



# GSS-VET

## *Geothermal & Solar* skills

VOCATIONAL EDUCATION AND TRAINING

WP2 / D 2.5-2.6-2.7-2.8

## Mapping of existing training programmes in Geothermal & Solar installations

Erasmus + Sector Skills Alliances 575891-EPP-1-2016- 1-EL-EPPKA2-SSA



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# EXISTING TRAINING PROGRAMMES IN GEOTHERMAL AND SOLAR INSTALLATIONS



# GSS-VET

Geothermal and solar skills - Vocational education and training

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## I. INTRODUCTION

The aim of WP2 is to define the final list of competencies needed that are not currently met by existing training courses for plumbers and electricians, as well as specialists with technical background aged 16+ years willing to work as geothermal & solar systems' installers. The working methodology for achieving this aim includes activities that are to be implemented in two phases.

Subtask 2.2.3, fulfilled in the first phases of WP2, represents a final report integrating the results of the subtask 2.2.1 "Desktop researches about existing training programmes for geothermal & solar installations in the 4 partners countries – Bulgaria, Greece, Spain and Germany".

The desktop researches used the following information sources:

- projects with similar activities;
- results of the project GSSkills;
- public educational assessment institutions;
- public and private educational institutions;
- ministries of education and other national and regional educational bodies;
- CEDEFOP reports;
- the European Qualification Framework.

They include general findings about available trainings at all levels, with a special focus on the vocational and education trainings (VET) trainings for **levels 4 and 5**, defined by the European Qualifications Framework (EQF) – table below:



Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5 <sup>[1]</sup>	Comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others

Level 5<sup>[1]</sup> - the descriptor for the higher education short cycle (within or linked to the first cycle), developed by the Joint Quality Initiative as part of the Bologna process, corresponds to the learning outcomes for EQF level 5.

For give a clear direction of the national researches, a template with concrete parameters was developed by SEC and ELI (BG). Thus, the contents of all national reports is structured in similar manner:

- educational systems, with special focus on VET;
- legal basis for VET;
- requirements for acquisition of the different levels of qualification (mainly 4 and 5 of EQF);



- table with information about: organizations providing VET, VET target groups, title and contents of the VET programmes, duration of courses, issued documents, links.

The general objectives of the researches are, to:

- find out the main VET providers in the 4 countries;
- define the main target groups to be trained;
- reveal existing gaps in the geothermal and solar skills and knowledge in the VET programmes of the partner countries;
- exploit the results of the successful training courses;
- get ideas about the important subjects in the well-developed and detailed VET programs;
- become acquainted with innovative teaching methods.

## II. Desktop research about existing training programs on geothermal & solar installations in Bulgaria

### II.1. Education system

The Bulgarian educational system falls within the continental European tradition. It is mainly supported by the state through the Ministry of Education and Science.

**School education is compulsory for children from seven to sixteen years of age.** Children complete their compulsory education in upper secondary schools.

#### A. Pre-Primary Education

Pre-primary education (preschool education) embraces children between 3 and 6/7 years old, who attend kindergarten optionally, with the requirement that prior to starting school, children must attend two years of pre-school education. These two years of mandatory pre-school education may be attended either at kindergarten or in preparatory groups at primary schools.



## B. Elementary Education

- Basic education (Grades I-VIII) in Bulgaria comprises primary school (grades I-IV) and pre-secondary school or middle school (grades V-VIII).
- The Upper Secondary level lasts for either 4 or 5 years following the receipt of a Basic Education Completion Certificate. Upper Secondary education is provided in three types of schools: general secondary schools, vocational-technical, profile-oriented, language and foreign schools.
- Admission Criteria
  - o Basic (primary and pre-secondary) education is free, except in private schools.
  - o Students can enter the profile-oriented schools upon completion of grades VII or VIII after passing entry examinations, according to the profile of the school (mother tongue/literature, mathematics, humanities etc.).
- Curriculum is unified for all schools. However, in the last two years of study, students are required to take advanced courses in two or three subjects.
- Completion Document: Diploma of Secondary/Secondary Specialized Education.

## C. Higher Education

The types of higher education institutions are Universities, Colleges and Specialized Higher Schools. Universities, as in most countries worldwide, have three stages: Bachelor's (undergraduate), Master's (graduate), and Doctoral degrees. Undergraduate stage lasts for at least four years and graduate stage lasts for five years after completion of secondary education or one year after obtaining a bachelor's degree. The third stage of higher education results in obtaining a Ph.D. Degree.

Colleges are former semi-higher institutes. Some of them are part of universities and use their equipment and facilities.

- Types of Higher Education Institutions.
- There are in total 51 accredited higher education institutions. They are four types: o Higher Education College (non-university higher education institution)
  - o University
  - o Specialized Higher Education Institution Equivalent to Universities /Technical University



- o Academy

14 Private and 37 Public Institutions have also educational accreditation.

- Admission:

The requirements for enrollment, depending on the type of higher schools and the particular specialty, comprise written competitive exams (one or more), tests (varying in volume and structure in the different higher schools), and a diploma of completed secondary education.

- Degree Structure (per 1995 law):

- o “Specialist in...” degree - Colleges, which are generally incorporated into the structure of universities, offer relatively short, vocationally oriented programs (usually three years in length) leading to the award of “Specialist in...” degree. Holders of this qualification are eligible for bachelor-level studies or for entry into the labor market.
- o First or Bachelor’s Degree - Four-to-five years of study is required at this level leading to the Bachelor’s degree. The curricula at the bachelor level provide for basic comprehensive training, thus facilitating direct access to the labor market.
- o Second or Master’s Degree - Requires one-to-two years of additional study after the bachelor’s degree, and leads to a Master’s degree. The new Master’s degree is currently offered in parallel with the traditional, integrated master’s-level degree known as the Diploma of Higher Education. Both qualifications possess the same academic value.
- o Third or Ph.D. Degree - Requires a minimum of three years of study after the master’s or four years of study after the bachelor’s, and leads to the Doctoral degree. Doctoral programs are essentially research programs. Graduates are awarded a Doctor’s degree upon successful defense of their doctoral thesis.

- Official Education and Training Documentation:

- o Diploma “Specialist in...” + Diploma Supplement (official transcript of the academic program listing subjects and grades; invalid without the diploma)
- o Bachelor’s Diploma + Bachelor’s Diploma Supplement (official transcript of Bachelor’s degree program listing subjects and grades, invalid without the diploma)



- o Master's Diploma + Master's Diploma Supplement (official transcript of Master's degree program listing subjects and grades; invalid without the diploma)
- o European Diploma Supplement
- o Certificate of Professional Qualification
- o Certificate of Professional Specialization in Medicine or Dentistry
- o Doctor of Sciences.

## II.2. Vocational education and training (VET)

The Ministry of Education and Science coordinates the national policy on vocational education and training (VET), while other ministries are in charge of schools in the fields they are responsible for (art, sports, etc.). The VET Act defines two target groups: school-age learners (pupils) and adults (16+ years old persons who are not in formal education and training). Pupils may enroll in VET from the age of 13 onwards.

The recent legislation – a new Pre-school and School Education Act and amendments to the VET Act – modernized the school network and increased the share of work-based learning in VET.

The main VET providers are schools (vocational gymnasiums, art schools and sports schools), VET colleges and private and public licensed vocational training centres. The State educational standards specify the content of VET qualifications.

The legal framework distinguishes six types of VET programs, defines the age and entry requirements, and regulates their content and duration:

- A. initial VET (IVET1) programs leading to EQF level 2 qualifications at VET schools and vocational training centers. Programs for school-age learners are with duration of 1 or 3 years; for adults they last up to 6 months.
- B. IVET2 and continuing VET (CVET) programmes leading to EQF levels 3 (1 or 4 years) and 4 (for adults – up to 1.5 years) at VET schools and vocational training centres.



- C. IVET2 and CVET programmes leading to EQF level 3 and 4 qualifications at VET schools for school-age learners. Their duration is 1-5 years and they provide access to higher education for learners with completed general secondary education.
- D. IVET2 and CVET programs for adults leading to qualifications at EQF level 5 at VET schools and colleges with a maximum duration of 2 years;
- E. Up to 1-year long IVET2 and CVET programs leading to partial qualifications at EQF levels 2-4 at VET schools and vocational training centers;
- F. CVET programs for adults leading to qualifications at EQF levels 2-4 at VET schools and vocational training centers. Their duration is not defined by the framework.

VET programs for school-age learners have a vocational and a general education part. Graduates acquire a general education (for example, secondary education) and a vocational qualification (for example, car mechanic). VET programs provided by vocational training centers and colleges for adults do not include a general education part and lead to a VET qualification only. VET qualifications can also be acquired through validation of prior learning.

Just like learners in VET programs, applicants must pass a State examination when acquiring a qualification.

Work-based learning forms a substantial part (50-70% or more) of all VET programs. Most of it is offered by schools. The share of work-based learning decreases with the program level. Since 2015/16, VET programs can include dual training. School age apprentices are trained in companies at least 2-3 days per week in the final grades (11<sup>th</sup> and 12<sup>th</sup>). The apprenticeship for adults usually complements on-the-job training with self-study or evening classes in order for theoretical vocational knowledge to be acquired. Both school-age learners and adults receive

Under the Act in 1999 was established a National Agency for Vocational Education and Training (NAVET) playing a key role in the process of modernization of the VET system in the country. NAVET is a specialized body to the Council of Ministers of the Republic of Bulgaria, a legal entity financed by the State budget and:

- Issues and revokes licenses for vocational training and vocational guidance;



- Supervises the activities and assesses the quality of training in licensed institutions in the system of vocational training;
- Creates and maintains a register of the vocational training centers and the centers for information and vocational guidance, as well as of the issued and revoked licenses;
- Creates and maintains a register of certificates of vocational qualification, certificates of vocational training, certificates for validation of vocational qualification and certificates for validation of vocational qualification on part of a profession issued by vocational training centers;
- Develops and presents to the Minister of Education and Science for approval:
  - the List of professions for vocational education and training - LPVET;
  - the State educational requirements for acquiring professional qualification - SERAPQ;

LPVET is developed pursuant VETA and is coordinated with the line ministries and the representative national organizations of employers and workers.

There are 2 specialties in LPVET of the professional direction “Electrical engineering and energetics”, addressing the professional qualification in the solar and geothermal field:

- Profession – Technician on energy equipment and installations - code 522020, specialty: Renewable energy sources – code 5220308, 3rd degree of professional qualification and
- Profession - Mechanic of energy equipment and installations – code 522040, specialty Renewable energy sources – code 5220408, 2nd degree of professional qualification.
- SERAPQ define the obligatory professional competencies required for practicing the profession and they are mandatory for all training institutions entitled to organize training courses and to issue the corresponding Certificates of vocational qualification or training upon their completion.

They include:

- Minimum entry level qualification and education requirements for pupils and adults;
- Description of the profession work activities, responsibilities, personal qualities, characteristics of working conditions, equipment and tools;
- Opportunities for continuing vocational training;
- Opportunities for professional development according to the National Classification of Professions and Occupations (NCPO);



- Learning objectives;
- Learning outcomes competences, knowledge, skills;
- Theoretical and practical training facilities requirements;
- Requirements for trainers.

### II.3. VET qualification levels

There are four VET qualification levels:

- level 1: acquired competences for performance of routine activities (at least 70% practical training since August 2016) – NQF/EQF level 2;
- level 2: acquired competences for performance of complex activities in a changing environment (at least 60% practical training since August 2016) – NQF/EQF level 3;
- level 3: acquired competences for performance of complex activities in a changing environment, including human resource management (at least 50% practical training since August 2016) – NQF/EQF level 4;
- level 4: acquired competences for performance of a broad range of complex activities in a changing environment, including human and financial resource management (at least 50% practical training since August 2016) – NQF/EQF level 5.

The minimum entry educational level for acquiring the respective degrees of professional qualification varies. For the first degree - completed VI grade is required; for the second and third degree - completed VII degree or primary education; and for the fourth degree - completed secondary education.

**Continuing vocational education and training (CVET)** in Bulgaria is defined as training to be delivered to persons over 16 years, which are no longer in the formal education system. It addresses employed and unemployed persons. The CVET is delivered by institutions for formal education and training and for non-formal training. The main institutions for continuing vocational training in the field of the formal education and training, according to VETA, are: the vocational schools, the vocational secondary schools, the vocational colleges and Centers for Vocational Training, the higher education institutions.



Vocational schools offer evening courses for adults. School-based CVET takes place in vocational secondary schools, vocational colleges and art schools, vocational classes for acquisition of vocational qualifications in general secondary schools.

The system of higher education carries out continuing vocational training through specialized units at the higher education institutions (HEI). All HE institutions in the country have units for post-graduate qualification and units for training of persons aged above 16 in professions and specialties.

Enterprises carry out non-formal continuing vocational training of their own employees. The training is in the form of courses for vocational qualification, on-the-job training, participation in seminars, conferences, etc.

SMEs, Chambers and Associations, NGOs are carrying out as well VET as a part of projects, developing VET curricula for CVET.

#### VET programs for individuals above age 16

Framework Programm	For current learners		For newly enrolled learners		EQF level
	Duration (years)	minimum entry requirements	Duration (years)	Duration (years)	
A	up to 1 year	primary education or literacy course	up to 6 months	primary education or literacy course	2
	-	grade 7*	-	grade 7*	2
B	1 year	at least one year of secondary education	up to 1 year	upper secondary stage 1	3
	-	-	1.5 years	secondary education or grade 12 without passing state mature exam	4
D	up to 2 years	secondary education	up to 2 years	secondary education	5
E	-	none	-	same as for the full qualification	2-4 (partial)
F	-	partial qualification	-	partial qualification	2
	-	VET qualification level 1	-	VET qualification level 1	3
	-	VET qualification level 2	-	VET qualification level 2	4

NB: \* learners with special educational needs

In order to acquire a VET qualification, adult learners study for:

- 300 hours for EQF level 2;
- 660 hours for EQF level 3;
- 960 hours for EQF level 4;
- 1260 hours for EQF level 5.



