
ENHANCING ENERGY EFFICIENCY IN THE EUROPEAN UNION: A CHALLENGE FOR THE NEXT DECADE

SVETLA BONEVA

INTRODUCTION

The EU's agenda for 2020 has set out the essential first steps in the transition to a high-efficiency, low-carbon energy system. Still, the EU needs to develop a vision for 2050 and a policy agenda for 2030. The fundamental technological shifts involved in decarbonising the EU electricity supply, ending oil dependence in transport, low energy and positive power buildings, a smart interconnected electricity network will only happen with a coordinated agenda for research and technological development, regulation, investment and infrastructure development.

THE ENERGY POLICY OF THE EU: SHORT OVERVIEW

As early as 1952 with the Coal and Steel Treaty and 1957 with the Euratom Treaty, the founding Member States of the European Community recognized the need for a common approach to energy policy. Since then, energy markets and geopolitical considerations have significantly changed. The need for European action in the sphere of energy, however, is stronger than ever. The world's acute environmental problems, the exhaustion and market volatility of traditional energy resources, the growing energy demand are all issues of current interest that need to be resolved or at least properly tackled as soon as possible. The European Union is strongly committed to dealing with these problems and securing competitive and clean energy for its Member States. The EU energy policy covers the following fields: European energy strategies, sustainable energy, renewable energy, energy efficiency, energy technology and innovation, oil, coal, gas, electricity, nuclear energy, security of supply, external dimension, energy infrastructure, energy market observatory and energy research. Now, the major energy challenges facing the EU ought to be considered from yet another perspective—the global economic and financial crisis.

In order to enhance the EU's energy market, its energy policy is focused on:

- developing renewable energy sources;
- reducing dependence on imported fuels;
- creating a competitive internal energy market offering quality service at low prices;
- doing more with a lower consumption of energy.

The development of renewable energy is one of the basic objectives of the European energy policy. There are four major types of renewable energy sources:

- Wind and solar energy (also energy from storms, tornados and hurricanes)
- Geothermal energy (also energy from sea and ocean waves, tides, etc.)
- Energy from some chemical reactions-release of hydrogen, ammonia, carbon oxide and others.
- Energy from bio-chemical processes (plants).

Despite all proactive steps encouraging a deeper integration of renewable energy Europe still has an intensive use of traditional energy sources such as of coal, natural gas, and petroleum. The European Commission's Second Strategic Energy Review, unveiled on 13 November 2008, warns that Europe will continue to rely on oil and gas imports until 2020, despite efforts to switch to a low-carbon economy.

In December 2008 the EU leaders adopted a comprehensive package of measures to reduce the EU's contribution to global warming and ensure reliable and sufficient supplies of energy. The most far-reaching reform ever of European energy policy, the package aims to make Europe the world leader in renewable energy and low-carbon technologies. Driving the policy is the EU's bid to achieve a 20 percent reduction in its greenhouse gas emissions by 2020 (compared with 1990 levels), mainly by boosting the use of renewable energy and curbing energy consumption. The measures will also reduce dependence on imports of gas and oil and help shelter the economy from volatile energy prices and uncertain supplies. Meeting the 20 percent target requires a growth in all three renewable energy sectors: electricity, bio fuels and heating and cooling. The policy frameworks in some member states have achieved results which show how this is possible. Renewable energy has the potential to provide around a third of the EU electricity by 2020.

Renewable energy sources are expected to be economically competitive with conventional energy sources in the medium to long-term. The EU, however, has to provide a long-term vision of the future of renewable energy within the union. This will help to trigger investments, innovation and jobs. The challenge for renewable policy is to find the balance between installing large-scale renewable energy capacity today, and waiting until the development of technology and research lowers their cost tomorrow. Finding the right balance means taking the following factors into account:

- Using renewable energy today is more expensive than using hydrocarbons, but the gap is narrowing—particularly when the costs of climate change are taken into account.
- The economies of scale can reduce the cost of renewable energy sources but this requires major investments today.
- Renewable energy helps improve the EU's security of energy supply by increasing the share of domestically produced energy, diversifying the energy mix, increasing the proportion of energy from politically stable regions, as well as creating new jobs in Europe.
- Renewable energies emit few or no greenhouse gases, and most of them bring significant air quality benefits.

