Co-funded by the Erasmus+ Programme of the European Union

Task 1.4 Report on European regulation

Author(s)	**Dr. Gabriella Calderari, Prof. Wolfgang, Streicher, Constantina Ioannou, Marvin Scherzinger, Alexander Beckendorff,**		
Organisation name(s)	**UIBK, UNIROMA1, UCY, TUHH**		
WP Number	**1**		
Task Number	**1.4**		
WP Leader	**UNIROMA1**		
Due date of delivery	**July 26th, 2018**	**Project month**	**9**
Submission date		**Project month**	
Total number of pages	**46**		

Project Coordinator

Prof. DI Dr. techn Wolfgang Streicher,

University of Innsbruck (UIBK)

Technikerstrasse 13 I 6020 Innsbruck, Austria

Tel: +43 (0) 512-507-63650 I Mob: +43 (0) 676-872-565 320 I Fax: +43 (0) 512-507 36902

Email: wolfgang.streicher@uibk.ac.at

Project website: HEBA webs

Contents

1 Executive Summary

The project HEBA aims at improving the capacities of 6 universities in MENA (2 in Egypt, 2 in Jordan and 2 in Lebanon) developing a new lectures/courses on "Energy Efficiency and Renewable Energy EE+RE" and establishing local but interconnected laboratories/centers on EE+RE (EEREL).

The project aims at answering to the global environmental challenges supporting the MENA policies oriented at saving energy demand in buildings and industry and increase the use of renewable energy thus protecting air and water and reducing pollution.

European countries have a long experience in EE+RE both in terms of technical capacities and impact of useful policies, working in the monitoring of process and consumption, in the training of experts, in the promoting of an eco-friendly approach among the different final users.

European EE+RE regulations and their impacts

Driving force for all European countries are the following European Directives

- Directive 2009/28/EC of the European Parliament and of the Council, 2009, on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC
- DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings.
- DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on energy efficiency

accompanied by the national action plans and regulations to fulfil the directives. There are many actions on national and international level and a clear increase in the renewable energies and in the energy efficiency in the building sector and in industry due to these directives.

Results from HEBA MENA partner questionnaires on knowledge of policy and regulations

From the answers received both from Industry and the residential sector emerges that there is an average knowledge of policies and regulations about energy in the countries interviewed.

From the investigation done among the participating universities it results clear how regulatory aspects are far to be offered as specific courses in the university didactic, but some universities partially included energy regulation issues in the technical courses. Also at research level, scientific faculties, normally, don't carry out research on law and legislation, but they can start close collaboration with external faculties to investigate the influence of the regulation on the development of new technologies and solutions.

In general, the major part of the actors involved, especially professional working in the field of energy efficiency and renewable energy (EE+RE) are aware about both advantage and difficulties coming from regulatory aspects and they declared the needs of the introduction of more simplified procedure and clear permission rules in order to facilitate the diffusion of EE+RE technologies. The International legislation on quality has become fundamental. New courses could indicate when the regulations must be taken in consideration and which are the main articles and indications.

2 Introduction of the HEBA project

HEBA, which in Arabic means “gift from God ”, aims at improving the capacities of 6 universities in MENA (2 in Egypt, 2 in Jordan and 2 in Lebanon) developing a new lectures/courses on “Energy Efficiency and Renewable Energy EE+RE” and establishing local but interconnected laboratories/centers on EE+RE (EEREL).

The project aims at answering to the global environmental challenges supporting the MENA policies oriented at saving energy demand in buildings and industry and increase the use of renewable energy thus protecting air and water and reducing pollution. All the Ministries for Environmental Affairs of the involved Countries are adopting new environmental policies and programs in the light of economic and social changes. Main goals are the air protection, controlling industrial emissions; using technologies to transform wastes into energy, saving energy with technologies or behaviour that are more efficient, using clean energy.

European countries have a long experience in EE+RE both in terms of technical capacities and impact of useful policies, working in the monitoring of process and consumption, in the training of experts, in the promoting of an eco-friendly approach among the different final users.

The overall objectives of HEBA are:

1. Increase the local competences on EE+RE systems;

2. Develop/reform modules /courses in EE+RE systems;

3. Promote the dialogue between EU and higher education institutions in MENA Countries in order to facilitate the reciprocal recognition of competences and credits, informing on EU Univ system: Bologna Process, Quality Evaluation and Internationalization;

4. Establish/improve centres/laboratories of EE+R- technologies in every MENA partner country. These centres will collaborate with each other

5. Contribute to guidelines for best practice for EE+RE in industry and buildings;

6. Promote the mobility of students and staff and the universities cooperation

The HEBA’s objectives is divided in the following work packages:

WP1 - Survey of energy efficient knowledge and awareness;
WP2 - Developing of HEBA courses;
WP3 - Implementation and Integration of EE+RE courses into existing curricula;
WP4 - Set up of energy efficiency and renewable energy centres/laboratories (EEREL);
WP5 - Quality control and monitoring;
WP6 - Dissemination for future sustainability;
WP7 - Management and coordination of HEBA’s activities.

This report is related to WP1, Task 1.4 Report on European regulation

3 European Energy law:

3.1 Environmental impact

The energy demand nowadays has increased tremendously generating a considerable environmental impact. It is undeniable that substantial and sustained reduction in greenhouse gas emissions (GHG) is necessary to limit the dangerous rises in global average temperature to below 2°C compared with the pre-industrial levels (the below 2°C objective). Thus, the development of the Energy Efficient and Renewable Energy infrastructures, an action that will be taken by HEBA partnership is a turning point for the protection of the environment and the socioeconomic development (from the application form and Paris Protocol).

Action to eliminate climate change can be achieved without compromising growth and jobs but instead providing significant opportunities to revitalize economies bringing at the same time benefits in terms of public well-being (Paris protocol).

In 1994, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed that they must act urgently to reduce their emissions by 2020. For this reason, more than 90 countries, both developed and developing, pledged to eliminate their GHG emissions by 2020. Since these pledges were insufficient, in 2012, the UNFCCC parties launched negotiations towards a new legally binding agreement applicable to all Parties that will put the world on track to achieve the below 2oC objective. At the European Summit in October 2014, European leaders proposed that EU countries should reduce their emission by at least 40% compared to 1990 by 2030. By this time, EU pledged to invest on modernization and further decarbonisation of the EU economy (Paris Protocol).

In light of the above, in 2015, the Paris Agreement came to function and sets out this global action plan to put the world on track to reduce the risks and impacts of climate change by limiting global warming to well below 2oC above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5oC. The Agreement also increases the ability to adapt to the adverse impacts of climate change and foster climate resilience and low GHG emissions development. Finally, it makes finance flows consistent with a pathway towards low GHG emissions and climate-resilient development (Paris Agreement). Moreover, governments agreed on the need for global emissions to peak as soon as possible, recognizing that this will take longer for developing countries and undertake rapid reductions thereafter in accordance with the best available science. The Paris Agreement states that developed countries will support the developing countries to prepare and communicate strategies, plans and actions for low GHG emissions development (Paris Agreement, Q&A on the Paris Agreement). In this respect and through this report, HEBA European Countries will collect the best practices implemented by their governments to support MENA countries to answer the global environmental challenges designing policies oriented at saving energy demand in buildings and industry and increase the use of renewable energy thus protecting air and water and reducing pollution.

On 30 November 2016 the Commission published the Winter Package, called “Clean Energy for all Europeans” of eight proposals to facilitate the transition to a clean energy economy. These proposals have three main goals: to put energy efficiency first, to achieve global leadership in

renewable energies and to provide a fair deal of consumers (Prof. L. Hancher and Mr. B.M. Winters, The EU Winter Package and website of the clean energy of all Europeans).

The aim of the 'Clean Energy for All Europeans' proposals is to enable the EU to deliver on its Paris Agreement commitments and to help the EU energy sector become more stable, competitive, and sustainable, and fit for the 21st century.

The Winter Package proposals have the potential to increase the job opportunities in Europe by encouraging cross-border cooperation and mobilizing public and private investment in the clean energy sector. They also deliver on new emissions targets for 2030 and pave the way to lower consumer bills, a better quality of life at home and in the workplace, and more opportunities for everyone to produce its own clean energy by embracing the deployment of renewables and other new and innovative technologies.

These proposals build on existing EU policies and funding opportunities, such as research, development and innovation projects under the Horizon 2020 Programme, and ongoing EU-financed investment programmes, for example the Connecting Europe Facility, the European Energy Programme for Recovery and other European Structural Investment Funds (ESIF), as well as funding through the European Fund for Strategic Investments (EFSI), where there are more projects related to energy than any other sector (website of the clean energy of all Europeans).

The facilitating actions to ensure the transition to a clean energy system include initiatives to accelerate clean energy innovation and to renovate Europe's buildings as well as measures to: encourage public and private investment and make the most of the available EU budget; promote industry-led initiatives to foster competitiveness; mitigate the societal impact of the clean energy transition; involve multiple players including on the one hand Member States authorities, local and city authorities and on the other hand businesses, social partners and investors, and maximize Europe's leadership in clean energy technology and services to help third countries achieve their policy goals. This package should be seen in the context of the EU leading the way towards a smarter and cleaner energy for all, to implement the Paris agreement, fuel economic growth, spur investment and technological leadership, create new employment opportunities and enhance citizen's welfare (COM (2016) 860 final).

According to the Energy Efficiency Directive (EED), the reduction of GHG emissions must be done through the control of European energy consumption and the increased use of energy from RES, together with energy saving and increased energy efficiency.

The scope of this Directive is to establish a common framework for the promotion of energy from RES. It sets mandatory national targets for the overall share of energy from RES in gross final consumption of energy and for the share of energy from RES in transport. It demonstrates the rules relating to statistical transfers between Member States, joint projects between them and with third countries, guarantees of origin, administrative procedures, information and training, and access to the electricity grid for energy from RES.

The European Union has set very ambitious targets to achieve a transition a low emissions economy. The development and deployment of climate technologies, including energy production technologies, has an essential role to play in meeting climate change objectives and for these reasons, RES have seen tremendous increase over the last few years.

The winter package paves the way towards achieving the clean energy transition and provides measures to promote the industrial competitiveness in the EU. European Commission has turned its energy policy targeting the promotion of RES as a very competitive alternative to fossil fuel electricity generation. Recognizing the benefits stemming from the different RES technologies, the target of 20% of the total gross energy consumption has been set by the EU to be reached by 2020. This translates into the doubling of the RES share in the EU countries over the last decades to reach the expected trajectory for the 2020 targets. For these reasons, each Member State has adapted its energy plan towards achieving the national energy targets by the year 2020.

The improvement of energy efficiency is pivotal for Europe and the aim is to achieve a 20% improvement in energy efficiency by 2020. The general objectives of the EED is to achieve a 20% share of energy from RES and a 10% share of energy from RES in each Member State's transport energy consumption by 2020. The Directive also demonstrates that Energy Efficiency and energy saving policies are two of the most powerful ways to increase the percentage share of RES. Significant improvements must be implemented in energy efficiency in all sectors so as the Member States more easily achieve their targets for energy from RES.

An even more ambitious energy plan is set for the year 2030, which foresees the boosting of RES share to at least 27% of the EU energy consumption and a reduction of greenhouse gas emissions by 40%. This acts as a drive to a low-carbon economy and proposes a flexible energy system that will allow for increased security of energy supply with less dependence on energy imports. For these reasons, the deployment of RES has seen tremendous increase over the last few years.

The EED states also that the reduction of GHG emissions in Europe and elimination of the energy imports as well as the development of energy from RES should be closely linked to increased energy efficiency. The transition towards renewable energy technologies has many advantages such as the utilization of local energy sources, increased local security of supply, shorter transport distances, reduced energy transmission losses and creation of new jobs locally.

Finally yet importantly, the national, regional and local authorities should review their administrative procedures for giving permissions to operate plants and associated transmission and distribution network infrastructures to produce electricity, heating and cooling or transport fuels from RES. During the design process, the governments should consider the contribution of RES towards meeting environmental and climate change objectives (EED).

3.2 Renewable Energy

Renewable Energy has become a game changer in Europe and on the national energy markets. It has started from fairly low participation in the market in the last decade of the last century, mostly driven by traditional hydro and some biomass use, becoming the big winner in new capacity in Europe and worldwide as of to date. The share of energy from renewable sources in gross final consumption of energy continued rising to reach 17% in the European Union in 2016.[1]

Nowadays, access of renewables to the market is being organized differently in the EU 28 Member States with some established patterns such as priority grid access and a majority of countries having

used various feed-in mechanisms. To avoid distorting energy prices and the market however, these schemes should be time-limited and carefully designed.