#### II.4. Table VET programs for geothermal & solar skills

Nº	Organization:	Trainees:	Title of the VET:	Training program:	Type:	Durations:	Syllabus (Nº of hours):	Document obtained	Source of information:
1	Vocational High School of Electronics "John Atanasoff" - city of Sofia	Students secondary education	Specialty: "Renewable Energy Sources"	<ol style="list-style-type: none"> <li>1. Introduction into the profession</li> <li>2. Heating methods of technical measurements</li> <li>3. Wind installations and machinery</li> <li>4. Hydrokinetic equipment and installation</li> <li>5. Geothermal equipment and installation</li> <li>6. Photovoltaic systems</li> <li>7. Solar power plants</li> <li>8. Solar heating systems</li> <li>9. Machinery and installations for energy produced from biomass</li> <li>10. Machinery and installation for energy produce from biomass and composting or decaying products</li> <li>11. Design of renewable energy installations</li> <li>12. Lifting - transportation equipment</li> <li>13. Manufacturing practice</li> </ol>	In class, module education	IVET1	36 hours (L) 54 hours (P)  72 hours (P) 72 hours (P) 108 hours (P) 72 hours (P) 52 hours (P) 72 hours (P) 72 hours (P)  124 hours (P)  52 hours (L)  39 hours (L) 122 hours (P)	Diploma general secondary education + Certificate for professional qualification III degree: Technician on energy equipment and installations - code 522020, specialty: Renewable energy sources – code 5220308	<a href="http://www.spge-bg.com/_data/pages/profesii/tehnik_energii_instalacii/5220308_VIII_XII_MODULNO.pdf">http://www.spge-bg.com/_data/pages/profesii/tehnik_energii_instalacii/5220308_VIII_XII_MODULNO.pdf</a>
2	Professional gymnasium of mechanical techniques "Uriy Gagarin" – town of Russe	Students secondary education	Specialty: „Renewable energy sources“	<ol style="list-style-type: none"> <li>1. Production, exploitation and repairing of renewable energy sources</li> <li>2. Exploitation and repairing of installations</li> <li>3. Organization and control of the assembling and repairing activities of equipment and installations</li> <li>4. Diagnostic of equipment and</li> </ol>	In class	IVET1	N/A	Diploma general secondary education + Certificate for professional qualification III degree: Technician on	<a href="http://www.pgmruse.tk/">http://www.pgmruse.tk/</a>





				installations of renewable energy sources				energy equipment and installations - code 522020, specialty: Renewable energy sources - code 5220308	
3	Professional gymnasium of transport and energy power "Henri Ford" – city of Sofia	Students secondary education	– Specialty: Renewable energy sources	1.Production, exploitation and repairing of equipment musing solar, geothermal, wind energy and energy from biomass 2.Assembly, exploitation and repairing of installations for production of energy from renewable energy sources 3.Organization and control of the assembling and repairing activities of equipment and installations with renewable energy sources	In class	IVET1	N/A	Diploma general secondary education + Certificate for professional qualification III degree: Technician on energy equipment and installations - code 522020, specialty: Renewable energy sources - code 5220308	<a href="http://www.pgtehf.ord.com/vei.html">http://www.pgtehf.ord.com/vei.html</a>
4	Professional gymnasium of food technology and technics – town of Plovdiv	Students secondary education	– Specialty: Renewable energy sources	1.Production, exploitation and repairing of equipment musing solar, geothermal, wind energy and energy from biomass 2.Assembly, exploitation and repairing of installations for production of energy from renewable energy sources 3.Organization and control of the assembling and repairing activities of equipment and installations with renewable energy sources 4.Solar systems for heating 5.Solar systems for electro energy – PV systems 6. Geothermal energy – the technology	In class	IVET1	N/A	Diploma general secondary education + Certificate for professional qualification III degree: Technician on energy equipment and installations - code 522020, specialty: heat technics – heating, conditioning, ventilating and chilling.	<a href="http://www.pghtt.net">www.pghtt.net</a>
5	Professional gymnasium of electronic and	Students secondary education	–	1. Introduction to profession 2. Wind and hydrokinetic equipment and installations	In class	IVET1	36 (L) 72 (L)	Diploma general secondary education	<a href="http://www.pgeht.net/spec4.php">http://www.pgeht.net/spec4.php</a>



**Existing Training Programmes in geothermal & solar Installations**

	chemical technologies- Prof. Assen Zlatarov” - Pleven			3. Geothermal facilities and installations 4. Solar facilities and installations 5. Equipment and installation for production of biomass energy 6. Operation and repair of equipment and installations for the production of energy from RES 7. Design of installations for RES energy use 8. Heat Measurements 9. In laboratory 10. Manufacturing			72 (L) 80 (L) 62 (L)  108 (L)  26 (L)  54 (P) 54 (P) 122 (P)	+ Certificate for professional qualification III degree: Technician on energy equipment and installations - code 522020, specialty: Renewable energy sources - code 5220308	
6	Technical University –city of Sofia, Faculty “Electrical power engineering”:	Complementary training for the degree "MASTER". For candidates with bachelor and/or master degree from all the specialties from the professional direction: Electric power, electronics and automation and all specialties of Communication and computer technics. For other technical and non-technical specialties – an additional course is organized on: electrical power or electro energy and electric equipment at the Faculty of Electrical power in the TU.	Specialty: ” Electrical power from renewable energy sources”	1. Renewable energy sources and electric generators 2. Power electronic convertors used in the conversion of energy from RES 3. Storage and re-use of energy from RES 4. Optimization of renewable energy systems 5. Electric part of power plant using RES 6. Rational use and quality of the electric energy 7. Electric networks and systems for decentralized energy production 8. Systems for relay protection and automation in the field of energy power supply and electrical drives 9. Electrical drives, electrical products and installations with increased energy efficiency through the use of moderns electronic convertors, controllers and control algorithms for energy technology and environmental management processes 10. Energy legislation and market of electrical energy in RBulgaria and the EU countries	In class	IVET2 + CVET	Regular training – 1.5 years, 2 semesters lectures and practice and 1 semester – diploma work Part time training – 2 years, 3 semesters lectures and practice and 1 semester – diploma work	Diploma for higher education	<a href="http://www.tu-sofia.bg/specialties/preview/734">http://www.tu-sofia.bg/specialties/preview/734</a>

8	Technical university – town of Sliven	Complementary training for educational qualification degree "MASTER".	Specialty: Electric energy and renewable energy sources.	1.Power generators for renewable energy sources 2.Power electronic convertors 3.Generation, storage and rational use of energy from renewable sources 4.Protection and accession to decentralized power networks	In class	IVET2 + CVET	Regular training – 1.5 years	Diploma for master degree	<a href="http://www.tu-sliven.com/priem-tu-sliven/SpecMaster.html">http://www.tu-sliven.com/priem-tu-sliven/SpecMaster.html</a>
9.	South-West University – town of Blagoevgrad – Faculty “Mathematics and natural science”, department ; Physics of Faculty “Mathematics and natural science”	Higher education – bachelor degree	Specialty: “Ecology and protection of environment”, discipline: Renewable energy sources”	<b>Lectures</b> 1.Energy balance of the Earth. Energy resources and energy problem. 2.Energy resources. Renewable energy sources 3.Solar energy - basic concepts. 4.Radiation characteristics of the materials. 5.Thermal transformation of solar energy 6.Concentrating solar systems 7.Solar systems for hot water 8.Heating buildings with solar energy 9.Other methods for utilization of solar energy 10.Wind power 11.Geothermal energy 12.Biomass as an energy source 13.Other renewable energy sources 14.Problems of environmental protection <b>Practice</b> 1.Energy problem on Earth. Energy balance. 2.Solar energy. Parameters. Potential resources 3.Devices for utilization of solar energy 4.Use of solar energy in buildings. Solar architecture 5.Use of solar energy in households and industry 6.Wind power. The potential and methods for recovery 7.Geothermal energy. Origin, application,	In class	IVET2 + CVET	Regular training – 4 years Lectures – 30 hours Practice– 30 hours	Diploma for bachelor degree, professional qualification: Ecologist	<a href="http://www.swu.bg">www.swu.bg</a>



				circuit design solutions of installations 8.Biomass-potential resources and use . 9.Saving energy and environmental problems of energy					
10	Center for regular and post-diploma training at the Technical university of the town of Plovdiv – affiliation of the Technical University of the city of Sofia.	Adults with completed secondary/high education – students graduate for additional professional qualification	Specialty: "Renewable energy sources"	<p><b>Discipline</b> "Power electronic converters for renewable energy sources":</p> <ol style="list-style-type: none"> <li>1.Basic types of converters of electrical energy used in renewable energy</li> <li>2. Principle of action, schemes for their management and control.</li> </ol> <p><b>Discipline:</b> "Relay protection and automation for renewable energy sources":</p> <ol style="list-style-type: none"> <li>1.Basic methods and technical means for the design, selection, setting up, commissioning and analysis of relay protection of electric power plants using renewable sources of energy</li> <li>2. Adjacent sub-stations and electricity distribution networks</li> </ol> <p><b>Discipline:</b> "Fundamentals of electrical engineering":</p> <ol style="list-style-type: none"> <li>1.Basic parameters of the electrical circuits and their measurement's options</li> <li>2. Electrical dimensions and rules of electrical circuits</li> <li>3. Methods for the analysis of the stationary regimes in single-phase, three-phase linear and chains.</li> </ol>	In class	CVET	<b>120 hours - 3 days weekly after 5 P.M.</b>	Certificate of qualification	<a href="http://www.tu-plovdiv.bg/special-education.php">www.tu-plovdiv.bg/special-education.php</a>
11	Technical university – town of Varna, Department "Heat Engineering	Discipline for Engineers with bachelor degree	Specialty: "Heat engineering and Renewable energy sources"	<ol style="list-style-type: none"> <li>1.Heat exchange devices</li> <li>2.Pumps, compressors and blowers, 3.</li> <li>3.Combustion engineering and technology</li> <li>4.Heat supply, gas supply and heating equipment</li> <li>5.Cooling equipment</li> <li>6.Heat measurements</li> <li>7.Industrial ventilation and dust removal, air-conditioning, regulation and control of thermal processes</li> <li>8.Architectural construction and heat characteristics of the buildings</li> <li>9.Conversion of solar energy into heat and</li> </ol>	In class	IVET2+ CVET	Regular training – 4 years Part time training – 5 years	Diploma for mechanical engineer - bachelor degree	<a href="http://ksp.tu-varna.bg/index.php?option=com_content&amp;view=article&amp;id=14:2016-06-28-10-17-45&amp;catid=1:2016-06-28-10-03-28&amp;Itemid=2">http://ksp.tu-varna.bg/index.php?option=com_content&amp;view=article&amp;id=14:2016-06-28-10-17-45&amp;catid=1:2016-06-28-10-03-28&amp;Itemid=2</a> and <a href="http://tu-varna.bg/tu-varnaumo/images/">http://tu-varna.bg/tu-varnaumo/images/</a>



			Specialty: "Renewable energy sources"	<p>power</p> <p>10.Cogeneration</p> <p>11.Geothermal energy</p> <p>12.Production of biogas</p> <p>13.Wind- and hydropower.</p> <p>1.Renewable energy sources – general course</p> <p>2.Power converters for renewable energy sources and cogeneration systems</p> <p>3. Wind equipment</p> <p>4. Commutation installations for RES</p> <p>5. Computer modeling</p> <p>6.Monitoring and evaluation of the energy resources of the renewable energy sources</p> <p>7. Photovoltaic systems and solar power stations</p> <p>8.Design of installations with renewable energy sources</p> <p>9.Exploitation, diagnostics and repairs of renewable energy production's systems</p> <p>10. Geothermal and hydrokinetic equipment and installations for biomass energy production o</p>			<p>30 hours (L)</p> <p>30 hours (P)</p> <p>30 hours (L)</p> <p>30 hours (P)</p> <p>30 hours (L)</p> <p>30 hours (P)</p> <p>45 hours(L)</p> <p>30 hours(P)</p> <p>30 hours (L)</p> <p>45 hours(P)</p> <p>30 hours (L)</p> <p>30 hours(P)</p> <p>30 hours(L)</p> <p>15 hours (seminar)</p> <p>30 hours (P)</p> <p>45 hours (L)</p> <p>30 hours (L)</p> <p>30 hours (P)</p> <p>30 hours lectures</p> <p>30 hours (P)</p> <p>(P) – laboratory work</p>	Diploma for electrical engineer – bachelor degree	<a href="http://stories/uchebni_planove/bak_mag_sl_ed_sredno/vei_rb.pdf">stories/uchebni_planove/bak_mag_sl_ed_sredno/vei_rb.pdf</a>
12	Vocational High School of Electronics "John Atanassoff-city of Sofia Project Install+RES Up to IEE program – pilot	Technicians and engineers	Title:" Training courses for installers for small scale renewable energy systems in buildings"	<b>Photovoltaic</b> 1.Introduction in the profession – general information for the use of PV energy, terms, solar radiation 2. Applied electrical engineering – basic rules and notions 3. PV – type of solar cells, structure of the solar cell, characteristics, impact factors, connection of solar cells in a module. Autonomous PV systems	In class	VETP +CVET	<p>15 hours (L)</p> <p>30 hours (L)</p> <p>45 hours (L)</p>	Certificate	<a href="http://www.spge-bg.com/_data/pages/projects/infoday_30032012_viaexpo/Presentation_Piloten_kurs_PV.pdf">www.spge-bg.com/_data/pages/projects/infoday_30032012_viaexpo/Presentation_Piloten_kurs_PV.pdf</a>



	course			<p>4. Design of PV installations – laboratory exercises</p> <p><b>Solar collectors for hot water</b></p> <p>1. Development of the thermo-solar technics – basis of the radiation technology, terms for thermal energy use</p> <p>2. Solar panels – the solar panel as a radiation collector, choice of collectors, physical conditions and energy flow, assembly, problems.</p> <p>3. Functioning of the solar technology, water buffer-types for maintenance of the temperature, heat losses, used liquids, installation systems</p> <p>4. Design of a solar system, security conditions, evaluation of the volume flow, evaluation of the losses, and evaluation of the chilling capacity. Laboratory exercises.</p>			<p>10 hours (P)</p> <p>30 hours (L)</p> <p>30 hours(L)</p> <p>45 hours (L)</p> <p>10 hours (P)</p>		
13	Sofia Energy Centre Ltd.	Electrical technicians	PVTRIN Training course	<p><b>Module 1: Basics</b></p> <p>1. Solar energy</p> <p>2. PV technologies</p> <p>3. PV system</p> <p>4. Types of PV systems / applications</p> <p>5. Benefits of PV technology</p> <p><b>Module 2: Design principles</b></p> <p>1. Site survey</p> <p>2. System sizing and design</p> <p>3. Simulation software</p> <p>4. Economics and environmental issues</p> <p>5. Standards and regulations (national / EU)</p> <p><b>Module 3: Building applied PVs (BAPV) &amp; Building integrated PVs (BIPV)</b></p> <p>1. Mounting and building integrating options</p> <p>2. Roof basics</p> <p>3. Façade basics</p> <p>4. Glass roofs and others</p>	In class, Online (e-learning platform)	CVET	<p>4 hours (L)</p> <p>6 hours (e-learning)</p> <p>9 hours (L)</p> <p>3 hours (Lab)</p> <p>24 hours (e-learning)</p> <p>4 hours (L)</p> <p>8 hours (e-learning)</p>	PVTRIN Certification	<a href="http://pvtrin.eu/en/course_overview/index.html">http://pvtrin.eu/en/course_overview/index.html</a>

				<p>5. Design parameters and performance factors</p> <p>6. Examples in the residential sector</p> <p><b>Module 4: Installation – Sitework</b></p> <ol style="list-style-type: none"> <li>Working safely with PV</li> <li>Installation plan</li> <li>Electrical components installation</li> <li>Mechanical components installation</li> <li>Grid-connected PV Systems</li> <li>Stand-alone PV Systems</li> <li>Mounting systems and building integration</li> <li>Completing the PV installation</li> <li>Installation checklist</li> </ol> <p><b>Module 5: Case studies – Best practices</b></p> <ol style="list-style-type: none"> <li>Case Studies – Best Practices</li> </ol> <p><b>Module 6: Example installation of a small scale PV on</b></p> <ol style="list-style-type: none"> <li>Step by step practical guide</li> </ol> <p><b>Module 7: Maintenance and troubleshooting</b></p> <ol style="list-style-type: none"> <li>Maintenance plan</li> <li>Typical mistakes and failures</li> <li>Diagnostic procedures</li> <li>Documentation to the customer</li> <li>Maintenance checklist</li> </ol> <p><b>Module 8: Quality management and customer care</b></p> <ol style="list-style-type: none"> <li>Quality principles</li> <li>EU standards for PV</li> <li>Customer care</li> </ol>			<p>10 hours (L) 2 hours (Lab) 30 hours (e-learning)</p> <p>3 hours (L) 8 hours (e-learning)</p> <p>3 hours (L) 7 hours (Lab) 15 hours (e-learning)</p> <p>4 hours (L) 12 hours (e-learning)</p> <p>3 hours (L) 6 hours (e-learning)</p>		
14	The Center for Energy Efficiency and the vocational	Technicians, profession: “Technician energy equipment and installations”	Specialty : “Heat pump installation”	<b>Thermo- and hydrodynamics</b>	In class On work	VETP + CVET	1 hour (L)	Agency for Vocational Education and Training (NAVET)	<a href="http://www.busenepro.com/programmes.html">http://www.busenepro.com/programmes.html</a>

