Objectives

The provision of free domestic energy scans aims to enable vulnerable households to use energy more efficiently, to help them with issues of energy affordability and to incentivise the implementation of energy efficiency measures in the home. Small efficiency improvements, such as energy-saving lamps, are implemented immediately and for free. Advice on further measures, such as improving insulation or replacing an old boiler, as well as the possible benefits from special grant schemes and interest-free loans, are intended to incentivise building renovations. Both changes in energy consumption behaviour and the implementation of energy efficiency measures can reduce a household's energy bill.

The programme responds to different factors that increase the risk of energy poverty in the Flemish region:

- an aging population;
- an old and energy-inefficient building stock;
- high electricity prices.

Target beneficiaries

To be eligible for a free domestic energy scan, a household needs to fall into one of the following target groups:

- protected consumers, that is, consumers who are entitled to the social tariff for electricity and natural gas in Belgium;[438]
- households for whom a request for disconnection from electricity and/or natural gas has been submitted to a local advisory committee;
- households that have a budget meter (prepayment meter) for electricity or natural gas installed in their home;
- households that are eligible for an interest-free loan for energy-saving investments in their homes[439] (e.g., households with a taxable income lower than or equal to €31,340 per year);
- households that live in social housing;
- households that rent and pay rent of under €521.69 per month (or €571.69 per month in certain cities and municipalities).

Delivery stakeholders

Fluvius, the distribution network operator in Flanders, has a number of public service obligations. One obligation is the provision of (or commissioning of) free domestic energy scans for vulnerable target groups.

The domestic energy scan can be performed by a municipality, by the distribution network

[438] The social tariff is reserved for consumers who receive social benefits because of low incomes/pensions, and household members with a disability or in need of care.

[439] https://www.vlaanderen.be/energielening

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operator Fluvius[440] itself or by an energy trimmer (in Dutch *energiesnoeier*).[441]

The energy scans are mainly (>90%), but not exclusively, delivered by social energy scan companies, that employ, train and supervise people (energy trimmers) who have fallen out of the labour market to implement energy-saving measures. Because of this they have a natural empathy for vulnerable customers in whose homes they perform the energy scan. Energy scans are also provided by municipalities, largely delivered by municipality staff but in a very limited number of municipalities, the scan is offered through a private company acting as a subcontractor.

Consumers are informed of the service through general communications with the Flemish Energy Agency and the distribution network operator. Also, many local actors, including Energy Houses[442] (a network of advice centres in Flanders) and social welfare organisations, systematically contribute as a referral network. Applications can be made by the target group or a referral actor on a website[443] or by telephone.

Delivery/Activities

A domestic energy scan is a basic screening of the energy consumption of a house. It is free for vulnerable target groups, who request the energy scan from their distribution network operator, their municipality or an *energiesnoeier*.

In each home visit that lasts two to three hours, the person who performs the energy scan inspects the household's energy behaviour, the building and energy-related installations. The household gets tips on how to save energy that can be immediately applied, and the energy scanner directly implements small energy-saving measures for free, for example, installs energy-saving lamps, draught excluders and energy-saving showerheads (with a value of up to €25). The energy scan may also include a comparison of energy suppliers and support to switch to a cheaper energy source.

After the home visit, the household receives a report that analyses the household's current energy situation and describes the implemented small energy-saving measures. It also gives advice on how to achieve further energy savings through changes in the household's energy consumption behaviour and the installation of energy efficiency measures, providing information on existing grant schemes. A second home visit is possible as a follow up, and this follow-up support can take different forms:

- Follow-up scan type 1: follow up of the energy-saving advice and additional small free measures or help with energy poverty in general (for instance, switch to a more affordable energy supplier);
- Follow-up scan type 2: support for energy savings investments such as roof insulation, energy efficient glazing or heating system renewal.

Vulnerable households that decide to install further energy efficiency measures, for example, improved building envelope insulation or the replacement of an old boiler, can

[440] Fluvius: https://www.fluvius.be/nl/thema/besparen-op-energie-en-water/energiescan

[441] Energiesnoeiers: https://www.energiesnoeiers.net/energiescan.html

[442] https://www.mijnenergiehuis.be/

[443] http://www.energiescans.be/

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receive a bonus on existing grant schemes for energy efficiency measures in residential buildings[444] and an interest-free loan.[445]

Results/outcomes

The Flemish Energy Agency evaluates the programme. Since 2007, over 300,000 energy scans have been undertaken. There is a database in which all the results of the scans are registered. This information can be used for future actions. For instance, at the local level a collective programme for roof insulation or heating renewal could be prepared and targeted towards the houses for which the potential for this measure was registered.

The breakdown of the number of energy scans delivered over the period 2014–2018 is illustrated below, along with the budget per year. It is estimated that on average the intervention results in an energy cost reduction worth €200 per year for each family assisted.

	2014	2015	2016	2017	2018
Energiescans	24,558	22,793	22,358	25,843	27,360
Budget (€)	4,911,600	4,558,600	4,471,600	5,168,600	5,472,000

Lessons

- The target group has a real need for information and guidance;
- On the behavioural level, there are always quick wins;
- The target group evaluates the scan as very useful;
- The small energy-saving measures deliver immediate energy savings;
- The general quality of the dwellings is low. A big potential for energy savings investments is registered in the database. The next development will be work on developing a business model to address this potential;
- 65% of the houses are rental houses;
- Only a small share of households has the means to invest. Only 3.5% of the energy scans lead to structural energy-saving renovations;
- For rental houses a programme offering guidance and a higher grant for the owner has had some success (since 2012 each year 800 to 1,000 roof and cavity wall insulations and double glazing have been done);
- For houses owned by the inhabitants, the actual measures (grants, zero interest loans) are working for a small share of the target group but are not sufficient to mobilise and support the majority. Additional measures are needed to tap this potential.

[444] Grants for energy efficiency measures are provided by Fluvius. For further information see: https://www.fluvius.be/nl/meer-weten/premies/premies-voor-beschermde-klanten

[445] The interest-free energy loan is organised through so-called Energiehuizen, which are municipal institutions. For further information see: https://www.vlaanderen.be/energielening

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A2.5 Stromspar-Check

Name of programme	Stromspar-Check Kommunal (Energy-saving-check communal). Since 1 April 2019: Stromspar-Check Aktiv (Energy-saving-check active).
Country	Germany
Reference or website	https://www.stromspar-check.de/
Organisation responsible	Deutscher Caritasverband e.V. (welfare organisation of the catholic church in Germany). Bundesverband der Energie und Klimaschutzagenturen Deutschlands (EAD) e.V. (Association of Energy and Climate Protection Agencies).
Duration	The first programme phase started in 2008. Preceding programme phase Stromspar-Check Kommunal: 1 April 2016 until 31 March 2019. Stromspar-Check Aktiv: 1 April 2019 until 31 March 2022.

Short description

The energy-saving-check (Stromspar-Check) is a home visit delivered free of charge, where trained energy-saving assistants (former long-term unemployed) analyse a household's energy bill, give advice on energy-saving behaviours and implement small energy-saving measures, such as energy-saving lightbulbs, switchable plugboards and water-saving showerheads (worth up to €70).

In around 150 energy-saving-check locations all over Germany, these households can benefit from a free-of-charge energy-saving-check.

The programme receives funding from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). At the local level, the programme is additionally supported by municipalities, job centres, utilities, housing associations and other social and environmental actors.

Objectives

The energy-saving-check has multiple objectives:

- The long-term reduction of energy consumption and electricity bills of low-income households;
- Cost reductions for municipal and federal institutions that carry the costs for heating and water for households that receive unemployment and social security benefits;
- Awareness raising among low-income households to use energy more efficiently;

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- Reductions in CO_2 emissions and contribution to Germany's climate targets;
- Reintegration of the long-term unemployed, who get trained as energy-saving assistants, in the job market.

The programme responds to rising energy prices and an increasing number of households that have difficulties paying their energy bill.

Target beneficiaries

Target beneficiaries are households that receive unemployment benefits (Arbeitslosengeld II), social security or housing assistance and supplementary child allowance and households on low incomes (below the limit for income seizure or *Pfändungsgrenze*) or low pensions.

Delivery stakeholders

The Deutscher Caritasverband e.V. (welfare organisation of the Catholic Church in Germany) and Bundesverband der Energie-und Klimaschutzagenturen Deutschlands (EAD) (Association of Energy and Climate Protection Agencies) are the organisations with the overall responsibility.

At each location a local institution organises the provision of energy-saving-checks and the training of long-term unemployed to become energy-saving assistants. The local institutions can be part of the Caritasverband but also include other social institutions that primarily work on employment promotion.

Delivery/Activities

The energy-saving-check includes up to three home visits by a local energy-saving team.

