

# COST-BENEFIT ANALYSIS IN THE NEW LEGISLATION ON ENERGY EFFICIENCY

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## **Abstract:**

*In this paper the author presents some aspects of a more comprehensive analysis on the macroeconomic effects it generates new regulations on energy efficiency in the European Union. Are presented for this purpose EU targets 20% of primary energy consumption by 2020 and those relating to improving energy efficiency in the perspective of 2030. The analysis consists in determining and assessing costs, benefits and energy efficiency is completed by develop conclusions and recommendations in order to help build a power system efficient, safe, competitive, reducing dependence on energy imports and create new opportunities for growth.*

**Keywords:** directive, energy market, consumption, energy efficiency

**JEL Classification:** E21, F62, Q43

## **1. General considerations**

Energy efficiency presents an increasingly important sector for the economy. This interest is motivated by a series of events starting with the continued growth of energy consumption, energy costs over the last few years, energy market regulation and not least, the entry into force of the Directive on energy efficiency. It lays down rules designed to remove barriers and overcome some of the market failures that impede efficiency improvements in energy supply and use. The Directive requires Member States to establish national mechanisms requiring energy efficiency and to increase its current efforts to ensure that the collective 2020 target.

The Commission considers it appropriate to maintain the dynamics of the energy savings and energy efficiency proposes an ambitious target of 30% for 2030.

## **2. Regulations on energy efficiency in the EU**

Energy Efficiency Directive (EAD) adopted by the Council and the European Parliament in 2012 establishes a common framework for promoting energy efficiency in the European Union to ensure the 20% of primary energy consumption by 2020 and to pave the way for further for improved energy efficiency.

Energy efficiency has been carefully analyzed in many EU (European Union) Member States during 2014 and will remain on the political agenda for at least two reasons: first, Directive energy efficiency (2012/27 / EU) ought to be implemented by Member States by June 2014; secondly, the analysis shows that energy efficiency target – a down 20% of primary energy consumption by 2020 compared to 2007 projections is most unlikely to be achieved under current conditions.

The new EU measures on energy efficiency objective quantification provide energy consumption for 2020 of more than 1474 Mtoe of primary energy or no more than 1078 Mtoe of final energy. With the accession of Croatia to the European Union target was revised in 1483 Mtoe of primary energy or 1086 Mtoe of final energy.

The obligation for Member States is to achieve a certain amount of energy savings final period (June 2014 - December 2020), using energy efficiency obligation schemes or other policy measures targeted to improve energy efficiency.

The general problem is that while energy efficiency policy is already in place, some barriers remain persistent energy savings and potential savings (both short and long term) energy is not fully realized. Therefore, energy efficiency today and, to a greater extent in the future is expected to contribute sufficiently to the EU energy policy goals.

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Based on an analysis of Member States' actions on the basis of forecasts and more, the Commission estimates today that the EU will achieve energy savings of approximately 18-19% in 2020 (savings of about 15 Mtoe). About a third of progress in achieving the 2020 target will be due to lower growth than expected, due to the financial crisis. If all Member States are working with the same commitment to fully implement the legislation approved, then the 20% can be achieved without the need for additional measures (COM 2014).

### 3. Cost - benefit analysis of energy efficiency in the European Union

#### 3.1. Optimum cost-benefit analysis

Commission Communication on a 2030 policy framework on climate change and energy levels identified energy savings of 25%, as part of a strategy to achieve the objective of reducing emissions of greenhouse gases by 40% most cost effective way. However, given the growing importance of strengthening the EU's energy security and reduce dependence on imports to the Union, the Commission considers it appropriate to propose a higher goal, namely 30%.

This would lead to increased costs for 2030 frame 20 billion per year, but would bring tangible benefits in terms of economic and energy security.

The Commission does not intend to propose new measures, but requires Member States to intensify their ongoing efforts to ensure that the collective target for 2020. The Commission will complement these efforts through appropriate guidance and disseminate best practices to ensure full use of funds available Union.

A key objective of future climate and energy policy is maintaining energy prices affordable for business, industry and consumers. Consequently, the 2030 and the objectives it contains, is the need to meet energy and climate objectives in the most cost effective. Such an approach requires that Member States have the flexibility in how they meet their commitments, taking into account national circumstances. On this basis, the Commission proposed for 2030, mandatory targets for reducing emissions of greenhouse gases by 40% (compared to emissions in 1990) and determining the share of renewable energy to at least 27% of the energy consumed. These are steps towards a path cost competitive low carbon dioxide 2050.

Regarding the 2030, it also indicates that the effective realization of the goal of reducing emissions of greenhouse gases by 2030 would require an increase of 25% energy savings. The study is based on this premise and is still considering the potential for improving energy efficiency in a cost and other benefits that create energy efficiency.

For 2030 the European Council promotes agreeing targets so that the EU can play an active role in international negotiations on climate change. Appropriate contribution for 2030 energy efficiency should be based on a detailed examination of the costs and benefits of additional exceeded 25% target of energy savings. Some aspects of the different options are presented in the Table 1.

