INTACT

Integration of Newly Arrived Migrants By Means Of Competency Assessment And High-Quality Further Vocational Training

Curricula

Energy efficiency and renewable energies

Satakunta University of Applied Sciences (SAMK), project partner number 7

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Introduction

Continuously increasing amount of greenhouse gases in atmosphere and increasing average temperature on the earth, the greenhouse effect, is believed to be a consequence of greenhouse gases. Worldwide climate change treaty and both European Union and national regulation with the aim to control the ongoing climate change and to limit the rise of temperature have directed the focus of the energy policy to renewable and alternative energy sources. The aim of the curricula presented below is to respond the requirements set by these new trends of the energy policy.

Target group

The target group of curricula consists of refugees and immigrants with various backgrounds, knowledge and experience, thus all potential students do not have the same start level. This means that in curricula two start points have been included (Figure 1), one for beginners, who should get elementary training including basics of electric, physics, chemistry, electronic, buildings and construction before the courses. Case by case also the potential lack of knowledge in mathematics should be tackled. If the local or national qualification rules contain admission requirements, it is responsibility of each local actor giving the training to make sure that

a) each participant has the required education, skills and experience, and
b) for those who do not have required education and experience, the elementary training described above will give the required skills.

The second start point is for those who already have the basic knowledge needed, who for example have technical or electric qualification, and who wants to specialize in renewable energy. Furthermore, considering the target group (refugees and immigrants), the curricula should give them knowledge and skills they could be capable to utilize in their own countries if they are returning. Thus, the curricula should give certain common skills and knowledge but also enable modification and personalization depending to the needs of both individuals themselves and the host country.

The qualification requirements and ways to reach qualifications and licenses to electric and energy work are quite different in the BSR-countries, thus the curricula can be written only as a form of framework inside which the local actors should be able to modify the contents of courses according to their own regulations and local requirements.

Work required

In the curricula the average work required by each course is measured in ECTS credit units (Abbreviated in this presentation as CU). One credit unit is 27 hours studying, and the total of obligatory theory courses and practice is 22 ECTS credit units corresponding 594 hours containing lectures, guided training in practice, individual studies and assignments. The practical training varies from 1 to 5 CU:s depending to the earlier proved experience of student. Furthermore, there is voluntary course packet “Management and entrepreneurship”, 15-25 CU:s, that is targeted to those planning to found a business of their own. All the courses can be used as separate modules.