	<p>training centers at the professional high schools of architecture and civil engineering in the cities of Pazardzhik and Ruse, the Bulgarian-German vocational training center in Pleven and the professional high schools in Sofia specialized in RES – “John Atanasov” and “Henry Ford”, under the monitoring by the Bulgarian Construction Chamber</p>		<p>2. Types of heat exchange. Equation heat transfer.  3. Basic equation of hydrostatics. Equation of continuity. Bernoulli equation.  Hydraulic resistance and losses.  4. Hydraulic machines - types, principles  <b>Heat pump technology</b>  1. Legal basis for the use of renewable energy  2. Ecology, Energy Efficiency, NZEB.  3. Construction thermo physics: resistance to heat transfer through building elements.  4. Heat loss and gains through building elements.  5. The essence of the heat pump, applications.  <b>Heat pump equipment and installations</b>  1.* Classification and purpose of the heat pump installations.  2. Structure and operating principle.  3. Construction elements of the heat pump installation.  4. Heat pump installation schemes. Operating modes.  <b>Installation of heat pump installations (IHPI)</b>  1. Health and safety - regulations and procedures for handling IHPI.  2. IHPI equipment assembly.  3. Set up and exploitation of the IHPI. IHPI management.  <b>Exploitation and repair of the heat pump equipment and installations</b>  1. Heat pump equipment and installations maintenance.  2. IHPI diagnosis - typical malfunctions and damages.  3. Repair of basic heat pump elements and units.  Exam of action, parameters.</p>		<p>1 hour (L)  1 hour (P)  1 hour (L)  1 hour (P)    1 hour (L)    1 hour (L)  1 hours (L)  1 hour (P)  1 hour (L)  1 hours (P)    1 hour (P)        1 hour (L)    2 hours (L)  2 hours (P)  2 hours (L)  2 hours (P)  1 hour (L)  2 hours (P)    2 hours (L)  2 hours (P)  2 hours (L)  5 hours (P)  2 hours (L)  5 hours (P)    1 hour (L)  3 hours (P)  1 hour (L)  3 hours (P)  1 hour (L)  3 hours (P)  2 hour (T)</p>	<p>officially approved a plan to update the state educational standards for acquiring qualification for 13 professions in professional directions 522 "Electrical and Energy" and Professional 582 "Construction"    Certificate for VET:  Mechanic of energy equipment and installations – code 522040, specialty Renewable energy sources – code 5220408, 2nd degree of professional qualification</p>	
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		Technicians, Profession:	Specialty: “ <b>PV Installations</b> “	<p><b>Photovoltaic technology</b></p> <ol style="list-style-type: none"> <li>1. Regulatory framework for the use of energy from renewable sources.</li> <li>2. Energy efficiency, ecology, NZEB</li> <li>3. The technology for using of solar energy in essence</li> </ol> <p><b>Equipment and installations in PV systems</b></p> <ol style="list-style-type: none"> <li>1. Purpose. Types</li> <li>2. Classification</li> <li>3. Basic elements</li> <li>4. Principle of operation</li> <li>5. Construction</li> <li>6. Types of circuitry for autonomous and connected to an electric grid PV system</li> <li>7. Modes of operation. Scaling up of a PV system</li> </ol> <p><b>Installation and commissioning of PV systems</b></p> <ol style="list-style-type: none"> <li>1. Law on health and safety at work</li> <li>2. Installation on different types of roofs</li> <li>3. Commissioning and settings. Protection against lightning</li> </ol> <p><b>Operation and maintenance of PV equipment and installations</b></p> <ol style="list-style-type: none"> <li>1. Maintenance</li> <li>2. Diagnostics</li> <li>3. Repair works</li> </ol> <p><b>Exam</b></p>			<p>4 hours (P) Total: 25 (L) 35 (P)</p> <p>1 hour (L)</p> <p>1 hour (L) 2 hours (L) 1 hour (P)</p> <p>1 hour (L) 1 hour (L) 1 hour (L) 1 hour (P) 1 hour (L) 2 hours (P) 1 hour (L) 3 hours (P) 1 hour (L) 3 hours (P)</p> <p>1 hour (L) 4 hours (P) 4 hours (P)</p> <p>2 hours (P) 4 hours (P) 4 hours (P) 2 hours (T) 4 hours (P)</p> <p>Total: 20 hours (L) 40 hours (P)</p>		
			Specialty:	<b>Thermal- and hydrodynamics</b>					



			<p><b>“Solar thermal installations”</b></p> <p>1. Basic thermodynamic parameters of the gases’ state. Water vapor. Circular processes. Carnot cycle. Second law of thermodynamics.</p> <p>2. Types of heat exchange. Heat equation.</p> <p>3. Basic equation of hydrostatics. Continuity equation. Bernoulli’s equation. Hydraulic resistances and losses.</p> <p>4. Hydraulic machines - types, principles of action and parameters.</p> <p><b>The sun as a renewable energy source</b></p> <p>1. Legislation on usage of renewable energy sources.</p> <p>2. Energy efficiency and ecology. NZEB.</p> <p>3. Nature of the solar energy. Factors, influencing the usage of the solar energy.</p> <p><b>Solar thermal equipment and installations.</b></p> <p>1. Solar collectors – purpose, classification, structural features, operating principle.</p> <p>2. Water thermal batteries – purpose, classification, structural features, operating principle.</p> <p>3. Solar thermal installations - purpose, classification, schemes, physical and technical security conditions essential elements.</p> <p><b>Installing solar thermal installations (STI)</b></p> <p>1. Health and safety working conditions</p> <p>2. Mounting of STI – requirements and technological consistency. Lightning protection.</p> <p>3. Commissioning of STI.</p> <p>4. Setting parameters of STI. Operation of STI.</p> <p><b>Operation and repair of STI</b></p> <p>1. STI maintenance</p> <p>2. STI diagnostics – typical malfunctions</p>		<p>1 hour (L)</p> <p>1 hour (L)</p> <p>1 hour (P)</p> <p>1 hour (L)</p> <p>1 hour (L)</p> <p>1 hour (L)</p> <p>1 hour (L)</p> <p>2 hours (L)</p> <p>2 hours (L)</p> <p>1 hours (P)</p> <p>4 hours (L)</p> <p>2 hours (P)</p> <p>4 hours (L)</p> <p>2 hours (P)</p> <p>4 hours (L)</p> <p>2 hours (P)</p> <p>1 hour (L)</p> <p>5 hours (P)</p> <p>3 hours (P)</p> <p>1 hour (L)</p> <p>2 hours (P)</p> <p>3 hours (P)</p> <p>3 hours (P)</p>		
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				and damages 3. Repair of key STI elements and units. Exam			6 hours (P) 2 hours (T) 4 hours (P) Total: 25 hours (L) 35 hours (P)		
15	European labor institute	Electro-technicians, electro engineers.	Specialty "Photovoltaic"	1.Energy efficiency in residential buildings and offices, optimization of energy consumption; 2.Solar radiation, solar spectrum, photovoltaic effect; 3. Technology of the PV cells production; 4. Characteristics of the PV cells; 5.Elements of the photovoltaic generators and system' s types; 6. Structure types- partially, fully integrated; 7. Design and sizing of PV systems – necessary data, pre-design study; 8. Orientation of the system, selection of system's elements.	In class	VETP, CVET	36 hours (L) 4 hours (P)	Certificate for additional qualification	<a href="http://www.eli-energy.com">www.eli-energy.com</a> and <a href="http://www.reetrofit.eu">www.reetrofit.eu</a>
		HVAC technicians	Specialty: "Solar collectors for hot water"	1.Solar radiation, principle of operation of the solar collectors; 2.Types of solar collectors – flat, vacuum-tube; 3. Assembly systems, orientation, connection schemes; 4.Sizing and basic elements of the solar collectors.			18 hours (L) 2 hours (P)		
			Specialty:	1.Geothermal energy, geothermal			36 hours (L)		



		and engineers	“Geothermal installations”	resources, analysis of the energy consumption; 2. Thermo-pumps-operational principles, geothermal installations, efficiency; 3. Geothermal systems- types: direct, ground water system, with a horizontal coil, drilling system; 4. Sizing of the heating system 5. Requirements before installation.			4 hours (P)		
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### III. Desktop research about existing training programs on geothermal & solar installations in Greece.

#### III.1. Education system.

In Greece, educational policy is issued by the Ministry of Education, Research and Religious Affairs. In certain cases, the Ministry of Education, Research and Religious Affairs shares responsibility with other Ministries when it is about Vocational Training.

Management of primary and secondary education is administrated at a central level; it falls under the responsibility of the Ministry of Education, Research and Religious Affairs, while the management is administrated at regional level by the Regional Education Directorates. Higher education institutions are supervised by the Ministry of Education, Research and Religious Affairs, but are self-governed public law entities. The supervision of the providers for 'non-formal education', both public and private, as well as the authority to define their educational framework, falls under the responsibility of the General Secretariat for Lifelong Learning of the Ministry of Education, Research and Religious Affairs. In this respect, accreditation of "input" (providers of Initial and Continuing Vocational Training, Occupational profiles, learning programs for Initial and Continuing Vocational Training) falls under the responsibility of EOPPEP and Ministry of Education, Research and Religious Affairs, while certification of "output" (certification of graduates of the Initial Vocational Training and Continuing Vocational Training, certification of qualifications) falls under the responsibility of EOPPEP.



## Analysis and Classification of existing qualifications

LEVEL	VET	GENERAL EDUCATION	HIGHER EDUCATION
1		PRIMARY SCHOOL CERTIFICATE (compulsory) (APOLYTIRIO DIMOTIKOU)	
2		LOWER SECONDARY SCHOOL CERTIFICATE (compulsory) (APOLYTIRIO GYMNASIOU)	
3	<p><b>INITIAL VOCATIONAL TRAINING VOCATIONAL TRAINING SCHOOL (SEK) 'DEGREE'</b> (post lower secondary level) (PTYCHIO EPAGGELMATIKIS EIDIKOTITAS, EKPAIDEFISIS KAI KATARTISIS, EPIPEDOU 3)</p> <p><i>*(VOCATIONAL TRAINING INSTITUTE (IEK) CERTIFICATE (Initial Vocational Training - post lower secondary level) (PISTOPOIITIKO EPAGELMATIKIS KATARTISIS</i></p>		
4	<p><b>VOCATIONAL EDUCATION VOCATIONAL SCHOOL (EPAS) CERTIFICATE</b> (post lower secondary level) (PTYCHIO EPAS)</p> <p><b>VOCATIONAL UPPER SECONDARY SCHOOL (EPAL) 'DEGREE'***</b> (PTYCHIO EPAGGELMATIKIS EIDIKOTITAS, EKPAIDEFISIS KAI KATARTISIS, EPIPEDOU 4)</p> <p><b>VOCATIONAL UPPER SECONDARY SCHOOL (EPAL) CERTIFICATE</b> (APOLITIRIO EPAGGELMATIKOU LYKEIOU)</p>	GENERAL UPPER SECONDARY SCHOOL CERTIFICATE (APOLYTIRIO LYKEIOU)	
5	<p><b>VOCATIONAL EDUCATION VOCATIONAL UPPER SECONDARY SCHOOL 'DEGREE'***</b> Post-secondary cycle (<b>Apprenticeship class</b>) (PTYCHIO EPAGGELMATIKIS EIDIKOTITAS, EKPAIDEFISIS KAI KATARTISIS, EPIPEDOU 5)</p> <p><b>INITIAL VOCATIONAL TRAINING VOCATIONAL TRAINING DIPLOMA</b> (DIPLOMA EPAGGELMATIKIS EIDIKOTITAS, EKPAIDEFISIS KAI KATARTISIS, EPIPEDOU 5) (post secondary level)</p> <p><b>POST SECONDARY AND NOT HIGHER EDUCATION DIPLOMA OR "DEGREE"***</b> (DIPLOMA/PTYCHIO ANOTERAS SCHOLIS)</p>		
6			<b>BACHELOR DEGREE</b> (PTYCHIO) UNIVERSITIES/TECHNOLOGICAL EDUCATIONAL INSTITUTIONS (TEI) – HIGHER EDUCATION
7			<b>MASTER'S DEGREE</b> (METAPTYCHIAKO DIPLOMA EIDIKEFSIS) UNIVERSITIES/TECHNOLOGICAL EDUCATIONAL INSTITUTIONS (TEI) – HIGHER EDUCATION
8			<b>DOCTORATE</b> (DIDAKTORIKO DIPLOMA) UNIVERSITIES

\*This qualification is no longer awarded since the enactment of the Law 4186/2013

### III.2 Analysis and Classification of existing qualifications

#### HQF and EQF Level 1

Primary education is called “Dimotiko” in Greek: The purpose of attendance at the Primary School is the “multifaceted intellectual and physical development of children”, according to the provisions of Law 1566/1985 (A 167/30.09.1985). Among others, specific objectives include understanding of the content of basic concepts, acquisition of the ability to properly utilize oral and written speech, improvement of physical and mental health, familiarization with moral and humanitarian values, and cultivation of the students’ aesthetic criterion. In addition, Primary School hosts actions for increasing digital learning and foreign languages learning, by initially teaching one foreign language and a second one at the 5th Grade. Attendance at the Primary School lasts for 6 years, beginning at age 6, is compulsory, and is offered free of tuition fees in public schools. Private schools count less than 5 % of all Primary schools. Curricula for the Primary School are developed by the Institute for Educational Policy (I.E.P.) and are approved by the Ministry of Education and Religious Affairs. These curricula are applied to every school in the country. Completion of Primary school leads directly to enrolment in a Lower Secondary School, and to the award of the Primary School Certificate. This is a level 1 qualification.

#### HQF and EQF Level 2

Compulsory secondary education: Upon completion of Primary School, students are obliged to continue their studies in the Lower Secondary School which is called “Gymnasio” in Greek. The age of students ranges from twelve to fifteen years. Attendance lasts for three years and has the purpose of catering for “the integrated development of students in pro-portion to their abilities at that age and the respective requirements of life”. Its specific objectives include linguistic cultivation, proper expression of thoughts, both orally and in written, enrichment of their value system, problem solving strategies development, familiarization with various forms of art, and realization of their abilities and talents, according to the provisions of Law 1566/1985 (A 167/30.09.1985). In Lower Secondary Schools students

attend a common analytical program concerning all teaching subjects, except for English, which is delivered in many schools in two distinctive levels, depending on the level of knowledge and foreign language skills of students. The analytical curricula for the Lower Secondary School are developed by I.E.P. and are applied throughout the country. Alongside the formal curriculum, innovative programs have been introduced and implemented covering areas such as Career Orientation, Health Training, Environmental Education, Youth Entrepreneurship, etc. Studies in the Lower Secondary School do not provide specialization in a specific field. However, there are certain specific Lower Secondary School types which, along with general education classes, provide education in the wider field of culture that could be related to future professional activity. Such institutions include Musical Lower Secondary Schools, Artistic Lower Secondary Schools, Ecclesiastical Lower Secondary School and Athletic Facilitation Classes.

At the end of this 3-year process, a qualification is awarded, the Lower Secondary School Certificate, which, on the one hand, certifies the completion of the compulsory cycle of education and, on the other hand, provides access to post-compulsory learning opportunities. The qualification is of Level 2.

