Implementation of bioenergy in Estonia - 2021 update

IEA Bioenergy
Technology Collaboration Programme

Country Reports

IEA Bioenergy: 10 2021

This report was prepared from the 2021 IEA World Energy Balances and Renewables Information, combined with data and information provided by the IEA Bioenergy Executive Committee and Task members[1]. Reference is also made to FAOstat and Eurostat data as well as data from national statistics. All individual country reports were reviewed by the national delegates to the IEA Bioenergy Executive Committee, who have approved the content. General background on the approach and definitions can be found in the central introductory report for all country reports.

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HIGHLIGHTS

- To date, wood fuels have played an important role in energy system - renewables make up 23% of Estonia's *total energy supply* in 2019. The renewable energy share in *final energy consumption* is 30%[2]. More than 90% of renewable energy is from biomass. Yet, in the next decade the contribution of wind and solar energy will increase significantly (capacity will quadruple).
- Estonia has a low population density and a high forest area per capita, so it has a high domestic potential of solid biomass. Most of its bioenergy comes from solid biomass. Some biomass is also exported to other European countries.
- The main application of bioenergy in Estonia is in renewable heat, both in direct heating (residential, services and industry) and in district heating. Biomass provides 50% of heat/fuel for heating in Estonia.
- Electricity production in Estonia is dominated by oil shale, typically representing 80% or more of power production in the past decades. In 2019 there was a step change with a 50% reduction of power from oil shale. For now, the reduction is compensated with electricity imports from neighbour countries. The role of bioelectricity (through CHPs) continues to grow, as well as but wind and solar power.
- The final energy consumption in transport is slightly increasing, with renewable energy/fuels showing an upward trend in the past years. In 2019 renewable energy in transport was around 4%, mostly through biofuels (5.15% with EU accounting rules).

[1] While data for 2020 are starting to become available at national level, it was decided to consider trends up to 2019 for good comparability and benchmarking between the different IEA Bioenergy member countries. Care should also be taken when using 2020 data for analysing trends as these data are distorted by the COVID19 Pandemic.

[2] The difference between the share of renewables in supply and consumption relates to unused heat from power plants (which is counted in energy supply, but not in final consumption).

- More than half of the Estonian land territory is covered with forest land and the role of forestry and wood industries in the Estonian economy is substantial, representing 11% of GDP. Approximately 36% of wood biomass removals in Estonia are primarily used for energy, mostly originating from low-quality wood and felling residues.

COUNTRY PROFILE

Population and land use

Estonia is a small and smart country in Northern Europe and is member of the European Union. It has a total land area of 43.5 thousand km² and a population of 1.3 million inhabitants, representing a low population density of 31 persons per km².

More than half of the land area is forest land. A quarter is agricultural land, of which two third is arable land. It is a land famous by its digital and new generation solutions (Skype, Estfeed, smart metering etc).

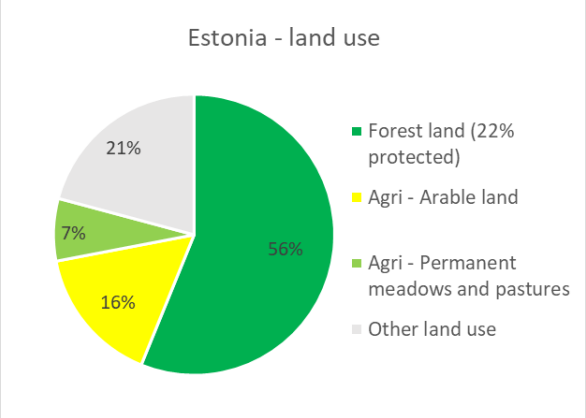

***Figure 1**: Land use in Estonia (2018 figures - Source: FAOstat)*

Forestry situation in Estonia

More than half of the Estonian land territory is covered with forest land and the forest land area has increased about 1.5 times during the last 70 years due to the low forest cover in the beginning of 20th century. Partly by natural afforestation of meadows and pastures resulting in formation of deciduous and mixed stands, but also pine and spruce have spread on former arable land. The coniferous forests planted on arable land tend to suffer root diseases and therefore require more care or even removal. The share of protected forests is high (25%), and the share of strictly protected forests is also high (14.1% according to NFI).

In 2018, the total forest land area in Estonia was 2.33 million hectares and the total growing stock of stands was 480 million m³. In Estonia, these are mostly mixed stands that have an uneven age distribution, therefore the share of low-quality wood (unsuitable for timber) is considerable. The total growing stock of stemwood, growing stock per hectare of forest area, as well as the annual increment of growing stock has been increasing gradually since 2000. As for the past 15 years, felling volume has been smaller than the increase of growing stock. For example, in the period 2007-2017 the average felling volume (for timber, pulpwood, energy wood) has been 8,8 million m³/year and the average annual increment of growing stock for the period in managed forests was 12.8 million m³/year[3]. Forest growing stock has raised due to both increase in forest land area as well as its average age. In addition, it is influenced by improved growth conditions resulting from the processes of human activities.

[3] Estonian Environment Agency, National Forest Inventory and: https://www.keskkonnaagentuur.ee/sites/default/files/smi_2019_tabelid_graafikud_1.xlsx

The "Estonian Forestry Development Program until 2020" specified that 12–15 million m³ per year is the optimum harvesting level. The planning of felling volumes is based primarily on the age structure of forests available for wood supply. Forest data originates from the Forest Register and the National Forest Inventory, which are based on internationally recognized methodologies. The share of mature stands in Estonian forests is relatively high. In 2019, there was 2.0 million ha of forest available for wood supply in Estonia (86% of forest land), of which 25.5% are mature stands. As the private forest has not been renewed to the same extent with coniferous trees compared to the state forest, the reforestation of the private forest land is mostly in deciduous stands. Hence, the use of low-quality wood in bioenergy is reasonable as long as natural forest management produces this assortment.

Approximately 36% of the wood biomass removals in Estonia is primarily used for energy and it mostly originates from low-quality wood and felling residues. If we include wood industry residues usage of wood for energy production forms altogether 60%[4] from the felling. Wood used for energy production is of the lowest quality and cost[5].