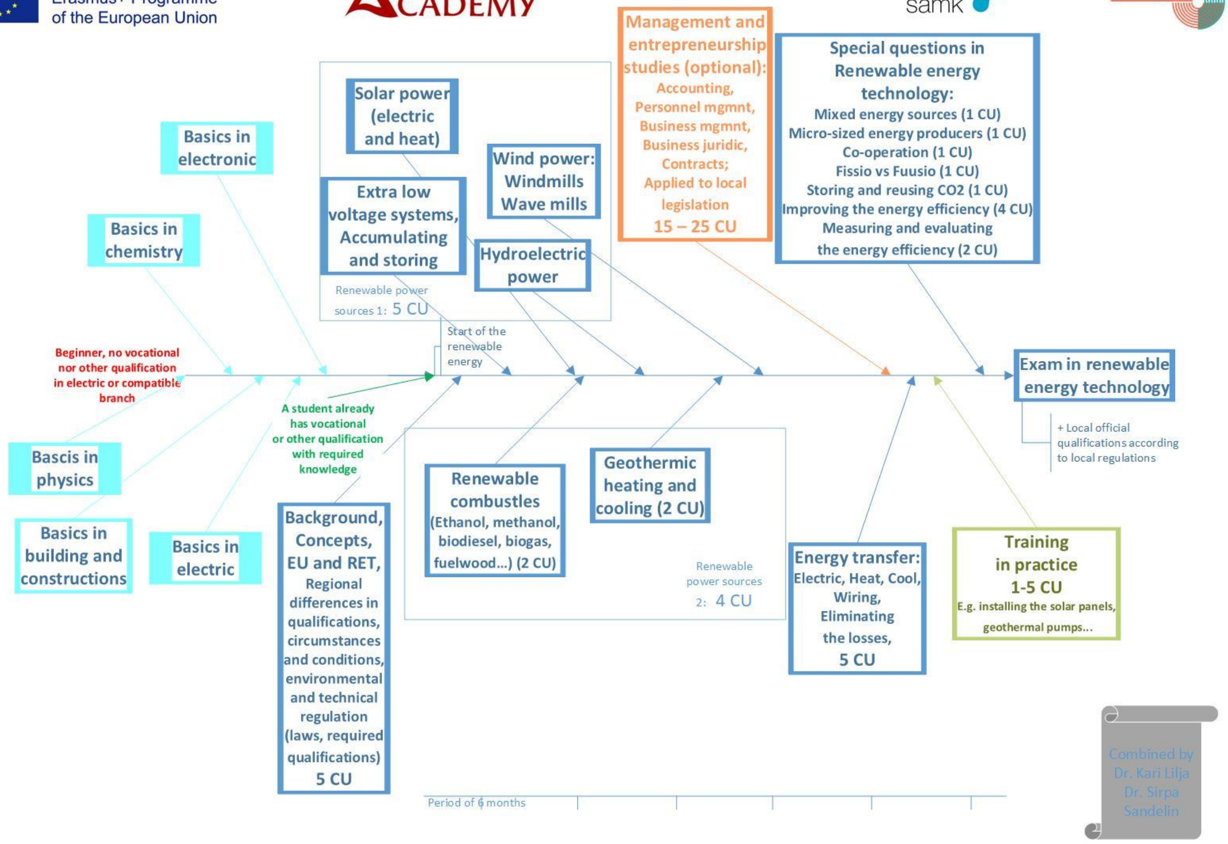

Figure 1: Content and order of Courses

Variation in regulations and circumstances

The regulation on both construction and electric branches is based on national-wide qualification systems limiting the rights of workers to do certain tasks, and national and even local requirements concerning e.g. isolation of houses, distances of wind mills from settled areas or location of geothermal heat well.

The national and local differences become more highlighted in the need of certain services like heating and cooling. In the southern part of Finland, cooling is needed approximately 2 months per year (Past year was an exception), whereas in Lapland there can be only few days when the cooling would be appreciable. With heating and thermal insulation, the situation is even more complicated. In south-western part of Finland, the temperature in winter varies mostly between -5 and +2 degrees, but there may be cold periods, when a temperature remains week or two under -20 degrees. Furthermore, it is always possible that the temperature sinks below -30 degrees and even close to -40. In eastern and northern parts of Finland the temperature varies during the winter mostly between -15 and -25 degrees but may sometimes go close to -40 degrees and stay there for weeks. Other parts of Finland are something between these. The new energy efficiency - and thermal insulation rules are measured according to average circumstances, which means that in one part of the country they can be oversized and in some other part of the country they might be hardly undersized.

This diversity in local circumstances will be multiplied if we compare northern Finnish village to southern German, Polish or Estonian city, and furthermore, in addition to temperature, rain and snow, other variations will be found from possibilities to use district heating, solar power and heat, wind power or geothermic heat. In the most northern village in Finland and in EU, Nuorgami, the sun is shining days and nights for 74 days, two and a half months, in summer and staying under the horizon 51 days in the winter, during the period, when the energy would be needed most. In the most southern part of Germany there is only few hours difference in sunny periods between winter and summer. The district heating is reasonable in villages and cities where the buildings are close to each other and close to power plant producing heat. In Finland there are regions where the distance between two farms or detached houses may be dozen kilometers.

Modular structure

Due to the regional differences, some of which were described above, the contents of courses concerning regulation and its adaptation to local circumstances must be responsibility of local institutes. In this curriculum just the frames are included. As the target group of this training is refugees and immigrants, the background, knowledge and experience of participants may vary a lot. The courses have been packed as modules (**Fehler! Verweisquelle konnte nicht gefunden werden.**), and each module contains certain independent topics (Figure 3: Obligatory and optional coursesFigure 3). Each topic, its subtopics, goals and examples of material will be described below in the chapter “Contents of curricula”.