- **Renewable energy targets**
  - **2020:**

The EU's Renewable energy directive sets a binding target of 20% final energy consumption from renewable sources by 2020 (in heating and cooling, electricity and transport sector).[1] To achieve this, all EU countries have adopted national renewable energy action plans showing what actions they intend to take to meet their renewables targets (e.g. from 10% renewables in Malta to 49% in Sweden). All EU countries must also ensure that at least 10% of their transport fuels come from renewable sources by 2020.[2] These renewable energy action plans include planned policy measures; the different mix of renewables technologies they expect to employ; and the planned use of cooperation mechanisms.[3]

  - **2030:**

(https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2030-energy-strategy, looked up 31.07.2018)

In October 2014 The European Council agreed on a new 2030 Framework for climate and energy, including EU-wide targets and policy objectives for the period between 2020 and 2030. These targets aim to help the EU achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 greenhouse gas reductions target. The figures for renewables and energy efficiency have subsequently been increased in the context of the Clean Energy for all Europeans package.

The objective of the strategy is to send a strong signal to the market, encouraging private investment in new pipelines, electricity networks, and low-carbon technology. The targets were based on a thorough economic analysis measuring how to achieve decarbonisation by 2050in a cost effective way.

The cost of meeting the targets does not substantially differ from the price we need to pay anyway to replace our ageing energy system. The main financial effect of decarbonisation will be to shift our spending away from fuel sources and towards low-carbon technologies.

Targets for 2030

- a 40% cut in greenhouse gas emissions compared to 1990 levels
- at least a 27% share of renewable energy consumption
- indicative target for an improvement in energy efficiency at EU level of at least 27% (compared to projections), to be reviewed by 2020 (with an EU level of 30% in mind)
- support the completion of the internal energy market by achieving the existing electricity interconnection target of 10% by 2020, with a view to reaching 15% by 2030

Policies for 2030

- To meet the targets, the European Commission has proposed:
- A reformed EU emissions trading scheme (ETS)

- New indicators for the competitiveness and security of the energy system, such as price differences with major trading partners, diversification of supply, and interconnection capacity between EU countries
- First ideas on a new governance system based on national plans for competitive, secure, and sustainable energy. These plans will follow a common EU approach. They will ensure stronger investor certainty, greater transparency, enhanced policy coherence and improved coordination across the EU.

- **Renewable Energy Directive 2009/28/EC**

The Renewable Energy Directive establishes an overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU to fulfil the set renewable energy targets.

On 30 November 2016, as part of the Clean Energy for All Europeans package, the Commission published a proposal for a revised Renewable Energy Directive to make the EU a global leader in renewable energy and to ensure that the 2030 target is met.[3] On 14 June 2018 the Commission, the Parliament and the Council reached a political agreement which includes a binding renewable energy target for the EU for 2030.[3]

- National action plans and progress reports:

The Directive specifies national renewable energy targets for each country, taking into account its starting point and overall potential for renewables. EU countries set out how they plan to meet these targets and the general course of their renewable energy policy in national renewable energy action plans. The plans cover:

- individual renewable energy targets for the electricity, heating and cooling, and transport sectors,
- the planned mix of different renewables technologies,
- policy measures to achieve national targets including cooperation between local, regional, and national authorities,
- any planned statistical transfers and/or joint projects with other countries
- national policies to develop biomass resources,
- measures to ensure that biofuels used to meet renewable energy targets are in compliance with the EU's sustainability criteria.[2]

Progress towards national targets is measured every two years when EU countries publish national renewable energy progress reports.[2]

- Cooperation mechanisms:

The Directive promotes cooperation amongst EU countries (and with countries outside the EU) to help them meet their renewable energy targets. This cooperation can take the form of statistical transfers of renewable energy, joint renewable energy projects and/or joint renewable energy support schemes.

In a statistical transfer, an amount of renewable energy is deducted from one country's progress towards its target and added to another's. This is an accounting procedure and no actual energy changes hands.[2] By allowing transfers of this kind, this cooperation mechanism provides EU

countries with an added incentive to exceed their targets because they can receive a payment for energy transferred to others. It also allows countries with less cost-effective renewable energy sources to achieve their targets at a lower cost.[2]

In joint projects, two or more EU countries can co-fund a renewable energy projects in electricity or heating and cooling, and share the resulting renewable energy for the purpose of meeting their targets. These projects can but do not have to involve the physical transfer of energy from one country to another. EU countries may also enter into joint projects with non-EU countries.[2]

In joint support schemes, two or more EU countries can co-fund a joint support scheme to spur renewable energy production in one or both of their territories. This form of cooperation can involve measures such as a common feed-in tariff, a common feed-in premium, or a common quota and certificate trading regime.[3]

- Sustainable biofuels

Biofuels and bioliquids are instrumental in helping EU countries meet their 10% renewables target in transport. The Renewable Energy Directive sets out biofuels sustainability criteria for all biofuels produced or consumed in the EU to ensure that they are produced in a sustainable and environmentally friendly manner.[3]

3.3 ENERGY EFFICIENCY

European Union faces everyday challenges stemming from a greater dependence on energy imports, a scarcity of energy resources, as well as the need to limit climate change and overcome the economic crisis. Energy efficiency is a valuable tool to address these challenges. It enhances the Union's security of supply by reducing primary energy consumption and decreasing energy imports. It helps to reduce greenhouse gas emissions in an efficient way in terms of costs and therefore to reduce climate change. Switching to a more energy-efficient economy should also accelerate the deployment of innovative technological solutions and improve the competitiveness of the Union industry, boosting economic growth and creating high-quality jobs in various related sectors.

In 2012 EU published the Energy Efficiency Directive establishing a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. According to this Directive, all EU member states are required to use energy in a more efficient way at all stages of the energy chain, from production to final consumption. The Energy Efficiency Directive have been updated in 2016 including a new 30% energy efficiency target for 2030, and measures to make sure the new target is met.

On 14 June 2018 the Commission, the Parliament and the Council reached a political agreement which includes a binding energy efficiency target for the EU for 2030 of 32.5%, with a clause for an upwards revision by 2023. This political agreement must now be translated into all EU languages and formally adopted by the European Parliament and the Council, and then published in the Official Journal of the EU. (https://ec.europa.eu/energy/en/topics/energy-efficiency, looked up 31.7.2018)

Specific measures and policies

The aim of the directive was to help member states to develop specific national measures ensuring major energy savings for consumers, industry, tertiary and Transportation. There measures include but are not limited to:

- energy distributors or retail energy sales companies have to achieve 1.5% energy savings per year through the implementation of energy efficiency measures
- EU countries can opt to achieve the same level of savings through other means, such as improving the efficiency of heating systems, installing double glazed windows or insulating roofs
- the public sector in EU countries should purchase energy efficient buildings, products and services
- every year, governments in EU countries must carry out energy efficient renovations on at least 3% (by floor area) of the buildings they own and occupy
- energy consumers should be empowered to better manage consumption. This includes easy and free access to data on consumption through individual metering
- national incentives for SMEs to undergo energy audits
- large companies will make audits of their energy consumption to help them identify ways to reduce it
- monitoring efficiency levels in new energy generation capacities.

3.3.1 ENERGY EFFICIENCY IN BUILDINGS

https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings, looked up 31.07.2018

Buildings are responsible for approximately 40% of energy consumption and 36% of CO2 emissions in the EU. Currently, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient, while only 0.4-1.2% (depending on the country) of the building stock is renovated each year. Therefore, more renovation of existing buildings has the potential to lead to significant energy savings – potentially reducing the EU's total energy consumption by 5-6% and lowering CO2 emissions by about 5%.

Improving the energy efficiency of buildings can also generate other economic, social and environmental benefits. Better performing buildings provide higher levels of comfort and wellbeing for their occupants, and improve health by reducing illnesses caused by a poor indoor climate. It also has a major impact on the affordability of housing and on the concept of energy poverty. Improvement of the energy performance of the housing stock and the energy savings it brings would enable many households to escape energy poverty.

Investments in energy efficiency also stimulate the economy, in particular the construction industry, which generates about 9% of Europe's GDP and directly accounts for 18 million direct jobs. SMEs would particularly benefit from a boosted renovation market, as they contribute more than 70% of the value added in the EU building sector.

Main EU policies

The 2010 Energy Performance of Buildings Directive and the 2012 Energy Efficiency Directive are the EU's main legislative instruments promoting the improvement of the energy performance of buildings within the EU and providing a stable environment for investment decisions to be taken. As Directives, they needed to be transposed by Member States into national legislation.

The 2010 Energy Performance of Buildings Directive has made it possible for consumers to make informed choices that will help them save energy and money, and has resulted in a positive change of trends in the energy performance of buildings. Following the introduction of energy efficiency requirements in national building codes in line with the Directive, new buildings today consume only half as much as typical buildings from the 1980s.

On 30 November 2016, as part of the Clean Energy for All Europeans package, the Commission proposed an update to the Energy Performance of Buildings Directive to help promote the use of smart technology in buildings, to streamline existing rules and accelerate building renovation. The Commission also published a new buildings database – the EU Building Stock Observatory – to track the energy performance of buildings across Europe. In order to direct investment towards the renovation of building stock, the Commission also launched the Smart Finance for Smart Buildings initiative, which has the potential to unlock an additional €10 billion of public and private funds for energy efficiency and renewables uptake in buildings.

On 19 June 2018 Directive (2018/844/EU) amending the Energy Performance of Buildings Directive was published. The revised provisions will enter into force on 9 July 2018. This revision introduces targeted amendments to the current Directive aimed at accelerating the cost-effective renovation of existing buildings, with the vision of a decarbonised building stock by 2050 and the mobilisation of investments. The revision also supports electromobility infrastructure deployment in buildings' car parks and introduces new provisions to enhance smart technologies and technical building systems, including automation.

Member States will have 20 months to transpose its provisions into national law (namely by 10 March 2020).

- Under the new, revised Energy Performance of Buildings Directive (EPBD)
- EU countries will have to establish stronger long-term renovation strategies, aiming at decarbonising the national building stocks by 2050, and with a solid financial component
- A common European scheme for rating the smart readiness of buildings, optional for Member States, will be introduced
- Smart technologies will be further promoted, for instance through requirements on the installation of building automation and control systems and on devices that regulate temperature at room level.
- E-mobility will be supported by introducing minimum requirements for car parks over a certain size and other minimum infrastructure for smaller buildings
- EU countries will have to express their national energy performance requirements in ways that allow cross-national comparisons
- Health and well-being of building users will be promoted, for instance through an increased consideration of air quality and ventilation.

Under the current Energy Performance of Buildings Directive

- All new buildings must be nearly zero-energy buildings by 31 December 2020 (public buildings by 31 December 2018)
- Energy performance certificates must be issued when a building is sold or rented, and they must also be included in all advertisements for the sale or rental of buildings
- EU countries must establish inspection schemes for heating and air conditioning systems or put in place measures with equivalent effect
- EU countries must set cost-optimal minimum energy performance requirements for new buildings, for the major renovation of existing buildings, and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls and so on)
- EU countries must draw up lists of national financial measures to improve the energy efficiency of buildings.

National reports on energy performance requirements

EU countries have calculated the cost-optimal minimum energy performance requirements for new as well as renovated buildings in their territory. These requirements must be reviewed every five years and, if necessary, updated in order to reflect technological progress in the building sector.

Buildings under the current Energy Efficiency Directive

- EU countries must make energy efficient renovations to at least 3% of the total floor area of buildings owned and occupied by central government
- EU governments should only purchase buildings which are highly energy efficient
- EU countries must draw up long-term national building renovation strategies which can be included in their National Energy Efficiency Action Plans.

Practical support initiatives

To help EU countries properly implement the Energy Performance of Buildings Directive ((EU) 2018/844) and to achieve energy efficiency targets, the European Commission has established practical support initiatives: The Energy Performance of Buildings standards (EPB standards).

These include a set of standards for a common methodology calculating the integrated energy performance of buildings, in accordance with the Energy Performance of Buildings Directive.

3.3.2 ENERGY EFFICIENCY IN INDUSTRY

The aim of the policies and therefore of the European regulations on energy efficiency in the industry is the breaking down of the most important obstacles that hinder the achievement of energy efficiency measures in enterprises (for example, information and knowledge deficit, low priority with respect to investments in energy efficiency or high transaction costs) and, at the same time, to exploit the driving forces that facilitate the implementation of energy efficiency measures. An appropriate package of measures for industry should therefore include regulatory instruments and other incentive tools in which regulatory instruments define the technological basis. Moreover, other tools that can then encourage the investor to take measures that comply with this baseline or can set incentives to promote the use of more advanced technologies should be included.