There is also a range of other specialized types of Lower Secondary Schools. These include:

- Pilot Experimental Lower Secondary Schools which, in liaison with a university, implements innovative experiments on individual aspects of the formal curriculum.
- Evening Lower Secondary Schools, aiming to facilitate working students (above 15 years of age).
- Special Training and Education Lower Secondary Schools and Special Vocational Lower Secondary Schools aiming to cover educational needs of students with disabilities.
- Intercultural Lower Secondary Schools, Minority Lower Secondary Schools and the European Education School<sup>24</sup> aiming to cover the needs of specific population groups.
- Finally, a special category of educational institutions includes the Second Chance Schools, operating within the area of lifelong learning, based on the principles of adult education. Duration of study is two years. They appeal to adults who have abandoned





the education system before completing compulsory education and grant a diploma equivalent to that of Secondary School level.

It is to be noted that the Greek compulsory education focuses on the promotion of the eight (8) basic competences as they are described by European texts.

#### **HQF and EQF Level 4**

General Upper Secondary School (Geniko Lykeio-GEL)

General Education of 3-year attendance offered in General Upper Secondary Schools (GEL). The aim of General Upper Secondary School is, among others, to provide quality general education that will contribute to balanced cognitive, emotional, intellectual and physical development of all students. At the end of this 3-year process, a qualification is awarded, the General Upper Secondary School Certificate ("Apolytirio Lykeiou"), which, on one hand, certifies the completion of the post-compulsory cycle of studies and, on the other hand, ensures eligibility of the graduate to participate in the national exams for admission to institutions of Tertiary Education. The qualification is at Level 4.

#### **Vocational Upper Secondary School (Epaggelmatiko Lykeio-EPAL) and Vocational School (Epaggelmatiki Scholi-EPAS)**

These two groups of vocational schools offer ranges of occupationally-focused programs. The schools operate within the upper secondary sector of the education system.

#### **The Vocational School (EPAS)**

Pupils who finish the 1st year of General Lyceum or Vocational Upper Secondary School (EPAL) have the possibility to enroll to the 1st class of the Vocational School (EPAS). The Vocational School (EPAS) takes 2 years to complete.

The Greek public manpower and employment service (OAED) operates a total of 51 Vocational apprenticeship schools EPAS, which have an average annual enrolment of 10 000 students, depending on the relevant annual announcement. Their courses last two school years (four semesters). The paid practical work takes place four or five

days a week in public or private sector enterprises on terms specified in the relevant apprenticeship contract. Participating enterprises are subsidized. The school is responsible for finding work placements for its students. Graduates of the Vocational School (EPAS) have the option to:

- to receive a license to practice a trade or profession (upon completion of exams);
- to enroll in the second grade of the EPAL;
- To register at an Initial Vocational Training Institute (IEK) in a similar specialization.

According to Law 4386/2016 the operation of the Vocational School (EPAS) of OAED has been extended until the years 2020-2021.

The difference between EPAL and EPAS is that the EPAS provide vocational training in a variety of specialties not provided in EPAL and the students that follow them do not need strong theoretical studies, but they focus mainly on practice and they are absorbed in the labor market as skilled technicians. They are eligible to attend them if/ when they have completed the first grade of General Upper Secondary Schools (GEL) or Vocational Upper Secondary School (EPAL).

Only graduates of General Upper Secondary School (GEL) or Vocational Upper Secondary School (EPAL) have access to higher education, after taking State exams (the only point where learning outcomes from secondary education are in any way accredited in higher education). The graduates of Vocational Schools (EPAS) have no right to do so. Qualifications awarded on completion of EPAL programs are the Vocational Upper Secondary School 'Degree' 26 and the Vocational Upper Secondary School Certificate. The qualification awarded on completion of EPAS programs is the Vocational School (EPAS) Certificate. These qualifications are at Level 4. Last but not least, all programs of secondary formal education in 2017-2018 will be redesigned on the basis of learning outcomes (for more detail, please, see the criterion 3).

### **The Vocational Upper Secondary School (EPAL)**

Programs at vocational upper secondary school (EPAL) can lead to two levels:

- (a) a three-year program;
- (b) an additional 'apprenticeship year'.

The Vocational Upper Secondary School (EPAL) takes 3 years to complete. The curriculum of the Vocational Upper Secondary School (EPAL) consists of general education subjects and technical-vocational education subjects, the latter including theoretical, stages, design and combined (theory and stages) subjects. Graduates of the EPAL are awarded a School Leaving Certificate equal to that of the General Upper Secondary School (GEL). Graduates of EPAL achieving the Vocational Upper Secondary School Certificate are eligible to take the national examinations for access to the technological sector of higher education programs. Graduates of the Vocational Upper Secondary School (EPAL) have the following options:

- to seek admission to higher education programs of studies relevant to their specialization upon completion of national examinations);
- to receive a license to practice a trade or profession (upon completion of exams);
- to enroll in an Initial Vocational Training Institute (IEK).
- to enroll in the ‘apprenticeship year’ (fourth year ) and after completion, can participate in certification exams.

### **HQF and EQF Level 5**

Graduates of the ‘apprenticeship year’ receive a diploma at EQF level 5 issued jointly by the Ministry of Education and OAED, after procedures for certification of their qualifications by EOPPEP have been completed. Graduates of a vocational upper secondary evening school do not have to enroll in the ‘apprenticeship year’ but can apply for certification of their qualifications if they have worked for at least 600 days in the specialty with which they graduated from the third year. The body responsible for certification of qualifications and for awarding specialization diplomas to graduates of ‘apprenticeship year’ is EOPPEP. Those who pass certification examinations receive both the related specialization diploma and a license to practice their trade. As appropriate, other ministries that issue corresponding occupational licenses may take part in conducting examinations.

### **Awarding bodies**

“Awarding bodies” are entities of key importance within the HQF. They are bodies established in Greece, which are entitled by law or other procedure to set standards for



qualifications and award qualifications to learners who are acknowledged to have achieved these standards. An awarding body can be solely responsible for this function, i.e., to design and /or award qualifications (e.g. the Ministry of Education, Research and Religious Affairs and EOPPEP), or it can also be an education provider. Universities are both education providers and awarding bodies.

**The awarding bodies in the context of the Hellenic Qualifications Framework are the following:**

- The Ministry of Education, Research and Religious Affairs.
- The Ministry of Culture and Sports.
- The Ministry of National Defense.
- The Ministry of Tourism.
- The Ministry of Marine, Transport and Island Policy.
- EOPPEP.
- The Universities and Technological Educational Institutions.

For the development of Hellenic Qualifications Framework and its Referencing to the European Qualifications Framework, EOPPEP collaborated with the social partners, representatives of the Ministry of Education, Research and Religious Affairs, representatives of the Assembly of Rectors of Universities, representatives of the Assembly of Presidents and Vice Presidents of Technological Education Institutes, representatives of the Hellenic Quality Assurance and Accreditation Authority (HQA) – ADIP, two international experts and external field experts.

### **III.3. The role of EOPPEP in relation to the quality assurance of qualifications.**

The National Organization for the Certification of Qualifications and Vocational Guidance (EOPPEP) is the body responsible for the certification of

- the graduates of SEK and IEK (HQF and EQF levels 3 and 5) and
- the graduates of apprenticeship year of the Vocational Upper Secondary School (EPAL) (HQF and EQF level 5)<sup>37</sup>.



EOPPEP is implementing a national quality system in the area of non-formal education drawing upon European and international experience. Availability of adequate and consistent data and indicators is the key to understanding the components of Vocational Education and Training, in order to strengthen lifelong learning and to assess in qualitative terms the progress in LLL development and promotion. The design of the National Framework for Quality Assurance in Lifelong Learning (p3) is in alignment with the recommendation of the European Parliament and Council 2009 / C 155/01 of June 18 in order to establish a European Reference Framework for quality assurance in Vocational Education and Training. EOPPEP is the National Reference Point for Quality Assurance in VET and represents Greece in the European network for Quality Assurance in Vocational Education and Training (EQAVET). EOPPEP develops the regulatory framework for the certification of qualifications, i.e. the learning outcomes of non-formal education and informal learning, in response to labor market needs and priorities and in liaison with the certification of inputs, i.e. providers, trainers, occupational profiles and curricula standards.

EOPPEP's current fields of responsibility are:

- the certification of the qualifications
- the licensing of awarding bodies.

Designing and developing a national system for the certification of qualifications is EOPPEP's principal policy priority in the field of lifelong learning (LLL), comprising the following key areas of responsibility:

- Development of a model system for the accreditation of outputs and setting the respective legal framework. Designing a system for the recognition and certification of qualifications acquired via non-formal and informal learning and establishing the framework for licensing awarding bodies.
- Inspection, monitoring and evaluation of awarding bodies.
- Implementation of certification processes by EOPPEP.
- The National System for the Certification of Qualifications aims at:
  - certifying those qualifications for which a state interest is attested and those which reinforce employment,

- assuring the certified qualification corresponds to the specifications set in the respective certified occupational profile and the accreditation/certification process is in compliance with set standards and criteria
- Providing equity and open access to qualifications, irrespective of the learning pathway and regardless of the way learning outcomes have been acquired.

### III.4. Initial and Continuous VET

#### Initial Vocational Training

Providers of Initial Vocational Training

##### HQF and EQF Level 3

The School of Vocational Training (SEK), which provides initial vocational training to graduates of compulsory education; SEK programs are of three years' duration. Holders of a lower secondary school leaving certificate or equivalent can enroll in the first year of SEK without sitting examinations. Students who are over 20 or employed attend evening vocational training schools for four years. The last year of the three-year SEK program is apprenticeship. SEK programs are structured into streams: agronomy/food technology/nutrition, technological applications, arts and applied arts, tourism and hospitality occupations. Upon successful completion of the certification exam, graduates of Schools of Vocational Training (SEK) are awarded a Vocational Training School (SEK) Certificate at HQF and EQF level 3. Non-compulsory Secondary Education (General Upper Secondary School (GEL), Vocational Upper Secondary School (EPAL), Vocational School (EPAS)) and Initial Vocational Training Institutes (IEK) programs are open to SEK graduates. According to recent law 4386/2016 SEK will be finally abolished on 31 8 2019.

##### HQF and EQF Level 5

The Institute of Vocational Training (IEK) provides initial vocational training to graduates of non-compulsory Secondary Education – General Upper Secondary School (GEL), Vocational Upper Secondary School (EPAL), Vocational School (EPAS)) or higher education (Universities/Technological Educational Institutions (TEI)) 27 – as well as graduates of SEK. IEK programs last five semesters. During the four semesters learners undertake theoretical



and laboratory training, lasting 1200 hours, and during the fifth semester internship or apprenticeship takes place, lasting 960 hours 28.

Students who successfully complete all the prescribed semesters can participate the certification exam for graduates of initial vocational training institutes. This certification entitles them to take part in the (practical and theoretical) vocational training certification examinations conducted under the jurisdiction of EOPPEP. Upon successful completion of the certification exam, graduates of Institutes of Vocational Training (IEK), are awarded Initial Vocational Training Diplomas at HQF and EQF level 5.

### **Continuing vocational education and training: LLCs and other bodies providing lifelong learning**

In Greece continuous vocational training and general adult education is provided by lifelong learning centers (LLCs). The Ministry of Education, through Eoppep, is responsible for safeguarding quality of non-formal education, evaluating these centers and monitoring their operation (see Section 3.4). To decentralize actions in this area (Law 3879/2010 concerning lifelong learning) administrative bodies have been set up by the Greek regional administrations to manage the national lifelong learning network. Each region draws up its own program, which includes investments, vocational training actions or programs, and more generally actions implementing public policy on lifelong learning in the region. The municipalities can set up LLCs or mobilize the network of lifelong learning bodies in their region, offering program linked to the local labor environment and beyond. Most municipalities have set up LLCs, which provide a variety of general adult education and continuous vocational training programs. As examples of this decentralization of lifelong learning, in 2013 the Attica region implemented recycling and public awareness programs, Crete organized programs for energy inspectors, and all across Greece there were regional job-seeker training programs in information and communications technologies. The Municipality of Athens offers its employees programs focusing on behavior and communication with the public, while the Municipality of Thessaloniki runs Open University programs in cooperation with the academic community. Funding comes from co-financed community programs (OP 'Education and lifelong learning') and from the regular budget with the signature of



program contracts. Continuing VET programs are also provided by most universities, including the Hellenic Open University, in a wide range of subjects (including ICT, tourism studies, accounting, economics and administration, energy and environment, food safety, production management, and programs for foreign students and repatriated Greeks). Moreover, almost all the ministries and their supervisory bodies implement continuing vocational training programs for their staff or for broader groups (distance learning for Greek language teachers, cross-cultural communication, youth entrepreneurship, job-seeker training courses in green occupations, training for mediators, health professionals, judges, etc.). For the present, qualifications that are acquired through continuing vocational training are not correlated to levels of the national qualifications framework, but this will eventually be done.





#### II.4. IVET - Initial Vocational Education Training Courses

Specialisation	IVET institutions				Lessons relevant to SOLAR/ GEOTHERMAL INSTALLATIONS	FURTHER INFORMATION
	EPAS	EPAL	IEK (Lower secondary school graduates)	IEK (upper secondary school graduates)		
Solar Thermal Installations technicians	Nothing relevant	Nothing relevant	Nothing relevant	Under the specialisation for technicians in RES (renewable energy Sources) installers, there is a course for solar energy installers		<a href="http://www.iek-xini.edu.gr/tomeis-spyodwn/mhchanologia/texnikos-ananewsimwn-phgwn-energeias">http://www.iek-xini.edu.gr/tomeis-spyodwn/mhchanologia/texnikos-ananewsimwn-phgwn-energeias</a>
Photovoltaic Installations technicians	Nothing relevant	Nothing relevant	Nothing relevant	Under the specialisation for technicians in RES (renewable energy Sources) installers, there is a course for solar energy installer		<a href="http://www.iek-xini.edu.gr/tomeis-spyodwn/mhchanologia/texnikos-ananewsimwn-phgwn-energeias">http://www.iek-xini.edu.gr/tomeis-spyodwn/mhchanologia/texnikos-ananewsimwn-phgwn-energeias</a>
Geothermal installations technicians	Nothing relevant	Nothing relevant	Nothing relevant	There are lessons under the specialisation for technicians in RES (renewable energy Sources) installers		<a href="http://www.iek-xini.edu.gr/tomeis-spyodwn/mhchanologia/texnikos-ananewsimwn-phgwn-energeias">http://www.iek-xini.edu.gr/tomeis-spyodwn/mhchanologia/texnikos-ananewsimwn-phgwn-energeias</a>
Solar and Photovoltaic Installations technicians				Korelko IEK	RES-design installation and repair of solar and photovoltaic systems	<a href="http://www.korelko.gr/learn/index.php/courses-renewable-energy/iliaki-aioliki?phpMyAdmin=INZx0IcxZKXo48dEjTNijjV4ZTd">http://www.korelko.gr/learn/index.php/courses-renewable-energy/iliaki-aioliki?phpMyAdmin=INZx0IcxZKXo48dEjTNijjV4ZTd</a>
Photovoltaic Installations technicians				Mediterranean Professional College	<i>Professional Diploma in Design &amp; Installation of Photovoltaic Systems</i>	<a href="http://www.medcollege.edu.gr/footer/epaggelmatikhs-exeidikeyshs">http://www.medcollege.edu.gr/footer/epaggelmatikhs-exeidikeyshs</a> <a href="http://www.semifind.gr/default.asp?pid=1239&amp;langid=53&amp;mdl=seminars&amp;semid=8590">http://www.semifind.gr/default.asp?pid=1239&amp;langid=53&amp;mdl=seminars&amp;semid=8590</a>