At the first visit, the energy-saving assistants assess a household's energy consumption and consumption behaviour and analyse the energy bill. Based on this assessment, the energy-saving potential for the individual household is calculated.

At the second visit, the energy-saving assistants install small energy-saving measures such as energy-saving lightbulbs, switchable plugboards, standby and time switches and water-saving showerheads (worth up to €70). In addition, they give advice on how to change the household's energy behaviour in order to realise the calculated energy-saving potential.

A third visit may follow one year after the first two home visits. The energy-saving assistants calculate the realised energy and cost savings after one year and follow up on the household's experience with the installed energy-saving measures.

In many municipalities, the local energy-saving teams also give advice on the opportunity to benefit from a scrappage programme for old refrigerators (launched in 2013). Households that have an old (more than 10 years) and energy inefficient refrigerator can receive a €100 voucher to buy a new device with an A^{+++} rating. The new device should not be larger in use volume and comparable in design to the old device.

Results/outcomes

The most recent evaluation of the Energy-saving-check communal programme phase shows that from 1 April 2016 until 31 March 2019, energy-saving assistants performed 113,041 energy-saving-checks all over Germany. At the home visits, they installed 1.5 million small energy-saving measures with a total value of €6.5 million. Altogether, 12,395 households made use of the scrapping programme for old refrigerators.

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Households that received an energy-saving-check reduced their energy bills on average by €184 per year (€287 when the refrigerator was replaced). The long-term energy savings, that is, over the lifetime of the installed energy-saving measures, results in a reduction in CO_2 emissions of around 179,000 tonnes (200,000 tonnes when including the long-term energy savings of replacing old refrigerators).[446]

Since 2008, when the first programme phase of the energy-saving-check started, energy-saving assistants have visited around 320,000 households all over Germany and installed small energy-saving devices for a total value of €20 million. Seventeen thousand households made use of the scrapping programme for old refrigerators. The achieved energy savings resulted in energy cost savings per household of €100 to €250 per year. The total energy cost savings for households since 2008 amount to €350m. The reduction in CO_2 emissions is estimated to amount to 550,000 tonnes.[447]

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) provides around €30 million in funds over the three-year programme phases (e.g., €31.7 million from 2016–2019 and €28.6 million from 2019–2022). Additional support is provided by municipalities, job centres, utilities, housing associations and other social and environmental actors.[448]

Lessons

The national funding is only extended for three-year periods. In order to establish the energy-saving-check in the long term, local financing models need to be developed.

The programme requires a close cooperation between the delivery stakeholders in alignment with municipal social and climate politics.

A2.6 Naturgy Energy School

Name of programme	Naturgy Energy School
Country	Spain
Reference or website	http://www.fundacionnaturgy.org/accion-social/plan-vulnerabilidad-energetica/escuela-de-energia/
Organisation responsible	Naturgy Foundation

[446] Auswertungsbericht Stromspar-Check (2019). The report is currently not publicly accessible but can be requested at Deutscher Caritasverband.e.V.

[447] Stromspar-Check Presse. Bundesumweltministerin Svenja Schulze startet Stromspar-Check Aktiv. Available at: https://www.stromspar-check.de/presse/pressemitteilungen/datum/2019/03/25/bundesumweltministerin-svenja-schulze-startet-stromspar-check-aktiv.html

[448] Nationale Klimaschutzinitiative des Bundesumweltministeriums. Stromspar-Check Kommunal. Available at: https://www.klimaschutz.de/projekt/stromspar-check-kommunal; Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit. 28.6 Millionen Euro für Energiesparberatung einkommensschwacher Haushalte. Available at: https://www.bmu.de/pressemitteilung/svenja-schulze-uebergibt-foerderbescheid-fuer-bundesweiten-stromspar-check/

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Duration	Started 2017, ongoing

Short description

Naturgy Foundation,[449] within its energy vulnerability plan, has launched an Energy School, which is a school that runs workshops for vulnerable family members, social services employees and third sector entities. The workshops are held in the offices of social services or other entities to make it easier for people in energy poverty to attend. This also allows the service to reach people that live in rural areas or small towns.

The workshops help households to understand their energy bills and offer advice on how to switch to a different energy provider to reduce bills. In addition, they also teach energy efficient behaviours and help households to apply for the social bonus, which is a 25 to 40% reduction in electricity bills and is the main assistance for the energy poor in Spain.

The Energy School has trainers with technical and social skills throughout the country.

Objectives

To help alleviate energy poverty by reducing energy consumption, raising awareness and fostering better energy habits.

Target beneficiaries

Households identified by employees of Social Services and other third sector entities are the main beneficiaries of the Energy School.

Social Services' employees are also a target, and 30% of the workshops are addressed to employees because it is relevant for them to learn information about bills and efficient behaviour so they can help people in the social service network.

Delivery stakeholders

The school has worked with nearly 500 entities in Spain. These entities are mainly local government organisations: city councils of major cities but also city councils of smaller towns or rural areas, county councils, and so on.

In addition, the Energy School organized workshops with main third sector entities such as the Red Cross, Caritas and many other medium- and small-size third sector organisations.

These stakeholders are responsible for choosing and inviting the people attending the course.

Delivery/activities

Energy training is delivered through specific workshops either for people in energy poverty or employees of social services. Increasingly, the Energy School provides regular training and courses organised with the delivery partners, which are becoming permanent support rather than ad hoc events.

An individual energy assessment is done by the entity that makes the appointment with the energy-poor household.

Other specific activities include training attendees of city council employment programs,

[449] https://www.naturgy.com/en/about_us/with_society/naturgy_foundation

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attendance at community events and fairs and holding workshops at schools and with vulnerable people.

Results/outcomes

From June 2017 to 30 October 2019, the Energy School delivered training in 1,675 workshops with 18,000 attendees and was present in nearly 500 municipalities.

Based on a sample of attendees monitored, savings were estimated to be around €200 per year on average.

Lessons

People in energy poverty need structured support to implement recommendations and benefit from the measures and changes introduced. Many times, people encounter difficulties when implementing recommendations and fail to make changes.

Regular workshops provide the opportunity to follow up with people and give them support.

A2.7 CORPORATE VOLUNTEERING

Name of programme	Corporate volunteering
Country	Spain
Reference or website	http://www.fundacionnaturgy.org/accion-social/plan-vulnerabilidad-energetica/voluntariado-energetico-corporativo/
Organisation responsible	Naturgy Foundation
Duration	Started 2017, ongoing

Short description

The goal of this corporate volunteering initiative is to make use of the knowledge of employees to help energy-poor people. All the activities are carried out in coordination with third sector entities. The main activities are the provision of tailored energy advice to enable a better understanding of the energy bill, provision of recommendations to reduce it and training in efficient energy-related behaviour.

Objectives

To contribute to energy poverty alleviation by reducing energy consumption and raising awareness of better energy habits, involving employees in the solutions.

Target beneficiaries

People in energy poverty.

Delivery stakeholders

- Spanish Red Cross;
- Other third sector entities: Cáritas, Fundacion tomillo, Secretariado Gitano, Fundación Esperanza, and so on;

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› Naturgy Foundation.

Delivery/activities

One of the main volunteer activities is implemented by Naturgy Foundation[450] in collaboration with the Spanish Red Cross. This activity is carried out by two volunteers, one from each entity, who contribute technical knowledge and social knowledge from their respective backgrounds. Both volunteers provide advice to poor people identified and chosen by the Red Cross.

Volunteering activities consist of providing advice on bills, training in efficient energy consumption, in-home visits to detect opportunities for low-cost retrofit and coordinating the intervention. All these activities take place during at least three meetings.

Other activities carried out by volunteers include workshops addressed to small groups of energy-poor people who are brought together by the partners.

Results/outcomes

Since the beginning of the volunteer program, Naturgy Foundation has engaged 500 volunteers; 250 low-cost retrofits in energy poor households have been delivered, benefitting more than 3,000 people.

Lessons

Coordination of the initiative is time consuming, in particular coordinating volunteers and participants.

Monitoring is important to capture, amongst other things, the number of meetings held, the number of volunteers that participated in the program and the number of retrofits undertaken.

450 https://www.naturgy.com/en/about_us/with_society/naturgy_foundation

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A3 PROVISION OF LOW-COST PHYSICAL MEASURES

A3.1 LED LAMPS KIT

Name of programme	Technical Measure
Country	Greece
Reference or website	PPC report on CSR for the year 2017 PPC report on Energy Efficiency Measures for the Reference Year 2017
Organisation responsible	Public Power Corporation S.A.
Duration	2017, completed

Short description

Within the framework of this programme, the Public Power Corporation (PPC S.A.) provided a kit of five LED lamps to vulnerable customers with more than three children. The kit included: one E27 lamp of 5.5 Watts, two E27 lamps of 11 Watts and two lamps of 5.5 Watts appropriate for table and floor lighting. The synthesis of lamps (i.e., in terms of size and type) allows for the replacement of lamps used in different fixtures in homes with LED technology, which is highly efficient and has a longer lifespan. The measure was implemented in 2017. The kit was provided to 1,700 households all over Greece.