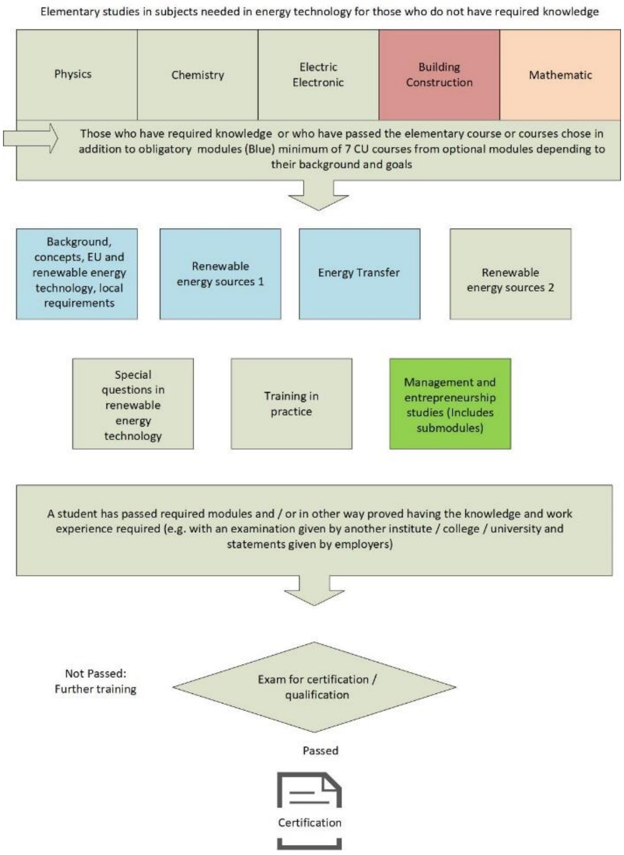

Figure 2: Modular structure

Background education If no suitable / acceptable vocational education

- Basics in
  - Mathematic
  - Physics
  - Chemistry
  - Building construction + practice

Obligatory courses 15 CU To be studied by everyone

- Background, Concepts, EU and RET, Regional differences in qualifications, circumstances and conditions, environmental and technical regulation (laws, required qualifications) 5 CU
- Renewable power sources 1, 5 CU: Solar energy (Heating and electricity), Wind power (Wind mills, wave mills), Hydroelectric power, Extra Low Voltage Systems (Wiring, energy losses, accumulators),
- Energy transfer: Electric, Heat, Cool, Eliminating the losses, collecting and reusing the loss energy 5 CU

Optional courses 7 CU min These courses can be selected depending to the needs of student

- Renewable power sources 2, 4 CU: Renewable combustibles (2 CU), Geothermic heating and cooling (2 CU) – can be selected separately
- Special questions in Renewable energy technology, 4 CU: Mixed energy sources, Micro-sized energy producers, Co-operation, Fissio vs Fuusio, Reusing the CO2; 1 CU per each.
- Improving the energy efficiency, 4 CU: Building construction; Isolating; Recovery of waste energy; Designing and planning;
- Measuring and evaluating the energy efficiency of the buildings, 2 CU: Legislation and regulations; Measuring; Calculations
- Business management (Not replacing the items above but in addition to these, if student wants), 15 – 20 CU

Figure 3: Obligatory and optional courses

Contents of the curricula

Obligatory parts

Background, Concepts, EU-regulation and regional and local differences, 5 CU

Motivation is one of the important factors behind the good results in learning. It is essential for students beginning their studies to know why these subjects must be studied, why these topics should be learned. In the first course this motivation is raised and supported by highlighting the emerging concept of sustainable development and clarifying the conceptual hierarchy between energy technology, renewable energy, energy efficiency and sustainable development (Figure 4). Student should also know, what is the sense of climate change or greenhouse effect, how they may affect on our daily life and how is the EU-level regulation to which the national regulation is based trying to tackle them. Furthermore, it is also important to realize that the national regulations and requirements for qualifications are not necessary similar in different BSR-countries, nor in line with EU-directives.