With the Energy Efficiency Directive from 2012 (2012/27/EU) the Member States are obliged to meet their national energy efficiency target set in Article 3 EED and the 1.5% energy saving target from Article 7 of the EED. The EED also includes specific regulations for this sector, especially Article 8 on energy audits. The achievement of the new 2030 target for energy efficiency, which prescribes a reduction of primary energy consumption by 27% compared to a reference development, will also need contributions from all end-use sectors.

The main instrument to face the problem of energy consumption in Industry is surely represented by financial measures in almost all EU Member States. Around half of the policies addressing energy efficiency in industry are about financial issues. However, a broad mix of other types of measures (incl. new market-based instruments) have been included in the national policies.

The Energy Efficiency Directive (2012/27/EU) introduced new energy efficiency policies in the Member States. With regard to industry, these are especially measures introduced under Article 7 (energy efficiency obligations and/or alternative measures), mandatory audits (Article 8) and new certification/qualification schemes.

Energy audits and energy management are instruments playing a crucial role in the Industry sector, as they can be seen as fundamental measures to recognise and observe existing economic energy efficiency potentials by systematic procedures to gain knowledge and developing a strategy to achieve energy efficiency targets.

Several energy efficiency measures are already in place for big Industries while more tailored programmes needs to be developed for small and medium enterprises (SMEs) in order to address their special needs.

3.3.3 ENERGY EFFICIENCY IN TRANSPORT

Policies and European legislation on road transport have been created to promote and guarantee efficient, clean and environmentally friendly mobility. Among the specific measures created, we find the promotion and harmonization of technical rules, so far fragmented, and the harmonization of fiscal and social provisions, such as to ensure the correct application of the rules.
The aim is for all European citizens to use clean and energy efficient vehicles as far as possible in order to increase the reduction of energy consumption, CO2 emissions and polluting emissions. The clean transport systems required by the legislation will have to meet the energy demand in the transport sector and encourage the use of alternative low-carbon fuels that should gradually replace fossil fuels. The directive on the promotion of clean and efficient vehicles from the point of view of road transport aims at a broad introduction on the market of environmentally friendly vehicles. The main target are vehicles for public transport services. The directive on the promotion of clean and efficient vehicles from the point of view of road transport aims at a broad introduction on the market of environmentally friendly vehicles. It requires that the energy and environmental impacts associated with the operation of vehicles throughout their life are taken into account in all purchases of road vehicles, as required by the public procurement directives and the public service regulation.

The energy efficiency of transport improved by 1.2% per year in the EU between 2000 and 2013. Greater progress was achieved for both cars and airplanes than in the rest of the sector. Energy efficiency progress has slowed down for trucks and light goods vehicles since 2005 and even has virtually stopped since 2007: the fall in freight activity (by 2.5%/year over 2007-2012) led to less efficient operation of the vehicle fleet, as shown by the sharp decrease in load factors.

The majority of the transport measures (about 70% of the total) concern the passenger modes with particular emphasis on the private car, and this is reflected in the corresponding energy consumption and traffic trends. In contrast, the approximately 30% of policy measures that directly or indirectly affect freight transport do not seem to have had a tangible impact on the corresponding energy efficiency and traffic indicators.

In the same way, the approximately 100 measures that address modal shift have not yet been able to noticeably affect passenger mobility habits and freight transport logistics and organization. Positive signs of change are indeed coming from some countries, especially with regards to the passenger modes, but it is too early to judge whether this is due to the measures that have been implemented or to the economic crisis. The energy efficiency potential of modal shifting is very high but is far from being realised.

In contrast to the household and services sectors, in the transport sector EU Legislation does not represent the major driver for the implementation of policies and measures. The transport measures related to the EU legislation represent just 20% of total ongoing measures and the majority of them have been issued in the period 2000 – 2010. This means that the issuing of purely national measures is still rather high in this sector, with the possible exception of the measures concerning the introduction of biofuel in the fuel market that generally refer to the corresponding EU Directive 2003/

4 Best practices:

4.1 Best practices in Austria

4.1.1 Renewable Energy

The 2010 National Renewable Energy Action Plan 2010 (bmwfi, 2010) has been created in accordance with Directive 2009/28/EC and the template predetermined in accordance with European Commission Decision of 30.06.2009 (2009/548/EC).

The general conditions of this action plan are based on the Austrian Energy Strategy (bmwfi 2010a).

Targets to be reached by 2020

According to Directive 2009/28/EC, Austria must increase its share of renewable energy in gross final consumption of energy to 34 % by 2020. In the 2005 base year this share was 24.4 %. The value for 2008 has already reached 29.0 %.

The accessibility of a 34 % share of renewables by 2020 is based on two conditions:

- compared to the reference scenario, which updates the previous trends, a 13 % reduction of final energy consumption is needed for the efficiency scenario to be achieved;
- the volume of renewable energy in 2008 must be increased by 18 % by 2020.

The mix of renewable energy various quantities of renewable energy are possible in principle in order to achieve the 34 % target for renewable energies in 2020, with a targeted final energy consumption of 1 100 PJ. In addition to water, wind and solar power, the exhaustion of available biomass potential is also important for the provision of heating and cooling and to achieve the 10 % biofuel target. For determining the energy mix, the factors of cost-efficiency, resource availability and environmental protection must also be taken into account. When using biomass there should be no unreasonable cutbacks in comparison with the proposals for measures of the energy strategy as a result of splitting up the template.

The implementation of the directive for achieving the renewables target of 34 % is a dynamic process, which is mainly determined through the transposition measures of the energy strategy to be implemented by the Austrian Federal Government. This can therefore result in changes over time in the individual areas which will be the subject of project reports to be transmitted every two years. At the same time, there must be coordination with other 2008 EU climate and energy pact targets.

2017 Progress Report for Austria under Directive 2009/28/EC

Table 1 shows that Austria is on a good way to reach the 2020 goal. In 2016 the target was almost reached. Many legislative, financial (subsidy, support programs, feed in tariffs, tax) and strategic measures were conducted in the state of Austria and its provinces to achieve these goals.

Table 1: Sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources (bmwfw, 2017)[*].

sources. 2011	2012	2013	2014	*2015*	*2016*	
Renewable energy sources – heating and cooling[2] (%)	44.8 %	45.4 %	45.1 %	46.4 %	46.0 %	46.1%
Renewable energy sources – electricity[3] (%)	64.5%	65.3%	66.9%	69.2%	69.3%	71.7%
Renewable energy sources – transport[4] (%)	7.8 %	7.9 %	7.8 %	9.2%	10.1%	10.5%
Overall share of renewable energy sources[5] (%)	30.4%	31.5%	32.5%	32.9%	33.0%	33.5%
Of which from cooperation mechanism[6] (%)	0 %	0 %	0 %	0 %	0 %	0%
Surplus for cooperation mechanism[7] (%)	0 %	0 %	0 %	0 %	0 %	0 %

[*] Distinction due to new factors – according to SHARES – compared to energy balance for which old factors were still used.

2 Share of renewable energy in heating and cooling: Gross final consumption of energy from renewable sources for heating and cooling (as defined in Articles 5(1)(b) and 5(4) of Directive 2009/28/EC) divided by gross final consumption of energy for heating and cooling. The same methodology as in Table 3 of the NREAP applies.
3 Share of renewable energy in electricity: Gross final consumption of electricity from renewable sources for electricity (as defined in Articles 5(1)(a) and 5(3) of Directive 2009/28/EC) divided by total gross final consumption of electricity. The same methodology as in Table 3 of the NREAP applies.
4 Share of renewable energy in the transport sector: Final energy from renewable sources consumed in transport (see Article 5(1)(c) and 5(5)of Directive 2009/28/EC) divided by the consumption in transport of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Table 1). The same methodology as in Table 3 of the NREAP applies.
5 Share of renewable energy in gross final energy consumption. The same methodology as in Table 3 of the NREAP applies.
6 In percentage point of overall RES share.
7 In percentage point of overall RES share.

4.1.2 Energy Efficiency Industry (IEA, 2014)

A new law, the Federal Energy Efficiency Act, was adopted on July 9th, 2014, with the required constitutional majority in the National Council and was published on August 11th, 2014. In this new Austrian Energy Efficiency Law, which is now already implemented and also in force, the national energy efficiency headline target - the Austrian final energy consumption must not exceed 1.050 PJ in 2020 - is set out.

Austria will reach this target by:

- a bundle of measures which can be divided into the categories industrial buildings, production and services as well as trade and small-scale consumption, mobility, energy provision, security of energy supply and general measures as well as by
- an obligation system.

As of 1st January 2015, all energy suppliers (with the exception of very small businesses) must implement demonstrable measures to increase energy efficiency to reach a target of 0.6% annual increase in energy efficiency (energy savings obligation system). Small energy retailers are excluded (<25 GWh). The residential sector must represent 40% of savings.

Large-scale consumers must either implement an energy management system or be subject to an energy audit every four years. Medium-scale and small businesses are exempt from these requirements, but can choose to voluntarily introduce energy saving measures.

The obligation requirements are calculated as a combination of deemed, scaled and metered savings. Also surveyed savings are permissible. There is a large catalogue of deemed savings values (mainly for the household sector) that is updated regularly.

A monitoring body has been appointed for M&V. Reporting via an online portal. All data is processed electronically. Three main pillars of M&V: plausibility checks (all measures), desktop check of detailed documentation of measures and on-site checks (both for representative samples of measures).

4.1.3 Energy Efficiency in Buildings (AEA, 2014)

In Austria, building regulations are under the jurisdiction of the nine federal provinces. In 2006, in order to transpose and implement the EPBD, a harmonization process was launched to develop a common calculation methodology for EPCs and labelling, as well as for inspecting the HVAC systems. The Austrian Institute of Construction Engineering (OIB www.oib.or.at) was assigned to manage this process. A working group of representatives of the nine provinces was authorised to work and agree on the common methodology. The outcome of this committee is the OIB Guidelines, whose contents are implemented in each of the respective provinces' building regulations.

The first guidelines were published in 2006, and the regulations of the provinces (Länder), according to these guidelines, entered into force in the first half of 2008. The new OIB Guideline 6 was published in June 2014. OIB Guidelines consist of a set of regulations for buildings with six parts and OIB Guideline 6 is the part setting requirements related with energy economy and heat retention in the buildings.

The OIB Guideline 6 (http://www.oib.or.at/de/guidelines/oib-richtlinie-6) regulates the energy saving and heat retention of both residential and non-residential buildings. There are no specific regulations regarding public buildings, therefore, these buildings follow the same requirements as all non-residential buildings.

Non-residential buildings are divided into 13 categories: office buildings, kindergartens and schools, colleges and universities, hospitals, nursing homes, boarding homes, hotels, restaurants, event sites, sports facilities, retails, indoor swimming halls and other conditioned buildings.

The OIB Guideline 6 deals mainly with the requirements on heating and cooling demand and final energy demand related to space heating and DHW, for new buildings and existing buildings undergoing major renovation. The U-values of the different building elements of new buildings or existing buildings in case of renovation (either major or smaller renovation, i.e. replacement of windows), are also defined in the OIB Guideline 6. The revision of the guideline in 2011 tightened the maximum U-values (Table 1).

The national plan on the minimum energy performance requirements of 2020 for NZEBs (new buildings) has been elaborated and implemented in almost all provinces. This plan also describes the minimum requirements for major renovations in case where the renovation measure is technically feasible, or accepted by the building law.

In the latest published version of the national plan by OIB in March 2014, the requirements for the NZEBs (non-residential) are also defined.

In the past few years, a few of the Austrian standards (ÖNORM) regarding the total energy efficiency of buildings, including principles and verification methods for heating and cooling demand, were updated.

The Austrian NZEB is defined as an energy efficient building with a good thermally insulated envelope and an environment-friendly heating system, which is not attached to a specific building concept, e.g., 'Passive House'.
The first draft of the Austrian national plan on NZEBs was published in 2012. This document was agreed on by the majority of the provinces and included minimum standards for four energy indicators for residential buildings. NZEBs are thus defined by four indicators or parameters:

- space heating demand (kWh/m².year);
- primary energy demand (kWh/m².year);
- CO2-emissions (kg/m².year);
- total energy efficiency factor f_{GEE}.

The national plan indicates a stepwise lightening of the requirements towards 2020 (in 2014, 2016, 2018, and 2020). The revised document containing the minimum requirements for non-residential buildings was published in March 2014. The minimum requirements for the energy performance of NZEBs are shown in the Tables 4 - 7, for new and major renovations of residential and non-residential buildings. Compliance with these requirements can be achieved by two methods:

- through tightened requirements on space heating demand (HWB), which means better building envelope in order to reduce the heating/cooling energy needed, and not considering the fGEE. This is reflected in the formula for NZEB 2020 buildings 10x(1+3/lc) where lc is the characteristic length (usually known as the building's 'shape factor');
- through installation of a more energy efficient technical system for heating and DHW. The total energy efficiency factor (fGEE) reflects the type of energy use and production (the

target space heating demand of this building is calculated with the following formula: 16x(1+3/lc).