The European Union has a strong interest in a well-functioning global oil market based on transparency and reasonable, predictable prices. With oil remaining an important energy source EU activities on oil have one main goal: reliable access to energy at reasonable prices for all Europeans. Oil import and prices are heavily dependent on the geopolitical situation in the Gulf region that may bring insecurity in the European Energy System. It is also threatened by the unstable political situation in Iran—the major disrupter of the supplies from both the Gulf and the Caspian basin. Iran also holds the transit point of over 40 percent of the daily world traded petrol. Currently, 2/3 of the imported crude oil in the EU is from the OPEC countries. For gas, however, reliance on pipelines creates interdependence along the supply chain. In response, the EU is seeking a balanced energy partnership with Russia and is pushing for the renewal of a wide-ranging Partnership and Cooperation Agreement (PCA), which includes energy relations as part of a broader trade arrangement. Recent developments have shown that using energy as a tool, Russia is increasingly able to influence EU decision-making, primarily through „divide and rule“ tactics.

Legislation is also in the works to separate (or unbundle) the supply of electricity and gas from production. As of July 2007, all EU households have been free to pick a gas and electricity supplier but their choice is still often limited by one company's domination of a particular region or country. Besides spurring on competition, unbundling would boost the use of renewable energies like wind and solar power.

The European Commission published its energy scenarios called "EU energy trends to 2030" that expect 333 Gigawatt (GW) of new electricity generating capacity to be installed in the EU in the decade from 2011 to 2020.

Wind would account for 136 GW, 41 percent of all new installations – by far the largest of any power technology. The Commission expects 64 percent of new capacity to be renewable energy, 17 percent gas, 12 percent coal, 4 percent nuclear and 3 percent oil. The Scenario calculates wind energy will produce 14 percent of EU electricity by 2020. Currently, 80 GW of wind energy capacity is installed in the EU, producing 5 percent of the EU's electricity.

"The European Commission recognises that wind power will play a very significant role in the European electricity system by 2020, in line with current market reality, EU legislation and industry expectations," said Christian Kjaer, Chief Executive Officer of European Wind Energy Association (EWEA). "It means that wind energy will provide electricity for the equivalent of 120 million EU households by 2020."

GRIDS 2010 represents the backbone of Europe's energy future. GRIDS 2010 will explore the financial, technical, policy and regulatory issues that will shape the development of a grid that meets Europe's energy, consumer and climate needs. On 23-24 November 2010 in Berlin the European Commission President José Manuel Barroso said: "We need to do for energy what we have done for mobile phones: real choice for consumers in one European marketplace."

ENERGY EFFICIENCY POLICY AND MEASURES AT EU LEVEL

The reduction of energy consumption and the elimination of energy wastages are basic goals of the European Union in the field of energy policy. The support of the EU for improving energy efficiency is a crucial factor for enhancing the competitiveness of the European economy, for the security of supplies and for meeting the commitments on climate change made under the Kyoto Protocol.

A significant potential for reducing energy consumption is available in all energy-intensive sectors that are widely spread across the EU, such as transport, metallurgy,

construction, manufacturing, energy conversion etc. At the end of 2006, the EU pledged to cut its annual consumption of primary energy by 20 percent by 2020. To achieve this goal, it is working to mobilise the population, the decision-makers and the market operators and to set minimum energy efficiency standards and rules on labelling for products, services and infrastructure.

Energy efficiency is especially important in times when the building of the EU internal energy market is slowing down due to a number of reasons. Opening energy markets for competition is key for the competitiveness of the EU economy as a whole. An efficient, interconnected and transparent European internal energy market will offer consumers a choice between different companies supplying gas and electricity and will make the market accessible to all suppliers.