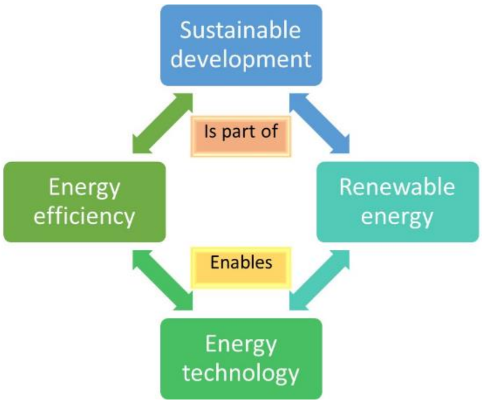

Figure 4: Conceptual structure of energy efficiency and renewable energy

The issues that should be dealt with during the course *Background, Concepts, EU-regulation and regional and local differences* and their relational proportions are

ISSUES	Goals of learning	Links to the material (Examples)
• **Concepts of (20 %)**	Goal: Understanding the sense of terminology	
○ Sustainable development	Goal: Understanding the diversity and variety of concepts and goals within the term "Sustainable development"	UN: Goals of sustainable devel opment
○ Renewable energy		www.irena.org/
○ Energy efficiency		Energy efficiency
○ Energy technology		Clean ET
○ Greenhouse effect		What it is?
○ Climate change		NASA knows
• Main points of energy and renewable energy policies of EU (30 %)	Goal: Understanding the background of new energy policy	Example: Energy policy
○ EU Energy strategy including	Goal: Understanding the sense and goals of common energy strategies	Theme: Energy ; The future of energy
▪ EU 2020 Climate and energy package	Goal: Understanding the differences of strategies (short / long term; targets and goals)	EU2020
▪ EU 2030 – policy		EU2030
▪ EU 2050 Low Carbon goal		EU2050
▪ EU adaptation strategy		Adaptation strategy
▪ EU adaptation to climate change		Adaptation to ; Climate change

○ EU research and development (R&D) concerning the energy technology	Goal: Understanding how the policies are based to the results of scientific research	EU Energy Technology Research
▪ European Energy research alliance		Coordinating Energy Research
• Local regulations and requirements of qualifications (50 %)	Goal: Understanding the diversity of regulation	
○ Each country deal with their regulations, that are not necessary applicable in other countries.	Goal: Knowing the applicable regulation in students own area well enough to pass the local examination if the base education fulfills the requirements.	Links to local authorities. Example: Link to Finnish TUKES
○ Local hierarchy of regulations		According to local documentation
○ Local hierarchy of qualifications and requirements		According to local documentation

Renewable Energy Sources 1, 5 CU

The topic *"Renewable Energy Sources"* has been divided into two courses, each with the extent of 5 CU:s. In the first course the focus is on the carbon neutral renewable energy sources. Solar power, wind power and hydroelectric power are contemporary the most promising energy sources in this branch. The geothermal or volcanic heat and electric produced by geothermal condensing power plants will be discussed in Renewable Energy Sources 2 -course. The issues that should be dealt with during the course *Renewable Energy Sources 1* and their relational proportions are

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Solar power (25 %)	To understand how the solar power works	EnergySage Solar (commercial community)
○ Heat	To understand the operational basics of heating panels and other systems collecting and utilizing the solar heat.	Solar heat collector
○ Electric	To understand the operational basics of electric panels and other systems producing electric by utilizing the solar.	How do they work
○ Dual production	To know the benefits and challenges of dual production (Both heat and electric)	Solar thermal plants
○ Scalable systems	To know how to enable and utilize the scalability of solar power systems	
○ Planning	To know fundamentals of planning effective and economic solar power systems	
○ Installing	To be able to install and implement the solar power system either as single heating or electric system or as a part of	