In both cases, the maximum values for primary energy demand and CO2emissions are defined. The minimum energy performance requirements on these four indicators are related to the Austrian reference climate.

Table 2: Minimum energy performance requirements for new residential buildings NZEB 2020. Source: OIB Guidelines; Guideline 6, National Plan Draft, March 2014.

	HWB_{max} [kWh/m².year]	EEB_{max} [kWh/m².year]	$f_{GEE,max}$ [-]	PEB_{max} [kWh/m².year]	CO_{2max} [kg/m².year]
2020	10 × (1 + 3.0 / ℓc)	using $HTEB_{Ref}$		160	24
	or				
	16 × (1 + 3.0 / ℓc)		0.75		

Table 3: Minimum energy performance requirements for new nonresidential buildings NZEB 2020. Source: OIB Guidelines; Guideline 6; National Plan Draft, March 2014.

	HWB_{max} [kWh/m³.year]	EEB_{max} [kWh/m².year]	$f_{GEE,max}$ [-]	PEB_{max} [kWh/m².year]	CO_{2max} [kg/m².year]
2020	3.33 × (1 + 3.0 / ℓc)	using $HTEB_{Ref}$		170	27
	or				
	5.50 × (1 + 3.0 / ℓc)		$f_{GEE,DLGneu,max}$		
	$f_{GEE,DLGneu,max}$ ... These values are the result of a stricter space heating demand and the use of reference technical equipments for energy supply.				

Table 4: Minimum energy performance requirements for existing residential buildings in case of major renovation NZEB 2020. Source: OIB Guidelines; Guideline 6; National Plan Draft, March 2014.

	HWB_{max} [kWh/m².year]	EEB_{max} [kWh/m².year]	$f_{GEE,max}$ [-]	PEB_{max} [kWh/m².year]	CO_{2max} [kg/m².year]
2020	17 × (1 + 2.5 / ℓc)	using $HTEB_{Ref}$		200	32
	or				
	25 × (1 + 2.5 / ℓc)		0.95		

Table 5: Minimum energy performance requirements for existing nonresidential buildings in case of major renovation NZEB 2020. Source: OIB Guidelines; Guideline 6; National Plan Draft, March 2014.

	HWB_{max} [kWh/m³.year]	EEB_{max} [kWh/m².year]	$f_{GEE,max}$ [-]	PEB_{max} [kWh/m².year]	CO_{2max} [kg/m².year]
2020	$5.67 \times (1 + 2.5 / \ell_c)$	using $HTEB_{Ref}$		250	39
	or				
	$8.50 \times (1 + 2.5 / \ell_c)$		$f_{GEE,DLGsan,max}$		
	$f_{GEE,DLGsan,max}$ ... These values are the result of a stricter space heating demand and the use of reference technical equipments for energy supply.				

References

(AEA, 2014), https://www.epbd-ca.eu/outcomes/2011-2015/CA3-2016-National-AUSTRIA-web.pdf, (looked up 01.08.2018)
bmwfi, 2010, National Renewable Energy Action Plan 2010, Federal Austrian Ministry of Economy, Family and Youth
bmwfi, 2010a, Energy Strategy Austria, Federal Austrian Ministry of Economy, Family and Youth
bmwfw, 2017, National Renewable Energy Action Plan, 2017 Progress Report for Austria under Directive 2009/28/EC, Federal Ministry of Science, Research and the Economy
Directive 2009/28/EC of the European Parliament and of the Council, 2009, on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC
DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings.
DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on energy efficiency
IEA, 2014, https://www.iea.org/policiesandmeasures/pams/austria/name-149671-en.php?s=dHlwZT1lZSZzdGF0dXM9T2s,&return=PG5hdiBpZD0iYnJlYWRjcnVtYiI-PGEgaHJlZj0iLyI-SG9tZTwvYT4gJnJhcXVvOyA8YSBocmVmPSIvcG9saWNpZXNhbmRtZWFzdXJlcy8iPlBvbGljaWVzIGFuZCBNZWFzdXJlczwvYT4gJnJhcXVvOyA8YSBocmVmPSIvcG9saWNpZXNhbmRtZWFzdXJlcy9lbmVyZ3llZmZpY2llbmN5LyI-RW5lcmd5IEVmZmljaWVuY3k8L2E-PC9uYXY -(looked up 31.07.2018)

4.2 Best Practices in Cyprus

The best practices to eliminate the environmental impacts of the increasing energy demand in the world include the energy efficient measures, enhancing renewable sources installations and nearly zero energy buildings development as well as transportation measures.

Each European country has different energy potentials and operate different schemes of support for energy from RES at the national level. Most of them apply support schemes that grant benefits solely to energy from RES that is favorable in their area (EED). For example, in Cyprus, solar technology is becoming a viable alternative to conventional electricity generation and will contribute to the achievement of the energy targets set by the EU for 2020 and beyond due to the significant cost reduction of PV systems and the increased solar potential all year around.

Renewable sources have been introduced to the Cypriot energy mix over the last decades due to the generous subsidies offered and more recently because of the significant price reduction.

Considering the ambitious target of 20% of the total gross energy consumption set by the EU, Cyprus foresees to reach a RES share of 13% in the gross national consumption of energy in 2020.

It is noticed that the steadily increasing RES deployment has been achieved through different incentive frameworks, including attractive tariff management schemes, such as Feed-in Tariff (FiT) and Feed-in Premium (FiP), and governmental subsidies. Overall, there have been several financial programmes announced over the last years in Cyprus to encourage the further deployment of PV systems. The Cyprus government launched the first support scheme in 2010 offering FiT incentives to promote PV penetration and to achieve the 2020 national energy targets. Incentives for small and large-scale PV systems (up to 20 kWp) were the most favorable and led to the installation of 1907 PV systems reaching a total of 43 MWp installed capacity by the end of 2013.

Additionally, a similar scheme was announced in the same year, supporting large-scale PV projects of capacity above 150 kWp by means of a competitive bidding process. The first tender was organized by the Ministry of Energy, Commerce, Industry and Tourism (MECIT) for a total capacity of 50 MWp. The high competitiveness of the tender in combination with the overall falling PV system component prices, led to an average tender price of 8.66 c€/kWh. Concurrently, the total PV capacity for installations under FiT incentives by the end of 2016 amounted to 53.0 MWp installed capacity.

The net-metering support scheme administrated by the MECIT under the “Solar Energy for all” programme was established in 2013 under Law No.112(I)/2013. Under this scheme, the installation of residential PV systems having maximum capacity up to 3 kWp was allowed. According to the framework amendment released by the year 2015, the upper limit for net-metered systems has been increased to 5 kWp. This comprises the only available policy framework for residential PV installation in Cyprus and the total approved capacity cap for the year 2015 was 23 MWp. To push further the utilization of net-metered PV systems, governmental subsidies were offered for vulnerable prosumers (i.e. low-income families) who could benefit up to €2700 of the total system price. The favorable conditions of net-metering scheme fueled the deployment of small-scale PV systems, reaching a total number of installations close to 8000, corresponding to 28.25 MWp of total installed capacity at the end of 2016.

Apart from net-metering, the “Solar Energy for All” policy framework encourages self-consumption, paving the way for optimal integration between PV and energy storage technologies. As defined by the DSO of Cyprus, the Electricity Authority of Cyprus (EAC), the process of self-consumption allows the transition of passive consumers to active “prosumers”. The scheme allows the installation of grid-connected PV systems of 10-500 kWp with no incentive-based tariffs for any surplus power fed back to the grid. A first amendment of self-consumption policy was released in 2015 where the upper limit of the permitted capacity was increased to 10 MWp and an 80% capacity limit was set. Historically, the total permitted capacity for new installations under self-consumption offered by the MECIT by 2010 was 5 MWp, whilst according to the first amendment in 2015 the total limit was elevated to 40 MWp. Despite the governmental attempt to pave the way for energy storage and promote self-consumption, the absence of incentive frameworks coupled with the high cost of storage units has not yet resulted in any storage uptake.

The establishment of support schemes is an important part of the energy strategic plan of the government towards promoting RES penetration and solar PV system through the active

engagement of consumers in achieving high shares of PV in the energy mix of the island. Self-consumption can be considered as a plan to expand towards managing optimal allocation of storage in the future active distribution networks of Cyprus for achieving the foreseen energy transition.

The Feed-in Tariff (FiT) support scheme promoted the installation of stand-alone and grid-connected PV systems for the first time in Cyprus with two different subsidy schemes provided by the Ministry of Energy, Commerce, Industry and Tourism (MECIT) having a duration of up to 20 years. Stand-alone PV systems were mainly installed in grid-isolated premises. Due to the high retail price of PV systems in 2010, prosumers under the specific scheme could benefit from 55% government subsidy of the total system cost including storage units, a total amount reaching up to €44,000. On the other hand, the policy framework for grid-connected PV systems was distinguished in two pillars. Producers could benefit a 55% subsidy (through MECIT) of up to €33,000 along with a FiT of 22.5c€/kWh for any excess PV energy fed back to the distribution grid. On the other hand, producers with no subsidy could receive a higher FiT of 38.3 c€/kWh as the overall PV production was fed back to the grid. However, the low cost of electricity generation from PV systems prompted the authorities to reduce the feed-in tariff and finally eliminate the scheme in 2013. Therefore, the net-metering framework as imposed in "Solar Energy for all" by the law N.157(I)/2015, consists of the existing policy for the installation of new PV systems. Grid-connected systems of capacity up to 5 kWp can be installed for three-phase homes and up to 4 kWp for single-phase homes. In addition, a subsidy of €900/kWp for the first 3 kWp installed PV capacity was granted to vulnerable customers. Under this policy, PV generated energy is directly fed to the distribution grid and a bidirectional meter is placed to account for the imported and exported electricity. The billing period is two months with any excess kWh by the end of it being transferred to the next period up to a year.

The self-consumption scheme was also part of "Solar Energy for All" with the latest amendment published in 2015 to encourage self-sufficiency and promote local energy storage through battery systems. The model is because the grid parity has already been achieved from decentralized electricity generation of renewables and especially small-scale PV systems. Under grid parity, consumers can save money by generating their electricity rather than buying it from the grid and high rates of self-consumption and self-sufficiency can result in several benefits for both prosumers and distribution system. The restriction for the total system capacity for each prosumer is 80% of the maximum power demand, a cap that can be exceeded if local storage is installed. Incentives for storage only exist for agricultural applications where a governmental grant for up to 50% of the total storage cost is available. For the proposed new Electricity market rules, storage is expected to play an important role in fading out the various imbalances of the electricity system and it is envisaged that appropriate mechanisms will be applied to incentivize storage deployment.

Another important step towards the implementation of the EU climate change targets is the establishment of energy efficiency policies that started to exist after the accession of the Republic of Cyprus to the European Union in 2004. Current national energy efficiency targets have been set out in line with the relevant EU legislation, such as the 'recast Buildings Directive' (2010/31/EC) and the 'Energy Efficiency Directive' (2012/27/EU) that they foresee 14.5% savings in national energy consumption by 2020 compared to a 'reference scenario' and 3% annual refurbishment of the stock of government-owned buildings (Energy Efficiency Trends and Policies in Cyprus).

In September 2017, Cyprus provided to the European Commission the 3rd National Energy Efficiency Action Plan (NEEAP), revising its national energy forecasts for the period 2014-2020, considering its new energy and economic data.

In application of the provisions of Article 7(9) of the Energy Efficiency Directive, as an alternative to the adoption of an energy efficiency obligation scheme, Cyprus has prepared a National Energy Efficiency Programme (NEEP) for achieving the mandatory cumulative energy savings target referred to in Article 7(1). The mandatory cumulative target calculated according to the provisions of the Directive amounts to 241 588 TOE and it must be achieved in the 2014-2020 period by taking measures to improve end-use energy efficiency. The NEEP was revised during the drafting of the 4th NEEAP, as the measures included in 2014 failed to attain the target for the 2014-2020 period.

The renovation of the existing building stock and the upgrading of its energy efficiency is one of the most important tools for Cyprus to comply with its obligations in the energy sector and reduce greenhouse emissions. The need for increasing the number of renovation projects is getting more imperative given the benefits that can be derived for building owners, undertakings, public finances and the labor market (4th NEEAP of Cyprus). In general, rules and obligation for minimum requirements for the use of energy from RES in new and renovated buildings have led to considerable increase in the use of energy from RES (EED).