Current energy efficiency policies in the EU are oriented to achieve the European Commission's targets to achieve energy savings of 20 percent by 2020 (Action Plan for Energy Efficiency) and of 9 percent by 2016 (Directive on Energy End-Use Efficiency and Energy Services). Are these targets realistic for the European energy agenda? Are they secured with enough financial resources and adequate technological development? In the recent years the above-mentioned energy policies and measures have been analysed by many authors as well as tested within different research projects. Among these projects is for example the AID-EE project (reviewing 20 case studies), according to which, if the proposed European objectives, policies and measures have been applied to all EU Member States, they would only achieve less than half of their target potential (0.3% to 0.8%/year, depending on the field of application and the policies analysed). Until now, in Europe, no country has achieved more than about 1 percent energy savings per year compared to the baseline development, but some countries have set higher targets for running and future periods. Therefore, it needs larger and urgent political effort and good, rational policy design at all political and administrative levels to achieve the 20 percent target.

In order to achieve greater coordination of national and European policies many pieces of energy saving legislation as well as other instruments have been adopted at European and national level. They have been periodically systemized by the European Environmental Bureau (EEA, 2012) and include a number of initiatives summarized below.

The 10-year strategy Europe 2020 proposed by the European Commission in March 2010 to revive the European economy aims at "smart, sustainable, inclusive

growth” with greater coordination of national and European policy. The strategy identifies five headline targets the EU should take to boost growth and employment. One of the five headline targets refers to the previously agreed goal to reduce greenhouse gas emissions by at least 20 percent compared to 1990 levels or by 30 percent if the conditions are right, increase the share of renewable energy in final energy consumption to 20 percent, and achieve a 20-percent increase in energy efficiency. The 20-20-20 consists of an emissions and renewables target which is legally binding while the energy saving target is not. The Europe 2020 process which can help promote efficiency and a sustainable growth agenda should not be used to replace national targets and plans, especially at a time when greater transparency, comparability and commitment is required.

The Energy Services Directive that has been adopted in 2006 requires all Member States to draw up Action Plans (NEEAPs) to meet an indicative target of 1 percent reduction in final energy use per year, until 2016. Intended to encourage delivery of efficiency programmes or measures to end users, and development of energy services market. It is highly discretionary to Member States and the level of ambition and delivery so far has been low.

The Energy Performance of Buildings (EPBD) Directive adopted in 2002 and recasted in 2010 addresses new buildings and those undergoing major renovation (which amounts to 40% of the EU energy use, 36% CO₂ emissions). Both its transposition and implementation have been slow. Its recast in 2009 has strengthened the Directive but less than hoped, in particular regards existing buildings, financing and urgency of deadlines.

The Ecodesign Directive adopted in 2005 sets the framework to decide measures to improve energy performance of products and appliances e.g. lightbulbs, boilers, tvs (=half of EU's Co₂ emissions). Minimum performance/labeling requirements are set as implementing measures for individual product categories. This directive is aimed to progressively phase out worst-performing products in each category. There is growing pressure from industry to move towards industry-designed voluntary initiatives as basis (or even substitute) for implementing measures.

The Energy Labeling Directive, adopted in 1992 and recasted in 2010, makes mandatory the display of A-G energy label. It is also aimed to direct consumers to best performing products. Lack of rescaling since 1992 means the large majority of products are now in A category. It was recast in 2009 to update and extend its scope.

The CO₂ in cars regulation, adopted in 2009, sets progressive CO₂ emission limit values for passenger cars. The limit values, timetable and penalty arrangements are unambitious. The regulation on CO₂ in vans (drafted in 2009) will set progressive CO₂ emission limit values for vans and utility vehicles.

The Combined Heat and Power (CHP) Directive (adopted in 2008) is a tool to increase energy efficiency and to achieve the energy savings targets. Combined heat and power or cogeneration contributes about 2% towards the 20% annual primary energy savings objective for 2020. It reinforces efforts to fight climate change by reducing CO₂ emissions (100 Mt CO₂ per year) and decreasing network losses. At the same time, it contributes to increasing competition in the electricity market.

The 2006 Action Plan for Energy Efficiency has proved weaker than the actual proposals outlined in the Green Paper—"Doing more with less". Partly the Action Plan has not mobilised what has been intended. The Plan recognises the different sectors and systems that should all be addressed in order to achieve a fully effective and comprehensive energy efficiency programme, however, it does not do so with the depth, urgency and targeted policies and practical measures required.