Objectives

The objective of the measure was to support those vulnerable households that are eligible for the Social Residential Tariff and have more than three children.

The measure was designed within the framework of the energy efficiency obligation schemes for the period 2017–2020. The objective for PPC was, on the one hand, to support vulnerable customers to increase their energy efficiency and, on the other, to assess the cost-effectiveness of technical measures developed within the framework of the Obligation Schemes, as implemented in Greece.

The measure was developed in cooperation with Philips Lighting, which supported the measure by providing PPC with a 30% discount on the wholesale price of the lamps. Philips's objective was the promotion of its products and the opportunity to get into business with PPC.

Therefore, this was a win-win measure for all involved parties.

Target beneficiaries

The targeted beneficiaries were households eligible for the residential social tariff, with more than three children.

Social Residential Tariff beneficiaries include:

- Anyone who meets the criteria for the Social Solidarity Payment (that is meeting specific maximum income thresholds and maximum asset value thresholds, as well as two key residence criteria, i.e. have a legal and permanent residence status in Greece);

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- Anyone with an actual or deemed total annual income below specific thresholds.

Delivery stakeholders

The delivery stakeholder was the Public Power Corporation, PPC S.A. The measure was supported by Philips Lighting that provided a discount for the purchase of the lamps.

Delivery/activities

To implement the measure, 1,700 eligible families were identified based on information available on PPC's SAP-ISU system (Sales & Information System). LED lamps were provided by Philips Lighting. A special package was designed so that the five-lamp kits could be transported safely all over Greece. A specialized company was hired to prepare the packages for posting. A letter explaining to the customer the scope and objectives of the measure was included in the package. The 1,700 packages were delivered by courier service to customers.

The overall cost of the measure for PPC was around €35,000. The cumulative energy savings up to 2020 are estimated around 2.5 GWh.

Results/outcomes

The measure was meaningful for the beneficiaries and warmly welcomed by them. The overall concept was in line with the Social Corporate Responsibility strategy of PPC.

The cost-effectiveness of the measure in relation to energy efficiency per se and the achievement of PPC's energy efficiency target within the Obligation Scheme was considered marginal, even though the LED lamps were procured at a very good price. It is very difficult for a utility to support such measures unless a state subsidy is provided or a contribution from customers is secured.

Lessons

The measure is relevant to SocialWatt since it was developed within the obligation schemes, supported solely by a utility and addressed to a specific group of energy-poor customers.

As explained previously, technical measures aiming to enhance the energy efficiency of poor households are the most effective in order to address energy poverty since they decrease energy bills whilst increasing the quality of life of households. However, to make such measures cost-effective for the delivery stakeholders, innovative schemes are required that combine corporate social responsibility strategies, legislative and institutional obligations and targets, commercial exploitation of technologies, promotional strategies and business objectives in order to create synergies leading to win-win approaches for implementing these measures.

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A3.2 HEATING CONTROLS

Name of programme	SEAI Better Energy Community Project
Country	Ireland
Reference or website	https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/citizens/Pages/Better-Energy-Communities.aspx
Organisation responsible	Electric Ireland, Climote, Louth County Council & Kingspan
Duration	2014, completed

Short description

The Sustainable Energy Authority of Ireland (SEAI) is Ireland's national energy authority, and its role is to provide the Irish government with advice on energy and deliver Ireland's policies and targets through a range of energy efficiency initiatives and programmes. One such programme is the Better Energy Communities (BEC) initiative. This programme is run annually through a competitive process (in general projects are submitted by local authorities, obligated parties and other entities involved in the retrofitting of energy efficiency products). The scheme funds community-based projects to improve the energy efficiency of the building stock in the area, including homes, (particularly those at risk of energy poverty), community facilities and businesses.

The scheme also encourages the use of innovative measures and solutions. To deliver this programme, a partnership approach is encouraged between the public and private sectors, domestic and nondomestic sectors, commercial and not-for-profit organisations and energy suppliers.[451]

The BEC programme has been running since 2012, and Electric Ireland has supported the initiative since its inception, through a variety of means, including financial and technical, and provided a full turnkey service when the programme was first introduced.

In the 2014 BEC programme, Electric Ireland partnered with Kingspan (who was the lead applicant) in support of Louth County Council's plan to upgrade heating controls in 2,100 houses. Electric Ireland provided financial and technical support in return for energy credits under Ireland's energy efficiency obligation.

The project consisted of replacing analogue heating controls with the Climote smart heating controller. This controller is a three-channel timer (two space heating and one hot water channel) with remote access via a sim card, so internet access is not required. The timer is user friendly and can provide multiple on/off periods for each channel, as well as providing temperature control for space heating (built into the unit), or a wireless thermostat is also available in the event the timer is installed in an area that maybe adversely affected

[451] https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/citizens/Pages/Better-Energy-Communities.aspx

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by a local heat source.

Objectives

Louth County Council (LCC) was experiencing large volumes of customer complaints in relation to home heating issues; for example, tenants complained of high heating costs or difficulty operating existing heating controllers. LCC was also receiving calls concerning the heat not working or coming on at odd times, not expected by the tenant. In the majority of cases, the issues highlighted were user related, and this proved costly for the council, due to field service calls (where the cost was borne by the council).

The user-friendly nature of the Climote heating controller and the ability to troubleshoot some heating issues remotely, convinced LCC to undertake a pilot programme of installing the Climote heating controller in a selection of the council's fuel-poor households.

LCC's main objective was to reduce the number of unnecessary heating-related field service calls and to help reduce heating costs in the more vulnerable households.

Target beneficiaries

The target beneficiaries for this scheme were low-income households experiencing difficulty with their heating systems. LCC used its own knowledge and its tenant database to identify high-priority cases: the houses selected were located in both urban and rural areas and were mainly heated using oil boilers. All of the houses selected were local authority owned, and the tenants were social welfare recipients.

Delivery stakeholders

- Department of Communications Energy and Natural Resources;
- Louth County Council (LCC);
- Sustainable Energy Authority of Ireland;
- Electricity Supply Board (Electric Ireland);
- Kingspan.

Delivery/activities

The service provided for the removal of old analogue heating controllers and for the installation of new smart heating controls with a remote access and temperature control built into the controller and/or the installation of a wireless thermostat.

Kingspan sourced and managed the delivery of the contract on the ground, and LCC identified the houses and provided Kingspan with a list of eligible houses for the retrofit works.

LCC also oversaw the works, ensuring these were carried out as agreed, and provided council liaison officers where deemed appropriate, especially in cases where customers were nervous or intimidated by unfamiliar people calling their home.

These low-income households can also access other relevant interventions from Electric Ireland such as:

- Instalment plans;
- Some debt write-offs;
- Provision of prepay meters (industry solution meter installed, allowing customers to

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prepay for their energy, as well as receiving a 5% discount on the standard unit rate, and to repay any outstanding debt over an agreed period of time);

- Field agents: this is a third-party contractor procured by Electric Ireland to engage directly with customers who are in bad debt, either by phone or by a visit to a customer's home. The objective is to work with the customer, to agree to a plan by which the customer can repay his or her debt and to make it easier for the customer to keep up with future payments. This approach has resulted in a 20% year-on-year reduction in disconnections for non-payment.

Results/outcomes

There were 2,100 heating controllers installed, and the energy reduction was calculated based on the Sustainable Energy Authority of Ireland deemed energy credits table (i.e., 1,760 credits per unit, replaced 2,100 x 1,760 = 3.69Gwh). The overall cost of the project was €535,920.00.

Lessons

- BEC projects are usually made up of several smaller projects across the community, and this element of the project formed part of a larger project submitted by Kingspan to SEAI for approval. Other elements of the overall project were supported by other obligated parties. This is an example of how engaging with a wide range of stakeholders can bring real benefits to a community. This element of the project was fully funded by Electric Ireland and therefore at no cost to LCC;
- This segment of society is more than happy to embrace new technology, and most users said it was very easy to use and they were delighted with the flexibility it afforded them in controlling their heating;
- The council reported that the number of calls to its office relating to heating issues declined dramatically, and the ability to solve some of the heating issues remotely reduced the cost of service calls.

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A4 ENERGY EFFICIENCY AND RENEWABLE ENERGY MEASURES AND INVESTMENT

A4.1 SOLAR PV AND LED LIGHTING FOR OFF-GRID HOMES

Name of programme	LED bulbs donation within the UNDP electrification initiative for energy-poor households in rural areas
Country	Croatia
Reference or website	http://www.hep.hr/esco/hep-podrzao-projekt-elektrifikacije-ruralnih-podrucja/1703
Organisations responsible	UNDP, HEP, local authorities
Duration	2015–2016, completed.