In the period 2007-2017, the average felling volume in Estonia has been 8-9 million m^3, tax revenue € 54 per cubic meter (total 475 mln eur) and the average total (direct, indirect, and induced) value added per cubic meter € 200 (total 1760 mln eur). During the same period, the share of the entire forest and wood industry sector in GDP has been on average 9.7%, the share in value added 11.1%[6]. Forests provide approximately 34,000 jobs in the forestry sector and many jobs also indirectly in tourism, sports, transport and other sectors. In Estonia, there are a total of over 100,000 citizens who are private forest owners.

Estonia is actively engaged in planting new trees in the forest land. For example, in 2018, a record was set for the last 10 years of tree planting in Estonia: a total of 33.3 million trees were planted in Estonian forests: 21.3 million in state forests and 12 million in private forests. It is part of the forestry development plan and is in line with good forest management practices. In Estonia, forest management is regulated by the Forest Act.

Final energy consumption

Overall final energy consumption in Estonia (also including non-energy use of oil, natural gas, and coal in industry) comes down to around 2.2 tonnes of oil equivalent (toe) per capita, which is around the average of IEA Bioenergy member countries. Particularly industry has a low share compared to other countries. Residential energy use is on the higher side, which is likely related to climatic circumstances in the country (higher domestic heating demand).

[4] Estonian Environment Agency, Wood balance, Overview of wood use volumes in 2017: https://www.keskkonnaagentuur.ee/sites/default/files/elfinder/article_files/puidubilanss_2017_0.pdf
[5]Wood price statistics: https://www.erametsa.ee/uuringud-ja-statistika/hinnainfo/
[6] Woodworking Industry Development Cluster: http://empl.ee/wp-content/uploads/2019/10/EY_EMPL_metsa-ja-puidusektori-uuring_24.10.2019.pdf

Table 1: Distribution of the final consumption of energy carriers by sector in Estonia (2019 figures - Source: IEA (2021) World Energy Balances and Renewables Information)

Final consumption energy carriers	Toe/capita (2019)	% of total	*Median* (toe/capita)*
Industry (energy use)	0.35	16%	*0.67*
Industry (non-energy use)	0.10	4%	*0.21*
Transport	0.63	28%	*0.69*
Residential	0.72	32%	*0.57*
Commercial & public services	0.35	16%	*0.34*
other	0.09	4%	
Total	2.24		*2.34*

** Median of the 25 member countries of IEA Bioenergy*[7]

NATIONAL POLICY FRAMEWORK IN ESTONIA

TARGETS AND STRATEGIES

Targets for renewables agreed at EU and national level will be achieved in Estonia, in the most cost-efficient way, with a focus on high efficiency and free competition. To develop renewable energy by focusing on solutions that make maximum use of the opportunities provided by Estonia's geographical and natural conditions (i.e., biomass, wind and solar energy). Biomass plays an important role, where the use of biomass for energy production is expected to remain at the current levels for the next decade (i.e., around 12 TWh[8]). Estonia prefers solutions that enable a maximum increase in the efficiency of this resource while taking into account the vital role it plays in the fight against climate change. Using biomass is in line with the climate goals, environmental sustainability and biodiversity conservation aspects and biomass sustainability criteria under the Renewable Energy Directive.

*Table 2: renewable energy and climate targets in Estonia**

Sector	Renewables share in gross final consumption per sector	GHG reduction target compared to base year 1990
Overall target	42% by 2030	70% by 2030
Heating and cooling	63% by 2030	
Electricity	40% by 2030	
Transport	14% by 2030	

** 2030 targets mentioned in the 2030 National Energy and Climate Plan are likely to be reviewed in the frame of the European Fit for 55 Package*

Estonia's main energy and climate policy objectives, policies (by 2030):

[7] Comparative figures of the different IEA Bioenergy member countries are discussed in the central Countries' Report.

[8] Estonia's 2030 National Energy and Climate Plan: https://ec.europa.eu/energy/sites/ener/files/documents/ee_final_necp_main_en.pdf

- **Estonia's national target for GHG emission reduction compared to 1990 emissions levels is 70% by 2030**. Estonia's long-term objective is to transition to a low-carbon economy, which means gradually reforming the economy and energy system to be resource-efficient, productive and environmentally-friendly in line with the objectives. In 1990, greenhouse gas (GHG) emissions were 40.4 Mt CO2eq (excl. LULUCF), in 2017 they were 20.9 Mt CO2eq (incl. 14.7 Mt CO2eq from the energy sector). The projected GHG emissions for 2030 when the existing and additional measures under the NCEP 2030 are applied are 10.7-12.5 Mt CO2eq, (excl. LULUCF).
- **To meet the binding national objective of a 13% reduction in GHG emissions compared to the 2005 level by 2030.** The use of fossil fuels will be reduced, and CO2 emissions will decrease due to energy savings in transport, agriculture, waste management and industrial processes and small-scale power production where energy is produced by facilities with a rated output of less than 20 MWh. According to the 2019 GHG inventory, in 2005 GHG emissions in the sectors covered by the Shared Effort Regulation totalled 6.3 Mt CO2eq, i.e. in 2030 emissions from the sector might total 5.5 Mt CO2eq (the exact target for 2030 will become clear shortly, when the national emission levels for the period 2021-2030 will be determined for the sectors under the Regulation).
- **Carbon emissions from land use, changes in land use and forestry (LULUCF) must not be greater than capture.** The volume of wood fuel production and use are mainly determined by the carbon capture obligation of the managed forest land set out in the national forestry accounting plan and the measures in the 2021-2030 forestry development plan.
- **Final energy consumption, 32 TWh/a.** To maintain final energy consumption in the period 2021-2030 requires annual energy savings equivalent to 0.8% of the average final energy consumption in the period 2016-2018. The achieved energy saving must be cumulative, in other words the volume of the saving made in previous years must be stable throughout the period. Estonia's economy is growing, so significant measures are needed to keep consumption at the same level. The general energy saving objective of 14.7 TWh for the period 2020-2030 applicable under Directive 2012/27/EU (the Energy Efficiency Directive) will help keep final energy consumption at the same level. Making primary energy consumption more efficient will help reduce energy consumption.
- **Reducing primary energy consumption to 14%.** Estonia has the highest primary energy intensity of all the EU Member States. Consumption of primary energy is forecast to drop by a quarter in the period 2017-2030.
- **Renewable energies share of total final energy consumption 42%**. The share of renewables will be increased by changing fossil fuel boilers to renewable fuels, increasing electricity generation from fuel free sources and increased use of biofuels in transport. In 2030, production of renewable energy needs to be at least 16 TWh, which is 50% of final energy consumption, including 4.3 TWh renewable electricity (2018 = 1.8 TWh), 11 TWh renewable heat (2018 = 9.5 TWh) and 0.7 TWh renewable energy in transport (2018 = 0.3 TWh);
- **Share of renewable electricity 40%.** Increase in the volumes of wind power produced (both on-land and off-shore wind farms solar energy and the use of wood-based fuels and restrictions on hydro pump stations.
- **Share of fuel-free energy sources in final electricity consumption >25%.** Restriction of on-land and off-shore wind parks and use of the potential of solar power.
- **Total share of cogeneration in electrical power >600MWel. I**f the potential of cogeneration were fully exploited, it would account one third of electrical power.
- **Renewable energy share in heating 63%.** The potential of wood fuels is increasingly exploited for heating and cooling in Estonia and the share of heat pumps is steadily increasing.