The Energy Efficiency Plan is a strategy paper that sets out ideas for measures to save energy and increase energy efficiency. On 8 March 2011, the EC adopted the Energy Efficiency Plan 2011 for saving more energy through concrete measures aimed at creating substantial benefits for households, businesses and public authorities: it should transform our daily lives and generate financial savings of up to €1000 per household every year. It should improve the EU's industrial competitiveness with a potential for the creation of up to 2 million jobs. Legislative proposals with very concrete binding measures will follow in the proposed Directive on Energy Efficiency and Savings. Many, including the European Environmental Bureau (EEB, 2012) have dismissed the Plan as flimsy and weak. The impact assessment does not even guarantee that the proposed measures will meet the 20 percent energy savings target. The strength of the few measures that are proposed is left to the individual ambition and efforts of Member States. Leaving an assessment of progress until 2013 is too late.

The EU energy strategy launched in late 2010 makes a case for energy saving as having a huge potential, especially in the case of buildings and transport. The strategy has a box titled 'Achieving an Energy Efficient Europe' that outlines four specific actions needed to tackle energy efficiency. The strategy although useful is not legally binding and does not propose a binding energy saving target.

In order to implement the Europe 2020 Strategy across the EU, national action, based on common objectives, targets and guidelines are being formulated through National Reform Programmes. These programmes include reference to the national progress made so far and national targets and goals on energy efficiency.

A number of national Energy Efficiency Programmes and targets have been accepted by the EU member states. They are different in terms of quantitative indicators and policy measures and depend on the particular natural, ecological and economical conditions of each member state. The World Energy Council and the Global Energy Intelligence periodically summarize and analyze these national programmes, measures and targets.

Table 1. Energy efficiency programmes and targets

	Name of the programme/law	Sector	Nature of target	Target value	Target year	Base year
Austria	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
Belgium	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
Belgium	CHP certificates (Flanders)	Final consumers	Energy savings (value)	0.58 TWh/year	2012	
Bulgaria	National Long Term Energy Efficiency Program, 2005-2015	Final consumers	Energy intensity reduction	-8%	2015	
Bulgaria	National Long Term Energy Efficiency Program, 2005-2016	Overall	Energy intensity reduction	-17%	2015	
Bulgaria	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Croatia	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	14%	2016	2008
Cyprus	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	10%	2016	2008
Czech Republic	State Energy Policy	Overall	Energy intensity reduction	3.22%	2030	
Czech Republic	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	

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Denmark	National Energy Strategy	Overall	Energy consumption reduction	-4%	2020	
Denmark	National Energy Strategy	Final consumers	Energy savings (rate)	10%	2020	2010
Denmark	Strategy for energy reduction in buildings	New buildings	Energy efficiency improvement	75%	2020	
Denmark	Obligation of energy savings for energy companies (white certificates)	Final consumers	Energy savings (value)	0.12 TWh/year		
Estonia	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
Finland	National strategy for Climate and Energy	Final consumers	Energy consumption reduction	310 TWh (same level than 2008)	2020	
Finland	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
France	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
France	Energy law(2005-781)- Loi POPE	Final consumers	Energy intensity reduction	-2%/year	2010	
France	Energy law(2005-781)- Loi POPE	Final consumers	Energy intensity reduction	-2.5%/year	2015	
France	Energy law(2005-781)- Loi POPE	Final consumers	Energy consumption reduction	0% (stabilization)	2050	
France	Obligation of energy savings for energy companies	Final consumers	Energy savings (value)	54 TWh	2006-2009	2006
France	Grenelle de l'Environnement 2008	New buildings	Minimum efficiency standards	15 kWh/m ² /year	2020	
France	Grenelle de l'Environnement 2008	Existing buildings	Thermal retrofitting	400 000 /year	2020	
France	Grenelle de l'Environnement 2008	Public sector	Thermal retrofitting	120 M m ²	2020	
France	EU draft regulation	Lighting	lamps/CFL	Ban	2012	
Germany	Coalition agreement	Overall	Energy intensity reduction	3%/year	2020	1990