It is widely known that buildings account for 40% of the European Union's total energy consumption. The sector is expanding and so too are its energy demands. Forty per cent (40%) of the home used as permanent dwellings were built before 1981 and fifty-four per cent (54%) were built between 1981 and 2006, i.e. before any minimum energy performance requirements were adopted. In a similar way, eighty-three per cent (83%) of the office buildings (public and private) as well as buildings in the accommodation sector (hotels, tourist establishments and restaurants) were built before the first minimum energy performance requirements were adopted (Zingheri, P. 2016).

Member States are thus developing plans to increase the number of Nearly Zero Energy Buildings (NZEBs), which most probably employ photovoltaics (PV), to reach their 2030 climate change targets. The increase share of NZEBs will help EU reduce its energy dependency and greenhouse gas emissions and advance towards its goal of reducing the overall energy consumption by 20% by 2020. The transformation of the EU's building stock to Nearly Zero Energy Buildings (NZEB) has already started and is expected to continue rapidly in the following years.

Since NZEBs are a brand-new concept not only for professionals in the building industry but for building owners, both in terms of design and construction as well, most Member States did not describe in a detailed way policies and measures that would lead to enhance NZEB penetration in the built environment (JRC and 2nd National Plan).

It is important to design measures to improve the skills of building designers and developers and thus introduce NZEBs to the public. The first step to take to do that is to increase NZEB-related awareness among professionals and consumers through incentives, training measures, information measures and research programs (2nd National Plan).

The best practices for the transformation of the existing building stock towards NZEB include technology awareness, incentive schemes, financial instruments, taxation mechanisms. Among the economic instruments are energy saving obligation schemes, market instruments such as public private partnerships to stimulate building renovation or one-stop solution centers giving advice on energy renovation (JRC).

In most Member States a wide range of policies has been selected to increase NZEB penetration (e.g. awareness raising and information, education and training, strengthening building regulations and energy performance certificates, chose by Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Sweden, Slovenia, United Kingdom). However, policies sometimes seem rather general and addressed to "all buildings". Their specific support to NZEB is not always sufficient clear, not is to what extent they contribute in practice to achieving the NZEB target in a country. Therefore, a stronger connection between policies, measures and NZEB is recommended. Reported policies appear in line with the EPBD requirements, but rarely do these legislative and normative measures explicitly refer to a clear definition of an NZEB renovation (JRC).

After the first phase of the BUILD UP Skills Initiative, a comprehensive Intelligent Energy Europe initiative to increase the number of qualified workers in the building workforce in European countries, some specific training programs and schemes have been developed and implemented in Cyprus, especially within the framework of EU-funded projects (Transition towards NZEBs in Cyprus, JRC).

The section below presents some measures taken by Cyprus authorities to increase the number of NZEBs in the country to help the other countries of the partnership to launch policies and measures to promote NZEBs in the built environment as well.

The current financial support policy for improving the energy performance of buildings and promoting NZEBs largely depends on State subsidization since certain deficiencies in the previous aid scheme of the Special Fund for RES and ES are addressed in the "Save & Upgrade" program. For instance, the "Save & Upgrade" program provide for major renovation financing, meaning that the buildings included in the current scheme are not at risk of "blocking" the entire energy savings potential of the buildings. Moreover, the provision for participation of the qualified experts and energy auditors in the scheme boosts energy efficiency in the market and promotes a holistic and cost-effective approach when measures are choses for intervention in each building (Economidou, M., Financing energy efficiency in buildings in Cyprus, JRC Technical Report, 2016).

However, ensuring maximum investment requires a higher share of private financing and solutions that are based on market mechanisms. Thus, NZEB projects must meet the different criteria that are mandatory for financing from the financial sector. Also, the banking sector must become acquainted with the concept of NZEBs and the economic parameters of the buildings. The technical report entitles "Financing energy efficiency in buildings in Cyprus, Status across the EU and recommendations, JRC Reports", as prepared by the JRC for the Ministry of Energy, Commerce, Industry and Tourism, provides details on the existing financial incentives and assesses their financial and technical efficiency to date. A greater mobilization of private capital is very important,

also in line with said technical aid, and proposals for improving the situation are being made. This parameter will be recognized in the impeding restructuring of the “Save & Upgrade” program in view of the second call to be issued.

The Energy Service and professional in the field of the energy performance of buildings organize events for key figures of commercial banks to exchange views and find solutions to satisfy all stakeholders, including building owners.

Until today, training and information on NZEBs are provided primarily to architects and engineers, as well as to installers to a lesser extent. However, a contribution can be made towards the promotion of NZEBs by other groups of professionals too, which are currently receiving no or very little information on the subject. The most important groups are real estate agents, properly evaluators and construction material and technical system suppliers. The technical assistance received by the Ministry of Energy, Commerce, Industry and Tourism from the JRC and the GIZ is also expected to contribute towards finding appropriate communication channels for better informing these groups.

NZEBs require higher levels of thermal insulation and possibly, in many cases, the implementation of sunlight protection measures, such as external shades, cantilevers, etc. These measures tend to reduce the amount of usable space available in a building or the distance from adjacent buildings. As building construction is subject to town planning restrictions, discussing the issue with the direct stakeholders, i.e. the Department of Town Planning and Housing and architects, will stress the extent of the problem and point to the implementation of corrective measures as appropriate.

Conformity to the NZEBs requirements laid down in RAA 366/2014 can only be achieved through the methodology used to calculate the energy performance of buildings. Various case studies and surveys have indicated that the actual energy consumption is lower than calculates where the largest deviation being observed in cooling. This is because of various reasons with the most important one being that the current methodology used to calculate the energy performance of buildings does not consider measures that help reduce cooling needs, such as roof-mounted fans and a building design that favors natural cooling. The contribution of such measures towards reducing the energy spent on cooling cannot be calculated at this stage, as the calculation procedures concerned are not specified in the relevant EU standards. Furthermore, EU standards do not allow the calculation of the renewable energy derive from high-efficiency heat pumps. As a result, there are certain savings measures which are not adequately encouraged, and it may be impossible to effectively implement an overall requirement concerning energy demand for cooling like that in place for heating. Cyprus looks forward to a solution to the problem through the new standards prepared by the European Committee for Standardization (CEN).

In Cyprus for example, consistent mixtures of policy instruments (policy packages) should be designed depending only partially on public budgets. Reliable data to monitor also policy impacts, including actual energy performance and indoor environment are required above all for building stock refurbishment. The adoption of roadmaps and indicators is a good option to address specific needs and monitor implementation (JRC).

Taking into consideration the energy targets set by the EU for the upcoming decade, new and sustainable frameworks are needed for supporting the reduction of GHG emissions especially in the context of transport where Cyprus lags greatly.

4.3 Best practices in Germany

- National Renewable Energy Action Plan in accordance with Directive 2009/28/EC

Under the EU Directive 2009/28/EC member countries of the European Union are obliged to draft and submit to the European Commission National Renewable Action Plans (NREAPs) outlining pathway which will allow them to meet their 2020 renewable energy, energy efficiency and GHG cuts targets.[4]

Germany's renewable energy 2020 targets are:

- Overall target: 19.6% of share of energy generated from renewable sources in gross final energy consumption;
- Heating and Cooling: 15.5% of demand met by renewable energy sources;
- Electricity: 38.6% of electricity demand met by electricity generated from renewable energy sources;
- Transport: 13.2% of energy demand met by renewable energy sources;
- Renewable Energy Sources Act (EEG),

Crucial measure for the development of renewable energies in Germany is "2012 Amendment of the Renewable Energy Sources Act –EEG" supporting energy production from renewable sources.

Electricity. The Renewable Energy Sources Act (EEG) is a series of German laws that originally provided sector-specific tariffs for electricity from renewable energies fed into the public supply grid. The amount of compensation follows the principle of cost-covering compensation and is based on the specific electricity production costs of the specific sectors. The EEG first came into force on 1 April 2000 and has been modified several times since. The original legislation guaranteed a grid connection, preferential dispatch, and a government-set feed-in tariff for 20 years, dependent on the technology and size of project.[5]

The following tables gives an indication the structure and development of feed-in tariffs over the course of the EEG. Table 6 summarizes onshore wind energy remunerations from April 2000 to October 2016 and Table 7 the photovoltaics remunerations from August 2004 to January 2012:

In 2014 the EEG was amended by addition of an auctioneering system, after a testing phase including photovoltaic pilot models. This system enables the German government finding the lowest bidder for state funding subventions, until the energy expansions goals are completed.[6]

The following agenda released in 2015 included the development of 2.4 GW/a wind energy, with the premiss of a guaranteed implementation within max. 9 years. The additional wind energy annex was adjusted to 2.8 GW/a in 2017-2019 and 2.9 GW/a in 2020, (declining in the following years in correlation with the so far implemented power).[6]

Table 6: Onshore wind energy remunerations in [¢/kWh] from April 2000 to October 2016

Phase	Initial	Basic
EEG (2000)	9.1	6.19
EEG (2004)	8.7	5.5
EEG (2009)	9.2	5.02
EEG (2012)	8.93	4.87
EEG (2014) from 1 August 2014	8.9	4.95
EEG (2014) from 1 January 2016	8.79	4.89
EEG (2014) from 1 April 2016	8.69	4.83
EEG (2014) from 1 June 2016	8.58	4.77
EEG (2014) from 1 October 2016	8.48	4.72

Table 7: German photovoltaics remunerations from August 2004 to January 2012

Type		2004	2005	2006	2007	2008	2009	2010	July 2010	October 2010	2011	January 2012
Rooftop-mounted	up to 30 kW_p	57.40	54.53	51.80	49.21	46.75	43.01	39.14	34.05	33.03	28.74	24.43
	above 30 kW_p	54.60	51.87	49.28	46.82	44.48	40.91	37.23	32.39	31.42	27.33	23.23
	above 100 kW_p	54.00	51.30	48.74	46.30	43.99	39.58	35.23	30.65	29.73	25.86	21.98
	above 1000 kW_p	54.00	51.30	48.74	46.30	43.99	33.00	29.37	25.55	24.79	21.56	18.33
Ground-mounted	conversion areas	45.70	43.40	40.60	37.96	35.49	31.94	28.43	26.16	25.37	22.07	18.76
	agricultural fields	45.70	43.40	40.60	37.96	35.49	31.94	28.43	—	—	—	—
	other	45.70	43.40	40.60	37.96	35.49	31.94	28.43	25.02	24.26	21.11	17.94

Installations on agricultural fields were excluded under the PV Act (2010).

Implementation of Technologies based on Renewable Energies. National funding programs (KfW) provide low-interest loans for investments in installations for electricity production in accordance with the EEG, cogeneration plants and for small heat production installations. In the EEG program section “Premium” low interest loans with repayment subsidies are granted for renewable energy

heat produced in large installations. Funding programs (KfW) for energy-efficient construction and renovation (CO2 building renovation program), which promote the development of renewable energies, are:

- Energy efficient Construction (Energieeffizient Bauen),
- Energy Efficient Renovation (Energieeffizient Sanieren),
- Energy-efficient Renovation – Local Authorities (Energieeffizient Sanieren – Kommunen) and
- Social Investment - Building Refurbishment (Sozial Investieren- Energetische Gebäudesanierung).[7]

Heating Sector. The EEG is supplemented by the "Combined Heat and Power Act". Heating sector is supported by "Market Incentive Program (Marktanreizprogramm – MAP)" {International Energy Agency #4}. The Heat-and-power Cogeneration Act (KWKG) regulates the funding of old and new combined heat and power (CHP) plants and the development and construction of heating networks into which heat from CHP-plants is fed. Guidelines on the promotion of mini-CHP plants promote through investment grants the new construction of CHP - plants up to 50 kWel.

Energy Taxes. The Energy Tax Act (EnergieStG) provides tax relief for energy products used for combined heat and power production if the CHP plant has a monthly or annual efficiency of at least 70%. There is also a tax exemption for biogas which is combusted immediately after production or is used in a CHP plant.

References

[1] Eurostat, Renewable energy in the EU, Share of renewables in energy consumption in the EU reached 17% in 2016 (30.07.2018)

[2] https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive (30.07.2018)

[3] https://ec.europa.eu/energy/en/topics/renewable-energy (30.07.2018)

[4] https://www.iea.org/policiesandmeasures/pams/germany/name-39470-en.php (30.07.2018)

[5] https://en.wikipedia.org/wiki/Germany_National_Renewable_Energy_Action_Plan (30.07.2018)

[6] https://de.wikipedia.org/wiki/Erneuerbare-Energien-Gesetz#Ausschreibung_im_EEG_2017 (30.07.2018)

[7] https://en.wikipedia.org/wiki/German_Renewable_Energy_Sources_Act (30.07.2018)

4.4 Best Practices in ITALY

ENVIRONMENTAL IMPACT IN ITALY

The Environmental Impact Assessment (EIA) was born in the United States in 1969 with the National Environment Policy Act (NEPA), anticipating the founding principle of the concept of Sustainable Development. In Europe this procedure was introduced by the Community Directive 85/337 / EEC (Council Directive of 27 June 1985, Evaluation of the environmental impact of certain public and private projects) as a fundamental instrument of environmental policy.

