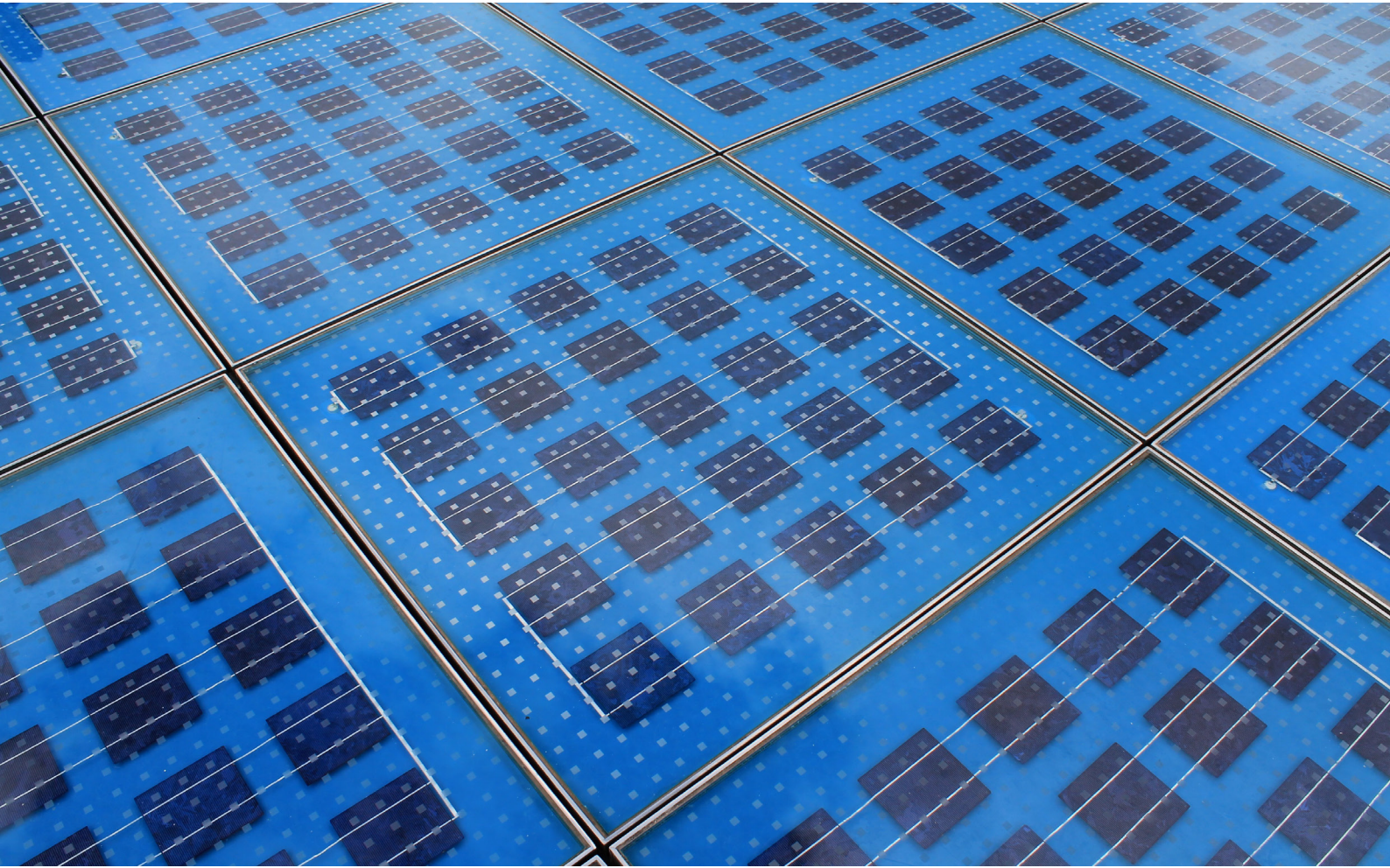




Jobs on the global scale for the energy sector: Skilled personnel for the Energy Transition (“Energiewende”)

Youth unemployment must be linked to the energy and climate crisis by thus mitigating it. The potential for new solar and efficiency jobs is huge. In the energy sector green jobs rely, however, on qualified young people. Professional training is therefore a key factor in the energy transition. A European (and global) education and employment initiative must focus on the five main occupational areas of solar power, smart grids, electrical fitting, air conditioning and heating trades.

Approximately 80 % percent of the world's energy consumption is currently covered by the fossil fuels of coal, oil and gas. At the same time, energy consumption is growing. The OECD countries which represent almost one third of humanity consume 80% of today's energy resources. In the future, the developing countries will increasingly compete over fossil fuels which will run scarce. Competition over resources is in full spate and will amplify.¹ Looming energy scarcity together with an awareness of the aggravating consequences of climate change have moved the governments of many industrialised countries to pass energy resolutions. Consequently, until 2020 the EU intends to reduce greenhouse gas emissions with a minimum of 20 % based on the level of 1990, increase the proportion of renewable energy sources by 20 % in final consumption, and reduce the total energy consump-

¹ Swiss Energy Foundation (SEF), Energy politics, www.energiestiftung.ch/energiethemen/energiepolitik.

tion by 20 % with regard to the predicted level in 2020.²

The targeted increase of energy efficiency measures will not only help to reduce greenhouse gas emissions, but also lead to higher economic efficiency. Studies executed in Switzerland estimate that approx. 40 % of the daily energy consumption is wasted due to lack of efficiency. The Swiss economy, households and the public sector pay around CHF 10 billion per year for energy losses.³ In other European countries, the efficiency potential appears to be equally high.