Germany	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
Greece	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
Hungary	Energy Saving and Energy Efficiency Action Programme 1999-2010	Overall	Energy intensity reduction	3.5%/year	2010	
Hungary	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Ireland	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	
Ireland	Energy White Paper	Final consumers	Energy savings (rate)	20%	2020	
Ireland	Obligation of energy savings for energy companies (white certificates)	Final consumers	Energy savings (value)	0.24 TWh		
Italy	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Italy	White Certificate	Final consumers	Energy savings (value)	3.5 Mtep/year	2012	2011
Italy	Energy Efficiency in Buildings Law and EE Appliances Incentives	New buildings	Energy savings (value)	56.8 TWh/year	2016	2010
Italy	Energy Efficiency in Buildings Law and EE Appliances Incentives	Existing buildings	Energy savings (value)	56.8 TWh/year	2016	2010
Latvia	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Lithuania	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Lithuania	National Energy Strategy	Overall	Energy intensity reduction	EU average intensity	2025	
Luxembourg	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Malta	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008

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Netherlands	Clean and Efficient ⁷ program	Overall	Energy savings (rate)	2%/year	2020	2011
Netherlands	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Poland	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Poland	Obligation of energy savings for energy companies (white certificates)	Final consumers	Energy savings (value)			
Portugal	Directive on energy end-use efficiency and energy services (NEEAP)	Overall	Energy savings (rate)	10%	2015	2008
Romania	National Strategy for Energy Efficiency (2004-2015)	Overall	Energy intensity reduction	40%	2015	2001
Romania	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	14%	2016	2008
Russia	Energy Strategy of the Russian Federation (2009)	Overall	Energy intensity reduction	-40%	2020	
Russia	Federal Law on Energy saving and energy efficiency improvement (2009)	Final consumers	Energy savings (rate)	15%	2015	
Russia	Federal program Energy Efficient Economy (draft)	Overall	Energy savings (rate)		2020	
Serbia	Energy Strategy Implementation Programme	Industry	Energy savings (rate)	15%	2012	
Slovak Republic	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Slovenia	National Energy Efficiency Action Plan	Overall	Energy savings (rate)	9 %	2016	2008
Slovenia	National Energy Efficiency Action Plan	Public sector	Energy savings (rate)	18 %	2016	
Slovenia	Energy Act					
Spain	Action Plan 2008-2012 (E4)	Overall	Energy savings (value)	87.9 Mtoe	2012	2008
Spain	Action Plan 2008-2012 (E4)	Residential	Energy savings (value)	7.9 Mtoe	2012	2008

Spain	Action Plan 2008-2012 (E4)	Industry	Energy savings (value)	17.3 Mtoe	2012	
Spain	Action Plan 2008-2012 (E4)	Transport	Energy savings (value)	30.3 Mtoe	2012	
Spain	Action Plan 2008-2012 (E4)	Residential	Energy savings (value)	1.7 Mtoe	2012	2008
Spain	Action Plan 2008-2012 (E4)	Public sector	Energy savings (value)	0.69 Mtoe	2012	
Spain	Action Plan 2008-2012 (E4)	Forestry	Energy savings (value)	1.4 Mtoe	2012	2008
Spain	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Sweden	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
Sweden	Energy Bill	Final consumers	Energy consumption reduction	6%	2010	
Sweden	Energy Bill	Final consumers	Energy intensity reduction	20%	2020	
Sweden	Sweden environmental objectives	Residential	Energy consumption reduction	20%/50%	2020/2050	
Switzerland	SwissEnergy Programme	Overall	Energy consumption reduction	-10% for fuel	2010	2001
Switzerland	SwissEnergy Programme	Final consumers	Cap electricity demand increase	5%	2010	2001
Switzerland	Federal Action Plan under preparation	Overall	Energy consumption reduction	"-20% for fuel"	2020	2010
Switzerland	Federal Action Plan under preparation	Final consumers	Cap electricity demand increase	5%	2020	2010
Switzerland		Lighting	lamps/CFL	Ban	2012	
Turkey	Energy efficiency strategy (2004)	na	na			

United Kingdom	Housing Act	Residential	Energy efficiency improvement	20%	2010	2000
United Kingdom	National Energy Efficiency Action Plan	Final consumers	Energy savings (rate)	9%	2016	2008
United Kingdom	Obligation of energy savings for energy companies (white certificates)	Final consumers	na			

Source: World Energy Council, <http://www.wec-policies.enerdata.eu/> and Global Energy Intelligence, <http://www.enerdata.net/>

A resource-efficient Europe is a flagship initiative of the Europe 2020 strategy. This flagship is targeted at bringing action to several different EU policy agendas, including climate change, energy, transport, industry, raw materials, agriculture, fisheries, biodiversity and regional development.