Short description

The Rural Electrification Project was implemented by the United Nations Development Program in Croatia (UNDP) in cooperation with the Environmental and Energy Efficiency Fund and local and regional self-government units. As part of the project, a register of nonelectrified households was created in Croatia, and priority households were equipped with autonomous solar systems.

Solar systems allow households to use electricity sufficient to carry out daily household activities. (lighting of premises, use of household appliances, use of TV and radio, etc.) and enables the development of small family farms in underdeveloped parts of Croatia.

Target beneficiaries

Priority beneficiaries of the project are households that reside permanently or for most of the year in rural areas of Croatia away from the electricity grid. Regional governments proposed the family homes for inclusion in the programme. A visit to the terrain identified 46 priority households, which were equipped with autonomous solar systems. This proved to be 13 times more favourable as a method of electrification compared to classical grid renewal.

Delivery stakeholders

- UNDP in Croatia;
- Environmental Protection and Energy Efficiency Fund;
- Regional governments: Karlovac County, Lika-Senj County, Požega-Slavonia County, Zadar County, Šibenik-Knin County, Sisak-Moslavina County, Split-Dalmatia County, Istria County, Vukovar-Srijem County.

Delivery/activities

The package the customers received included a photovoltaic system (PV1000, PV1500 or PV3000) with batteries, an auxiliary unit, LED bulbs (LED for households included in project) and an energy efficient refrigerator. Priority users were granted systems for permanent use and free of charge. Equipment costs were co-financed, for the most part, by the Environmental and Energy Efficiency Fund (EPEEF) (80%), counties (10%) and the UNDP (10%). The cost of preparing and implementing the project itself was provided by UNDP

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funds.

Results/outcomes

Forty-six priority households were identified, which were equipped with autonomous solar systems, which proved to be 13 times more economically viable as a method of electrification compared to grid extension.

Lessons

Local and regional self-government units were actively involved in the implementation of the project, which is important for the continued management of the systems.

A4.2 Helping Hand: The Energy Savings Bonus

Name of programme	Helping Hand: The Energy Savings Bonus 2019–2020
Country	France
Reference or website	https://www.ecologique-solidaire.gouv.fr/coup-pouce-economies-denergie-2019-2020
Organisation responsible	Ministry of Ecological and Solidarity Transition (MTES)
Duration	2019–2020

Short description

Since the beginning of 2019, the Ministry of Ecological and Solidarity Transition (MTES) has consolidated a system of assistance for consumers to help them switch away from fossil fuels, insulate their homes and thus significantly reduce their heating bills.

The programme Helping Hand: The Energy Savings Bonus 2019–2020 (in French, Les primes Coup de pouce économies d'énergie 2019–2020) aims to encourage households to achieve energy savings by giving them incentives to purchase space heating equipment or materials to carry out energy efficiency retrofits (e.g. insulation).

This is a national programme (France mainland) financed through utility offers and complemented by another fund (National housing agency programme). A share of the energy savings is accounted for under Article 7 of the EED.

Objectives

All households can benefit from this programme. The amount of premium awarded is differentiated according to income levels. The very low- and low-income households benefit from higher premiums and can also benefit from 'free' retrofits[452] in the case of space heating systems, when combined with other programmes.[453] For insulation measures, the Helping Hand programme covers the total up-front cost.[454] The premium concerns

[452] Households are required to contribute a small up-front cost of €1, called '1€ offers'

[453] For example: https://www.quelleenergie.fr, https://www.laprimeenergie.fr/les-travaux/la-pompe-a-chaleur-air-eau/pac-a-1-euro

[454] For example, a family of four with an annual income of €38,000 wants to insulate its lost attic space, which

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activities that commence before 31 December 2020.

The programme aims to achieve 25,000 retrofits per month both for retrofitting heating systems and adding insulation, i.e. an expected monthly rate of 50,000 retrofits for the 2019–2020 period.

Target beneficiaries

All households are eligible to the programme but a premium for fuel-poor households is calculated according to their income tax level (a proxy used to assess fuel poverty). Households are required to provide an income tax notice or other documents that are considered evidence for income.

Very low-income household thresholds (fuel poverty situation)

Number of persons in the household	Household income limits located in Île-de-France region (€)	Household income limits located in other regions (€)
1	20,470	14 790
2	30,044	21,630
3	36,080	26,013
4	42,128	30,389
5	48,198	34,784
Per additional person	+ 6,059	+ 4,385

Source: ANAH, 2019

Delivery stakeholders

The delivery partners are different according to the type of retrofit. Fifty-one companies (energy companies, businesses selling fuel and gasoline, Regional Councils/Boards, etc.) are listed on the ministry's website as of 2019. Thirty-eight have committed to both the 'Heating charter' and the 'Insulation charter', nine have committed only to the 'Heating charter', and four have committed only to the 'Insulation charter'.

Measures proposed by the delivery partners for space heating include the installation of air/water or water/water heat pumps and very high-efficiency gas boilers. Biomass boilers, hybrid heat pumps, combined solar systems and independent biomass stoves are the next most commonly proposed measures, followed by connection to a heating network, direct electric heaters and combustion product exhaust ducts.

For insulation, all partners submit offers that include both attic/roof and floor insulation.

All partners have to sign a specific charter for each type of subsidised retrofit. The charter contains the following:

- Commitment to set up an offer with minimum subsidy amounts;
- Commitment on the type of the product replaced, on the performance of the retrofit;
- Commitment to monthly report to the public body in charge of the programme (Energy

covers an area of 80m². The up-front cost is €1,600, for material and labour (i.e., €20 per m²), and is fully covered by the EEO premium (source: https://www.pacte-energie-solidarite.fr).

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and Climate Department [DGEC]).

For insulation works, the charter also provides for on-site inspections of the works to be carried out by an accredited inspection body.

Delivery/Activities

The energy efficiency measures subsidised are: biomass boiler, air/water or water/water heat pump, combined solar system, hybrid air/water heat pump, connection to a space heating network using renewable energy or waste heat, very high efficient gas boiler, Independent wood heating stove, attic and roof insulation, insulation of the ground floor, electronically regulated direct electric space heater with advanced functions, duct (chimney shaft[455]) for combustion products.

The Helping Hand premium for low-income and very low-income households is presented in the table below.

As mentioned previously, the Helping Hand premium can be combined with the tax credit (CITE, energy transition tax credit), the Eco-PTZ (soft loan) and the ANAH programme (the Live Better programme or Habiter Mieux Agilité) which is funded by a dedicated EEO programme. Such combinations make up the offer of the free retrofit (1€ offer) to low-income households for retrofitting heating systems. For example, for low-income households, the remaining half of the up-front costs (ex-VAT) can be funded through the programme 'live better' (*habiter mieux*), at a fixed rate (€5/MWhc[456]) through the EEO programme.

Premium for low-income and very low-income households

	Attic and roof insulation	Insulation of low floor
Premium for low-income households	€20 /m² insulated area	€30 /m² insulated area

Source: Ministry of Ecological and Solidarity Transition [MTES]

Premium for low-income and very low-income households

	Efficient biomass boiler	Air/water or water/water heat pump	Combined solar system	Hybrid air/water heat pump	Connection to an space heating network	Very high efficient gas boiler
Premium for low-income households	€4,000	€4,000	€4,000	€4,000	€700	€1,200

Source: MTES

Results/outcomes

The percentage of households in fuel poverty (i.e., low and very low income) benefitting from the premium were 35% for biomass heating, 43% for heat pumps and 31% for gas

[455] The work has to be carried out in a collective residential building and the exhaust duct has to be compatible with the installation of an individual gas condensing boiler as a replacement for an incompatible duct (source: DGEC).
[456] MWhc means MWh cumulated over lifetime and discounted (4%).

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heating. The percentage of households in fuel poverty benefitting from the premium were 80% for attic or roof insulation and 59% for ground-floor insulation.

The statistics presented below are for all households (results specifically for fuel poor are not available) and cover the period from January 2019 to September 2019. These are based on the reports submitted by the charter signatories.[457]

Outcome: Space heating statistics

Space heating system installed	Delivery	Energy replaced by the implemented space heating system
Renewable energy (heat pumps, biomass, solar, heating network)	68,821 retrofits started, including 40,329 completed out of which 4,218 were delivered with a premium (€14.5 million).	The work undertaken replaces: fuel oil (51,336: 75%), gas (15,524: 23%) coal (1,828: 3%).
Gas boiler	80,876 retrofits started, including 41,742 completed, out of which 23,139 were delivered with a premium (€20.7 million).	The work undertaken replaces: fuel oil (7,421: 9%), gas (72,645: 90%), coal (163: 0%).