- **Share of renewable transport fuels 14%.** Primarily met by domestic waste based biomethane, taking into account the use of gaseous fuels in Estonia. The plan is to produce up to 340 GWh of biomethane (actual volume required without multipliers).
- Ensuring energy security by keeping the rate of dependency on imported energy as low as possible: Use of local fuels is kept as high as possible (including increasing the use of fuel-free energy sources), developing biomethane production and potential uses.
- Meeting the minimum criteria for interconnectivity of electricity grids: Increasing capacity towards Latvia and synchronising the power grid with the Central European frequency band by 2025.
- Use of research and development and innovation in measures to retain the competitiveness of the economy: Implementation of the energy sector's research and development programme will enable the application of measures using research and development results.

A description of renewable energy and climate policies and measures in Estonia is available at the IEA's Policies and Measures Database https://www.iea.org/policies?country=Estonia and from Estonia's 2030 National Energy and Climate Plan: https://ec.europa.eu/energy/sites/ener/files/documents/ee_final_necp_main_en.pdf

Specific policies related to renewable electricity, renewable heat and transport biofuels will be highlighted in the chapters about the role of bioenergy in different sectors.

THE CONTRIBUTION OF BIOENERGY IN NATIONAL ENERGY SUPPLY

TOTAL ENERGY SUPPLY

The total energy supply of Estonia in 2019 amounted to 218 petajoule (PJ) and is dominated by oil products (141 PJ). Oil represented 75% of total energy supply in Estonia up to 2018; this dropped to 65% in 2019. Natural gas represents 7% (16 PJ). Renewable energy sources have a share of 22.5% or 50 PJ – 21% bioenergy and 1.2% other renewable energy sources. 8 PJ of electricity was imported in 2019.