The Roadmap to a Low Carbon Economy (2011) contributes to the Resource Efficient Europe flagship initiative intended to put the EU on course to using resources in a sustainable way. The Roadmap looks beyond the 2020 objectives and sets out a plan to meet the long-term target of reducing domestic emissions by 80 to 95 percent by mid-century as agreed by European Heads of State and Governments. The roadmap is a needed long-term perspective, however, attention should not slip from ambitious action in the short term. The proposal that existing efforts will already bring us to 25 percent cuts by 2020 suggests that going further is all the more possible.

In February 2011, the EU Heads of States and Governments declared the need to complete the internal energy market by 2014. To achieve this, timely and complete transposition of EU legislation on the single market of gas and electricity into national law is crucial. The third energy package includes key provisions for a proper functioning of the energy markets, including new rules on unbundling of networks, rules strengthening the independence and the powers of national regulators and rules on the improvement of the functioning of retail markets to the benefit of consumers.

The Electricity and Gas Directives of the Third Energy Package had to be transposed by the Member States by 3 March 2011. However, Bulgaria, Cyprus, Spain, Luxembourg, the Netherlands, Romania and Slovakia did not undertake any transposition measures for the two Directives within the set deadline and Estonia did not do so for the Gas Directive. Consequently, the Commission has sent 15 Reasoned Opinions to these 8 Member States to urge them to comply with their

legal obligation. The Member States had two months to respond. If they had failed to comply the Commission might have referred them to the Court of Justice of the EU. This infringement exercise would have addressed non-communication cases of the transposition of the Third Energy Package. At the same time, the Commission is analysing the measures notified by the Member States which have only partially transposed the Directives, and will decide in the coming months on appropriate further steps.

On 11 September 2012, the European Parliament adopted in first reading the Energy Efficiency Directive. The directive brings forward legally-binding measures to step up Member States efforts to use energy more efficiently at all stages of the energy chain—from the transformation of energy and its distribution to its final consumption. Measures include the legal obligation to establish energy efficiency obligations schemes or policy measures in all member states. These will drive energy efficiency improvements in households, industries and transport sectors. Other measures include an exemplary role to be played by the public sector and a right for consumers to know how much energy they consume.

The EU cannot reach its energy saving target. To achieve the overall 20 percent energy savings 394 Mtoe of energy must be saved in 2020 when compared to ‘pre-recession’ baseline expectations of the 2006 Energy Efficiency Action Plan. According to the study of Ecofys and Fraunhofer (ENERGY SAVINGS 2020 How to triple the impact of energy saving policies in Europe, 2010) at present rates of progress, the EU is on track to achieve only about 200 Mtoe of energy savings by 2020—as compared to the 400 Mtoe target, as presented in the figure below, taken from the report. According to the European Environmental Bureau (EEA, 2012), the EU is falling short of the energy saving target due to:

- Unambitious and fragmented policies, due to lack of high level political drive, accountability and urgency;
- Poor levels of implementation, due to low governmental priority, lack of clarity over responsibilities, and a range of (mostly) non-price barriers;
- An incomplete policy framework; 10 percent of EU primary energy use (freight transport, and heat and electricity transmission losses) is not covered or only covered indirectly by any type of regulation.