Source: DGEC, September 2019

Outcome: Insulation statistics

Type of insulated area	Delivery
Attic or roofs	232,724 insulation works started (19 million m²), inc. 169,121 completed (14 million m²), out of which 126,391 were delivered with a premium (11 million m²) €197 million
Ground floors	98,530 with insulation work started (7 million m²) incl. 84,149 completed (6 million m²), out of which 68,113 were delivered with a premium (5 million m²) €122 million

Source: DGEC, September 2019

It is estimated that the retrofits of heating systems result in approximately 50 TWhc (TWh cumulated and discounted), out of which 9 TWhc of energy savings can be reported under Article 7 of the EED, whilst 42 TWhc were achieved due to subsidies (energy savings premium).

Concerning the 'insulation' measures implemented, it is estimated that the retrofits undertaken correspond to approximately 96 TWhc, of which 40 TWhc of energy savings can be reported under Article 7 of the EED, whilst 56 TWhc were achieved due to subsidies

[457] Ministère de la Transition Ecologique et Solidaire—DGEC, Lettre d'information 'Certificats d'économies d'énergie', octobre 2019, 7.

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(energy savings premium).

Lessons

There are positive outcomes but also unexpected problems resulting from this programme. Issues include bias towards the delivery of certain technical solutions, up-front cost coverage structure, customer targeting, variable incentives, market instability, lack of a long-term vision and issues with quality and fraud.

These impacts illustrate some of the difficulties that arise for a public body managing a scheme based on an obligation of utilities in conjunction with a market driven by other economic actors.

For example, the success of the programme has a tremendous impact on the heat pump market. Driven by public subsidies, sales of air-to-water heat pumps increased by 69% in the first eight months of 2019 with 95,290 heat pumps sold, almost reaching the level of total annual sales in 2018. Sales in 2019 are expected to exceed 100,000 units. Unfortunately, according to Pac&Clim'Info,[458] the up-front cost (supply and installation) of air/water heat pump has increased by €4,000 since the beginning of 2019, more specifically from €12,000 - €13,000 to €17,000 - €18,000 in eight months.[459]

Partly as a result, some of the '€1 offers' concerning space heating and especially heat pumps are temporarily suspended due to a regulatory change announced on 10 October 2019, which capped/lowered the amount of incentive offered through the ANAH housing agency programme. This program continues to exist but the remaining up-front cost to be paid by household is greater.

Finally, fraud has been an issue within the programme, related to both the offer of free retrofits for low-income households and to the increase of the retrofits' price to increase the potential margin for companies. In order to combat fraud, an inter-Ministerial working group is being set up.[460]

[458] Pac&Clim'Info is an association bringing together manufacturers of air conditioning and domestic hot water equipment on the French market.

[459] Batirama, Climatisation et pompes à chaleur: l'insolente santé du marché, 4 October 2019, www.batirama.com

[460] The Sustainable Building Plan and the interministerial coordination team of the energy renovation plan for buildings (Ministry of Ecological and Solidarity Transition, Ministry of Territorial Cohesion and Relations with Local Authorities) are setting up a working group to combat fraudulent practices in energy renovation (MTES, Working group on combating fraudulent practices in energy renovation, 10 October 2019).

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A4.3 WHOLE-HOUSE RETROFIT

Name of programme	SEAI Better Energy Community Scheme
Country	Ireland
Reference or website	https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/citizens/Pages/Better-Energy-Communities.aspx
Organisation responsible	NABCO (now Co-operative Housing Ireland, CHI)
Duration	Completed

Short description

The Better Energy Community Programme (BEC) is delivered at a national level and managed by the Sustainable Energy Authority of Ireland. This project formed part of the SEAI Better Energy Community Scheme in 2014, with NABCO being the lead applicant and taking full responsibility for its implementation, including the acquisition of funding to ensure the project could be delivered.

NABCO is an approved housing body and works closely with various stakeholders in the housing sector, including local authorities, the government, aspiring homeowners, tenants and developers, to provide high-quality social rentals and home ownership co-operative homes across Ireland.

The works involved full energy upgrades to 90 semidetached houses, including roof and cavity wall insulation and window and door replacement with double-glazed PVC units. The heating systems were upgraded with new gas boilers and fully integrated heating controls, and the heating system was separated into three zones (two space heating and one water heating).

Electric Ireland was awarded the contract to undertake all the work, based on a defined scope and schedule provided by NABCO. The work was carried out according to the building standards of the day and to SEAI's Domestic Technical Standards and Specifications, and all work was completed in a four-month period. The project was funded by SEAI, Electric Ireland and NABCO. In addition, NABCO had agreed with its tenants that in return for increasing the comfort of their homes and reducing the cost of heating, a small rent increase would apply.

Objectives

NABCO targeted older stock in its housing portfolio, built in the 1970s and 1980s and consequently very energy inefficient. The houses chosen were on the one street in a housing estate in South Dublin, with a mix of both fuel-poor and non-fuel-poor tenants (approximately 70%FP and 30%NFP). NABCO's overall objective was to improve the fabric and comfort of its housing stock, reduce maintenance costs and increase the energy efficiency of all its houses over several years.

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Target beneficiaries

The main beneficiaries of this project were householders who occupied similar properties in one street and were either in fuel poverty or not and NABCO, the housing agency responsible for the upkeep of the properties.

Delivery stakeholders

- Sustainability Energy Authority of Ireland;
- NABCO;
- Electric Ireland;
- Bayview Contracts (contracted to Electric Ireland to deliver the works).

Delivery/activities

This project entailed a full energy efficiency upgrade of 90 houses. The renovation projects were predominantly done in tandem with one another as they involved different trades. However, the project was managed to avoid any major disruptions to householders. This was important as many of the homes were occupied throughout the day, and in some cases, tenants were old and vulnerable.

Attic and cavity wall insulation was completed early in the project, allowing the more intrusive work of replacing windows, doors and boilers and zoning heating systems to take place.

Bayview Contracts, acting as project manager on behalf of Electric Ireland, sourced material providers and relevant subcontractors. Bayview also acted as project supervisor of both the design phase and the construction stage. Due to the short time frame for completion, the nature of the work (invasive to people's lives and homes) and the potential for friction between homeowners and contractors, weekly progress meetings took place among all stakeholders.

Results/outcomes

This project was delivered on time and therefore did not incur any penalties, which may be served by SEAI, who has the authority to withhold an element of funding for late delivery of a project or for quality related issues.

The annual savings associated with this project were 1,427,763 kWh, and these savings were assigned to Electric Ireland by SEAI in return for an agreed amount paid for each credit (this was a separate transaction to that of undertaking the works contract). The energy credit savings contributed to Electric Irelands EEO. The cost of the project was €1.4 million or €15,500 per house on average.

Lessons

- The National Association of Building Co-operatives (NABCO) own and maintain several developments throughout Ireland, and it usually forms part of larger developments; it is in this context that a street or section of a larger estate can be owned and run by NABCO. Its approach to improving housing stock is to implement improvements to all units within one area. This has many benefits as it eliminates any tenant grievances as all houses in the scheme are treated the same. It means economies of scale can be leveraged, and planning and work management is much more efficient;

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- The business model was too unwieldy: there were too many layers (client, Electric Ireland, works contractor and subcontractors). This added to the overall cost and made for difficulties in decision-making at times;
- On a positive note, all the work was well coordinated, and whilst there was a lot of disruption, the tenants were very positive, as they could see the benefit in getting all the work done at the same time;
- Working directly with the housing authority was very beneficial, as they knew their tenants and had cleared the way for the installers to undertake their work, and any issues that arose with the tenant were dealt with by the housing authority;
- In 2015 Electric Ireland took the strategic decision to only provide technical and financial support for projects, due to the added cost (additional layers in delivering projects) of direct involvement and the resource intensive nature of providing a full turnkey service. EI has found that the majority of lead applicants and energy efficiency contractors are happy to undertake the delivery of these types of projects through their own resources, with financial and technical support from obligated parties.

A4.4 PV FOR DISADVANTAGED FAMILIES

Name of programme	Photovoltaics for disadvantaged families
Country	Italy
Reference or website	https://www.comune.porto-torres.ss.it/Comunicazione/Argomenti/Reddito-energetico
Organisation responsible	Municipality of Porto Torres
Duration	Started July 2017, ongoing

Short description

This programme is based on a public fund that serves to finance the installation of photovoltaic systems on the homes of citizens, starting from those with lower incomes but destined for everyone, free of charge. The Municipality of Porto Torres was the first in Italy to promote the project. The programme allows for the installation of photovoltaic systems through a public award. The first call for tenders ended in 2017.

Objectives

The long-term goal is to create a virtuous circle to increase the number of photovoltaic roofs, increase environmental awareness, reduce bills and spread the culture of renewables.

Target beneficiaries

The 100 most disadvantaged families in the municipality of Porto Torres were targeted. By December 2018 45 families had been reached.