	electric power network or heating network	
○ Environmental aspects	To know the environmental aspects of solar power system during the whole life cycle of the system from manufacturing to recycling	
• Wind power (25 %)	To know fundamentals of wind power	Tutorials Examples: Wind power in Finland and in Europe
○ Wind mills	To understand how the windmills work, what are their benefits and challenges and what the utilizing of windmills requires.	How they work
▪ Different technologies	To know and identify different type of windmills and their functionalities	
▪ Offshore	To know benefits and challenges of windfarms offshore	
▪ Ashore	To know benefits and challenges of windfarms ashore	
▪ Windfarms	To know the issues that should be taken into account when planning and building the windfarms	Impacts on environment
▪ Scalability of systems	To know the benefits, challenges and requirements of scalable wind power systems	
▪ Planning	To know fundamentals of planning effective and economic wind power systems	
▪ Installing	To be able to install and implement the wind power system either as single electric system or as a part of electric power network	
▪ Environmental aspects	To know the environmental aspects of wind power system during the whole life cycle of the system from manufacturing to recycling	
○ Wave mills	To understand basic functionality of wave mils, and the benefits and challenges of using the wave power	Slowmill Baltic area
▪ Different technologies	To know the different technologies available when developing the wave mills	
▪ Contemporary situation in development	To know the contemporary situation of development, the challenges met and victories gained	
▪ Environmental aspects	To know the environmental aspects of wave power system during the whole life cycle of the	

	system from manufacturing to recycling	
• Accumulating and storing technologies (20 %)	To understand the functional properties and differences of different energy storing systems	[Storing the energy]
○ Batteries	To know different types of batteries, their properties and suitability to different usages.	[Battery technologies for vehicles]
○ Hydrostatic accumulating (pump power plants)	To know the functionality of hydrostatic accumulating, its benefits and challenges.	
○ Kinetic accumulating	To know the functionality of kinetic accumulating (Storing the energy as kinetic form, e.g. in flywheel), its benefits and challenges.	
○ Other storing technologies	To know and name other storing technologies, to be up-to-date in technologic development	
○ Efficacy and losses	To know factors impacting the efficacy and losses of different accumulating technologies, how to affect them and how to gain the best benefits.	
○ Environmental aspects	To know the environmental aspects of different accumulating technologies during the whole life cycle of the system from manufacturing to recycling	
• Hydroelectric power (5 %)	To understand the functional properties and differences of different hydroelectric power systems	[Different types of plants]
○ Different technologies and solutions	To identify different technologies and solutions and to know their benefits and challenges	
○ Scalability (from banks of creeks to huge pondage power stations)	To know the possibilities of scalable power systems	
○ Usability	To understand the aspects impacting the usability of hydroelectric power	
○ Environmental aspects	To know the environmental aspects of different hydroelectric power technologies during the whole life cycle of the system from manufacturing to recycling	
• Extra low voltage systems (ELVS; Voltage < 50 V) (40 %) 25 %	To understand the connections between variables Power (P), Voltage (U), Current (I) and Resistance (R): P=UI and U = RI, and impacts of these on designing the systems and wires	[ELV-systems] E.g. [Wiring] (Commercial) [Serie or Parallel] (Commercial) [In buildings]

○ Differences compared to systems with higher voltage	To understand the difference between higher voltage systems and extra low voltage systems as well as between AC (Alternating current) and DC (Direct current)	
○ Planning ELVS	To know requirements to be taken into account when planning the systems	
○ Installing and implementing ELVS	To know requirements and properties to be taken into account when installing and implementing the systems	Installing
○ Minimizing losses	To understand how to minimize losses in extra low voltage systems	

Energy Transfer 5 CU

Both in centralized and distributed energy production transferring the energy is one of the major sources of loss, particularly when transferring the electric, heat or cool. This course covers the different transferring technologies and possibilities to minimize the loss. Although it might be unbelievable at first sight, in different forms of energy the variables impacting the loss are quite similar – with one exception that confirms the rule. The most impacting variables are the distance between energy source and user, diameter or cross-sectional area of wire or pipe and the material the pipe or the wire is made of. The exception is transfer of combustibles either in pipe or over the sea, on the road or on the rails in the containers. In these cases there are many other variables too. The issues that should be dealt with during the course and their relational proportions are