On the basis of the literature review on the topic, the following hypothesis can be outlined when comparing the energy demand reduction pathways in the different scenarios, energy efficiency potentials (Thomas et al. 2006) and the potentials mentioned and target set in the Action Plan on Energy Efficiency:

1. *The Action Plan is quite ambitious as it sets a target quite close to the full techno-economic energy saving potentials that could be harnessed by 2020 (and compared to the most ambitious energy efficiency scenario pathways in the ÖI and WI/WWF scenarios).*
2. Although the scenarios start at a comparable level and apply similar general economic and demographic assumptions, their pathways described for the period until 2020/2030 differ substantially.
3. A comparison of the European Environmental Agency scenario and the other three scenarios shows that *increasing energy prices through energy taxation or carbon emission caps and permit trading might be necessary but is in no way sufficient for harnessing the cost-effective energy efficiency potentials.* The reason are the many market barriers and imperfections that are not due to insufficient price signals and that are listed in the AID-EE guidelines for the monitoring, evaluation and design of energy efficiency policies (AID-EE project, 2006).

Finally, the analysis of energy demand reduction scenarios has shown that *the links between “energy demand reduction pathways”—“potentials identified” and “policies—measures to be implemented”, are quite weak.*

ENERGY EFFICIENCY AT COMPANY LEVEL

Energy efficiency and the possible ways to increase it at micro-level is a worldwide problem. Plenty of American authors offer ideas for energy efficiency measures and methods of measuring industrial and household energy savings. “Accurate measurement of energy savings from industrial energy efficiency projects can reduce uncertainty about the efficacy of the projects, guide the selection of future projects, improve future estimates of expected savings, promote financing of energy efficiency projects through shared-savings agreements, and improve utilization of capital resources. Many efforts to measure industrial energy savings, or simply track progress toward efficiency goals, have had difficulty incorporating changing weather and production, which are frequently major drivers of plant energy use” (Kissok

2008, Eger 2008). Kissok and Eger offer “a general method for measuring plant-wide industrial energy savings that takes into account changing weather and production between the pre and post-retrofit periods. In addition, the method can disaggregate savings into components, which provides additional resolution for understanding the effectiveness of individual projects when several projects are implemented together. The method uses multivariable piece-wise regression models to characterize baseline energy use, and disaggregates savings by taking the total derivative of the energy use equation. Although the method incorporates search techniques, multi-variable least-squares regression and calculus, it is easily implemented using data analysis software, and can use readily available temperature, production and utility billing data. This is important, since more complicated methods may be too complex for widespread use”. The method is demonstrated in Kissok and Eger articles using case studies of actual energy assessments. “The case studies demonstrate the importance of adjusting for weather and production between the pre- and post-retrofit periods, how plant-wide savings can be disaggregated to evaluate the effectiveness of individual retrofits, how the method can identify the time-dependence of savings, and limitations of engineering models when used to estimate future savings.”

Moreover, it is not only in the EU that energy efficiency measurement research is stimulated by the Union. In the USA there are 26 Industrial Assessment Centres at universities. Each centre is funded by the United States Department of Energy Industrial Technologies Programme to perform about 25 energy assessments per year for mid-sized industries, at no cost to the industrial client. Each assessment identifies energy, waste, and productivity cost saving opportunities, and quantifies the expected savings, implementation cost and simple payback of each opportunity. This information is delivered to the client in a report summarizing current energy and production practices and the savings opportunities identified during the assessment. About one year after each assessment, the client is contacted to collect implementation results.

OPPORTUNITIES AND THREATS FOR THE ENERGY POLICY OF THE EU — A LOOK AT THE FUTURE

The EU agreed on a forward-looking political agenda to achieve its core energy objectives by 2020. This agenda means very substantial change in EU’s energy system over the coming years, with public authorities, energy regulators, infrastructure

operators, the energy industry and citizens all actively involved (European Commission, Second Strategic Energy Review—Securing our Energy Future, 2008). Completing the internal energy market, achieving energy savings and promoting low-carbon innovation are the main vectors to reach the objectives of competitiveness, sustainability and security of supply. An open global business climate and a more coherent and effective approach to the EU external energy relations are also recommended for reaching these objectives.

With the new energy policy, a number of opportunities lie ahead. Firstly, building a decarbonized economy will certainly require great efforts, but will also provide Europe with new jobs, fresh capital, technological advances. This way of development is fostered by the fact that the EU's greatest potential source of indigenous energy is renewable energy. The timely achievement of the energy objectives can put the EU industry at the forefront of the rapidly growing low carbon technology sector. Secondly, the new approach in the energy infrastructure policy and the implementation of modern integrated grids will effectively manage EU's supply dependence and firm its position on global energy markets.