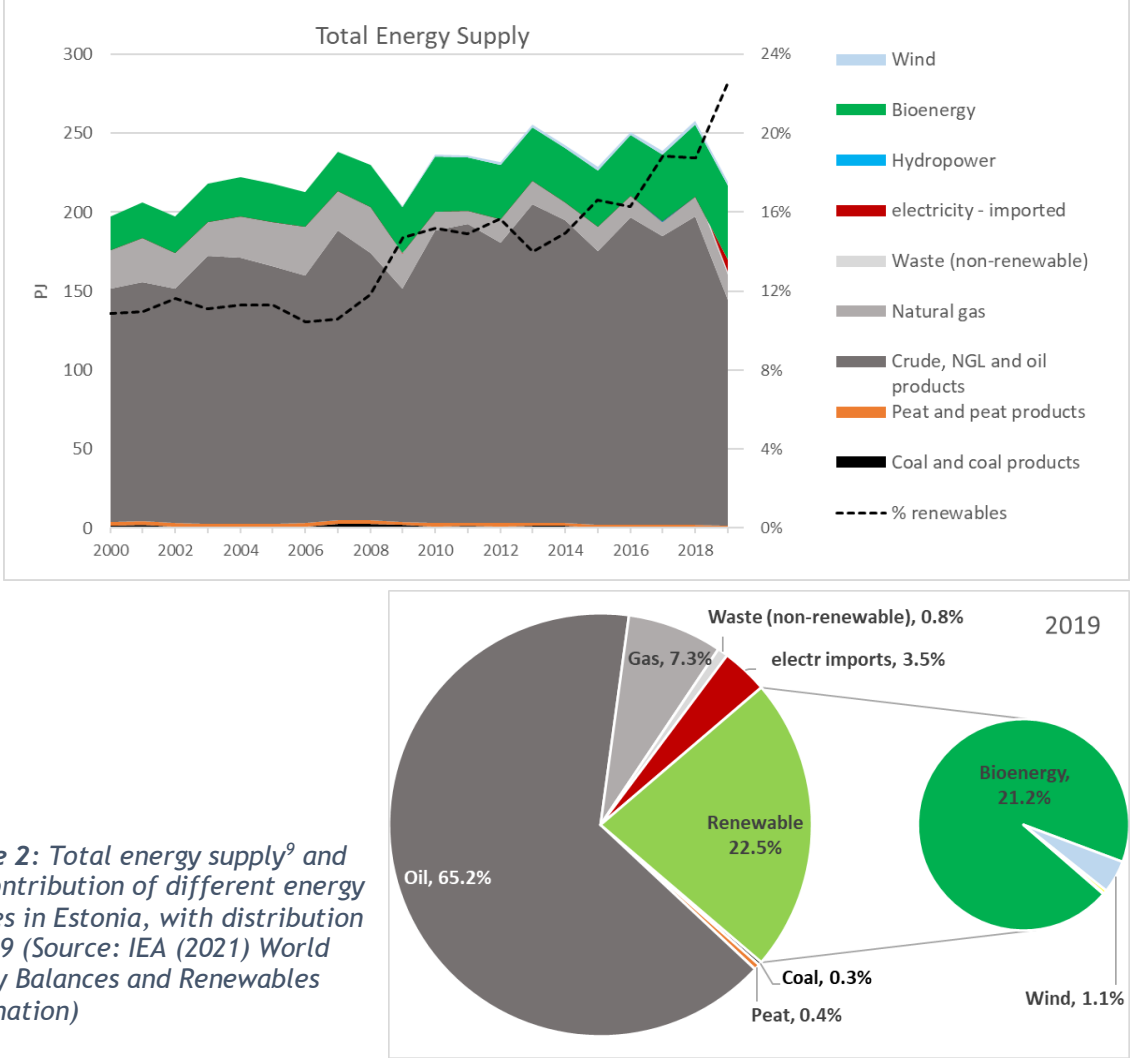

***Figure 2**: Total energy supply[9] and the contribution of different energy sources in Estonia, with distribution in 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)*

Since 2010 total energy supply slightly increased from 230 to 260 PJ in 2018, with oil products representing the major part between 180 and 200 PJ. In 2019 there was a 30% drop in oil products down to 140 PJ, still 65% of total energy supply. The share of natural gas went down steadily from 15% in 2000 to 7% of TES in 2015 and stabilized since. The share of renewable energy increased from

[9] Total energy supply refers to the use of resources. In terms of the role in the energy system this distribution overestimates the role of resources producing electricity with a high share of unused waste heat (like nuclear plants).

15% to over 22% in the past 5 years. More than 95% of renewable energy supply comes from biomass.

As shown in Figure 3, solid biomass represents the major part (94%) of bioenergy in Estonia. The other bioenergy types are renewable MSW (2.5%), biodiesel (1.8%), biogas (1.2%) and biogasoline/bioethanol (0.7%).

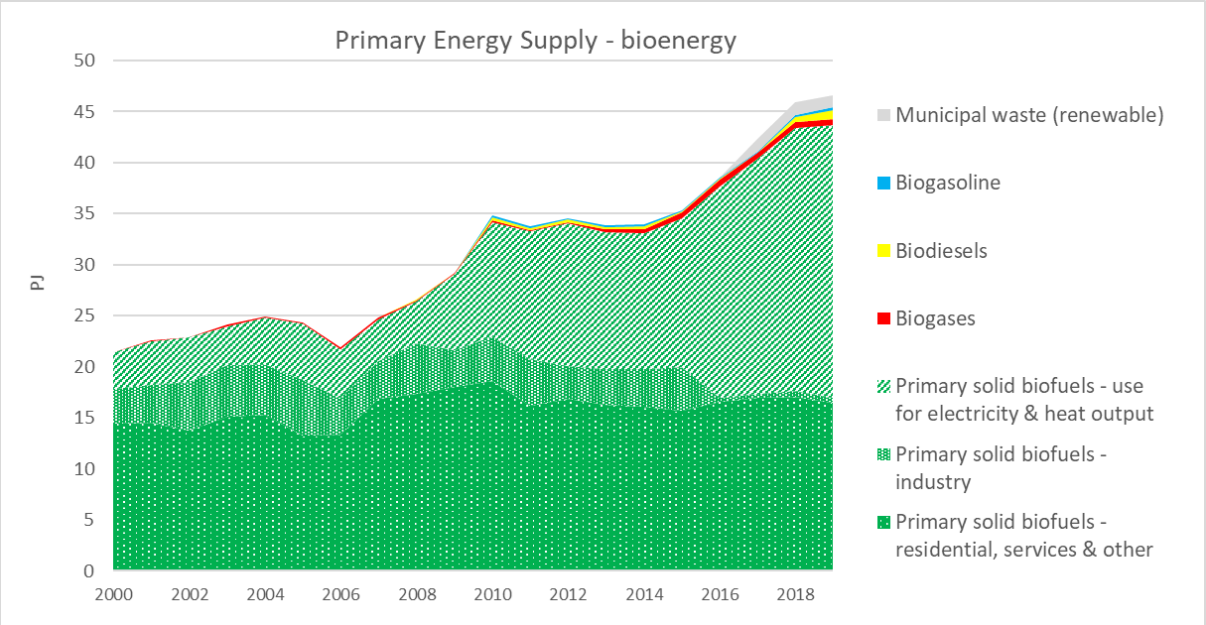

***Figure 3**: Development of total energy supply from bioenergy in Estonia 2000 – 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)*

Evolution of the bioenergy carriers:

- There is a consistent growth of solid biomass, growing from 22 PJ in 2006 to 44 PJ in 2019. The main increase is in CHP and heat plants (particularly replacing fossil fuels with wooden resources for district heating). The use of solid biomass in residential applications is quite stable. The use in industry dropped in the past years and has a modest role.
- Energy from renewable MSW was introduced in 2017 at a level of 1.2 PJ.
- Biogas saw a growth between 2012 and 2016 up to a level of 0.7 PJ and has stabilized around 0.6 PJ since.
- Transport biofuels were introduced in 2010 at a level of 0.5 PJ. After some downward fluctuations, they recently recovered up to a level of 1.1 PJ.

Table 3 displays the 2019 total bioenergy supply values on a per capita basis. Compared to the other 24 member countries of IEA Bioenergy (expressed per capita), Estonia ranks at the top 3 for solid biomass, in the middle for renewable MSW and liquid biofuels and at the lower end for biogas.