Delivery stakeholders

- Porto Torres municipality;

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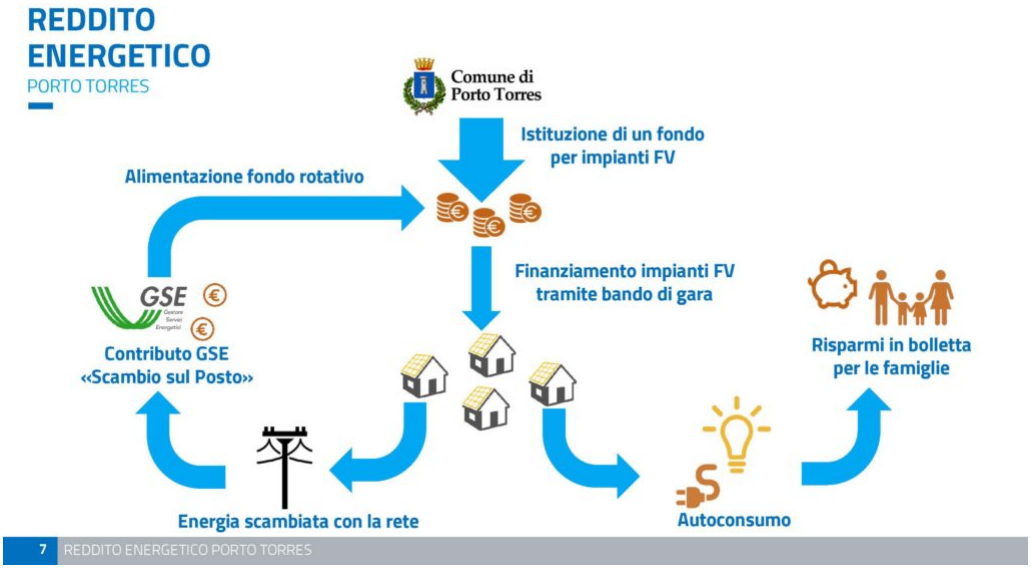
› GSE (Gestore dei Servizi Energetici), state-owned company.

Delivery/activities

The diagram below illustrates the design of the programme. The Municipality of Porto Torres created a PV fund. A Call for Tenders was then enacted to finance the PV installation on homes of disadvantaged households. Households benefitted from the savings associated with consuming electricity generated on-site. Electricity not used on-site was fed back into the grid, and GSE provided a contribution based on the spot exchange price to resupply the revolving fund, which, in turn, served to purchase new systems.

The families were supplied with a photovoltaic system (under 20 kW peak) capable of generating on-site electricity, which saved each family around €200 per year on their electricity bill.



Results/outcomes

From July 2018 to December 2018, the programme had the following outcomes:

› 27.2 MWh was produced;

› 9.4 MWh was self-consumed by households resulting in bill savings;

› 12.5 MWh was refunded through net metering;

› 5.3m MWh was sold back into the electricity network;

› 13.6 tonnes of CO_2 were saved.

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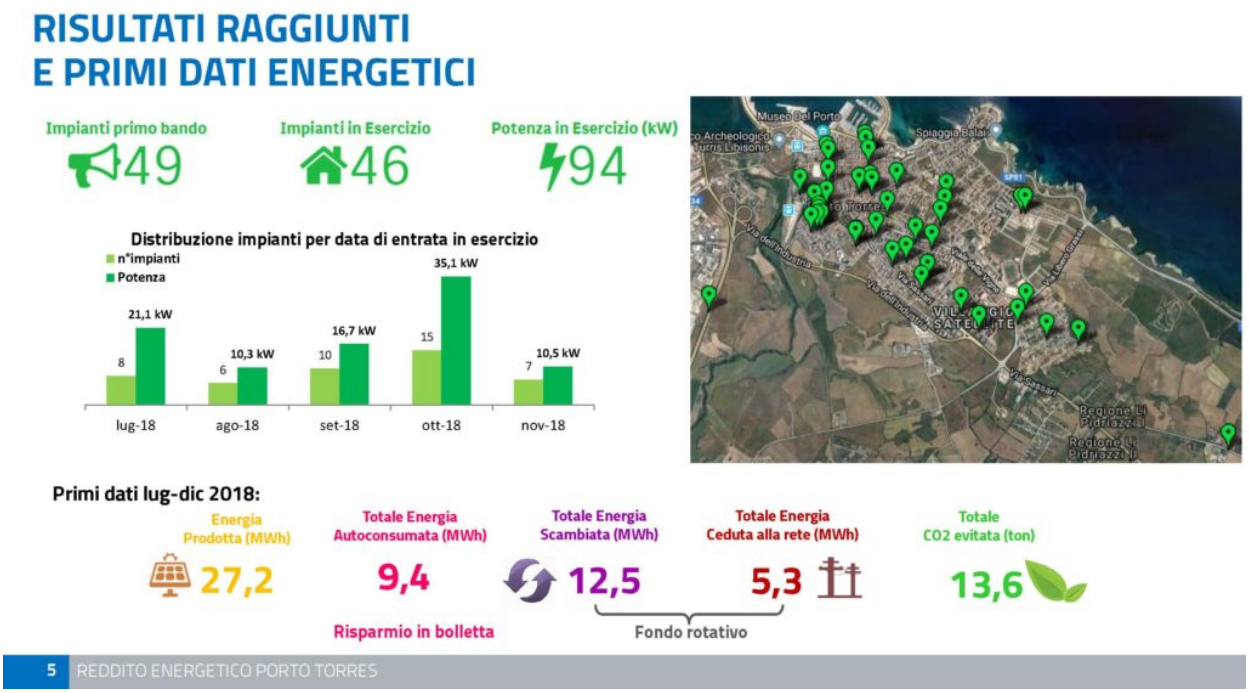

Lessons

- The "energy income" project trialled by the municipality of Porto Torres responds well to the priorities of the Italian NECP namely to put citizens at the centre of the choices, so that they are protagonists and beneficiaries of the energy transformation and not just financiers, as well as to promote PV with an aim to increase generation from 19.7 GW in 2017 to 50 GW in 2030;
- The Porto Torres project has a potential for replicability. Similar measures are being evaluated with the Puglia Region;
- GSE is a provision of the Public Administration and citizens that provides support in the design and implementation of similar measures and in general in the promotion of photovoltaics. It does this through simple tools of vast usability (in development geographic information systems, portal for dissemination of self-consumption, behavioural economics, etc.).

A4.5 Energy performance incentive for the rental sector

Name of programme	Energy Performance Incentive scheme for the rental sector (STEP)
Country	The Netherlands
Reference or website	https://www.rvo.nl/subsidies-regelingen/stimuleringsregeling-energieprestatie-huursector-step/voorwaarden-woningcorporaties
Organisation responsible	National government
Duration	2014, completed

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Short description

The Energy Performance Incentive scheme for the rental sector (STEP) was launched in 2014 to support energy efficiency renovations in rented houses. Subsidies were provided to support measures such as building insulation, heating system upgrades and renewable energy production.

The scheme was funded by the Dutch government with a budget of around €400 million.

Owners and landlords of rented dwellings whose rental price is below the rent liberalisation threshold (€710/month) were eligible for the subsidies.

Objectives

The scheme was part of the initiatives of the Dutch government to achieve energy efficiency in the rental sector, where the prevalence of energy poverty is higher. Combined with other schemes, this programme aimed to help the Netherlands reach the targets set in the Energy Efficiency Directive and the Energy Agreement for Sustainable Growth.

Target beneficiaries

Eligible households received subsidies, the value of which corresponded to the improvement of the energy index, measured before and after the implementation of the actions. More specifically, the subsidy per level of improvement is presented in the table below.

To:	EI ≤ 0.40	EI ≤ 0.60	EI ≤ 0.80	EI ≤ 1.20	EI ≤ 1.40
Of:					
EI 1.41 ≤ 1.80	€4,800	€3,600	€2,800	€1,500	€0.00
EI 1.81 ≤ 2.10	€6,200	€4,800	€3,600	€2,800	€1,500
EI 2.11 ≤ 2.40	€7,200	€6,200	€4,800	€3,600	€2,800
EI 2.41 ≤ 2.70	€8,300	€7,200	€6,200	€4,800	€3,600
EI > 2.70	€9,500	€8,300	€7,200	€6,200	€4,800

Netherlands Enterprise Agency[461]

Therefore, each household received subsidies based on the level of improvement achieved in terms of the Energy Index (EI) of the building, which is part of the energy performance certificate. The certificate for each dwelling contained a label from A to G, with the average for the Netherlands to be label D. The label is determined from the EI, which gives a number on a scale of 0.6 to 2.7 and is calculated by a certified auditor who examines the characteristics of the dwelling.[462] The EI also determines the rent of a property through the Dutch point system for houses (*puntentelling*).[463]

[461] Rijksdienst voor Ondernemend Nederland: https://www.rvo.nl/subsidies-regelingen/stimuleringsregeling-energieprestatie-huursector-step/voorwaarden-woningcorporaties

[462] https://www.odyssee-mure.eu/

[463] https://www.huurcommissie.nl/onderwerpen/huurprijs-en-punten/huurprijscheck-en-puntentelling

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Delivery stakeholders

The Dutch government.