The EIA procedure is structured on the principle of preventive action, according to which the best environmental policy is to prevent the negative effects related to the implementation of the projects

rather than to subsequently combat the effects. The structure of the procedure is designed to provide information to the public and to guide the decision-making process in a participatory manner. The EIA is born as a tool to identify, describe and evaluate the direct / indirect effects of a project on some environmental components and consequently on human health.

The EIA has been implemented in Italy with Law no. 349 of 8 July 1986, law that establishes the Ministry of the Environment and the rules on environmental protection. The D.P.C.M. December 27, 1988 contains the Technical Rules for the preparation of Environmental Impact Studies and the formulation of the compatibility judgment.

The regulatory framework in Italy, relating to the EIA procedures, was extended following the issue of the so-called. "Legge Obiettivo" (L.443 / 2001) and the related implementation decree (Legislative Decree No. 190/2002). The Legislative Decree identifies a special EIA procedure, with a special dedicated Commission. With the CIPE resolution no. 57/2002 were given provisions on the National Environmental Strategy for Sustainable Development 2000-2010 and it was stated that the EIA had to be integrated upstream with Plans and Programs that already had the criteria of environmental sustainability, through the Strategic Environmental Assessment.

A first assessment underlines the need to improve the training of local government staff; risk assessment and monitoring systems; sensitization on the links between human health and the environment; the overlap of environmental authorization procedures; facilitating public participation.

Legislative Decree 3 April 2006, n. 152 undertakes the reorganization of Italian environmental legislation and tries to overcome all dissonances with relevant European directives. Part II deals with the procedures for the strategic environmental assessment (SEA), for the environmental impact assessment (EIA) and for the integrated environmental authorization (IPPC);

An update on the application of the EIA in Europe was published in 2009: the Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the EIA Directive (Dir 85 / 337 / EEC, amended by Directives 97/11 / EC and 2003/35 / EC). The problems identified in the 2003 report are not yet resolved and further difficulties are identified in cross-border procedures and the need for better coordination between the EIA, other directives (SEA, IPPC, Habitats and Birds, Climate Change) and Community policies.

RENEWABLE ENERGY IN ITALY

Renewable energy is one of the areas in which the EU's focus is most concentrated. In this context, legislation has also developed, which we will see is rather complex and wide, on the RES (Renewable Energy Sources) and on the financing of their production in Italy. In particular, the promotion and development of energy produced by RES has been very successful in recent years, thanks to a financial incentive policy promoted by the State, mainly through the GSE (Gestore Servizi Energetici), and somehow forced by the obligations undertaken at the level Community from the country. In

fact, that the new European regulatory framework foresees the achievement of a share of renewable energy to cover energy consumption by 2020, equal to 17%, of which 10% only in biofuels, and a reduction in gas emissions 14% greenhouse compared to 2005.Developed since '99, the current Italian legislation is rather complex, but reserves important opportunities for producers of renewable energy. At national and regional level, today a wide range of economic and regulatory incentive measures have been developed to promote the use of renewable sources and energy efficiency, aimed at both energy operators and businesses and citizens.
Even if some of them are not in use anymore, their description can be useful as best practice or as a model to be implemented also for other countries.

The Green Certificates

The Italian legislation on renewable energy, and in particular on the Green Certificates (CV), is somewhat intricate. The starting point is Legislative Decree 79/99, also known as the Bersani Decree, which transposes the European Directive 96/92 / Ce on the "Common Rules for the internal electricity market". This decree establishes the liberalization of the markets in the energy sector and introduces a new form of incentive for renewable energy, based on the obligation for producers and importers of electricity produced from non-renewable sources to enter the national electricity system (with effect from 2002) a minimum share of electricity produced by plants powered by renewable energy sources, in operation after 1 April 1999.
The obliged parties can reach this quota by introducing into the grid electricity produced by RES or by purchasing from other producers the so-called Green Certificates (CV), ie annual titles that are attributed to energy produced from renewable sources and that prove the production of the equivalent share. These securities are issued by the Electricity Services Operator (GSE) in favor of producers of electricity from clean sources, subject to notification by the obliged subject of the amount of energy produced from clean sources and qualification of production facilities. This mechanism has created a market whose demand is made up of producers or importers who are subject to the obligation to purchase a share of clean energy while the offer is made up of the producers of electricity holding the CVs. Transactions can be made through bilateral contracts or through a trading platform managed by the Electricity Market Operator.

All-inclusive rate

A second incentive mechanism, introduced by the 2008 Finance Law and an alternative to the Green Certificates, is the so-called All-inclusive Tariff.
This is a monetary incentive, differentiated by source, which is granted for the electricity fed into the network. It is called all-encompassing because its economic value incorporates both an incentive share and a consideration for the sale of energy.
The tariff was born above all to promote the development of small plants, greatly simplifying the procedures and ensuring a fixed and predictable return. It is granted for a period of 15 years, and covers all renewable sources, with the exception of photovoltaics, whose incentive mechanisms are contained in the so-called "Conto Energia". After fifteen years, electricity will be remunerated, using the same procedures and economic conditions as set out in Article 13 of Legislative Decree 387/03, ie based on market conditions. The all-inclusive tariff can be updated every three years by the

Ministry of Economic Development, which is concerned with ensuring the adequacy of the remuneration taking into account the incentives of renewable sources.

Net metering

The net metering is a service provided by the GSE and is in force since 1 January 2009. It is defined as a mechanism that "allows the user who has the ownership or availability of a plant, the compensation between the value associated with 'electricity produced and fed into the grid and the value associated with the energy withdrawn and consumed in a different period from that in which production takes place ". In other words, it is a mechanism that allows the electricity produced, but not immediately consumed, to be put into the grid and then taken at a later date to satisfy its consumption.

Conto Energia (photovoltaic)

In Italy, to promote the use of renewable sources for energy production, the possibility of using incentive tariffs for the construction of photovoltaic plants through a mechanism called "Conto Energia" entered into force on 19 September 2005. It is necessary to specify that the incentive tariffs foreseen by this can only be applied to photovoltaic systems. On the other hand, the latter can not access other incentives through Green Certificates or the all-inclusive rate.
The "Conto Energia" system envisages that the energy produced by a photovoltaic system can be sold directly to the GSE operator at an incentive rate. In other words, the Energy Account consists of directly incentivising electricity production and not the initial investment. According to this mechanism, the owner of the photovoltaic system, in exchange for the energy sold, receives sums for the first 20 years of the plant's life.

Energy Efficiency in Italy

The mail regulation about Energy Efficiency in Italy is the Legislative Decree 102/2014. It sets the national indicative energy saving target, which consists in reducing primary energy consumption by 20 million tonnes of oil equivalent (Mtep) to 2020, equivalent to 15,5 Mtoe of final energy, counted starting from 2010.
It provides for the establishment of a mandatory energy efficiency scheme, consisting of the White Certificates mechanism that will ensure the achievement of energy savings of not less than 60% of the national energy saving target. The remaining volume of energy savings will be obtained through the current incentive measures.
As for the industrial sector, it introduces the obligation for large companies and energy-intensive companies to perform an energy diagnosis every four years, to identify the most effective measures to reduce energy consumption, and to promote its implementation in the SMEs.
As for the buildings, it is obligatory to install, metering systems, able to measure the actual energy consumption of the individual apartments, and the thermostatic valves, which allow to program the temperature and the hours of ignition of heaters in different environments.

- It provides for the establishment of training programs and certification and accreditation schemes to ensure compliance with the technical standards for Energy Service Companies, energy management experts, energy management systems and energy audits.
- At the same time it plans to start an analysis on the national territory to identify the areas with the greatest potential for district heating development, to direct investments and simplify the authorization procedures.
- Furthermore, as part of the supply of products and services of the central government, the provision reinforces the purchase constraint of energy efficient products and services. In the regulation of energy services and energy transmission and distribution activities, the Decree introduces rules to support energy efficiency, eliminating any barriers to the increase in network efficiency, the efficient deployment of renewable sources, and distributed generation.
- For energy end-users, provisions are envisaged to increase awareness of energy consumption among citizens through the promotion of individual metering systems, such as smart meters for electricity and gas, and a more precise and consumer-based billing system.
- The normative also promote the dissemination of information and for the training of companies, public administrations, citizens and students provides a three-year training and information program, which targets citizens, the public administration and businesses.
- For the improvement of the energy performance of buildings, both public and private, Legislative Decree 102/2014 provides sectoral plans for energy efficiency, such as
- the Strategy for the Energy Regeneration of the National Real Estate Park (STREPIN), aimed at mobilizing investments in the restructuring of the national park of buildings Starting from the national real estate. The document analyzes the technical, economic and financial barriers that hinder the implementation of energy efficiency and proposes the improvement of the support tools to increase the expected savings to 2020, bringing it closer to the estimated potential for the civil sector.
- The Action Plan for Almost Zero Energy Buildings (PANZEB) foresees that, from 2021 the new buildings will have to be almost zero energy. In view of this obligation, the PANZEB tracks the national guidelines and development lines to increase their number through the available regulation and incentive measures. The document, among other things, clarifies the operational meaning of NZEB, evaluates the energy performance of some of its expressions in the different types of use and climatic zones and estimates the over-costs necessary for their realization.
- The Plan for the Energy Regeneration of the Public Central Administrations (PREPAC), at Article 5 of Legislative Decree. 102/2014 provides that, annually, starting from 2014 and until 2020, the Ministries of Economic Development and the Environment and the Protection of the Territory and the Sea prepare, by November 30 of each year, a program of interventions annual requalification of energy in the buildings of the central Public Administration, including the peripheral properties, relating to at least 3% of the annual air-conditioned covered area, whose implementation methods have been defined by Interministerial Decree 16 September 2016.

- Finally, Legislative Decree 102 establishes the National Energy Efficiency Fund, an important financial instrument to support the energy requalification of public administration buildings and to reduce energy consumption in the industrial and service sectors. A specific section of the Fund will be dedicated to supporting investments in district heating and cooling networks. In the industrial sector, the predominant incentive mechanism is that of white certificates

White Certificates

The White Certificates, or Energy Efficiency Certificates (TEE) are negotiable securities that certify the energy savings achieved in the final uses of energy, implementing measures to increase energy efficiency. The CB system is an incentive mechanism based on a mandatory primary energy saving scheme for electricity and natural gas distributors with more than 50,000 end customers. For each mandatory year, from 2017 to 2020, the savings targets that distributors have to achieve through the implementation of energy efficiency measures have been set.

- The obliged parties can fulfill the savings obligation in two ways:
- realizing directly or through the companies controlled by them, or controlling, the energy efficiency projects admitted to the mechanism;
- buying the securities from the other parties admitted to the mechanism, or other distributors, ESCO certified or public or private end users who have appointed a certified EGE.
- Quantitative evaluation of achieved savings has been made both with reference to National Energy Efficiency Action Plan 2011 (2011 NEEAP) objectives, relative to the 2005- 2016 period, and to the Italian National Energy Strategy objectives, relative to the 2011-2020 period, further revised in 2014 NEEAP.

Besides, energy savings and information for the mandatory targets of Energy Efficiency Directive (EED) article 7 are also provided.

The methodology for the quantification of energy savings has been revised in 2015, in order to take a broader set of available data and information into account.

In particular, the following measures were analyzed:

- Energy efficiency scheme or White Certificates (Table 8): the energy

saving from projects implemented since 2005 through standard sheets (ex-ante estimation based on algorithms), and analytical and final balance sheets (ex-post measure) was equal to more than 4.75 Mtoe/year of primary energy (equivalent to more than 4.38 Mtoe/year of final energy).

Table 8: Italian savings from white Certificates (primary energy Mtoe/year), years 2005 - 2015

Total 2015-2010		**2011**	**2012**	**20013**	**2014**	**2015**	**Total 2005-2015**
Total	2.62	0.07	0.30	0.79	0.53	0.44	4.75

Source: Ministry of Economic Development elaboration on GSE data

- Fiscal deductions for energy renovation of existing buildings: until September 2016 it is still possible to modify data relative to interventions implemented in 2015. The energy saving for 2015 has then been estimated on the basis of preliminary data and was equal to 0.24 Mtoe/year of primary and final energy.
  The overall energy saving in primary and final energy was equal to 1.89Mtoe/year (Table 9). In the 2007-2015 period more than 2.5 million interventions were incentivized, with more than 28 billion euros invested by households.