Table 3: Total energy supply per capita in 2019 for different bioenergy carriers

	Supply per capita	*Median IEA Bioenergy members*
Bioenergy	35.1 GJ/cap	*10.6*
Solid biomass	32.9 GJ/cap	*7.0*
Renewable MSW	0.9 GJ/cap	*0.8*
Biogas	0.4 GJ/cap	*0.7*
Liquid biofuels	0.9 GJ/cap	*1.5*

Source: IEA (2021) World Energy Balances and Renewables Information

Table 4 indicates the amounts of the different bioenergy carriers compared to some relevant reference points, namely the amount of forest in the country (for solid biomass), the amount of generated MSW (for renewable MSW used for energy), the amount of natural gas consumed in the country (for biogas) and the amount of fossil oil products consumed (for liquid biofuels).

Table 4: Comparison of the supply of different bioenergy carriers in 2019 to specific reference points

	Compared to reference points			*Median**
Bioenergy	21.2 %		of total energy supply	*7.2 %*
Solid biomass	22.9 GJ/ha_forest		compared to the domestic hectares of forest land (excl. protected)	*21.3 GJ/ha_forest*
Renewable MSW	2.43 GJ/ton_MSW		compared to the total generated MSW in the country	*1.4 GJ/ton_MSW*
Biogas	0.036 GJ/GJ_NG		compared to natural gas supply	*0.023 GJ/GJ_NG*
Liquid biofuels	0.008 GJ/GJ_oil		compared to oil products supply	*0.028 GJ/GJ_oil*

Source: energy data from IEA (2021) World Energy Balances and Renewables Information; forest figures from FAOStat; waste figures from World Bank
** Median of the 25 member countries of IEA Bioenergy*[10]

Specific comments in relation to the reference points:

- While the amount of solid biomass used for energy seems high per capita, considering the high share of forest in Estonia and the low population density, the use of solid biomass compared to the domestic forest area is modest (~1.2 tons_dry mass of wood per hectare[11]). Mind that Estonia also exports wood pellets to other European countries.
- Energy production from (the renewable share of) MSW has recently been developed and is now comparable to other European countries with well-developed waste management systems.
- Biogas is still relatively low in relation to the domestic potential, so has some further growth potential.
- Transport biofuels are still at modest level, so this also has substantial growth potential.

[10] Comparative figures of the different IEA Bioenergy member countries are discussed in the central Countries' Report.
[11] Counted with a typical calorific value of wood (dry mass) of 19 GJ/ton$_{\text{dry mass}}$

ROLE OF BIOENERGY IN DIFFERENT SECTORS

OVERVIEW

The overall share of renewables in **final energy consumption** among electricity, transportation and heat sectors is 30%, with bioenergy making up 28% of the energy share (Table 4). Mind that these figures are higher than the shares in total energy supply (where unused waste heat, e.g., in fossil power production, is also included).

Table 5: Role of bioenergy and renewable energy in electricity, transport energy and fuel/heat consumption in 2019

Sector	Share of bioenergy	Share of renewable energy	Overall consumption
Electricity[12]	13.9%	22.0% *(7% wind)*	9.8 TWh (35.2 PJ)
Transport energy (final consumption)	3.9%	4.1%	35.0 PJ
Overall fuel and heat consumption[13]	Direct biomass: 29.1% Biobased heat: 21.4%	50.5%	59.0 PJ
TOTAL FINAL ENERGY CONSUMPTION	**28.0%**	**30.1%**	**129 PJ**

Source: IEA (2021) World Energy Balances and Renewables Information

The following paragraphs will consider the evolutions in the different sectors.

[12] Renewable electricity production compared to final consumption. Potential renewable shares of imported electricity are not included.

[13] This includes final consumption of fuels and heat in industry, the residential sector, commercial and public services and agriculture/forestry. Transport fuels are excluded. Energy used for transformation and for own use of energy producing industries is also excluded.
Electric heating (direct or through heat pumps) is not included in these figures as this is not separately reported.

ELECTRICITY

The Estonian power generation is dominated by oil shale. Up to 2018 oil shale represented 75 to 90% of total electricity production. However, in 2019 power production from oil shale dropped more than half from 9.5 TWh to 4.3 TWh (due to the high CO2 price). The reduction was compensated with electricity imports from neighbour countries, to provide 22% of domestic electricity consumption. In previous years Estonia typically exported between 10 and 25% of its power production. Since 2009 biomass and wind power saw an increasing trend, together up to 2 TWh in 2019, which is equivalent to 21% of domestic electricity consumption. Wind energy stabilized after 2015, while bioelectricity continued to grow. Bioelectricity is mainly produced in combined heat and power (CHP) plants feeding district heating grids. In recent years there is also some increase of manufactured gases (e.g., coke oven gas), but still at rather modest levels.