To boost these opportunities, even in a time of economic crisis, the European Energy Programme for recovery (EEPR) was launched, investing to modernize Europe's energy infrastructure and production facilities. The EEPR represents an innovative approach to union financing of infrastructure and technology deployment in the energy sector. In terms of financial effort, it is the first time that such a large amount of funding has been made available under the EU budget (Report from the European Commission to the Council and the European Parliament on the implementation of the European Energy Programme for Recovery, 2012). The funding is allocated as follows:

- gas and electricity infrastructure projects (2.365 bln euros);
- offshore wind energy products (565 mln euros);
- carbon capture and storage products (1.050 bln euros).

Speaking more hypothetically of opportunities, through its endeavours to get a grip on climate change and resource shortages, the EU could set the pace for new industrial revolution. The key word of this new industrial revolution is eco-innovation. The EU Innovation Panel has defined the term as follows: *Eco-Innovation aims the creation of novel and competitively priced goods, processes, systems, services,*

and procedures that can satisfy human needs and bring quality of life at life-cycle-wide minimal use of natural resources (material including energy, water and surface area) per unit output, and a minimal release of toxic substances”. From a European perspective, this means employing a bundle of already proven policies, lessons learned and best practices on the global scale. Thus, Europe’s competitive edge will be supported—by a continuous stream of knowledge dividends resulting from the implementation of European sustainable technologies in newly industrialized economies and developing countries. The core elements of eco-innovation, namely sustainable energy, sustainable technology and the vast and ever-increasing knowledge base related to them are Europe’s strongest assets in the new millennium. Hence, it is of utmost importance for the future of Europe in a changing world how this asset is employed (European Business Council for Sustainable Energy, 2008).

However, there are some possible threats endangering the success of the EU energy policy. One of them is the possibility that the costs of implementing Europe’s global strategy will turn out to be too high. There is an important question: Would the benefits exceed the costs (in money and social terms) of building a wholly new energy system? Would countries relying on traditional energy resources so easily give up to the idea of green energy? There are no exact estimates of the costs that are going to be incurred if the whole European Union is to alter its energy generation practices and industry production patterns. However, there are some numbers available indicating that to achieve a 20 percent share of renewables will cost approximately 18 bln euros per year or around 6 percent of the EU’s total expected energy import bill in 2020. Further, if a carbon price of more than 20 euros is factored in, the 20-percent objective will cost no more than relying on traditional resources, but will bring about benefits such as new jobs and new technology-driven European companies.

The other issue carrying a possible threat to the energy policy of the EU is that the EU cannot achieve its energy and climate change objectives on its own. In future, it will account for only 15 percent of the world’s CO₂ emissions. By 2030, with the new objectives, the EU will consume less than 10 percent of the world’s energy. In order to reach its ambitious ends the energy policy should involve strong partnering and cooperative external relations as well as common actions of Member States.

CONCLUSION

The EU has set the goal of a 20 percent cut in Europe's annual primary energy consumption by 2020. The European Commission has proposed several measures to increase efficiency at all stages of the energy chain: generation, transformation, distribution and final consumption. The measures focus on the public transport and building sectors, where the potential for savings is the greatest. Other measures include the introduction of smart metres (which encourage consumers to manage their energy use better), clearer product labelling and support for production of renewable energy.

Currently, more than 50 percent of the EU's energy comes from countries outside the Union and the percentage is growing. Much of that energy comes from Russia, whose disputes with transit countries have repeatedly disrupted supplies in recent years. This highlights the need for the EU to monitor its oil and gas supplies more closely and be prepared in the event of an energy emergency. Renewable energy sources are expected to be economically competitive with conventional energy sources in the medium to long-term. The EU has to provide a long-term vision of the future of renewable energy in the Union. This will help trigger investments, innovation and jobs. The challenge for renewable policy is to find the balance between installing large-scale renewable energy capacity today, and waiting until research lowers their cost tomorrow.

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