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Transfer of heat and cool (30 %)	To understand the challenges of transferring heat and cool	Concepts Distance cooling Distance heating
○ Transferring strategies and techniques ▪ Pipe, container, [radiation] ▪ Usage and usability	To understand factors impacting the choice of technique	Designing (Commercial)
○ Variables impacting the loss ▪ Cross-sectional area of pipe ▪ Distance = length of the pipe ▪ Volume of the container ▪ Material of pipe or container and used insulate materials ▪ Properties of heat carrier, e.g. density, viscosity and specific heat capacity ▪ Efficacy of pumps (speed of the heat carrier) ▪ surrounding temperature ▪ Efficacy of heat exchanger in both ends of the pipe	To know the variables affecting the efficiency of transfer	
○ Environmental aspects	To know the environmental aspects of heat and cool	

	transfer during the whole life cycle of the system from manufacturing to recycling	
○ Maintenance backlog (in conceptual level)	To understand the meaning and impacts of maintenance backlog	Definition
• Transfer of electric (30 %)	To understand the challenges of transferring electric	
○ Transferring strategies and techniques ▪ Wire, batteries, [radiation] ▪ Usage and usability	To understand factors impacting the choice of technique	Wireless transfer
○ Variables impacting the loss	To know the variables affecting the efficiency of transfer	
▪ Cross-sectional area of wire ▪ Distance = length of the wire ▪ Capacity of the battery ▪ Material of wire = specific resistance ▪ Properties of current: Voltage, direct or alternating current, frequency ▪ Properties of transformers ▪ Properties of load, e.g. idle power, stability of load, load peaks		
○ Superconductive materials and techniques		
• Transfer of combustibles (20 %)	To understand the challenges of transferring compustibles	
○ Transferring strategies and techniques ▪ Pipes ▪ Containers in cars, trains and ships	To understand factors impacting the choice of technique	
○ Causes of losses ▪ Accidents, technical faults and human incidents ▪ Energy used by pumps and vehicles	To understand the main causes of losses, to know how to avoid losses	
○ Environmental aspects	To know the environmental aspects and risks of combustible transfer during the whole life cycle of the system from manufacturing to recycling	

• Minimizing, collecting and reusing the loss energy (15 %)	To understand the benefits of minimizing the loss, to know how to minimize the energy loss	Designs
○ Insulation	To understand how the constructions can affect energy loss.	Heat losses Thermal insulation
○ Minimizing the friction	To understand how the design of systems can impact on energy economy	Friction in pumps
○ Minimizing the air / water / electric resistance	To understand what the resistance is and how to impact on it.	
○ Recovery of heat (see above)	To know how to recovery (loss) heat	
○ Recovery of kinetic energy e.g. in electric cars	To know how to recovery kinetic energy	
○ Technologic challenges in minimizing and reusing the loss energy	To know the technologic challenges that are slowing down the development	
○ Loss caused in energy transfer – see the next course: Energy transfer	To understand the importance of energy transfer in minimizing the losses.	
○ Environmental aspects	To know the environmental aspects of minimizing energy losses during the whole life cycle of the system from manufacturing to recycling	
○ Commercial aspects		
• Storing the heat / cool (5 %)	To understand the possibilities, challenges and benefits of storing the heat. To know the methods used and methods under the development.	New ways Molten sand

Optional parts

(At least 7 CU must be chosen)

Renewable Energy Sources 2 4 CU

The second part of Renewable Energy Sources -course concentrates in sources the renewability or carbon neutrality of which can be questioned. E.g. producing and using ethanol causes in most cases carbon dioxide whereas cultivating the plants from which ethanol is made of binds carbon dioxide via photosynthesis. What is the final result concerning the carbon neutrality depends on many variables. However, the research, production and use of these so called renewable combustibles has increased during the latest decades due to the fact that they can be used in many contemporary motors with minor modifications.