“Green skills” against youth unemployment

Various employment promotion measures are implemented together with efforts in sustainability. High youth unemployment is considered to be particularly severe. In the EU, 22.2 % of young job seekers (around 5.2 million) do not find jobs.⁴ As a consequence, youth unemployment is more than twice as high as that of adults.

The difference between the member state with the lowest youth unemployment rate (Germany with 7.8 % in May 2014) and that with the highest rate (Greece with 57.7 % in March 2014) amounts to almost 50%. Besides Greece other Southern European countries such as Spain (54 %), Croatia (48.7 %), Italy (43 %), Cyprus (37.3 %), and Portugal (34.8 %) are especially hard hit.

New green jobs for energy efficiency and renewable energy

If we consider the transition to a greener economy there is a great potential for new jobs. According to EU forecasts, by 2020 up to 5 million jobs could be made available in the sectors of energy efficiency and renewable energy.⁵

In 2013, approx. 312,000 EU jobs were available in photovoltaics, and 32,000 in solar heating and cooling.⁶ Even though the economic crisis has temporarily slowed down expansion, *renewable energy* job markets will continue to grow.

On the global scale, an estimated 5.7 million people work directly or indirectly in the renewable energy

sector, 1.36 million of which in photovoltaics and approx. 0.9 million in solar heating and cooling.⁷ International platforms (e.g. Intersolar) ensure the transfer of knowledge and the exchange of professionals as well as the linkage between technology and the markets.⁸

Wanted: skilled personnel

By defining objectives and creating policy frameworks, the work is, of course, not yet done. Implementing measures and introducing new technologies requires specific know-how. Although this knowledge is available in centers of excellence and with experts, it is insufficiently applied in practical planning as well as in the construction of buildings and facilities. Technologies developing extremely fast pose a major challenge to all actors who work in the energy sector.⁹ An energy-specific viewpoint is lacking for a number of processes in order to make progress. To promote energy themes and topics in vocational trainings in target-oriented terms is a requirement.

On the one hand, additional qualified personnel must be made available in order to cope with a now increased demand on redevelopment, optimization and consultancy. On the other hand, job descriptions and tuition must be adapted to the new requirements. New professions and further training in the field of energy efficiency and renewable energy (e.g. energy consulting, solar installing) must be developed and existing professions updated.

Technical know-how consultation expertise in addition becomes more important. Home owners, property management companies, businesses and consumers report a growing interest in qualified consultancy about energy efficient devices, equipment, and alternative energy sources (solar collectors, heat pumps etc.).

Flagship-professions for an international energy campaign

According to the *International Standard Classification of Education* ISCED the *electricity and energy sector* includes professions in installation, maintenance, repair and fault diagnosis of electrical wiring (power grids) and accessories in private homes, buildings and the industry.¹⁰ Installation and maintenance of power lines and networks also belong to

² CEDEFOP (European Centre for the Development of Vocational Training), Short report: Qualifications for European low-emission zones, April 2013, p. 1.

³ Swiss Energy Foundation (SEF), Energy efficiency will pay off, www.energiestiftung.ch.

⁴ European Union measures to tackle youth unemployment, European Commission - MEMO/14/466 08/07/2014.

⁵ European Commission 2012, Einen arbeitsplatzintensiven Aufschwung gestalten, Commission message dated 18 April 2012, KOM (2012) 173, p. 6.

⁶ Ibid.

⁷ REN21, Renewables 2013, Global Status Report, p. 53.

⁸ See Intersolar, Mission & Vision, www.intersolarglobal.com.

⁹ See EnergieSchweiz, Die Zukunft: Bildungsinitiative von Energie Schweiz, p. 2 et seqq.

¹⁰ ISCED, 0713, Electricity and energy, Draft February 2013, pp. 26–27.

it. 16 occupational fields are listed. To realise and implement an energy revolution, the following five occupational groups are particularly relevant:

1. Solar business / Solar power
2. Powerline installation and maintenance
3. Electrical fitting
4. Air conditioning trade programmes
5. Heating trades

In the field of renewable energy, the solar industry is one of the fastest growing job markets.¹¹ In solar energy vocational education is therefore of great importance. In order to promote renewable energy, energy distribution and network stability play important roles. Growing portions in peripheral electricity generation are leading to many new challenges with regard to the power supply system. Smart grids help to address and come to terms with these challenges.¹²

Electricity networks are further challenged by transmission losses. There is a huge potential to save energy when transformers are rebuilt or refurbished. A new generation of transformers is suited for applications with highly varying weights existing in photovoltaics and wind energy.