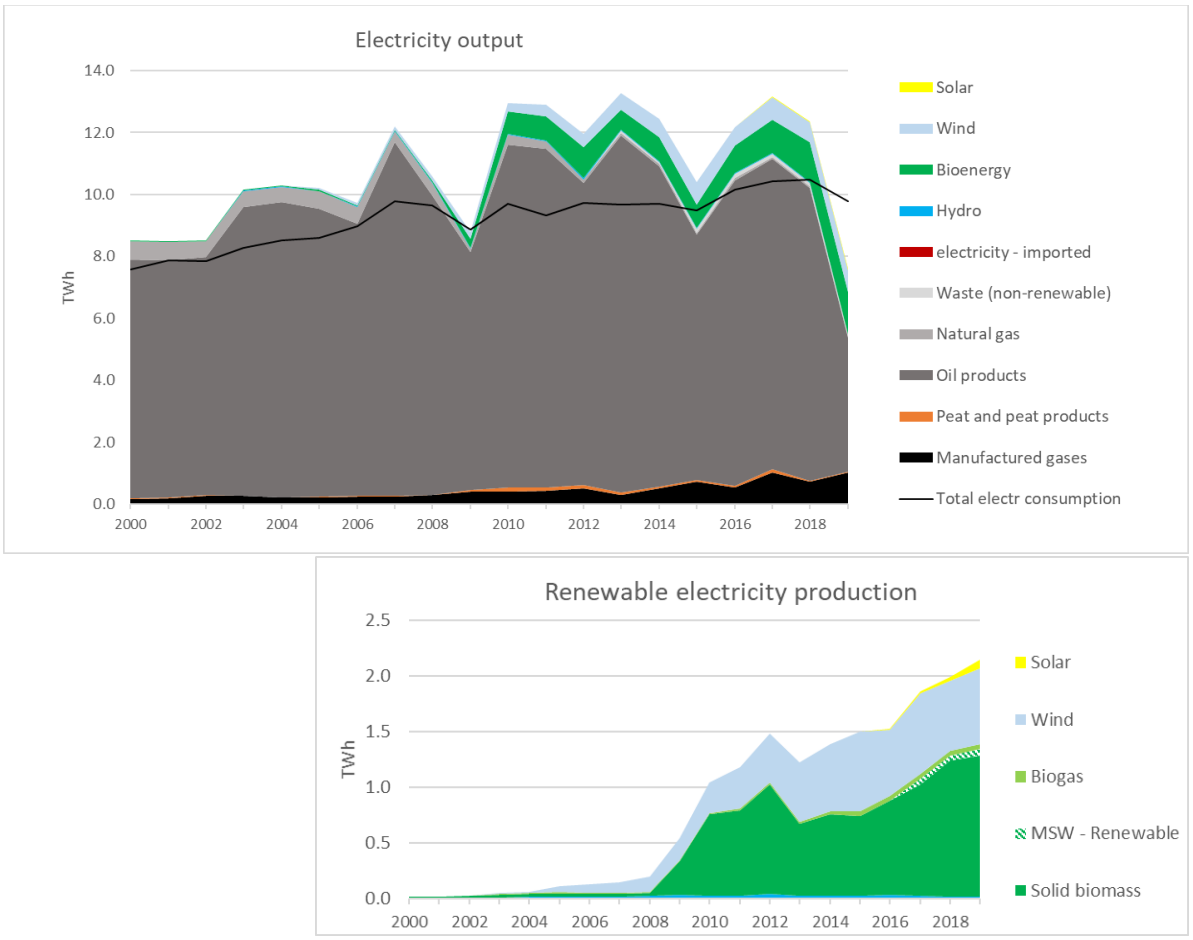

Figure 4: Evolution of the electricity mix in Estonia 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Policy framework

The main relevant policy instruments behind these evolutions are:

- Renewable Energy Subsidy - Subsidies are paid in order to promote the use of renewable energy sources, make the energy sector more efficient, and ensure the security of domestic supply and capacity.
- Renewable energy charge - paid by all consumers (2020: 0,113 euro/kWh)

- 2020+ technology specific auctions - The auction can be used for acquisition of both dispatchable and intermittent production capacity. The highest rate will be determined every single time before call of tender, taking into account current market situation.

HEAT/FUEL

Figure 5 shows the role of different fuels/energy carriers for providing heat in different sectors (industry, residential sector, commercial and public services and other). It also includes heat sold to customers, e.g., through district heating. Fuel use by energy producing industries for transformation and for own use is excluded. Mind that electric heating (direct or through heat pumps) is not included in these figures as this is not separately reported in the IEA database.