Table 9: Italian savings from fiscal deductions for energy renovation (primary energy Mtoe/year), years 2007 – 2015

Intervention	2007	2008	2009	2010	2011	2012	2013	2014	2015*	Total
Overall renovation	0.006	0.014	0.01	0.004	0.003	0.003	0.003	0.003	0.003	0.049
Thermal insulation of the envelope	0.016	0.043	0.043	0.066	0.052	0.047	0.064	0.065	0.06	0.0465
Efficient heating system installation	0.096	0.162	0.136	0.138	0.146	0.129	0.174	0.175	0.18	1.347
Multiple actions	0.015	0.034	-	-	-	-	-	-	-	0.049
Total	0.133	0.253	0.189	0.208	0.201	0.179	0.241	0.243	0.243	1.890

*Estimate

Source: ENEA

- Renewable Energy for Heating & Cooling Support Scheme (so-called Thermal Account): Table 10 shows achieved energy savings in 2014 and 2015 by Public Administration. The total amount is equal to almost 0.78 ktoe/year of primary and final energy.

Table 10: Italian savings from Thermal Account (primary energy Mtoe/year), years 2014 – 2015

Intervention	2014	2015
Opaque envelope	na	0.000266
Windows and shutters	na	0.000140
Condensation boilers	na	0.000366
Total	0.00005	0.000773

Source: GSE

- Transposition of Directive 2002/91/CE and implementation of Legislative Decree 192/05 with reference to the Minimum Energy Efficiency Requirements for buildings: the overall primary energy saving was 2.03 Mtoe/year, mainly deriving from the substitution of heating systems in residential buildings (Table 11).

Table 11: Italian savings from the implementation of Legislative Decree 192/5 (primary energy Mtoe/year), years 2005 – 2015

Intervention	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*	Total
New Buildings-Residential	0.008	0.037	0.040	0.034	0.028	0.026	0.027	0.021	0.017	0.015	0.013	0.266
New Buildings-Non Residential		0.019	0.019	0.041	0.031	0.040	0.035	0.027	0.018	0.017	0.015	0.262
Heating system replacement		0.226	0.179	0.161	0.168	0.178	0.166	0.155	0.100	0.091	0.08	1.504
Total	0.008	0.282	0.238	0.236	0.227	0.244	0.228	0.203	0.135	0.123	0.108	2.032

*Estimate
Source: ENEA Elaboration

References

1 – ENEA Italy's Energy Efficiency annual report
2 - https://ec.europa.eu/energy/en/topics/energy-efficiency
3 - https://www.gse.it/
4 - http://www.isprambiente.gov.it/it/temi/autorizzazioni-e-valutazioni-ambientali/valutazione-di-impatto-ambientale-via
5 - http://www.rinnovabili.it/energia/energie-rinnovabili-italia/
6 - http://fire-italia.org/

5 Results of the surveys

HEBA's interest is not only to secure access to affordable renewable energy carriers, but also to increase the efficiency by reducing the energy demand in two strategic fields, industry and buildings, by keeping the energy services in efficient way in order to avoid pollution, to save money and energy.

The WP1 of HEBA project aims at identifying the real competences that have to be provided to experts on "Energy Efficiency (EE), Renewable Energy (RE) and sustainable use of energy" and at investigating the needs, in term of facilities and services in the three MENA Countries involved (Lebanon, Egypt and Jordan). For this reason, also the level of knowledge and the management of

Energy regulation have been investigated by including in the WP1 surveys some specific questions about Energy regulations. The aim was to understand the current national regulations on energy efficiency, renewable energies and environmental impact of energy and the perceptions of final users (especially industry) and local stakeholders in order to develop innovative regulation approaches.

The analysis will take into consideration the answers of the three MENA Countries as a whole, with the intent to make a picture of a trend about Energy regulation. Even if the number of interviewed (63 for the Industry survey, 140 for Residential and 6 for University) can maybe not be considered statistically relevant, it can give us an idea about the situation and an indication about the measures to be undertaken.

Industry Survey

The first question was to investigate the knowledge Industry declares to have about the relevant regulation on energy issues. The feedback was very balanced (41,3 vs 41,3) between interviewed no and Yes, while 17,5 declared to have a partial knowledge of the regulations (Figure 1).

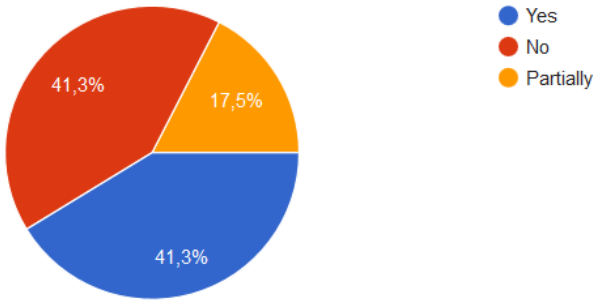

Figure 1: Industry knowledge about relevant energy regulations

When asked to list the most relevant energy regulation applied in their Countries they answered as follow:

the authoresses must connect the meters in any PV station
Published by NREA
- Net metering, NEEREA
Net Metering, NEEREA financing, PPA law which awaits the Regulatory authority
net metering, environmental impact, no customs, supported loans
Net metering, Central Bank Subsidized Loans, Green Bldg. classification
NEEREA
Green Building Council
energy efficiency code in buildings
Feed in tariff stages
Renewable energy and energy efficiency low of 2013,
the regulation of costumes and tax exempt of renewable energy and energy efficiency
the regulation of Jordan renewable energy and energy efficiency fund
the regulation of bio-fuel production and use
Instructions of connecting renewable energy generation systems to the grid

The general electricity low
renewable energy low and regulations that is issued under its jurisdiction
Renewable energy law, building codes, electricity connection codes
2013 Renewable energy and energy efficiency low and it amendments and its related regulation
Too many, Law (13) year 2012, Bylaws (73), (10), 49, 50,...
Renewable energy and energy efficiency law No. 13 of 2012
By 2030 we plan to have 30% from power from renewable energy
EEG
Renewable Energy and Energy Efficiency Law
RE&EE law
the low of renewable energy and energy efficiency
the regulation of the projected more than 1 MW
Solar Energy code
Jordan Building code
Solar energy code
variable and not clear
NEEREA low-interest loan for RE/EE projects, net-metering between our customer and the national grid.
Jordan Renewable Energy Law , 2012
Approval
Egypt intends to supply 20 percent of generated electricity from renewable sources by 2022, with wind providing 12 percent,

To the question, "Do you think that energy international, national and regional strategies fit the real needs of research and industry?" the major part of the interviewed declared itself as neutral (34,9%), 28,6% thinks that Industry needs are fulfilled by the regulation and even 12,7% strongly agree with this statement while 23,8 % instead don't agree (of which 11,1 strongly) (Figure 2).

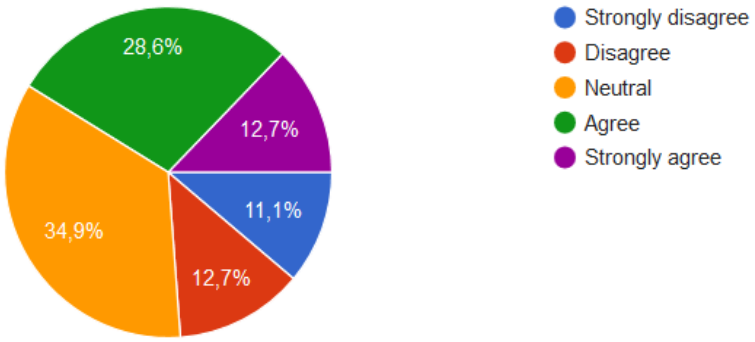

Figure 2: Answer to: "Do you think that energy international, national and regional strategies fit the real needs of research and industry"

In a scale about the relevance of regulatory issues concerning the scientific / technological activity that interviewed carry out, where 1 is associated to "Not relevant at all" and 5 to "Very relevant", 46% put themselves in the middle (answering 3), while 33% considered this issues relevant and only 9,5% very relevant. About 11% does not consider them relevant (Figure 3).

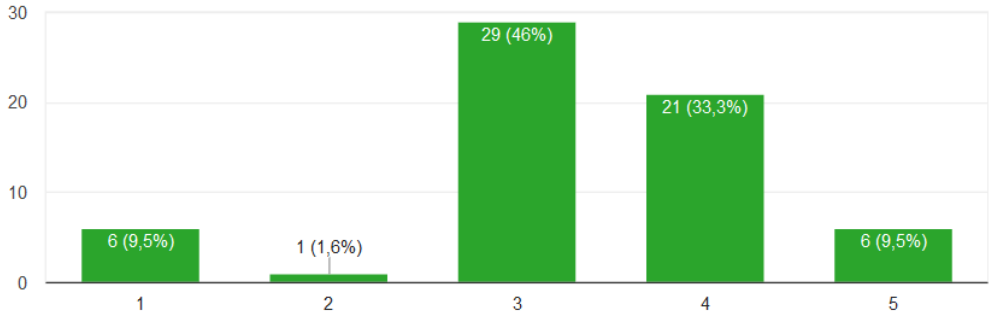

Figure 3: Relevance of regulatory issues concerning the scientific / technological activity

According to the feedback received, 66,7% of the Industries interviewed takes into account the regulatory aspects in their business, against a 7,9% who does not. 25,4% is not sure about it (Figure 4).

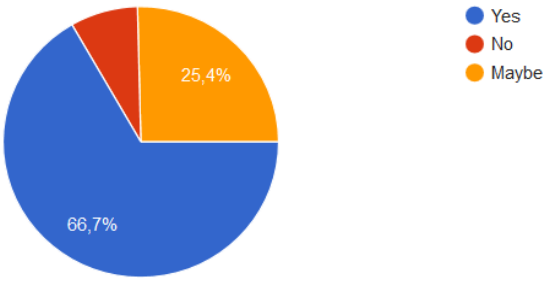

Figure 4: Regulatory aspects are taken into account by industry in their business

When asked about the role that national or internal regulation play in promoting or hindering the development of new technology solutions, 77,8% of the interviewed confirmed this influence while only 22,2 doesn't consider their role relevant (Figure 5).

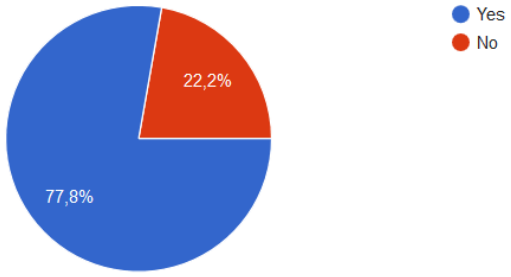

Figure 5: Role that national or internal regulation play in promoting or hindering the development of new technology solutions

helps to create single market, free trade
For sure Yes, if there is any regulation so sure the Client will obligatory to use new technology solutions because usually the client don't want to pay more
The regulation will help in expanding the knowledge needed in our country with everything that concerns with power consumption guidance thus new technology solutions field will increase in terms of new projects and raise the awareness in decreasing the pollution rates
Still not enough to encourage the industry
for facility and approval
It controls the new technology promotion
On grid regulations
Internal regulation definitely affects the development of new solutions, example The Net metering (if there is reliable power grid in Lebanon) will be very attractive for people to install RE solutions. Also the development of Electric vehicles without proper regulation, this new technology might not be able to be properly promoted.
Regulations should encourage the use and installing of renewable energy systems. For example, make it easier to use roofs for RE systems
Regulation is the first way forward for any new technology
more incentives from the government for renewable and clean energy
Example: Forbidding by law the import / installation of incandescent bulbs in Lebanon helped save energy and promote the EE and RE trades
By taking into consideration all the complications in the implementation of new technologies and different standards set by the governments.
National regulation could promote the development of new technology solutions by decreasing prices (less taxes and douane) on the related products
Always regulations are the main way to aware users of the importance of any new technology then the conclusions of minimizing consumption will encourage them to use it by themselves
This would boost specific path intended by these regulations & apprehend others which are meant to be stopped by regulatory bodies
because the leak of information
It will be used
New technologies are always delayed to have to enter the market because of the delay in the regulations, also if there is no penalty on the businesses that pollute the atmosphere there will be no insensitive to adapt cleaner technologies
the regulation can stop implementing new technology
For technologies to be applicable, they have to adhere to laws and regulations. Otherwise, regulations need to be adjusted
development of the technologies should flow the markets needs. Regulation is needed for the implementation phase
National institutes promote the new technologies especial in the field of electrical power by encouraging small investors in this field
The governmental support can accelerate and facilitate the development of new technology
because with corrupt personnel comes corrupt business
Changing the Customs, Implementing Energy Label, LED regulations.
National regulation has the power to encourage the investment in the renewable energy sector therefore promote any new technology/ solution.
Forcing custom fees on renewable energy material for example can hinder the development of this sector. While subsidies can enhance it.
by using multi technology at management, operation, economical prospective
it will enhance managers to take decisions
Execution of work is normally related to laws and regulations.
Regulations are very important to move forward
Because most of investments in RE Projects is (BOO) and strongly focus on the technology
Balanced national regulations help in attracting investment in RE investments
Because the government not support the minds over here
By enforce the need of finding new and brilliant solution for today problems
الموضوع بهذا الخطه الثقافه له (Week cultural Information)

Awareness
This will help to offer more facilities
No clue
By giving some opportunities and good training specially for fresh grads
Regulations encourage specialist to promote the development.
Not all the people are technology educated nor familiar with environmental issues. Therefore, if there are national regulations directing the people to the use renewable energy, the people can easily adopt it.
current regulation can prevent hi level presentation of renewable to the grid we have multiple regularity bodies with each one has its own policy which contradict and can lead to conflict of interest
the code has guide lines that take into consideration the energy consumption and energy efficiency
new regulation do not take into account the involved sectors it always introduce new problems and conflicts that will harden the work
not possible due to central government control over issues
subsidies and support from governments encourage people and businesses to be involved in this domain.
Make more training
الى مجتمع وتطوير مساعده الى يتة هدف لاذ ها (help and improve local societies)
I think its going to facilitate the working in this sector of energy
We need in some projects approval from other entities, such as the National Electricity Company, especially when we want to connect solar panels to the national electricity grid
Electrical connection
They support the using of renewable resources to minimize the carbon emissions.