Delivery/activities

With STEP, landlords who rented their property were eligible for the aforementioned subsidies to improve the energy efficiency of their buildings, such as installing new thermal insulation. These improvements did not result in an increase of rent; therefore, the actions were beneficial for the tenant as well, since the change on the EI did not affect the initial rent calculated by the point system. The landlords could also combine in the subsidy received from STEP, with a low-interest loan, available from another scheme targeting the rental sector, the Energy Savings Fund for the Rental Sector (FEH).

On 31 December 2018, when the scheme officially ended, more than 130,000 houses had been improved.[464]

Lessons

Energy poverty in the Netherlands is more prevalent in the rental sector than in the home-owning sector. Therefore, it is important to create schemes specifically targeting those houses. The Dutch government introduced the STEP scheme on 2014 offering subsidies of almost €400 million to the owners of 130,000 rental houses to improve the energy efficiency of their properties. Since it is possible for other countries to experience the same prevalence of energy poverty on the rental sector, STEP could be a basis to create innovative schemes to mitigate energy poverty in the rental sector.

A4.6 RENOVATION OF MULTIAPARTMENT BUILDINGS

Name of programme	Programme for Improving Energy Efficiency in Multi-Apartment Residential Buildings
Country	Latvia
Reference or website	https://www.altum.lv/en/services/individuals/energy-efficiency-in-multi-apartment-buildings/about-the-programme/
Organisation responsible	Attīstības finanšu institūcija Altum (Altum) (state-owned development finance institution)
Duration	Programme is set to operate from 2019 to 2023, but as of the first quarter of 2020, all funding will have already been reserved

Short description

The objective of the programme is to promote energy efficiency improvements, smart energy management and the use of renewable energy resources in apartment buildings.

[464] https://www.rvo.nl/over-ons/duurzaam-resultaten-uitgelicht

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The target audience and beneficiaries are apartment owners in multiapartment buildings.

Financial aid is provided as de minimis aid in accordance with Commission Regulation (EU) No. 1407/2013 of 18 December 2013.[465]

Multiapartment owners have to agree on a financing model with options to take out a loan from Altum, a bank, municipality or ESCO.

Objectives

The main target is the renovation of multiapartment buildings to improve energy efficiency and increase the comfort level for households. The plan is for 600 buildings to apply and participate in this programme, which is about 3% of the total number of buildings that could apply (i.e. 20,000).

Target beneficiaries

Target beneficiaries are owners of apartments in multiapartment buildings. Specific limitations apply. Buildings have to contain at least three apartments. One person cannot own more than 20% of the total number of apartments. After renovation, the heat supply cannot exceed 90 kWh/m^2. Investments made by owners must pay back within 30 years.[466]

This programme is not targeted for specific household types and operates on a first come, first served basis.

Delivery stakeholders

- Altum (state-owned development finance institution);
- Representatives of multiapartment owners;
- Lending company (bank or ESCO approved by Altum or Altum itself);
- Construction company.

Delivery/activities

The overall programme is clear, but the process that needs to be followed requires a lot of documentation in order to submit a complete application, to organise the energy audit, organise financing, calculate technical specifications, calculate payback and so on. Two-thirds or more of the apartment owners in a building have to agree to participate in this program, which often can be challenging, as many owners are sceptical.

The entire process takes about two years, from its inception to final construction. Informative campaigns and seminars were organized to raise awareness and encourage applications.

The total budget of the programme is €166 million, of which €136 million were allocated for building reconstruction. Demand in the programme has been high, and by the first quarter of 2020, all funding will have been reserved, despite the fact that the programme ends in 2023.

[465] https://www.altum.lv/en/services/individuals/energy-efficiency-in-multi-apartment-buildings/about-the-programme/

[466] https://www.altum.lv/lv/pakalpojumi/maju-energoefektivitate/daudzdzivoklu-maju-energoefektivitate-pamatinformacija/kas-var-sanemt-atbalstu/

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Results/outcomes

For each project, energy efficiency targets have been set, but as many projects are still at the construction stage or just being finalised, there is limited information on achieved energy savings.

By the second quarter of 2019, 113 projects had been finished. Average costs for heating decreased from €0.83/m^2 to €0.31/m^2. Average temperatures in the apartments increased from 17 degrees to 22 degrees. Average energy savings in already renovated buildings reached 67%, decreasing from 165 KWh/m^2/year to 54 KWh/m^2/year.[467]

By mid 2019, 568 projects were submitted, but around 20% of these will not be implemented, mostly due to an inability to obtain the necessary number of votes from apartment owners.

Lessons

- This is an essential programme that activates and stimulates building renovation;
- Effective and professional communication about this program raised active interest and the programme will close faster than planned because available funds will end;
- To date achieved energy-saving results are in line with expectations;
- The programme did not focus specifically on energy-poor citizens. Multiapartment buildings with poor energy efficiency can benefit from this program;
- This programme covers about 3% of all multiapartment buildings in Latvia.

A4.7 SOLIDARITY FUND FOR ENERGY RETROFIT

Name of programme	Solidarity fund for energy retrofit
Country	Spain
Reference or website	http://www.fundacionnaturgy.org/accion-social/plan-vulnerabilidad-energetica/fondo-solidaridad-rehabilitacion-energetica/
Organisation responsible	Naturgy Foundation
Duration	Started October 2018, ongoing

Short description

Naturgy Foundation,[468] within its energy vulnerability plan, has launched a Solidarity fund for energy retrofit.

The fund collects contributions from employees, customers, suppliers and society in general, and the Naturgy Foundation matches those donations. The funds raised are used to provide low-cost renovations for vulnerable households.

[467] http://www.la.lv/nakama-gada-pirmajos-menesos-bus-rezerveti-visi-altum-daudzdzivoklu-maju-atjaunosanai-paredzetie-lidzekli

[468] https://www.naturgy.com/en/about_us/with_society/naturgy_foundation

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Households are identified by the third sector organisations with which Naturgy Foundation collaborates. The types of renovations are those that influence the energy demand of the house and are low cost and do not require works/building license or household members to move out.

In September 2017, Naturgy Foundation published a study directed by the architect Margarita de Luxán García de Diego, Professor Emeritus of Polytechnic University of Madrid, and entitled 'Express Retrofit for vulnerable homes: Low cost solutions'. The study proposes 77 retrofit solutions divided into five broad categories (i.e. walls, ceilings, floors, carpentry and sunscreens) and indicates the cost of installation for each retrofit, its' efficiency, and stores where items, such as awnings and insulation, can be purchased, among other features. These solutions can range from the installation of an awning or carpet, to replacing windows or thermal insulation in walls, among many other examples.

The fund implements the solutions proposed in the study. The objective is to implement passive measures that can be easily implemented and do not need specific licenses or permits (e.g. works carried inside the house).

The fund recommends and encourages that the retrofit is carried out by labour insertion companies that get unemployed people back to work, so that in parallel another cause of energy poverty is tackled, which is lack of income.

Objectives

The programme aims to contribute to reducing energy poverty, by focusing on poor housing insulation, one of the causes of energy poverty.

Target beneficiaries

Households in the network of third sector organizations.

Delivery stakeholders

Naturgy Foundation and third sector entities with which Naturgy Foundation has an agreement, including; Cáritas, Red Cross, Hábitat 3, Foment de l'habitatge social, Fundación Mambré, Fundación Roure, Fundación Domus Misericordie Sant Josep, Fundación Isadora Duncan, Fundación la Vinya, CEAR, ACCEM.

Results/outcomes

The fund has enabled retrofits of nearly 800 homes; this number is expected to reach 1,000 by the end of the year.

The average expenditure per house has been €2,000 (taxes included), with retrofits up to €5,000.

Lessons

- Good coordination and cooperation with other entities is essential;
- It should be kept in mind that the rhythms and times of third sector entities are usually slower than those of the private sector, which limits the capacity to complete actions;
- It is important to draw up a detailed renovation plan, closely track the work as it is done and evaluate the project once it is completed.