Geothermal heating and cooling, including geothermal condensing power plants used in some volcanic regions is in common considered to be riskless, carbon neutral and not affecting to the green house effect but – depending to the area where geothermal heat is used – the situation is not necessary so simple. In Finland, for example, the soil contains radioactive radon, which is released to the atmosphere when a heath well is drilled. In Siberia and Northern Canada, drilling the soil may release huge amounts of methane that is considered to be one of the greenhouse gases, to the atmosphere, and drilled wells in volcanic soil may cause carbon monoxide and carbon dioxide emissions. On the other hand, some of the systems, e.g. geothermal heat pumps, are easily included into contemporary central heating systems.

Minimizing, collecting and reusing the loss energy is – on point of view of sustainable development - an essential part of both traditional energy technology and renewable energy technology. Among the known examples of minimizing the loss are the thermal insulation regulations of buildings and regulations concerning the idling of motor vehicles. In many cases – like examples above – minimizing the energy loss also supports the reducing of pollutant emissions. The two topics, *renewable combustibles* and *geothermal energy*, which are available to be included to the course *Renewable Energy Sources 2* are 2 CU courses each.

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Renewable combustibles (2 CU)	To understand the challenges and possibilities of production and usage of renewable combustibles	Products (commercial) Global aspect Renewable energy
○ e.g. ethanol, methanol, biodiesel, biogas, carbo monoxide, fuel wood	To know the most common renewable fuels and different ways to produce them	Examples Articles
○ Usage and usability	To be aware of the challenges and issues concerning to the usage of renewable combustibles	Use of cleaner fuels
▪ Changes and modifications required to motors and heating systems	To understand the requirements renewable fuels set to the motors and heating systems	Motors
○ Production	To understand the production of different renewable combustibles	Materials (commercial) Technology
○ Environmental aspects	To know the environmental aspects of different renewable combustibles during the whole life cycle of the system from manufacturing to recycling	
○ Commercial aspects	To understand how the marketing and delivery of renewable combustibles can be developed	
• Geothermal heating and cooling (2 CU)	To know the geothermal heat and benefits and challenges in utilizing it.	Heating and Cooling Power plants History and...
○ Known applications	To know what kind of applications to utilize geothermal heat has been develop.	www.thermia.com (Commercial)
○ Usability of geothermal systems	To know, where, when and how to use geothermal systems	
○ Scalability of systems	To understand the requirements a scalability sets to planning and manufacturing the systems	
○ Planning and installing geothermal systems	To be able to plan, install and implement common small geothermal systems	
○ Environmental aspects	To know the environmental aspects of utilizing geothermal heat during the whole life cycle of the system from manufacturing to recycling	
○ Commercial aspects	To understand the issues impacting to marketing and	

	implementing the geothermal systems	
○ Other applications basing to thermal pumps	To know other applications and implementing and usage of them.	Heat pump systems Articles
▪ Air source heat pump		
▪ Exhaust (air) heat recovery		
▪ Exhaust water heat recovery		
▪ Reuse of the heat from cooling systems		

Special Questions in Renewable Energy Technology

As the target group of the education is immigrants and refugees, many of them coming from countries where the lack of energy in everyday life is emerging, and where the lack of infrastructure emphasizes the mixed energy sources, micro-sized energy producers and co-operation between separate stakeholders. On the other hand, mixed energy production and micro-sized energy producers are emerging phenomena also in European Union. The micro-sized electric plants like solar electric panels and wind mills, as well as systems they are using, will most probably operate in low voltage area from 12 to 48 volts to minimize both loss caused by inverters and accidents caused by higher voltage. However, there are many issues in low voltage systems that should be considered when planning and implementing the systems. Finally, the contemporary situation in nuclear power should be discussed. Although the nuclear power is not considered as renewable power, the energy technicians should have at least basic knowledge concerning the fission, fusion and their risks and opportunities. Furthermore, there has been developed small fission plants, which are said to be a solution to complement the local production of renewable energy. The environmental activists in many countries are now changing their earlier strongly negative attitudes and accepting the nuclear power as temporary solution, which helps reducing greenhouse gases during the way to completely green energy production, whatever it could be.