58% of the industries interviewed declared to have had some difficulties during the implementation of their activities, related to technical standards or regulation for construction, installation and use of RE technologies. 41,3 % never faced this kind of problems (Figure 6).

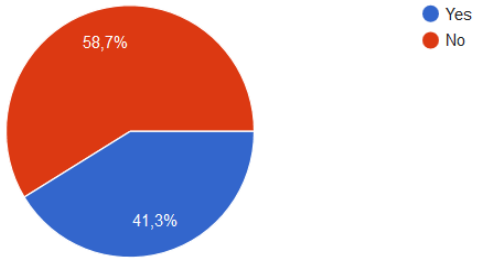

Figure 6: Difficulties during the implementation of their activities, related to technical standards or regulation for construction, installation and use of RE technologies

Industries answering “YES” have been asked to describe the kind of problems faced:

rules for permits (2)
rules
Permits for installing solar panels on rooftops
The is no qualified personnel at the owner firm who can fairly evaluate our work at the end of the project.
For on grid solar energy the fed in tariff changed two times in one year
Vague regulations subject to different interpretations
There is no licensing for using the roof of a building for a PV system which causes Internal Security Forces intervention from time to time
laws for utility scale wind projects, grid code for solar projects
PV mounting structures should be exempted from Building Permits.
Taxes, experts, availability
My Answer for the previous question was "NO"
leak of information of the built of the system
The current regulation give the electrical distribution company the right to accept or refuse licence for renewable energy this had led to conflict of interest in some cases
Energy storage systems are hard to apply in Jordan due to lack of regulation, However, we haven't taken any such projects to date

A lot of routines facing me especially when installing solar cells with low power capacities on the electrical grid
answered no
There are no local technical standards!
There is no problem in standards or regulation for construction, installation and use of RE technologies
legislation
we did not impalement yet
Normally permits and approvals are most apparent problems
If Deng suitable regulations and costs
rules for permits, taxation
ڈ ق ا ف ہ
Risks
No clue
refused to get licence to projects refuse some inverts technologies lack of knowledge and capabilities
the implantation of the codes are far from the texts
unspoken regulations
Regulatory: PV Panels not allowed to be installed on high level with a clearance beneath them. If it was allowed, customers will make better use of this space. Also some of the inverters don't meet the national THD requirements so other inverters had to be chosen.
How is it good fixation
How to solve high pressure at petroleum pipe line
Approval problems
Rules
Testing and analysis

Industries have been also asked to list at least one obstacle and one advantage resulting from legislation:

huge business opportunity however, certification takes a lot of time in my country
providing the deceleration
One Obstacle if it is very hard to achieve (very strict), one advantage it promote to spread the Energy efficiency and renewable Energy knowledge the advantages of such permits will increase the number of households or companies that have a will in installing renewable energy systems
Standards
Many companies withdraw after submitting their proposal for big projects
Advantage no customs for imports. Disadvantage small on grid projects need same complicated permits as large scale projects
Advantage: Allows the promotion of the RE in a clear standard, and uniform manner through out the country. Obstacle: During the legislation the government should not put many regulatory points that doesn't allow the small companies and startup companies to enter the RE market such as huge project experience, or huge annual revenue, instead government should create training centers to certify the small companies/ startups to enter into the RE market, and don't limit the RE market for the medium & big size companies.
one advantage creating a fair market and equal opportunities for every company to share.
one obstacle they might pose limitations and also slow down procedural work.
Advantage is the financial support for RE system Obstacle: Lack of permit for using roof and other construction obstacles
Import duties
political debates, advantage could be on the economy and environment
obstacle: the long lead time needed for the approval of NEEREA Loans. Advantage : The PPA law.
one obstacle is increasing processes time and one advantage is respecting the rules
Obstacle :need for experts, public awareness..... Advantage :encourage community to minimizing fuel consumption and CO2 emissions
We never encountered any things related to legislations in our activities.
The routine and the unqualified administration employees. Advantage: the exist of funding
advantage: encourage the investor to come and invest in solar energy
tax and customs free renewable energy equipment is an advantage conflict of interest because the electrical distributions company has the right to decide if you can have renewable energy company
installation and use of RE technologies
Regulations limit application of new technologies. Codes can protect the market from flawed systems
some times the low is very tight but the application of it is different
Open the doors for small investors to invest their money in renewable resources with a lot of benefits
Implementation of new technology that is not regulated can be very hard in Jordan
Power storage
Obstacle: Poor Implementation of National Codes!
One obstacle resulting from legislation is the long procedure that might discourage the people as well as the investors for using or investing in renewable energy and energy efficiency sector. One advantage resulting from legislation is organize the work in this important sector.
Order is an advantage of legislation, can't see any obstacles.
obstacle that restriction, the advantage is take into account interests
limitation to transfer the power through network in case of remote generation for industrial sector
NA

Permits
Too much compilation
make a very good opportunities for privet sector to invest in RE and EE
Different bodies are involved
Save the patient project
Regulate the works, but restrict the new idea
الا تمويل
Budget
Legislation in our country encourage the field of renewable energy
No clue
One obstacle, is the connection to the grid, and the advantage is No taxes.
Advantage: creating framework regulate the energy consumption. Disadvantage: the need for creating a fit all legislation
too much constrictions and limitations on PV technology the customs and taxes exemption
solar orientation in the building code
on one hand the obligation of Renewable energy are not hard to meet on the other hand this will lead to less RE use in building
The advantage is with the subsidized loan from the Central Bank of Liban. When it stopped for several months, people couldn't pay for the projects anymore.
Tilt pedstil
actually I don't have much information about this legislation
One obstacle that the legislation force my entity to get the approval from National electricity Company since we prefer the on grid solution not the stand alone one . However, there is one advantage of the legislation that it supports further advancement in the field of renewable Energy.
Network limitation
No Egyptian code for renewable energy

From the survey emerges how in the Companies involved, in the 60,3% of the cases the regulatory aspects are managed directly by technician and engineers, while only 15,9% has specific offices dealing with legal issues and 14, 3% uses external consultants. 9,5% declared that this kind of issues are completely ignored.

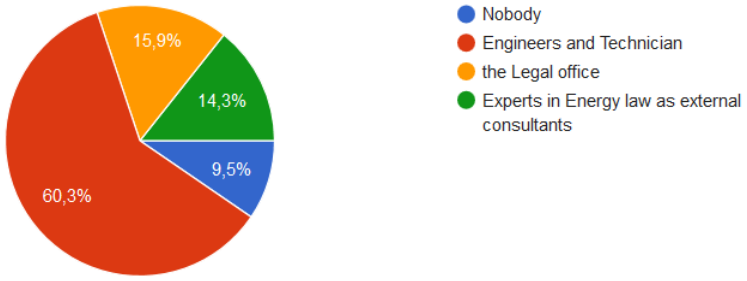

Figure 7: How is managing the regulatory aspects

Analysis of the answers

From the survey emerges how in general, in the Industry sector there is an average knowledge of the Energy Regulation applied in the three MENA Countries and how the main regulatory documents are well known (NREA, Netmetering, NEEREA, Central Bank Subsidized Loans, Green Bldg., Green Building Council, RE&EE law, etc).

The interviewees do not have a precise position about the fact that the legislation clearly meets the needs of the industry, but almost 30% have a positive opinion on the matter, while the space occupied by the regulatory aspects in the activities of the Industry is significant. In fact, these aspects are taken into account by 67% of the interviewed, proving that in the countries involved the legislative aspect has an increasing weight in the development of industrial activities and that, even for 78%, can influence, positively or negatively, the development of new technologies.

One of the positive effects of the role of the law identified by the survey was that it helps to create single market, overcoming the fragmentation of the different rules applicable and promote the use of new energy technologies thanks to the incentives systems.

Among the negative aspects, the delays and long administrative procedures, the lack of policies and a contorted and contradictory regulatory system have been mentioned. Only slightly more than half of the respondents, however, encountered difficulties during the implementation of their activities regarding technical standards, installation and use of renewable technologies. Most of the difficulties were found with regard to the rules governing permits for the installation of the plants, the lack of information and competent staff who are aware of the regulations,

Furthermore, among the disadvantages caused by the (failed) regulation were listed the long times for the certifications and the unclear rules for permits, while among the advantages the creation of a uniform market, especially for new technologies, financial measures of promotion and promotion.

An interesting aspect that emerges is that of how in most cases the legal issues are dealt with within the industry, directly by the technicians and the engineering, which is not said to have specific expertise or experience in the field, while in few cases industries have an internal legal service or outsource issues to external experts.

6 Conclusions and recommendations (UIBK)

The aim of this report was to investigate the importance that regulatory issues about Energy have in the MENA Countries partners of HEBA project and understand their impact in the development of renewable energy technologies and energy efficiency measures.

European EE+RE regulations and their impacts

As additional information on the European developments this report includes European information on this topic. It has been developed by the European members of HEBA presenting the main European regulations on Environmental impact, Renewable energy and Energy Efficiency and providing a clear example on how Europe is answering to these strategic topics. Driving force for all European countries are the following European Directives

- Directive 2009/28/EC of the European Parliament and of the Council, 2009, on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

- DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings.
- DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on energy efficiency

accompanied by the national action plans and regulations to fulfil the directives. There are many actions on national and international level and a clear increase in the renewable energies and in the energy efficiency in the building sector and in industry due to these directives.

Results from HEBA MENA partner questionnaires on knowledge of policy and regulations

The number of interviews were 63 for the Industry survey, 140 for Residential and 6 for University. From the answers received both from Industry and the residential sector emerges that there is an average knowledge of policies and regulations about energy in the countries interviewed.

From the investigation done among the participating universities it results clear how regulatory aspects are far to be offered as specific courses in the university didactic, but some universities partially included energy regulation issues in the technical courses. Also at research level, scientific faculties, normally, don't carry out research on law and legislation, but they can start close collaboration with external faculties to investigate the influence of the regulation on the development of new technologies and solutions.

In general, the major part of the actors involved, especially professional working in the field of energy efficiency and renewable energy (EE+RE) are aware about both advantage and difficulties coming from regulatory aspects and they declared the needs of the introduction of more simplified procedure and clear permission rules in order to facilitate the diffusion of EE+RE technologies. The International legislation on Quality has become fundamental. New courses could indicate when the regulations must be taken in consideration and which are the main articles and indications.

Moreover, the introduction of structured incentives system seems to be the right way to encourage people in using energy efficiency technologies and renewable energy.

Please include the following in the produced report:

- TABLE OF CONTENT
- ACRONYMS AND ABBREVIATIONS (IF NEEDED)
- LIST OF FIGURES (IF NEEDED)
- LIST OF TABLES (IF NEEDED)
- EXCUTIVE SUMMARY
- INTRODUCTION
- ACTIVITIES DESCRIPTION / SUMMARY

- RESULTS / DISCUSSION
- CONCLUSIONS AND RECOMMENDATIOS
- REFERENCES (IF NEEDED)
- APPENDICES (IF NEEDED)
- Photos (if the report is about dissemination activities, events, and workshops)
- Agenda of the conducted event
- Invitation card
- Any additional information