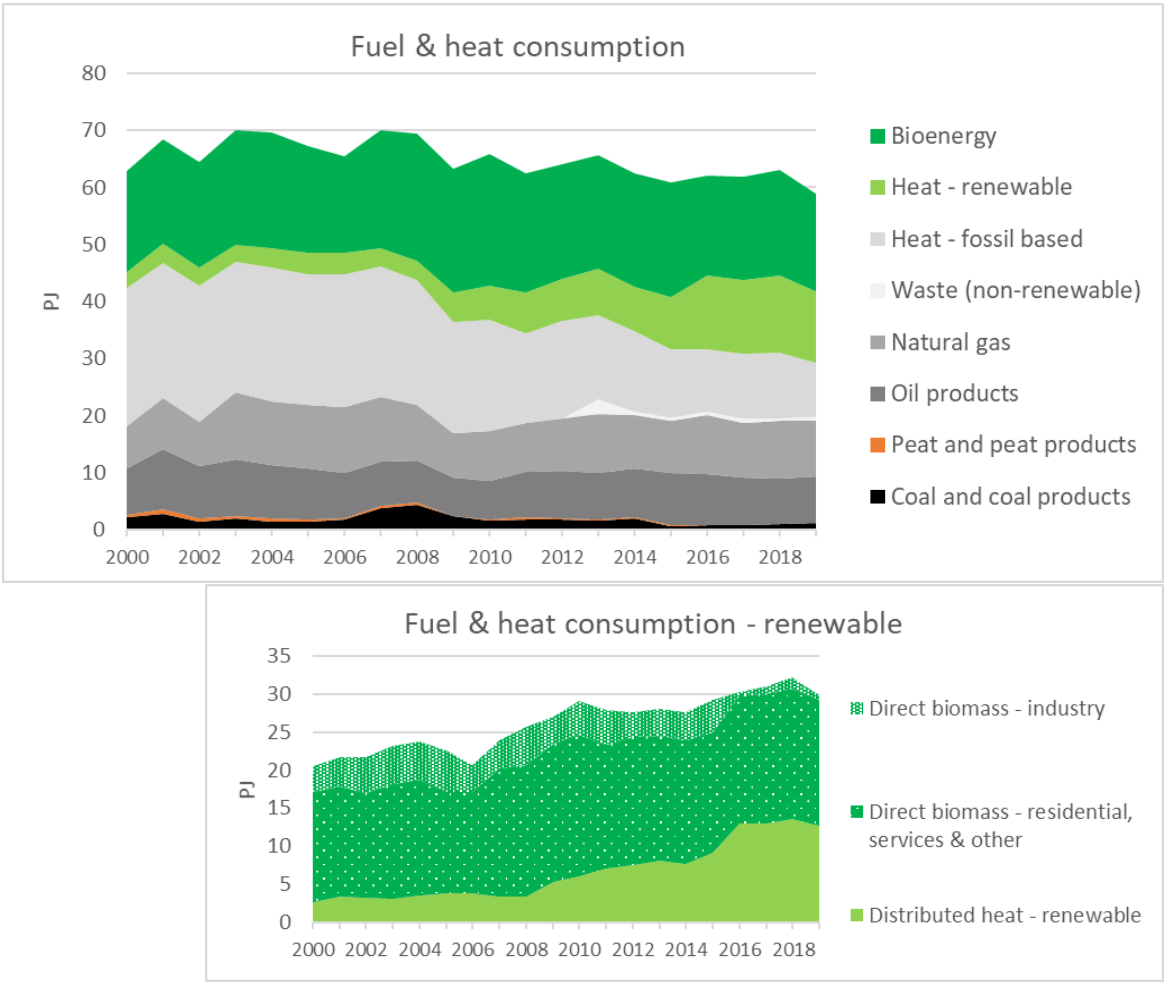

***Figure 5**: Evolution of fuel and heat consumption in Estonia 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)*

The provision of heat can be divided in three parts: 34% on fossil fuels (shale oil & gas), 37% through heat sales (e.g., through district heating), and 29% direct biomass. The overall shares of these three components have been relatively stable in the past decade. The main change is that heat distribution is changing from largely fossil based, to largely biomass based energy production.

In the past 10 years the role of biomass in heat provision increased from 22% to 57%, with a major decrease of natural gas (from 45% to 19%) and shale oil (from 21% to 9%). Manufactured gases (e.g. coke oven gas) and peat represent another 10%, which was fairly stable in the past 10 years.

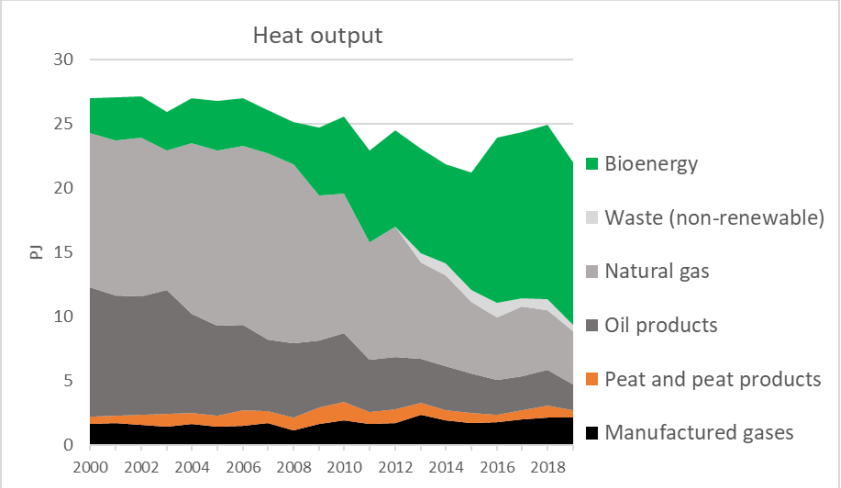

***Figure 6**: Evolution of fuels for heat output in Estonia 2000 – 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)*

Policy framework

The main relevant policy instruments behind these evolutions are:

- Renewable Energy Subsidy - Subsidies are paid out in order to promote the use of renewable energy sources, make the energy sector more efficient, and ensure the security of domestic supply and capacity (old scheme 0,0537 euro/kWh; 0,032 euro/kWh for CHP, the new support scheme is based on tenders).
- Renewable energy charge - paid by all consumers (2020: 0,113 euro/kWh)
- Support for modernising the heating systems of small residential buildings
- The renovation and/or construction of district heating boilers and fuel changeover
- Conditions for support for preparing a heating infrastructure development plans of local governments

TRANSPORT

Figure 7 shows an overview of the energy used in transport in Estonia, split up by different fuels/energy carriers.

Diesel is the dominant fuel in transport, and its consumption was in fact still increasing until 2018. Biofuels were introduced in 2010 at a level around 0.5 PJ. After some downward fluctuations, they recovered in 2018 and saw a major increase in 2019 up to a level of 1.4 PJ, representing around 4% of transport energy consumption. In 2019 biodiesel represented 3.87% (by energy) of diesel fuels and bioethanol represented 2.6% by energy of gasoline fuels. There is also some gas consumption in transport, with increasing levels of biogas.

Electricity represents a share of 0.6% of total transport energy use. This is mostly in rail - the use of electricity in road vehicles is still marginal in 2019 (0.17% of total transport energy use), but can be expected to increase in the coming years.