#### CVET – Continuous Vocational Education Training

TRAINING PROVIDER	COURSE/ Seminar TITLE	TARGET Group	Modules/ contents	Regular basis	Duration (h)	Further information
KDVM - European Center in Training for Employment	Photovoltaic installations	Electricians				
KDVM - European Center in Training for Employment	Geothermal heat pumps and water management	Pumpers/ Geothermal installers		Non regular	45	<a href="http://www.ecte-edu.gr">www.ecte-edu.gr</a>
IEKEM TEE	Renewable energy sources	Plumbers / Electricians	Renewable energy recourses /thermal&solar energy systems / photovoltaic systems / biomass systems / geothermal systems /	Non regular	8	<a href="http://www.iekemtee.gr/el/%CF%83%CE%B5%CE%BC%CE%B9%CE%BD%CE%AC%CF%81%CE%B9%CE%B1/%CE%B4">http://www.iekemtee.gr/el/%CF%83%CE%B5%CE%BC%CE%B9%CE%BD%CE%AC%CF%81%CE%B9%CE%B1/%CE%B4</a>

						<a href="#">%CF%89%CF%81%CE%B5%CE%AC%CE%BD-%CF%83%CE%B5%CE%BC%CE%B9%CE%BD%CE%AC%CF%81%CE%B9%CE%B1</a>
The Centre for Renewable Energy Sources and Saving (CRES)		Electricians/ Pumpers/ Geothermal installers	Photovoltaic systems/active solar systems/geothermal energy/ wind energy/biomass/small hydroelectric plants/RES and hydrogen technologies/new RES technologies			<a href="http://www.cres.gr/kape/index_eng.htm">http://www.cres.gr/kape/index_eng.htm</a>
PVTRIN Installer certification	Photovoltaic Systems	Electricians	Solar energy and Photovoltaic systems			<a href="http://pvtrin.eu/el/course/overview/index.html">http://pvtrin.eu/el/course/overview/index.html</a>
TEI of Crete	Photovoltaic energy systems	Engineers	Solar energy, BOS components, Energy storage, photovoltaic system		100	<a href="http://pv.stef.teicrete.gr/index.php">http://pv.stef.teicrete.gr/index.php</a>
University of Peraus e-learning	RES-new technologies and upgrade of the old ones	Plumbers / Electricians	Photovoltaic-Thermal systems/ Biomass-Geothermal		3 months	<a href="http://goseminars.gr/index.php/component/eventbooking/?task=view_event&amp;event_id=10812&amp;Itemid=525">http://goseminars.gr/index.php/component/eventbooking/?task=view_event&amp;event_id=10812&amp;Itemid=525</a>

### Indicative CVET seminars from private organisations/companies

Name of training provider	COURSE / Seminar title	TARGET Group	Modules	Duration	Further information
Engineering Intelligence	Design and Installation photovoltaic systems	Technicians,	Photovoltaic installations / Energy sources, / Sun Geometry / Photovoltaic panels / Battery/ electronic devices	16	<a href="http://www.engineering-intelligence.gr/el/normal/sid/336/details.aspx?gclid=C1z2sMwX0sMCFQIYwwod8hgAYQ">http://www.engineering-intelligence.gr/el/normal/sid/336/details.aspx?gclid=C1z2sMwX0sMCFQIYwwod8hgAYQ</a>
Engineering Technical Education	Design and installation of photovoltaic systems	technicians	Photovoltaic installation / Data Collection / Components of a solar installation	20	<a href="http://www.enta.gr/customer/home.php?cat=397">http://www.enta.gr/customer/home.php?cat=397</a>
TUV Austria Academic	Photovoltaic: installation-inspection-certification-maintenance	Technicians/ electricians	Photovoltaic installations / Energy sources / Photovoltaic panels	6	<a href="http://www.tuvaustriahellas.gr/briefing&amp;page=3&amp;item=74">http://www.tuvaustriahellas.gr/briefing&amp;page=3&amp;item=74</a>
National Association of T.E.I. graduate electricians	Design and installation of photovoltaic systems in interconnected network	Electricians / Technicians	Design & installation of photovoltaic systems / Study of shadows / Inspection and maintenance of solar systems	10	<a href="http://www.hlektrologoi-tei.gr/seminars.asp?lng=">http://www.hlektrologoi-tei.gr/seminars.asp?lng=</a>
Engineering Intelligence	Research and design of geothermal systems	Plumbers	Geothermal energy/ design and installation of geothermal systems	16	<a href="http://www.engineering-intelligence.gr/el/normal/sid/61/seminar.aspx">http://www.engineering-intelligence.gr/el/normal/sid/61/seminar.aspx</a>
Aid engineering	Geothermal energy and air-conditioning	Plumbers	Design and installation of geothermal systems / inspection and maintenance of geothermal systems	16	<a href="http://www.engineering-intelligence.gr/el/normal/sid/336/details.aspx?gclid=C1z2sMwX0sMCFQIYwwod8hgAYQ">http://www.engineering-intelligence.gr/el/normal/sid/336/details.aspx?gclid=C1z2sMwX0sMCFQIYwwod8hgAYQ</a>
IENE	<i>Geothermal energy</i>	Plumbers	Geothermal thermal energy and its use / economic schedule of geothermal system / design and installation of geothermal systems		<a href="http://www.iene.gr/energyB2B/articlefiles/geothermia/arvanitis.pdf">http://www.iene.gr/energyB2B/articlefiles/geothermia/arvanitis.pdf</a>
Thermomap	Geothermal energy and systems	Plumbers	Legal use of geothermal system / direct use of geothermal systems	5	<a href="http://www.eneroots.gr/uploads/pdf/2013_03_IGME.pdf">http://www.eneroots.gr/uploads/pdf/2013_03_IGME.pdf</a>



## IV. Desktop research about existing training programs on geothermal & solar installations in Spain

### IV.1. Description of Vocational training provisions.

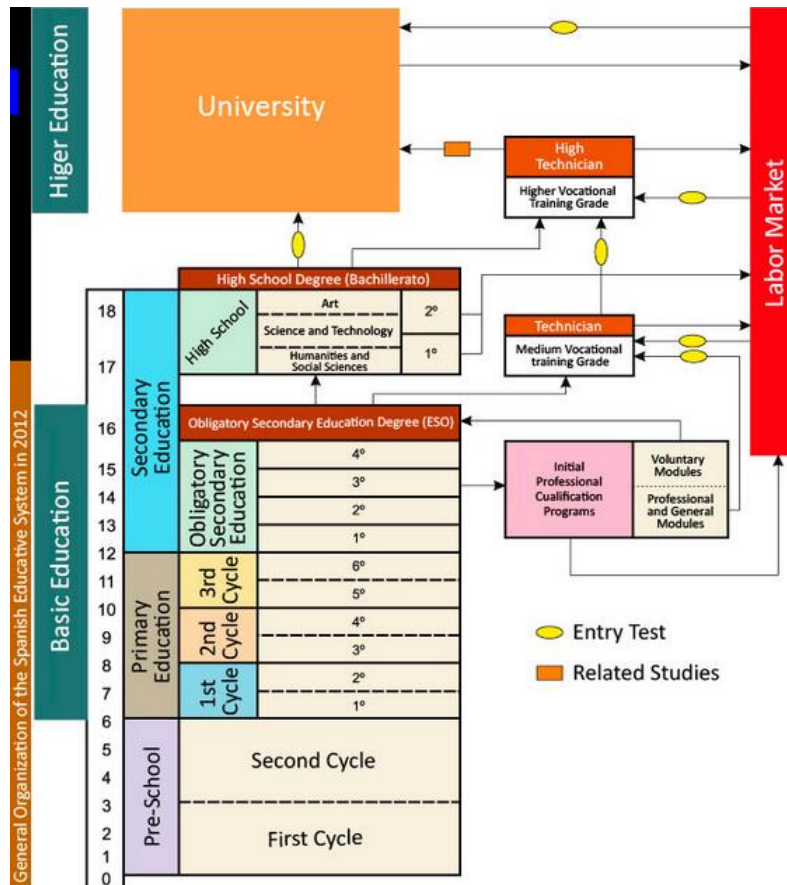
Existing national provisions should be referred for each Partners' country. In this context, a brief description of the VET educational system for both initial (IVET) and continuing vocational training (CVET), should be given.

**Primary/Elementary education** Primary education is free and mandatory. Children will enrol in their first year of school when they turn six years old. There are three cycles in primary school. (6-8, 8-10, 10-12)

**Secondary education:** Secondary education is also compulsory and the students are in school between the ages of 12 and 16. There are two cycles (12-14, 14-16). Students at 15 years have a choice of entering a general secondary school or a vocational training school.

The completion of four years of secondary schooling results in a Secondary Education Certificate. This certificate is required to continue further education. After the age of 16, the student or the parents may decide to end their schooling. After secondary education is completed, when they are 18, students are required to take a university entrance exam. The next picture shows the Spanish Education System:





The system is divided in two big groups, basic education and higher education. The first one is addressed to youth between 1 and 18 years old and the second one to older ones. Furthermore, we can see another way, and this is the one we are going to discuss in this document, vocational training grades.

#### IV.2. Vocational Training

Vocational training is modular, including a training module in the workplace but this module can only be taken once all the other modules followed at school have been obtained. The work placement occurs in the final stage of the course. Higher-level training cycles also include a module devoted to a professional project.

A **professional certificate** corresponding to a level I vocational qualification in the national vocational qualifications framework is offered to young people aged between 16 and 21 who have not yet obtained a diploma.

Since September 2014, the basic vocational training offers to young people to start from their 15 years old, for a period of two years.

### Higher education

The upper level is open to holders of the A-levels or the *intermediate level*. This post-secondary education prepares students for specialised vocational qualifications and lasts for 1 or 2 years. One quarter of the time is devoted to vocational training. It leads to the qualification of higher technician.

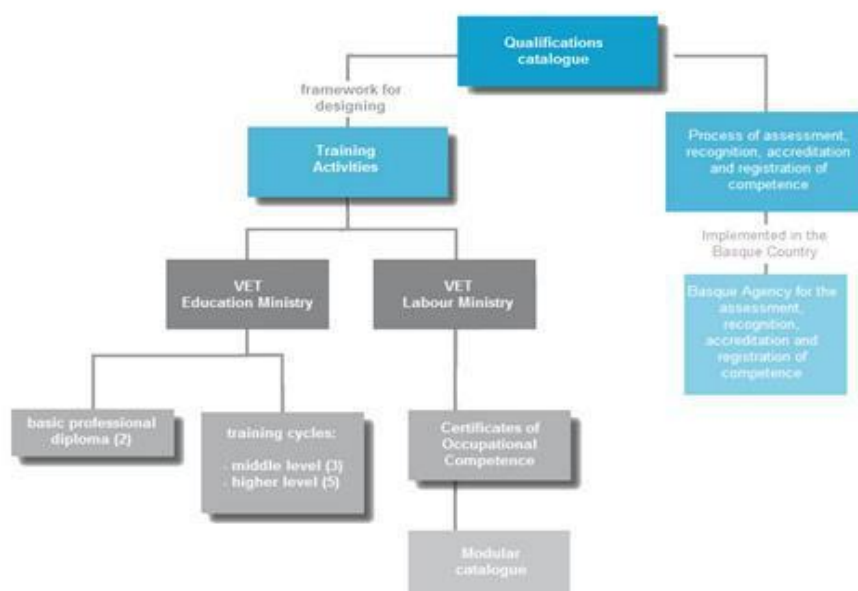
Without taking any further examinations, holders of the diploma for higher technician are admitted to university courses leading to the 1st university qualification.

### Apprenticeship

Work-study programmes are **few and far between**. They are offered as a priority to **young people between the ages of 16 and 21** who dropped out of compulsory schooling and have neither a diploma nor any qualification. It is carried out within the framework of a Training Contract and lasts between 6 months and 2 years.

The next figure shows a little more from the education system:

### Qualifications and Vocational Education and Training System



The 55% length of the Professional modules are fixed by the Department of education and the other 45% can be developed by the regions, therefore, the region, as Basque Country, has the possibility to complete and adapt contents.

### IV.3. Dual Professional Training in the educational system

Dual Vocational Training is a modality within vocational training that is getting increasingly used the last years in Spain, having a strong potential in the Basque Country. Dual VET projects in the educational system combine the teaching and learning processes in the company and in the training center, and are characterized by being carried out by the alternation between the educational center and the company, with a stay of hours or days of variable duration.

With this new innovative modality, companies can support new models of professional training organization that are directed towards the search for excellence in the relationship of the company with the VET centers and promote their Corporate Social Responsibility.

To this end, through the projects developed in the Autonomous Communities, it is being working to promote a culture of Dual Professional Training in companies and centers to provide people with the required specialized and polyvalent training and bring the learned lessons of the vocational training closer to the socioeconomic reality of the labor market. That way, it would be able to respond to the personal development and qualification needs of the different productive and service sectors of the autonomous and state economies.

Royal Decree 1529/2012, of 8 November, which establishes the contract for training and learning and establishes the basis of Dual Vocational Training, states in its article 28 as the purpose of dual vocational training projects:

- To increase the number of people eligible for a post-compulsory secondary education diploma through vocational training.
- To obtain a greater motivation in the student body, reducing early school leaving.
- Facilitate labor insertion as a result of greater contact with companies.



- Increase the linkage and co-responsibility of the business community with vocational training.
- To strengthen the relationship between the professional trainers and the companies of the sector and to promote knowledge transfer.
- Obtain qualitative and quantitative data that allow the decision-making in relation to the improvement of the quality of vocational training.

The implementation of this modality in VET depends, as in the entire educational offer, of each Autonomous Community.

You can consult the regulations that regulate the new modality in:

Royal Decree 1529/2012, of 8 November, which establishes the contract for training and learning and establishes the basis of dual vocational training.

Regulation ESS / 2518/2013, of 26 December, where it is regulated the formative aspects of the contract for training and learning, in development of the Royal Decree 1529/2012 of November 8.