Cooling is related to high energy expenditure. Due to climate change the demand of cooling systems will continue to grow while efficiency measures are increasingly important for both air conditioning and refrigeration.

Up to 50 percent of the energy consumption takes place in buildings with a major expenditure of heating and hot water.¹³ Consequently, the potential for savings is substantial. This implies that when heating systems are refurbished and reconstructed, renewable energy (solar thermal energy, wood, biomass, district heating, heat pumps) ought to be deployed whenever possible.

In these professional groups key skills should be taught in order to promote energy efficiency and renewable energy. Based on examples from the Swiss professional environment the following key competences should be promoted:

1. Solar business / Solar power

Corresponding professions (Switzerland): project leader in solar installing, polybauer (polyconstructor).

Professionals in solar installation are planning and installing standardised facilities. They counsel clients as well as customers and assess buildings, which is based on an evaluation of being suitable for solar

installations (electricity and heat). Required competences:

- Installation, maintenance, repair and removal of solar installations
- Project planning and leadership
- Customer advisory service
- Investment appraisal / Repayment

2. Power line installation and maintenance

Corresponding professions (Switzerland): linesman, linesman master, maintenance professional, maintenance professional master. Linesmen are responsible for the new construction and reconstruction as well as the maintenance of low-voltage and high-voltage cable systems, communications and data cable systems, landlines, cable distribution cabinet systems, and switching and transformer stations, public lighting and catenary systems for public transport.

Required competences:

- Introduce technical innovation (intelligent networks and control systems, solar cadastre for measuring the solar potential of a region, possibilities of using waste heat for transformers and the recovery of low and medium voltage cables etc.)
- Procure according to energy efficiency criteria (e.g. in transformers)
- Apply measures to reduce transmission losses
- Decentralised feed
- Knowledge of the regional and national energy infrastructure (e.g. Europe: Supergrid; Renewables-Grid-Initiative)

3. Electrical fitting

Corresponding professions (Switzerland): Electrician, electrical project manager, qualified electricians and installers build electrical installations and bring installations into service. They maintain electrical systems including fault removal. They also instruct clients about the use of energy-efficient equipment.

Required competences:

- Knowledge of best equipment in energy efficiency and rating tools
- Implementing measures to optimise efficient use of equipment (avoiding stand-by mode etc.)
- Recycling and environmentally sound waste management of electrical equipment, materials and chemicals (national and international environmental standards)
- Apply national efficiency standards for electric power, lighting equipment, electrical appliances, communications equipment etc.
- Connect equipment to renewable energy power generation devices

¹¹ See REN21, Renewables 2013 Global Status Report, p. 53.

¹² Swiss Federal Office of Energy (SFOE) 2013, Smart Grids. www.bfe.admin.ch/smartgrids.

¹³ See EnergieSchweiz, Heizung und Warmwasser, www.energieschweiz.ch/de-ch/gebaeude/heizung-und-warmwasser.aspx.

4. Air conditioning trade programmes

Corresponding professions (Switzerland): Refrigeration systems planner, air conditioning systems constructor, facilities engineering planner in air conditioning, refrigeration chief repairman.

Experts of these professions are specialised in manufacturing and installing ventilation and air conditioning systems as well as different cooling systems (industrial refrigeration systems, heat pump systems, air conditioning refrigeration systems). They also carry out maintenance, service and repair work. Chief engineers repairmen are planning work flows, monitor job handling and coordinate the work with other professions. Required competences:

- Calculate the annual energy costs of air conditioning and refrigeration systems
- Identify opportunities to reduce operating costs and optimise cooling and / or ventilation systems
- Perform profitability calculations (pay-back) of efficiency measures
- Distinguish the main refrigerant based on their impact on ozone depletion, global warming and electricity demand
- Take into account the legal basis for deploying and disposing refrigerants
- Adjust devices of control and regulation according to the standards of energy efficiency (shut-down, timing, setting, intermittent operation, variable speed control etc.)
- Advise clients and users about energy-efficient applications

5. Heating trades

Corresponding professions (Switzerland): Heating installer, facilities engineering planner in heating, heating chief repairman, master in heating

Professionals in the heating trade are planning and calculating energy-efficient equipment in the building sector. They are specialists for the installation of heating systems and other thermotechnical installations as well as cooling water conduits. They also perform maintenance, service and repair work. As executives they coordinate and control installation work as well as the placing in service. Required key competences for the energy transition:

- Assess heating systems based on an energy-oriented point of view
- Optimal planning of the redevelopment and new construction of energy and building technology
- Examine the application of renewable energy
- Implement energy efficiency measures in pipes, radiators, heat production, assembly work etc. as well as pipe systems, channel and equipment insulation
- Ensure optimal interaction of various measuring, steering and controlling components during installation
- Advise clients and partners (caretakers, building contractors etc.) with regard to modernising, applying renewable energy, and the energy-efficient operation of heating systems

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