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A4.8 Affordable Warmth in ECO3

Name of programme	ECO3 (Energy Company Obligation 3)
Country	Great Britain (England, Wales and Scotland)
Reference or website	https://www.ofgem.gov.uk/environmental-programmes/eco
Organisation responsible	Obligated parties: medium and large energy suppliers Ofgem (government regulator for the electricity and gas market in Great Britain)
Duration	ECO3: 3 December 2018 to 31 March 2022, 3.5 years Preceding schemes ECO1, ECO2 and ECO2t

Short description

The Energy Company Obligation (ECO) is a government energy efficiency obligation scheme in Great Britain that aims to reduce carbon emissions and tackle fuel poverty. Great Britain has had an energy company obligation in place in one form or another since 1994. Low-income or fuel-poor households have always been a priority group of the obligations, but it only became compulsory to deliver to this group in 2002.

Under ECO3 (2019–2022), energy suppliers are required to meet one distinct obligation: the Home Heating Cost Reduction Obligation (HHCR).[469] The HHCR obligation requires energy suppliers to promote and fund the installation of energy efficiency measures, such as loft or wall insulation and the replacement of an inefficient heating system, in low-income, fuel-poor and vulnerable households (see target beneficiaries).

Within this obligation, there is a 15% ring-fence of the overall target that needs to be delivered in rural areas and a further sub-target to treat 17,000 solid wall construction properties each year. These ring-fences are intended to ensure that rural and solid wall homes that have not been well served under previous programmes receive support.

Objectives

ECO3 aims at reducing the energy bills of low-income, fuel-poor and vulnerable households and at improving their ability to heat their home. The overall lifetime, notional home-heating cost reduction target is £8.253 billion (€9.560 billion).[470]

Target beneficiaries

Target beneficiaries are low-income, fuel-poor and vulnerable households. Receipt of

[469] The preceding schemes ECO1, ECO2 and ECO2t included two additional obligations with a broader focus on carbon emission reductions.

[470] The Electricity and Gas (Energy Company Obligation) Order 2018. Part 2, Article 4. Available at: http://www.legislation.gov.uk/uksi/2018/1183/article/4/made

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means tested benefits[471] is one of the main eligibility criteria used. A household that lives in social housing with an energy performance rating of E, F or G may also be eligible.

Furthermore, local authorities may directly refer households to obligated energy suppliers; for example, fuel-poor households on low income that do not receive any of the above listed benefits and low-income households that are vulnerable to the effects of living in a cold home.[472] This enables local authorities who have identified a significant issue with fuel poverty in their area or in a particular neighbourhood to proactively engage at-risk households and make referrals. It also allows local authorities in areas that have been underserved by the energy company obligation to date (areas that are hard to reach or expensive to deliver and have suffered from lower levels of support) to make efforts to attract investment in the area. Up to 25% of the obligation can be met through this Local Authority Flexible Eligibility mechanism.[473]

The eligibility criteria are such that around 6.6bn households are eligible for support.

A household can benefit from ECO3 regardless of the supplier from which the household buys energy. The household does not need to buy energy from an obligated supplier.

Delivery stakeholders

Energy suppliers over a threshold size are obligated parties and required to meet their HHCR obligation. The threshold is based on the number of domestic customers and the supply volume of the energy supplier.474 Ofgem, the government regulator for the electricity and gas market in Great Britain, allocates the obligation to energy suppliers and calculates the individual target that each obligated supplier is required to meet, based on a supplier's share of the gas and electricity supply market.

To meet their obligation, energy suppliers work together with installers, which finally implement the energy efficiency measures, such as loft or wall insulation and heating system replacements. Installers need to hold accreditations (e.g., from the Microgeneration Certification Scheme) for quality insurance. Via ECO Brokerage, energy suppliers may also buy ECO Cost Savings from ECO providers in anonymous auctions, which are held every fortnight as an alternative to delivering measures and achieving savings directly.

Delivery/activities

Eligible households are identified through customer engagement with suppliers or the supply chain, via referral services or by local authorities.[475]

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[471] Details on eligible benefits can be found in Ofgem (2018) ECO3 delivery guidance. Available at: https://www.ofgem.gov.uk/system/files/docs/2019/03/eco3_guidance_delivery_v1.2.pdf

[472] Department for Business, Energy & Industrial Strategy (2019). Energy Company Obligation: ECO3, 2018-2022 Flexible Eligibility Guidance. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776540/energy-company-obligation-3-LA-flexible-eligibility-guidance_.pdf

[473] BEIS. (2018). The Government response to the ECO3, 2018 to 2022 Consultation. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/727065/Energy_Company_Obligation_ECO3_2018-2022.pdf

[474] 200,000 customers, reducing to 150,000 customers in 2020.

[475] Ofgem. (2019). ECO3 Toolkit. Available at: https://www.ofgem.gov.uk/environmental-programmes/eco/contacts-references-and-resources/eco-

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Under ECO3, a wide range of energy efficiency measures can be installed, including insulation measures (e.g., solid wall, cavity wall, loft insulation and improved window glazing), heating measures (e.g., boiler repair and replacement) and connections to district heating systems (new and upgrades).[476] The obligated energy suppliers may commission installers to implement these measures free of charge to the household or may ask households to partially cover the installation costs. If the supplier does not cover all costs, the installer or local authority may be able to provide advice on further financing options available.[477]

Energy suppliers report the measures installed to Ofgem. Each measure installed by a supplier is awarded a deemed score. The score is based on the estimated notional bill saving that the measure is expected to deliver in the measure's lifetime, specific to the type of house it is being installed in. The deemed scores used in the ECO3 scheme are based on the values that would result from an assessment of the home pre- and post-intervention, using the Standard Assessment Procedure (SAP or rdSAP).[478]

Results/outcomes

Ofgem publishes ECO public reports and data on its website.[479]

Under ECO3,[480] 89,769 efficiency measures had been approved by Ofgem by the end of September 2019.[481] Cavity wall insulation represents the largest share of approved measures (26%), followed by boiler replacement (20%), heating control measures (18%) and loft insulation (15%).

As the programme is ongoing there are no ex-post costs and impact data. The policy impact assessment prepared before the introduction of ECO3 predicts that the delivery costs to suppliers of the programme will be £640m per year (£2,240m over the 3.5 year programme). Of this total, the costs associated with the installation of the energy efficiency measures are the largest contributor at a predicted £1,192 million. The second-largest contributor to the overall costs is the costs of searching and finding eligible households at £257 million over the programme's lifetime.

The costs of this programme are expected to be passed onto consumers' energy bills, and the average cost of ECO3 on an annual household dual fuel bill is estimated to be around £27. For households that benefit from a measure, these costs will be more than offset.

publications-library

476 A list of possible measures is available at:
https://www.ofgem.gov.uk/system/files/docs/2019/09/eco3_measures_table_v3.3_0.pdf. Additional measures may also qualify, subject to review by Ofgem.

477 https://www.northdevon.gov.uk/benefits-and-grants/housing-grants-and-loans/eco-flexibility-assistance/

478 BEIS. (2018). ECO3 Final stage impact assessment. Available at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/749638/ECO_3_Final_Stage_IA__Final.pdf

479 Available at: https://www.ofgem.gov.uk/environmental-programmes/eco/contacts-guidance-and-resources/eco-public-reports-and-data/energycompany

480 This includes measures installed on or after 1 October.

481 Approved means that Ofgem has validated these measures and attributed the savings to the relevant energy supplier.

The SocialWatt project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 845905

The number of houses expected to benefit from at least one measure is 1.2 million.[482] The overall energy savings from the programme are expected to be £1,272 million, and increased comfort taken from warmer homes is valued at £305 million.

Lessons

- An energy company obligation has been in place in Great Britain for 25 years. The obligation has been the most significant domestic energy efficiency programme in the country, providing long-term support for energy efficiency and home heating measures;
- The success of the programme led to a scaling up of the delivery target over successive iterations of the obligation. However, political sensitivities over the costs of the programme being passed onto consumers' energy bills resulted in a drastic reduction of the ambition and, therefore, the cost of the programme in recent years and a refocussing entirely on energy-poor households. Therefore, sensitivities around the pass-through of costs onto energy consumers' bills need to be carefully considered;
- There is an inherent tension between an energy company's obligation to deliver assistance to those who most need it versus the company's incentive to operate the scheme at least cost, as vulnerable households are least likely to be able to contribute to the cost of measures. This leads to distortions in delivery to favour relatively richer households and geographical areas and house types in which it is cheaper to deliver measures. The design of ECO has tried to address these distortions with the rural area ring-fence, the solid wall sub target and the local authority flexibility mechanisms;
- Eligibility criteria and targeting efficiency continue to be a challenge. Means-tested benefits are often a poor proxy for energy poverty. Therefore, the targeting efficiency of the programme is poor. However, introducing and tightening eligibility criteria raises the costs of finding and engaging eligible households (costs of reaching eligible households are expected to amount to ECO3 £257 million over the programme's lifetime).

[482] BEIS. (2018). ECO3 Final stage impact assessment. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/749638/ECO_3_Final_Stage_IA__Final.pdf