## IV.4. VET - Initial Vocational Education Training Courses

Specialisation	IVET institutions				Lessons relevant to SOLAR/ GEOTHERMAL INSTALLATIONS	FURTHER INFORMATION	EQF LEVEL
	EPAS	EPAL	IEK (Lower secondary school graduates)	IEK (upper secondary school graduates)			
Geothermal / Solar thermal installations	Hot productions Installations				Perform assembly operations, maintenance and repair of heat production facilities and transmission fluids, according to the processes and plans for installation and maintenance, with the required quality, complying with the laws and regulations in force, under conditions personnel and environmental security (480h).	<b>ANNEX CCCLXVIII</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/IMA368_2.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/IMA368_2.pdf</a>	3-4
Geothermal / Solar thermal installations	Air conditioning and refrigeration systems				During installation, maintenance and reparation of refrigeration facilities with required quality, complying with regulations force and in safety and respect for the environment (540h) Perform assembly operations, maintenance and reparation of air conditioning, ventilation-extraction and filtrate air, according to the processes and assembly plans and maintenance, with the required quality, complying with the rules and regulations in force, under conditions of personal security and environmental (480h).	<b>ANNEX XL</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/05_041.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/05_041.pdf</a> <b>ANNEX CCCLXIX</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/IMA369_2.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/IMA369_2.pdf</a>	3-4
Geothermal / Solar thermal installations	Electromechanical maintenance				Perform assembly and installation in plant machinery and industrial equipment and maintenance and repair, in terms of quality and safety (540h)	<b>ANNEX XLI</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/05_042.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/05_042.pdf</a>	3-4
Geothermal / Solar thermal installations		Prevention of occupational hazards			Participate in preventing occupational hazards by identifying and evaluating risk and the establishment or adaptation measures Specific safety, prevention and protection health workers and act in situations emergency (810h).	<b>ANNEX CXXXI</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/06_035.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/06_035.pdf</a>	5
Geothermal / Solar thermal installations		Development of projects of heating and fluid			Develop projects networks and distribution systems fluid, determining their characteristics, designing plans, planned control method, and specificating assembly and test protocols intermediations required for receiving, from a draft and according to technical specifications, standards and established procedures, ensuring the viability of the project to, quality, safety and respect for the environment these facilities(510h).	<b>ANNEX CCCLXXIII</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/IMA373_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/IMA373_3.pdf</a>	5





Geothermal / Solar thermal installations		Maintenance of thermal installations and fluids			Monitor and control the assembly of networks and distribution systems of fluid, controlling its implementation, from a project implementation and planned car, manage or carry on maintained in accordance with established rules and standards with the requisite quality, ensuring comprehensive security Installation and prevention of occupational hazards and environment (510h)	ANNEX CCCLXXVIII <a href="http://www.educacion.gob.es/educa/incual/pdf/1/IMA378_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/IMA378_3.pdf</a>	5
Geothermal / Solar thermal installations		Industrial mecatronics			Develop programs and supply assembly in mounting systems industrial automation, from the project and work conditions (540h).	<a href="http://www.educacion.gob.es/educa/incual/pdf/1/ELE486_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/ELE486_3.pdf</a>	5
Geothermal / Solar thermal installations		Energy and water			Manage the efficient use of energy, evaluating the efficiency of energy and water facilities in buildings, collaborating in the process of energy certification of buildings, determining the feasibility of implementation of solar installations, promoting the efficient use of energy and making proposals improvement, with the required quality, complying with current regulations and in safety (870h)	ANNEX CCCLVIII <a href="http://www.educacion.gob.es/educa/incual/pdf/1/ENA358_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/ENA358_3.pdf</a>	5
Solar Thermal Installations technicians		Energy efficiency and solar energy Energy and water			Manage the efficient use of energy, evaluating the efficiency of energy and water facilities in buildings, collaborating in the process of energy certification of buildings, determining the feasibility of implementation of solar installations, promoting the efficient use of energy and making proposals improvement, with the required quality, complying with current regulations and in safety (870h).	ANNEX CCCLVIII <a href="http://www.educacion.gob.es/educa/incual/pdf/1/ENA358_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/ENA358_3.pdf</a>	5
Solar thermal installations		Energy and water			Installation, commissioning, operation and maintenance of low temperature solar thermal installations with the required quality and safety and complying with current regulations	ANNEX I <a href="https://www.boe.es/boe/dias/2015/08/03/pdfs/BOE-A-2015-8714.pdf">https://www.boe.es/boe/dias/2015/08/03/pdfs/BOE-A-2015-8714.pdf</a>	3,4
Solar thermal installations		Energy and water			Installations promotion, projects development and management of the assembly and maintenance of solar thermal installations, monitoring the obtained results, applying the techniques and procedures required, optimizing the resources, with the required quality, complying with the current regulations and in safety conditions.	ANNEX CCLXIV <a href="https://www.boe.es/boe/dias/2007/09/11/pdfs/A37041-37089.pdf">https://www.boe.es/boe/dias/2007/09/11/pdfs/A37041-37089.pdf</a>	5
Solar photovoltaic installations		Energy and water			Installation, commissioning, operation and maintenance of solar photovoltaic installations with the required quality and safety and complying with current regulations	ANNEX CCLXI <a href="https://www.boe.es/boe/dias/2007/09/11/pdfs/A37041-37089.pdf">https://www.boe.es/boe/dias/2007/09/11/pdfs/A37041-37089.pdf</a>	3,4
Solar photovoltaic installations		Energy and water			Installations promotion, projects development and management of the assembly and maintenance of solar photovoltaic installations, both grid-connected and stand-alone, applying the techniques and procedures required, optimizing the resources, with the required	ANNEX CCLXIII <a href="https://www.boe.es/boe/dias/2007/09/11/pdfs/A37041-37089.pdf">https://www.boe.es/boe/dias/2007/09/11/pdfs/A37041-37089.pdf</a>	5



					quality, complying with the current regulations and in safety conditions.		
Photovoltaic Installations technicians		Electronic maintenance			Maintain and repair professional, industrial and consumer electronics, getting quality criteria, in safety, conservation environmental and complying with current legislation (600h).	<b>ANNEX DLII</b> <a href="http://www.educacion.gob.es/educa/incual/pdf/1/ELE552_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/ELE552_3.pdf</a>	5
Photovoltaic Installations technicians		Industrial mecatronics			Develop programs and supply assembly in mounting systems industrial automation, from the project and work conditions (540h).	<a href="http://www.educacion.gob.es/educa/incual/pdf/1/ELE486_3.pdf">http://www.educacion.gob.es/educa/incual/pdf/1/ELE486_3.pdf</a>	5

#### IV.5. CVET – Continuous Vocational Education Training

TRAINING PROVIDER	COURSE/ Seminar TITLE	TARGET Group	Modules/ contents	Regula r basis	Durati on (h)	Further information
IUSC	Course of specialization of Geothermal Energy	Graduates, Senior Engineers and Technical Engineers.	<ol style="list-style-type: none"> <li>1. Geothermal Deposits</li> <li>2. Prospecting Techniques.</li> <li>3. Applications of Geothermal Energy.</li> <li>4. Equipment.</li> <li>5. Power Generation.</li> <li>6. Direct uses of Geothermal Energy.</li> <li>7. Calculation of a "district heating" geothermal.</li> <li>8. Most notable experiences.</li> </ol>		24	<a href="http://www.iusc.es">www.iusc.es</a>
I.E.F.P.S. Repélega	Management of projects of solar thermal facilities	For professionals, having expertise in solar thermal systems	<ul style="list-style-type: none"> <li>• MF0842_3 Studies on the feasibility of solar installations (120 hours).</li> <li>• MF0846_3 Projects of solar thermal systems (180 hours).</li> <li>• MF0847_3 Organization and control of mounting solar thermal systems (90 hours).</li> <li>• MF0848_3 Organization and maintenance control of solar thermal systems (80 hours).</li> <li>• MP0049 Unprofessional practices on organizational and project solar heating systems (160 hours).</li> </ul>		630	<a href="http://www.repelega.hezkuntza.net/web/guest">http://www.repelega.hezkuntza.net/web/guest</a>



Universitat Politècnica de València	Introduction to the photovoltaic solar power	The most suitable profiles to easily follow the studies are: <ul style="list-style-type: none"> <li>Higher engineers and technicians from any branch: electronics, electrical, mechanical, civil, environmental, forestry, etc.</li> <li>Architecture or related field.</li> <li>Graduates in Physics, Chemistry, etc.</li> <li>Students and vocational training courses.</li> <li>Staff technical offices.</li> <li>Electrical and Installers others seeking additional training and applied in the field of solar photovoltaic and renewable energy.</li> </ul>	<ul style="list-style-type: none"> <li>Module 1: Elements of PV systems (9 ECTS).</li> <li>Module 2: Photovoltaic Systems Networking (9 ECTS).</li> <li>Module 3: Isolated photovoltaic systems (9 ECTS).</li> <li>Module 4: Photovoltaic Projects (3 ECTS).</li> </ul>	6 month	<a href="http://www.cursofotovoltaica.com">www.cursofotovoltaica.com</a>
Ilustre Colegio Oficial de Geólogos	The second course online of specialist in shallow geothermal applied to the building	professionals from across the broad spectrum of those working in the building	<ul style="list-style-type: none"> <li>Module I: Introduction and state aid</li> <li>Module II: Methodology</li> <li>Module III: Research and implementation of facilities</li> <li>Module IV: Case Studies</li> <li>Module V: Energy certification of buildings</li> </ul>	170	<a href="http://www.icog.es">www.icog.es</a>
IEFPS San Jorge	The setting out and functioning of solar photovoltaic installations	For professionals having expertise in installation and maintenance of plumbing and water networks were interested in updating their skills.	<p>The course modules are:</p> <ul style="list-style-type: none"> <li>Stakeout photovoltaic panels from a design or technical report to refitting.</li> <li>Stakeout solar photovoltaic grid-connected from a design or technical report to refitting.</li> <li>Stakeout solar photovoltaic isolated from a design or technical report in order to make assembly</li> <li>Rethinking energy support system in isolated facilities from a design or technical report.</li> </ul>		<a href="http://www.san-jorge.org">www.san-jorge.org</a>
Lea Artibai Ikastetxea	Operations of plumbing and heating domestic air conditioning	For professionals having expertise in installation and maintenance of plumbing and water networks were interested in updating their skills.	<p>The course was divided into three modules:</p> <ul style="list-style-type: none"> <li>Module 1: Installing pipes.</li> <li>Module 2: Installation and maintenance of health and cooling elements.</li> <li>Practice unearned operations professionals plumbing and heating-cooling domestic.</li> </ul>	480	<a href="http://www.leartik.com">www.leartik.com</a>



## IV.6. Indicative CVET seminars from private organisations/ companies

Name of training provider	COURSE / Seminar title	TARGET Group	Modules	Duration	Further information
Ingurubide	The 3 pillars of energy efficiency	For professional in the construction and rehabilitation	<ul style="list-style-type: none"> <li>1 or 2 companies are invited each day.</li> <li>The exposition is an hour and a half.</li> <li>Always Thursdays at 9.30am.</li> </ul>	1.5	<a href="http://www.ingurubide.org">www.ingurubide.org</a>
EVE	Solair		<ul style="list-style-type: none"> <li>Promote the implementation of market solar air conditioning appliances in SMEs.</li> <li>Focus on the residential and commercial sector combining supply hot water and heating, air conditioning.</li> <li>Resolve major market barriers.</li> <li>Develop a set of measures relevant to key market actuators.</li> <li>Create a set of tools to help the growth of the relevant market.</li> </ul>		<a href="http://www.solair-project.eu">www.solair-project.eu</a>
EVE	Climasol		When installing a solar cooling system is necessary to carefully consider the characteristics of the building in question and take all necessary measures to reduce energy needs.		<a href="http://www.eve.es">www.eve.es</a>
Krannich Solar	UniKrannich training courses		<ul style="list-style-type: none"> <li>Reception and welcome.</li> <li>Take advantage of the opportunities offered by the new Law on consumption.</li> <li>Products for the Portuguese market: What criteria continue to choose correctly?</li> <li>Products and tips for getting the most out of their isolated photovoltaic system.</li> <li>Demonstration of configuring an off-grid installation.</li> <li>Data collection and quickly design a facility. Practical example.</li> </ul>	8	<a href="http://es.krannich-solar.com/">http://es.krannich-solar.com/</a>
ALECOP	ONLINE training for professionals in "solar photovoltaic installations" and "Development of solar photovoltaic projects."		<p>The course content was as follows:</p> <ol style="list-style-type: none"> <li>Autonomous ESFV facilities in CC.</li> <li>The work of the designer-developer.</li> <li>The documentation of a ESFV project.</li> </ol>		<a href="http://www.alecop.com">www.alecop.com</a>



			<ul style="list-style-type: none"> <li>• Promotion of solar installations.</li> <li>2. Autonomous ESFV facilities in CC.</li> <li>• Determination of baseline data.</li> <li>• Calculation and design of an autonomous installation.</li> <li>• Selection of materials.</li> <li>• Plans and schemes.</li> <li>• Memory</li> <li>3. ESFV facilities network connection.</li> <li>• Study of architectural integration.</li> <li>• Study of shadows.</li> <li>• Networking Systems. Sizing.</li> <li>• Development of the security plan of a project.</li> <li>4. Projects.</li> <li>• Rural housing for temporary use DC.</li> <li>• Rural housing for permanent use in alternating current.</li> <li>• Mini 5 kW PV plant. Connected to a single phase supply.</li> </ul>		
<b>INSTAGI</b>	License course of installer and maintainer of termal installations	For professionals, having or no having knowledge of installation and/or maintenance of heating systems.	<p>The course content was as follows:</p> <ul style="list-style-type: none"> <li>• Components of a solar installation.</li> <li>• Configuring solar installations.</li> <li>• Dimensioning of solar installations.</li> <li>• Inspection and maintenance of solar installations.</li> </ul>	<b>15</b>	<a href="http://www.instagi.com">www.instagi.com</a>



## V. Desktop research about existing training programs on geothermal & solar installations in Germany

### V.1. The education system in the Federal Republic of Germany

The education system in the Federal Republic of Germany is a state-run, predominantly public-sector, legally regulated structure comprising various education institutions. The formal education system is divided into school-based general education, vocational education and training, including initial vocational education and training and the further training opportunities building on it, higher education and continuing education.

EQF level	Qualifications
1	<b>Vocational training preparation</b> Employment agency measures (vocational preparation schemes) Pre-vocational Training Year
2	<b>Vocational training preparation</b> Employment agency measures Year of pre-vocational training Introductory training for young people <i>Berufsfachschule</i> [full-time vocational school] (Basic Vocational Training
3	<b>Dual vocational education and training (2-year training courses)</b> <i>Berufsfachschule (Mittlerer Schulabschluss)</i> [full-time vocational school] (general education school leaving certificate obtained on completion of grade 10 at Realschule or, under certain circumstances, at other lower secondary school types)
4	<b>Dual vocational education and training (three-year and three-and-a-half-year training courses)</b> <i>Berufsfachschule</i> [full-time vocational school] (assistant occupations) <i>Berufsfachschule</i> [full-time vocational school] (full vocational qualification)
5	<b>IT-Spezialist (Zertifizierter) [Information Technology Specialist (Certified)], Service-techniker (Geprüfter) [Service Technician (Certified)]*</b>
6	<b>Bachelor</b>

	<i>Fachkaufmann (Geprüfter)</i> [Commercial Specialist (Certified)], <i>Fachwirt (Geprüfter)</i> [Business Management Specialist (Certified)], <i>Meister (Geprüfter)</i> [Master Craftsman (Certified)], <i>Operativer IT-Professional (Geprüfter)</i> [Operative IT Professional (Certified)]* <i>Fachschule (Staatlich Geprüfter...)</i> [ <i>Fachschule (State-Certified...)</i> ]
<b>7</b>	<b>Master</b> <i>Strategischer IT-Professional (Geprüfter)</i> [Strategic IT Professional (Certified)]*
<b>8</b>	<b>Doctoral studies</b>

Source: *Deutscher Qualifikationsrahmen für Lebenslanges Lernen* ([https://ec.europa.eu/ploteus/sites/eac-eqf/files/German\\_EQF\\_Referencing\\_Report.pdf](https://ec.europa.eu/ploteus/sites/eac-eqf/files/German_EQF_Referencing_Report.pdf))

### Primary school.

**Grades 1-4.** After the 4th grade, the children are separated according to their academic ability and the requests of their families, and attend one of three different kinds of schools: Hauptschule, Realschule or Gymnasium.

### Secondary School

#### Hauptschule

The Hauptschule (**grades 5-9**) teaches the same subjects as the Realschule and Gymnasium, but at a gentler pace and with some *vocational-oriented* courses. It leads to part-time enrollment in a vocational school combined with a traineeship until the age of 18.

#### Realschule

The Realschule (**grades 5-10** in most states) leads to part-time *vocational schools* and higher vocational schools. After the 10<sup>th</sup> grade, students with high academic achievement at the Realschule can switch to a Gymnasium on graduation.