The topics that are available and their CU-values are

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Mixed energy sources (1 CU)	To realize that system may produce more than one type of energy, to know when, and how, this kind of systems would be usable and why.	Depending to the interests
○ Heat and cool (e.g. heat pumps)	To be able to install and implement simple heath pump	
○ Heat and electric (e.g. solar plants, condensing power plants)	To identify different ways to produce energy in larger scale	
○ Heat and kinetic (e.g. condensing power plants)		
○ Electric and kinetic (e.g. wind mills)		
• Micro-sized energy producers (1 CU)	To know the challenges in micro-size energy production	VTT Heat VTT Microgrids
○ Trading the energy (surplus or everything), connecting to networks / grids ○ Local regulations ○ Governmental support ○ Pricing and taxation systems	Local circumstances vary, to be completed by local education provider	E.g. Blockchain

• Co-operation (1 CU o Producers o Consumers o Suppliers of equipment o Energy transfer operators	To understand the importance of co-operation between different participants in renewable energy markets.	Blockchain Path to success Collaboration is crucial
• Fission and fusion (1 CU) o Benefits (impartial and objective approach) o Risks (impartial and objective approach) o Small-sized fission plants o Contemporary situation of fusion plant development	To have a true and fair view concerning the contemporary situation of nuclear power, and the possibilities and risks of different ways to produce and utilize nuclear power.	Nuclear power today Fission VS fusion Fusion today (example)
• Storing and Reusing the CO2 (1 CU)	To understand the challenges of storing and reusing CO2	Reusing technologies Storing Is storing safe?
• Improving the energy efficiency, (4 CU) o Building construction o Isolating o Recovery of waste energy o Designing and planning;	To understand what factors have an impact on energy efficiency, how to improve energy efficiency and how to design and plan energy effective constructions	Competitive approach Energy Efficiency in buildings How to improve Improving… How to… (Commercial)
• Measuring and evaluating the energy efficiency (2 CU) o Legislation and regulations o Measuring o Calculations	To be able to measure and evaluate the energy-efficiency of building	Measuring Evaluating Tools (example)

Management and entrepreneurship studies (Optional courses)

One goal of this education is to encourage and help persons with a business idea to start their own business instead of working as an employee. The management and entrepreneurship studies will be offered as optional studies so that every student can choose those courses best applied to his/her situation and needs. The optional courses offered could include

- Business management
- Business jurisprudence
- Contract jurisprudence
- Personnel management
- Accounting
- Tax jurisprudence
- Financial management
- Marketing and communication

etc. All the courses should be applied to local legislation and regulations.

Further material

Further material can be applied according to needs. Following links, e.g., are worth looking into:

http://veste-project.eu/results/

https://www.oph.fi/download/178167_further_qualification_for_entrepreneurs_2012.pdf

https://www.oph.fi/download/140416_vocational_qualification_in_electrical_engineering_and_automation_technology_2009.pdf

https://www.globalccsinstitute.com/

https://www.weforum.org/system-initiatives/shaping-the-future-of-energy

https://www.irena.org/

https://europa.eu/youreurope/business/index_en.htm

https://www.interreg-central.eu/Content.Node/4-energy-final.pdf

https://drive.google.com/file/d/1kD9kjDCFdnMG4sU8sUBib9pbItAgNzBZ/view

Also the products of earlier courses are useful:

Curriculum_Energy efficient construction_

Curriculum_Energy efficiency_EN.pdf

Curriculum_Seminar Solar Energy_EN.pdf

Modifications allowed

The proportional division and content of separate courses suggested above can be changed if local conditions or needs of participants could be responded better by other solutions.

Examinations and qualifications

Examinations will be coordinated and competences will be controlled according to local regulation and locally required qualifications. It is each local actor's responsibility to take care that the admission requirements are fulfilled before the qualification application.