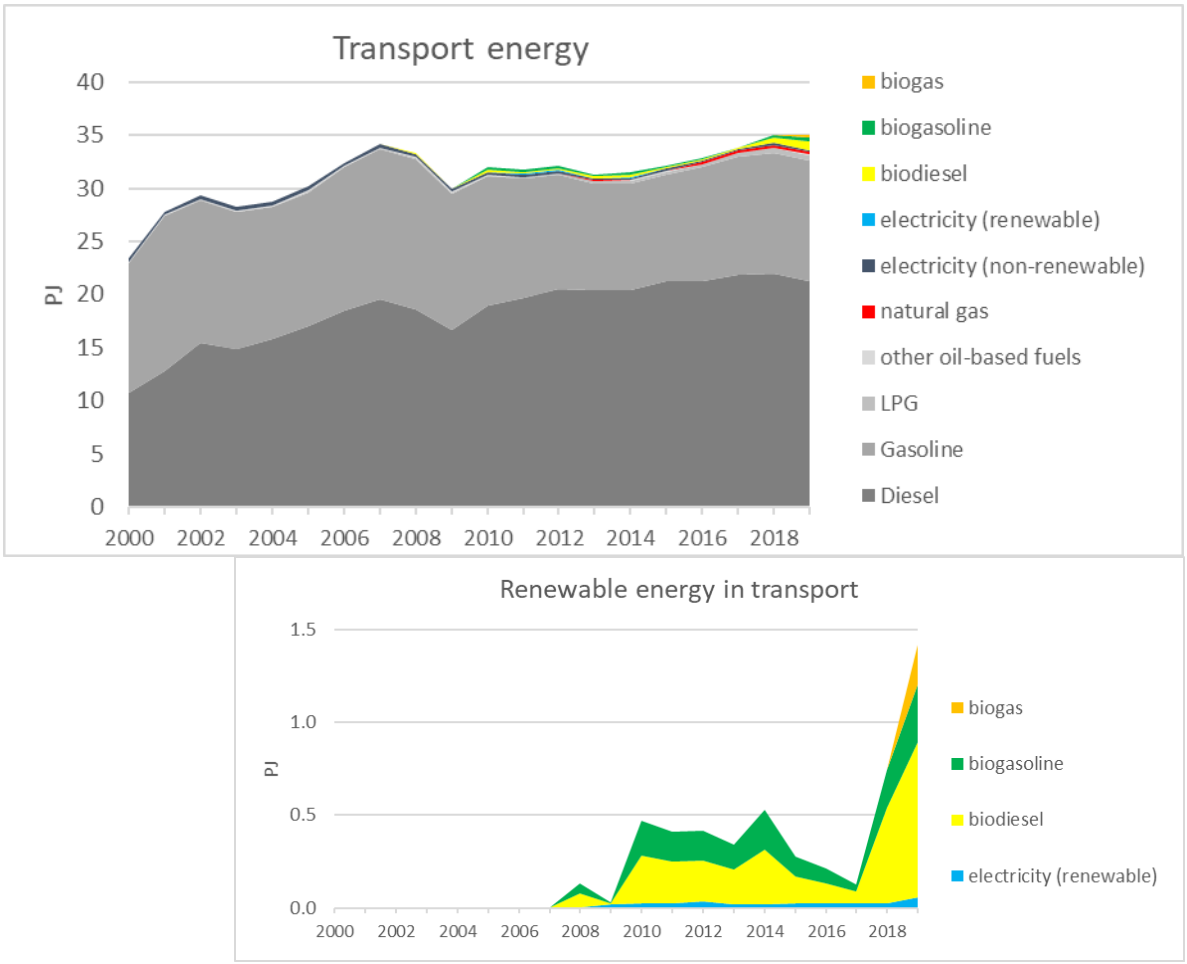

Figure 7: Evolution of transport fuels in Estonia 2000 - 2019 (Source: IEA (2021) World Energy Balances and Renewables Information)

Policy framework

The main relevant policy instruments behind these evolutions are:

- the obligation to supply biofuels in the market of liquid fuels (blending obligation)
- promoting the use of biomethane in vehicles (production and consumption support) Biomethane potential - 370 million m^3 (vs 2015 natural gas usage 450 million m^3)
- promoting electromobility - Estonia was the first country in the world constructing a charging network of electric cars)

Comparison with renewable energy targets

According to Eurostat[14], the following renewable energy shares in *gross final energy consumption* were reached.

***Table 6**: Share of renewables in different sectors in Estonia, according to Eurostat, and compared to the 2020 target*

	2005	2010	2015	2019	*2020 target*
Overall share	17.5%	24.6%	28.6%	31.9%	*25.0%*
In heating & cooling	32.2%	43.3%	49.6%	52.3%	*38.4%*
In electricity	1.1%	10.4%	15.1%	22.0%	*17.6%*
In transport	0.2%	0.4%	0.4%	5.1%	*10%*

Estonia already reached its overall 2020 target around 2012, mainly through renewable heating. Meanwhile, levels have further increased. Only transport is behind targets.

Mind that some of these figures can differ from the IEA derived data because of different accounting rules. Particularly in transport the Eurostat shares are higher, which is due to the multiple counting of advanced biofuels and renewable electricity towards the transport target. The heating & cooling figure in Eurostat also includes heat pumps.

RESEARCH FOCUS RELATED TO BIOENERGY

The aim of the ADDVAL-BIOEC project[15] is to identify the developments of the Estonian bioeconomy and its main value chains and the possibilities of using bio-resources to increase competitiveness. The perspectives of increasing added value and better use of raw materials are considered, taking into account the principles of sustainable development. The current state of the Estonian bioeconomy is analysed by six value chains: food and feed; pulp, paper, wood products and wood construction; textiles and clothing; fuels and energy; biomaterials, chemicals, pharmaceuticals and plastics, and ecosystem services related to the bioeconomy. The suitability of the best possible innovative technologies for valuing Estonian bio-resources is studied. Scenarios and business models for the development of the Estonian bioeconomy in selected areas are developed and their social, economic and environmental impact is analysed. Entrepreneurs and policy makers can use the developed scenarios and business models to strategically plan and improve bioeconomy policies.

BIOEAST[16] – Central and eastern European initiative for knowledge-based agriculture, aquaculture and forestry in the bioeconomy. offers a shared strategic research and innovation framework for

[14] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en
[15] https://taltech.ee/biomajandus
[16] https://bioeast.eu/home/

working towards the development of a sustainable bioeconomy in the Central and Eastern European (CEE) countries. The comparative advantage in the EU of the CEE countries, namely the sustainable biomass production and processing, could lead to the benefit of the society by creating jobs and growth in the private sector. The macro-region's environmental, economic, societal, geopolitical, cultural, and historical homogeneity and complexity could provide the framework conditions favourable to development of a sustainable circular bioeconomy. However, to achieve this goal, the traditional primary production and processing sectors must be modernized through a robust research and innovation initiative in bioeconomy. In fact, the research and innovation capacities of these countries are facing significant internal disparities, thus creating a barrier to the full completion of a European Research Area. Joint efforts are thus required to address present and future challenges successfully. Along with the process of forming the BIOEAST Initiative and TWG establishment, 100+ stakeholders from the research, business, and public sectors, and also non-governmental non-profit organisations expressed their support and interest to participate in the Bioeconomy development and the BIOEAST Initiative. It means that the BIOEAST Initiative already gathers an extensive community that now covers a wide range of bioeconomy.

LINKS TO SOURCES OF INFORMATION

Estonia's 2030 National Energy and Climate Plan:
https://ec.europa.eu/energy/sites/ener/files/documents/ee_final_necp_main_en.pdf