#### Gymnasium

The Gymnasium (**grades 5-12** or 13) leads to a diploma called “Abitur” and prepares students for university study or for a *dual academic and vocational credential*. Curricula differ from school to school, but generally include German, mathematics, computer science, physics, chemistry, biology, geography, art, music, history, philosophy, civics, social studies, and foreign languages.

#### Gesamtschule

The Gesamtschule, or comprehensive school, is only found in some states. The Gesamtschule takes place at both the Hauptschule and the Realschule. All students in the 5<sup>th</sup> grade can enroll. Students who complete schooling through the 9<sup>th</sup> grade receive a Hauptschule certificate and students who complete through the 10<sup>th</sup> grade receive the Realschule certificate.

### **Berufsschule/Vocational School/Technical School**

Away from the Hauptschule and Realschule lies the Berufsschule, combining part-time academic study and *apprenticeship*. A successful achievement of an apprenticeship program leads to certification in a particular trade or field of work. Control of the Berufsschule rests with the federal government, industry and the trade unions.

Usually the *Berufsschule* (vocational school, technical school) is not part of the normal German public school system, but is financed and supervised by the federal government in conjunction with industrial groups (chambers of commerce/trade) and trade unions. As part of a concept known as “duale Berufsbildung” (dual vocational education), in which businesses and schools work together, a Berufsschule combines academic study with an apprenticeship. In most cases, students must have a diploma from a Realschule or Mittelschule in order to be accepted by a Berufsschule, which usually has a two- or three-year course of study. Successful tech school graduates are certified in a certain trade or industrial field

### **Germany Higher Education System**

Types of Higher Education Institutions: Universities and equivalent institutions of higher education, Colleges of art and music and Fachhochschulen (Hochschulen für angewandte Wissenschaften/Hochschulen für angewandte Forschung).

### **Universities and equivalent institutions of higher education**

In addition to the traditional universities, the Universities of Applied Sciences, which specialize in natural and engineering sciences also, have university status. What these institutions have in common is the right to award doctorates.



Academic and scientific research and the teaching of the next generation of academics are also characteristic features of universities and corresponding institutions of higher education.

### **Colleges of art and music**

Colleges of art and music offer courses in the visual, design and performing arts as well as in the area of film, television and media, and in various music subjects.

### **Universities of Applied Sciences**

Fachhochschulen (universities of applied sciences) are characterized by a *practice-oriented* teaching and research, an integrated semester of practical training, and professors, who have, in addition to their academic qualifications, gained professional experience outside the academic field. Awards bachelor and master degree.

### **Institutions outside the higher education system**

Berufsakademien or professional academies combine academic training with practical professional training. This is called a *duales system* or *dual system*. The companies where the practical professional training take part pay the salary of the students. The students are also paid during the theoretical part of their education.

Many universities of applied sciences have developed so-called dual courses of study.

### **Dual study programs**

*Fachschulen* are institutions of continuing vocational education and advance training in the tertiary sector that require appropriate vocational training in a recognized occupation.

### **Vocational education and training**

In the Federal Republic of Germany the vocational education and training system is of central importance. Training in the dual system, i.e. training in companies and in the Berufsschule (part-time vocational school), has a leading role.

The German vocational education and training system has divided into three major sectors each with their own institutional structures:

- The dual system; in company training and school-based training

- The vocational school system
- The transitional sector between general education schools and regular vocational education and training.

### Tables – Vet programs for geothermal & Solar skills

Vocational course of education	Qualification/acquired entitlements	Legal basis/special features
<b>Dual system of vocational education and training</b>		
Dual vocational education and training (in-company + part-time in vocational schools)	<p>Skilled worker [<i>Facharbeiter</i>], journeyman [<i>Geselle</i>], specialised employee [<i>Fachangestellter</i>]</p> <p><i>Fachhochschulreife</i> [higher education entrance qualification for the <i>Fachhochschule</i> (university of applied sciences)] following an additional examination</p> <p>Access to higher education for vocationally qualified applicants without a higher education entrance qualification</p>	<p>Vocational Training Act [<i>Berufsbildungsgesetz</i>] or Handicrafts Code [<i>Handwerksordnung</i>]</p> <p>Federal training ordinances</p> <p>Framework curricula for the <i>Berufsschule</i> (part-time vocational school) in accordance with the Resolution of the Standing Conference</p> <p>Länder ordinances on the <i>Berufsschule</i></p> <p>Agreement on the acquisition of the <i>Fachhochschulreife</i> in vocational courses of study (Resolution of the Standing Conference of 5 June 1998 as amended on 9 March 2001)</p> <p>Higher education access for vocationally qualified applicants without a higher education entrance qualification (Resolution of the Standing Conference of 6 March 2009)</p>
<b>Regulated vocational further training</b>		

Further training examinations through the	e.g. Master Craftsman in Industry [ <i>Industriemeister</i> ], Business Management	Vocational Training Act [ <i>Berufsbildungsgesetz</i> ] or Handicrafts Code [ <i>Handwerksordnung</i> ]
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competent authorities (chambers)	Specialist [ <i>Fachwirt</i> ], Commercial Specialist [ <i>Fachkaufmann</i> ]  Access to higher education for vocationally qualified applicants without a higher education entrance qualification	Federal training ordinances  The attendance of training courses is not obligatory. Training courses to prepare for the further training examination are offered by private educational providers.  Higher education access for vocationally qualified applicants without a higher education entrance qualification (Resolution of the Standing Conference of 6 March 2009)
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**Vocational education in schools**

<p>Fully qualifying vocational training at the <i>Berufsfachschule</i> (full-time vocational school) under the Vocational Training Act [<i>Berufsbildungsgesetz</i>]</p>	<p>Skilled worker [<i>Facharbeiter</i>], journeyman [<i>Geselle</i>], specialised employee [<i>Fachangestellter</i>]</p> <p><i>Fachhochschulreife</i> [higher education entrance qualification for the <i>Fachhochschule</i> (university of applied sciences)] following an additional examination</p> <p>Access to higher education for vocationally qualified applicants without a higher education entrance qualification</p>	<p>Vocational Training Act [<i>Berufsbildungsgesetz</i>] or Handicrafts Code [<i>Handwerksordnung</i>]</p> <p>Federal training ordinances</p> <p>Framework curricula for the <i>Berufsschule</i> Regulations for the <i>Berufsfachschule</i> Agreement on the acquisition of the <i>Fachhochschulreife</i> in vocational courses of study (Resolution of the Standing Conference of 5 June 1998 as amended on 9 March 2001)</p> <p>Higher education access for vocationally qualified applicants without a higher education entrance qualification (Resolution of the Standing Conference of 6 March 2009)</p>
<p>Training in assistant occupations in the <i>Berufsfachschule</i> (full-time vocational school)</p>	<p>State-certified assistant</p> <p><i>Fachhochschulreife</i> and/or <i>Allgemeine Hochschulreife</i> (general higher education entrance qualification) following additional examination</p> <p>Access to higher education for vocationally qualified applicants without a higher education entrance qualification</p>	<p>Ordinances regulated under Land law</p>

<p><i>Fachoberschule/ Berufsoberschule</i></p>	<p><i>Fachhochschulreife Fachgebundene Hochschulreife</i> (higher education entrance qualification restricted to a specified field of study) <i>Allgemeine Hochschulreife</i> (general higher education entrance qualification)</p>	<p>Ordinances regulated under Land law As well as the ability to study, the professional ability to act is also developed.</p>
<p><i>Berufliches Gymnasium/Fachgymnasium</i></p>	<p><i>Allgemeine Hochschulreife</i></p>	<p>Ordinances regulated under Land law In addition to the tasks of the general education <i>Gymnasium</i>, these include work-related disciplines and specializations such as economics, technology,</p>
		<p>professional information technologies, nutrition, agricultural science, and health and social issues, which may be chosen instead of general education subjects as a second subject with an intensified requirement level and which are also examination subjects in the <i>Abitur</i> examinations.</p>
<p><b>Further vocational training at <i>Fachschulen/Fachakademien</i></b></p>		

<p>Further training at a <i>Fachschule/Fachakademie</i></p>	<p>e.g. State Certified Technician [<i>Staatlich geprüfter Techniker</i>], Certified Business Administrator [<i>Betriebswirt</i>] <i>Fachhochschulreife</i> following an additional examination Access to higher education for vocationally qualified applicants without a higher education entrance qualification</p>	<p>Ordinances regulated under Land law Framework Agreement on <i>Fachschulen</i>, Decision of the Standing Conference dated 03.03.2010 Agreement on the acquisition of the <i>Fachhochschulreife</i> in vocational courses of study (Resolution of the Standing Conference of 5 June 1998 as amended on 9 March 2001) Higher education access for vocationally qualified applicants without a higher education entrance qualification (Resolution of the Standing Conference of 6 March 2009)</p>
<p><b>Transitional sector between general education schools and vocational education</b></p>		
<p>Basic vocational training year at a <i>Berufsfachschule</i> (full-time vocational school), with some practical in-company training (full-time school/ cooperative)</p>	<p>Basic vocational training Crediting as the first training year in the event of transition into a dual vocational education and training course regulated by Land law</p>	<p>Framework Agreement on <i>Berufsfachschulen</i> (Resolution of the Standing Conference of 28 February 1997 as amended on 7 December 2007) Curricula are regulated by Land law Acquisition of a subject-specific basic vocational training, promotion of the professional ability to act</p>
<p>Pre-vocational training year at a <i>Berufsschule</i> (part-time vocational school) or through education providers</p>	<p>Parts of the basic vocational training, where applicable the secondary general school certificate</p>	<p>Pre-vocational school study course, regulated by Land law Preparation for entering vocational training or employment</p>

Vocational preparation scheme through education providers	Basic vocational qualification, where applicable the secondary general school certificate	Social Security Code [ <i>Sozialgesetzbuch</i> ] III Section 51 Preparation for starting vocational training or facilitating professional insertion
Introductory training in companies and at a <i>Berufsschule</i> (parttime vocational school)	Parts of the first year of training for a training occupation, where applicable qualification modules under the Vocational Training Act [ <i>Berufsbildungsgesetz</i> ]	Social Security Code [ <i>Sozialgesetzbuch</i> ] III Section 54 a In-company introductory training serves to impart and deepen the basic foundations enabling young people to act in a professional ability. Where in-company introductory training is implemented as vocational training preparation under the Vocational Training Act [ <i>Berufsbildungsgesetz</i> ], Sections 68 to 70 of the Vocational Training Act apply.

Table 1 Solar

Nº	Organization: Title and place	Trainees: Students, Engineers with bachelor /master degree, Architects, Technicians – Electrical, HVAC...	Title of the VET:	Training program: Detailed description, List of modules, topics etc.	Type: In class, On work, On-line, other	Durations: IVET1 IVET2 CVET VETP	Syllabus (Nº of hours): Lectures Practice	Document obtained: Certificate, Diploma	Source of information : site
1	Distance Learning Center -	General certificate of secondary	Regenerative energy sources – technology,	General principles of renewable energies Thermal utilization of solar energy	In class	CVET	12 months, 8 hours per week	Certificate – Approved by the National	<a href="http://bit.ly/2o9gHfH">http://bit.ly/2o9gHfH</a>



	<p>Fernschule Weber</p>	<p>education (5th year secondary)</p> <p>All employees in companies that are active in the field of environmental protection or want to be in the future</p> <p>Employees of authorities and public bodies, in so far as they are active in the field of environmental protection or wish to be in the future</p> <p>Commissioner for waste that wants to develop further</p> <p>Members of environmental associations</p> <p>Employees of waste disposal companies,</p>	<p>application and economic efficiency</p>	<p>Function and application possibilities of heat pumps</p> <p>Photovoltaics and their application</p> <p>Wind energy "Regenerative energy sources - technology, deployment and profitability</p> <p>Biomass or biogas</p>				<p>Center for Distance Learning (ZFU) and registered under the number 787601</p>	
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		<p>landfills, waste incineration plants and composting plants</p> <p>Members of municipal parliaments</p> <p>All who want to deepen their knowledge in the field of environmental protection</p> <p>Anyone who wants to improve their chances on the labor market through higher qualification or wish to reorient themselves professionally by expanding their knowledge without a career break</p> <p>Anyone who wants to expand his</p>							
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		education and his knowledge in general							
2	Chamber of Handicrafts - Düsseldorf	Craftsmen	Solartechnik/Solarateur®	<p>Theory</p> <ul style="list-style-type: none"> <li>Fundamentals of energy engineering</li> <li>Preparatory course of thermal engineering</li> <li>Electrical Engineering</li> <li>Photovoltaics</li> <li>Solar thermal energy</li> <li>NRW-Aktion "Solar-Check NRW"</li> <li>Heat pump</li> <li>Housing ventilation</li> <li>Marketing and customer orientation</li> <li>Preparation for examination</li> </ul> <p>Practice</p> <ul style="list-style-type: none"> <li>Security on the roof</li> <li>measuring technology</li> <li>Photovoltaics</li> <li>Solar thermal energy</li> </ul>	In class and practical	CVET	210 hours in 9 months (150 hours theory, 60 hours practice)	Certificate of advanced vocational training, „Solarateur®“	<a href="http://bit.ly/2p8HXsl">http://bit.ly/2p8HXsl</a>
3	WBS Training, private training provider	Job-seekers, Craftsmen, somebody entering a field of work different from their educational background	consultant Solar energy and heat pumps	<p>Solar thermal installations (15 days) *</p> <ul style="list-style-type: none"> <li>Physical principles, laws, regulations, subsidies, types of equipment, components, solar stations, solar storage, integration of heating and WW system, control, regulation, optimization, design, planning, profitability</li> </ul>	Virtual classroom training	VETP	66 days, full-time	WBS Certificate	<a href="https://www.wbstraining.de/weiterbildung-fachberater-in-solarenergie-und-waermepumpen/">https://www.wbstraining.de/weiterbildung-fachberater-in-solarenergie-und-waermepumpen/</a>

				<p>Photovoltaic plants (15 days) *</p> <p>Physical principles, laws, regulations, subsidies, technology and technology, system components, protective measures, planning of autonomous and grid-connected PV systems, insurance, yield and profitability</p> <p>Heat pumps (15 days) *</p> <p>Physical principles, heat pump principle, types, operating modes, performance ratings, dimensioning, approval and planning steps, maintenance, optimization, safety, noise protection, calculation examples</p> <p>Project management (10 days)</p> <p>Management, Marketing and Sales (10 days)</p> <p>Marketing, sales, advertising, PR, management competence, team process, verbal / nonverbal communication, communication strategies, conversation techniques, sales process, call control, customer relationship</p>					
4	German Solar Energy Society	Architects, technicians, craftsmen	Consultant Photovoltaic	<p>Basics</p> <p>Solar radiation</p> <p>Solar cells and module technology</p>	Classroom /Seminar	VETP	4 days	certificate depending on your professional	<a href="http://www.dgs-berlin.de/de/dgssolarschu">http://www.dgs-berlin.de/de/dgssolarschu</a>

				<p>Inverter technology Electrical storage</p> <p>Planning</p> <p>Plant concepts Plant dimensioning Protection and safety engineering Standards and regulations Practical exercise</p> <p>Profitability I - Revenues and savings, profit and loss</p> <p>EEG as the basis for the cost-effectiveness of PV systems Electricity price development, electricity production costs Income, self-consumption, self-sufficiency, optimization Concepts with storage (batteries, heat storage, heat pump) and PV guerrillas Energetic refurbishment with PV (ENEV Consideration of PV installations) Costs, taxes, insurance</p> <p>Profitability II</p> <p>Operational concepts: solar power supply, PV rental, PV partial rent Practical examples and user queries Profitability calculation (with and without self-consumption) and software Marketing: customer consulting, customer wishes, sales arguments,</p>				<p>qualification . Certificate DGS Specialist Photovoltaic .</p>	<p>len/kursephoto voltalk.html#</p>
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				environmental aspects					
5	German Solar Energy Society	Electricians, technicians	Craftsman Photovoltaic	<p>Basics</p> <ul style="list-style-type: none"> <li>Solar radiation, solar cells, modules and inverters</li> <li>Electrical characteristics, characteristics and parameters</li> <li>Shading effects, hot spot</li> <li>Quality and longevity, quality proof</li> <li>Ecological assessment</li> </ul> <p>Planning, design and safety of grid-connected PV systems</p> <ul style="list-style-type: none"> <li>Technical regulations structural standards and guidelines</li> <li>Plant concepts, various interconnection possibilities</li> <li>Step-by-step design of a system for medium and low voltage, grid integration</li> <li>Dimensioning of components and lines</li> <li>Optimization of yield</li> </ul> <p>Assembly, installation</p> <ul style="list-style-type: none"> <li>Installation of various mounting systems</li> <li>Building rights, statics, accident prevention regulations, safety, typical case studies</li> <li>Practical installation on training roofs</li> </ul> <p>Commissioning and operation</p>	Classroom /Seminar	VETP	5 days	Certificate DGS Specialist Photovoltaic	<a href="http://www.dgs-berlin.de/en/dgssolarschools/kursephotovoltaik.html">http://www.dgs-berlin.de/en/dgssolarschools/kursephotovoltaik.html</a>

				<p>Commissioning and operation of PV systems; Plant monitoring, maintenance and service; Fault analysis, protection of goods</p> <p>Cost and profitability</p> <p>Investment costs, performance ratio, income</p> <p>Tax, PV insurance, EEG, self-consumption, promotion programs for storage technology</p> <p>Profitability, forecasting of the market segments</p> <p>Presentation of measuring instruments and measurements on PV modules</p> <p>For shading and location analysis</p>					
6	Vocational School - TBS1 Bochum	Apprentices, students	Solartechnik	<p>Electrical power output</p> <p>Meteorological data</p> <p>Pollution of the environment</p> <p>Measured value evaluation</p> <p>Environmental database</p> <p>Visualization statistics</p> <p>Data transmission</p> <p>Transfer within the school</p> <p>Provision of data for a school weather network</p> <p>Feed into the Internet</p> <p>Plant planning</p> <p>Mechanical / electrical components</p> <p>Approval procedures / Construction</p>	Classroom, in company	IVET2	2 years	Certificate of vocational training	<a href="https://www.tbs1.de/jcms/index.php?option=com_content&amp;view=article&amp;id=53&amp;Itemid=57">https://www.tbs1.de/jcms/index.php?option=com_content&amp;view=article&amp;id=53&amp;Itemid=57</a>

				regulations Cost / benefit calculation under ecological aspects					
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**Table 2 Geothermal**

<b>Nº</b>	<b>Organization: Title and place</b>	<b>Trainees: Students, Engineers with bachelor /master degree, Architects, Technicians – Electrical, HVAC...</b>	<b>Title of the VET:</b>	<b>Training program: Detailed description, List of modules, topics etc.</b>	<b>Type: In class, On work, On-line, other</b>	<b>Dur atio ns: IVE T1 IVE T2 CV ET VE TP</b>	<b>Syllabu s (Nº of hours): Lecture s Practice</b>	<b>Documen t obtained: Certificat e, Diploma</b>	<b>Source of informatio n: site</b>
1	Aachen RWTH, University	Students	Bachelor degree	Applied Geosciences List of modules/topics: General Geology History of the Earth Crystallography Mineralogy Determination of Minerals Petrology Paleontology Polarization Microscopy I Geological Work Methods Cartography Sedimentology, Endogenous Dynamics Geophysics Engineering Geology and Hydrology Organic Geochemistry Radiographic Powder Methods Clay Mineralogy Regional Geology	In class	IVE T2	180 ECTS Credits	diploma	<a href="https://www.rwth-aachen.de/go/id/bqxx?lidx=1#aaaaa-aaaaabqxy">https://www.rwth-aachen.de/go/id/bqxx?lidx=1#aaaaa-aaaaabqxy</a>



				Inorganic Geochemistry Geoformation Systems Remote Sensing Statistics and Modelling Presenting and Publishing					
		Students with bachelor degree	Master degree	Applied Geosciences List of modules/topics: Geophysics-Hydrogeology-Engineering Geology Energy and Mineral Resources Geomaterials	In class	IVE T2	120 ECTS Credits	diploma	<a href="https://www.rwth-aachen.de/go/id/bnlc?lid=x=1#aaaaaaaaaaabnld">https://www.rwth-aachen.de/go/id/bnlc?lid=x=1#aaaaaaaaaaabnld</a>
		Students	Bachelor degree	Georesources Management List of modules/topics: Mineralogy and Petrography Geological Foundations Commercial Geography Climatology Soil Geography Biogeography Introduction to Business Administration Raw Materials Economy Environmental Management Microeconomics Geochemistry Statistics and Programming Geochemical Analytics Geodynamics Raw Materials and Recycling Engineering and Hydrogeology Geoformation Systems Maps and Satellite Data Communication Law	In class	IVE T2	180 ECTS Credits	diploma	<a href="https://www.rwth-aachen.de/go/id/bllm?lid=x=1#aaaaaaabln">https://www.rwth-aachen.de/go/id/bllm?lid=x=1#aaaaaaabln</a>
		Students with bachelor degree	Master degree	Georesources Management	In class	IVE T2	120 ECTS Credits	diploma	<a href="https://www.rwth-aachen.de/go/id/blte?lid">https://www.rwth-aachen.de/go/id/blte?lid</a>

**Existing Training Programmes in geothermal & solar Installations**

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2	Aachen RWTH/Delf TU/Zürich ETH University	Students with bachelor degree	joint master degree program	Applied Geophysics	In class	IVE T2	120 ECTS Credits	diploma	<a href="http://www.rwth-aachen.de/cms/root/Studium/Vordem-Studium/Studiengaenge/Liste-Aktuelle-Studiengaenge/Studiengaengebeschreibung/~bjvc/Applied-Geophysics-M-Sc/?lidx=1">http://www.rwth-aachen.de/cms/root/Studium/Vordem-Studium/Studiengaenge/Liste-Aktuelle-Studiengaenge/Studiengaengebeschreibung/~bjvc/Applied-Geophysics-M-Sc/?lidx=1</a>
3	ICDP International Continental Scientific Drilling Program	The training course is recommended for master students, doctorate students and post-docs involved in scientific drilling	Annual Training course	scientific drilling, including fundamentals of drilling technology, borehole measurements and interpretation, data management, sample handling and storage, and project management	In class	VET P			<a href="http://www.icdp-online.org/support/training/annual-training-course/training-content/">http://www.icdp-online.org/support/training/annual-training-course/training-content/</a>
4	GESEP e.V School of Geo Science	graduate and PhD student s as well as Post- doc scientists	<i>GESEP School</i>	Fundamentals of scientific drilling	In class	VET P			<a href="http://www.gesep.de/weiterbildung/interne-angebote/">http://www.gesep.de/weiterbildung/interne-angebote/</a>

**Existing Training Programmes in geothermal & solar Installations**

5	LIAG  Institute of Applied Geophysics	Students	Study practical	Promotion of young scientist. School or study practical in one of the following sections: Groundwater systems and hydrogeophysics Geothermal energy Research boreholes	In class	CV ET			<a href="http://www.liag-hannover.de/en/teaching-and-promotion-of-young-scientists.html">http://www.liag-hannover.de/en/teaching-and-promotion-of-young-scientists.html</a>
6	Westdeutsche Handwerkskammer (WHKT)  Chamber of Handicrafts	Engineers, technicians, electricians	Vocational training	Vocational training for the following jobs Well-driller Electrical engineer Mechatronics Plant mechanic Etc.	In class / on work	CV ET	Duration: 36 Months		<a href="https://www.whkt.de/ausbildung/ausbildungsbereitungen/ausbildungsbereitungen-im-handwerk-ausgebildet-werden/">https://www.whkt.de/ausbildung/ausbildungsbereitungen/ausbildungsbereitungen-im-handwerk-ausgebildet-werden/</a>
7	Bau-ABC Rostrup  Educational Centre	Engineers, technicians, electricians	Vocational training	Vocational training for the following jobs Well-driller Electrical engineer Mechatronics Plant mechanic Etc.	In class / on work	CV ET			<a href="http://www.bau-abc-rostrup.de/de/Ausbildung/Berufe">http://www.bau-abc-rostrup.de/de/Ausbildung/Berufe</a>
8	Bauakademie Nord  Institute for further professional education	Engineers, technicians	Training courses	Vocational training for well-drilling masters  - Technical math - Technical drawing - Building site survey - drilling technology - well construction - Plant construction - Documentation - Water supply - Special low profile construction	In class	VET P	Duration: 16 weeks	certification	<a href="http://www.bauakademie-nord.de/index.php?datei=weiterbildungsangebot/kat.php&amp;sys=160&amp;bez=Brundenbauermeister">http://www.bauakademie-nord.de/index.php?datei=weiterbildungsangebot/kat.php&amp;sys=160&amp;bez=Brundenbauermeister</a>

				<ul style="list-style-type: none"> <li>- Operating customer</li> <li>- manufacturing</li> <li>- Calculation and billing</li> <li>- accident prevention, occupational safety, work safety</li> <li>- Environmental Protection</li> </ul>					
		Engineers, technicians	Training courses	<p>Vocational training “Drilling, Special low profile construction and geothermal energy ”</p> <p>Planning of site surveys                  Deep ground exploration in soils                  Building excavation drillings in rock                  Work aids: Quality assurance at geot. Exploration and the                  STLK 203 Drilling work                  Drilling in special deep-drawing (extract)                  Probing and borehole investigations                  Geophysics in water and civil engineering                  Fundamentals of the Exploration of Weapons                  Methods for the discovery of weapons                  Planning of warfare investigations                  Laboratory tests on soil and fodder samples                  From digestion in the soil to the soil model                  From digging into the rock to the building model                  VOB / Homogeneous areas                  Waste Management: Recycling and disposal of drilling fluids and                  Drilling material                  Borehole filling and surface restoration                  Flushing and pumping technology for horizontal flushing drilling                  Digital drilling data collection                  Basic information on the grounding information:                  NIBIS card server                  Offshore site survey - planning and specifications for the execution                  Offshore site survey - Project example</p>	In class	VET P			

**Existing Training Programmes in geothermal & solar Installations**

				<p>Qualifications for drilling work. What should that be?                  Drilling technician. What's this?                  Company qualifications. Who needs it?                  Qualified specialist supervisor. Is that possible?                  Real-time calculation of wells and effects on the environment                  Sealing of wells, germination                  Stainless steel constructions at wells                  Large rotary drilling machine for well construction and dredging for the                  Well construction                  Load securing                  Traffic safety of demanding construction sites                  Well and measuring point construction - understandable!                  Construction of groundwater and pore water pressure measuring points                  Exploration in the track bed                  Exploring the motorway</p>					
9	Tracto-Technik  Further education, private	Engineers, technicians	Training courses	Training courses for "Drilling fluids", "Positioning technology", "Rock drilling", ""	In class	VET P	Duration: 2-3 days		<a href="https://www.tracto-technik.de/Schulungen-219.html">https://www.tracto-technik.de/Schulungen-219.html</a>
10	Agency for Renewable Energy, Chamber of Crafts and Trades, Chamber of Industry and Commerce	Entry requirements are not governed by legislation; as a rule, young people are admitted after completing (nine or ten years of) general education.	Well builder	<p>Carry out excavation work, line construction pits and trenches</p> <ul style="list-style-type: none"> <li>• Fill in and compress earth and build embankments</li> <li>• Carry out water retention measures and investigate the site ground</li> <li>• Take, examine and label soil samples and keep soil course records</li> <li>• Create vertical and horizontal embankments for such purposes as examining the ground at the site, for extracting and in - feeding water and for lowering the groundwater</li> </ul>	Teaching of the knowledge, skills and competences needed for an occupation	CV ET	3 years	Certificate, Chamber of Crafts and Trades, Chamber of Industry and Commerce	<a href="https://www.bibb.de/tools/berufesuche/index.php/certificate_supplement/en/brunnenbauer_e.pdf">https://www.bibb.de/tools/berufesuche/index.php/certificate_supplement/en/brunnenbauer_e.pdf</a>

			<p>and for geothermal purposes, using drilling equipment and applying a range of drilling techniques</p> <ul style="list-style-type: none"> <li>• Develop boreholes into wells, groundwater measuring positions and geothermal probes</li> <li>• Lay pipelines and attach the corresponding fittings</li> <li>• Fit prefabricated units used in well construction and pipeline installation</li> <li>• Build bulkheads</li> <li>• Carry out pumping tests</li> <li>• Install water transportation and treatment plants</li> <li>• Detect t and document shortfalls in well performance and the causes of such shortfalls</li> <li>• Carry out restorative and regeneration measures on wells</li> <li>• Maintain equipment, plants and machinery and in particular repair pumping and transportation systems</li> <li>• Use and process metals and synthetic materials</li> <li>• Carry out related tasks in the field of building construction,</li> <li>• Work autonomously either alone or in conjunction with others to execute works on the basis of technical documentation and work orders</li> <li>• Plan and coordinate work and coordinate work with those involved in the construction works</li> <li>• Set up construction sites and initiate measures to safeguard the work process and ensure safety, health and safety at work and environmental protection at the construction site</li> <li>• Check the quality of the work for any errors in execution, document works</li> <li>• Carry out quality assurance measures</li> <li>• Invoice for services provided and conduct official handover of vacated job site</li> <li>• Use equipment and machinery</li> <li>• Rigid work, load bearing and protective scaffolding and calibrate plant components and construction</li> </ul>	<p>on is based on the typical requirements of work and business processes and prepares the trainees for a specific job. The training is provided in a company and at part-time vocational school : In the company, the trainees acquire practical skills in</p>				
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				<p>machinery subassemblies.</p>	<p>a real working environment. On one or two days per week, the trainees attend part-time vocational school, where they are taught general and vocational knowledge related to their training occupation.</p>				
11	Vocational School IHK Berlin	Apprentices	Well construction, Vocational training	<p>Carry out excavation work, install excavation pits and ditches, fill and compact soil masses and lay embankments,</p> <p>Carry out water conservation measures,</p>	In class, in company	IVE T2	3 years	Educational certificate	<a href="https://www.ihk-berlin.de/ausbildung/Ausbildungsbe">https://www.ihk-berlin.de/ausbildung/Ausbildungsbe</a>

				<p>Investigate the subsoil, take soil samples, examine and designate them and carry out layer lists,</p> <p>Make bores, for example, to investigate the soil, to extract water and to introduce water and to lower groundwater,</p> <p>Use drilling equipment and apply different drilling methods,</p> <p>Laying pipelines and installing associated fittings,</p> <p>Build complete parts in well and pipeline construction,</p> <p>Building bridges for groundwater measuring stations.</p> <p>Make vertical and horizontal bores,</p> <p>Perform pumping tests,</p> <p>Install water pumping and water treatment plants,</p> <p>Identify and document the shortcomings and causes for the drop in water output from wells,</p> <p>Perform well restoration and well regeneration measures</p> <p>Service equipment, equipment and machines, in particular repair pumps and conveyor systems.</p>					<p><a href="#">rufe von A bis Z/Brunnenbauer/2262530</a></p>
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# GSS-VET



Contact and information:  
[www.gss-vet.eu](http://www.gss-vet.eu)

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