**Table 1. Energy Efficiency Goals**

	REF 2013	Output 40%, 27% RES, 25% EE	EE 27	EE 28	EE 29	EE 30
Energy savings 2030	21.0%	25.1%	27.4%	28.3%	29.3%	30.7%
Power Consumption Primary 2030 (Mtoe)	1 490	1 413	1 369	1 352	1 333	1 307
Costs of energy systems (Euro)	2 067	2 069	2 069	2 074	2 082	2 089
Investment expenses (Euro)	816	854	851	868	886	905
Net imports of gas in 2030 (bcm)	320	276	267	256	248	257
Costs imports fossil fuels (Euro)	461	452	447	446	444	441
The average price of electricity in 2030 (Euro / MWh)	176	179	180	179	178	178

Source: European Commission, 2014

One goal of energy saving by 25% will increase the average annual cost of a power system from 2067 billion to 2069 billion per year (2011 to 2030), about 2 billion per year, about 0.09 %. Substantial costs of the energy system that will support Member States are part of the current renewal of an old energy system. With an energy saving of 25% for 2030 would bring the already substantial improvements Union's energy dependency, representing a saving of EUR 9 billion a year in fossil fuel imports (2% less) and a 13% reduction on imports of gas (about 44 billion cubic meters) compared with current trends and policies (COM 2014).

Energy saving target of 40% by the European Parliament would have a significant impact on energy dependence, reducing, in particular gas imports. These benefits in terms of energy security could lead to a strong increase in global energy system costs from 2 069 to 2 181 billion billion per year, approximately 112 billion per year in the 2011-2030 period. The Commission has assessed a number of decisions corresponding energy savings between 25% and 40%. The analysis showed that the benefits increase with increasing ambition in energy efficiency and gas imports would be reduced by 2.6% for each additional percentage energy savings. This has a direct impact on the security of supply in the EU - although above a 35% energy savings, the rate of reduction of gas imports due to additional energy savings decreases (COM 2014).

A more ambitious energy efficiency provides greater benefits, especially in terms of fossil fuel imports. Additional benefits include those related to GHG emission reduction, reduction of pollution of air, water and soil and noise pollution, reducing resource extraction, processing, transportation and use of energy, health and related benefits human and ecosystem condition. However, there are, however, additional costs beyond what is necessary to achieve the objective of 40% reduction in greenhouse gas emissions. For example, a target of 28% energy efficiency would increase total annual costs of the energy system from 2 069 billion, with savings of 25% to 2 074 billion, which represents an annual increase of about 5 billion Euro or 0.24% in the 2011-2030 period.

Additional measures to improve energy efficiency should especially address the energy efficiency of buildings and products and, therefore, incumbent upon a significant extent non-ETS sectors. Regarding the construction sector, which accounts for about 10% of EU GDP, improving the energy efficiency of buildings is the most promising element for restoring economic growth after the recession.

### **3.2. Measures to reduce costs in the Member States of the European Union**

Regarding the long-term trends, current studies have shown that improvements in energy efficiency in the EU are below the potential energy savings and are not sufficient to fully contribute to the EU decarbonisation targets.

According to the IEA (International Energy Agency), efficiency gains compared to current trends, could increase EU GDP by 1.1% in 2030; additional investment required to use the final efficiency are approximately 2,200 billion in the period 2012-2035 compared with low energy expenditure of about 4900 billion in the same period (IEA, 2014). Impact Assessment accompanying the Communication "2030" determined that the current trends (baseline 2013) only 21% of savings on projections will be realized as the 25% would be required to meet '2030'.

Member States have set national targets for energy efficiency non-binding. Energy Efficiency Action Plans of the Member States for 2014 indicates strengthening national energy efficiency policies.

In Germany, the state bank KfW provide preferential loans for the rehabilitation of existing buildings in terms of energy efficiency and building new ones. Between 2006 and 2013, 2.8 million homes were rehabilitated and 540,000 new homes were built highly efficient (COM 2014).

In France, the new draft national legislation provides numerous concrete actions, especially for buildings. Measures include a tax reduction of up to 30% of the cost of energy efficiency renovations since September 2014.

In Poland, the relevant provisions of the EAD will be fully implemented by means of such a system. DEE promote awareness programs among households about the benefits of energy audits by appropriate counseling services.

In the UK, a specialized help develop policies based on research on how consumers can be stimulated decisions on energy efficiency.

In Romania, the transposition of Directive 2012/27 / EU (EAD) in Law no. 121/2014 on energy efficiency provides the conditions necessary for the implementation of measures to increase energy efficiency in all economic and social sectors. The measures to increase energy efficiency, considered the first two national action plans for energy efficiency has helped reduce primary energy consumption and final energy consumption. These reductions were influenced also by the economic crisis that hit Romania in the period 2009 - 2010, the economic upswing is accompanied by modest increases in energy consumption. Energy consumption is the easiest option. This is most directly related to the long-term decarbonisation objectives. This indicator is directly influenced by economic development. If growth turns out to be higher than anticipated, the objective will require additional energy efficiency measures, potentially making cost effective. If, on the other hand, the increase is less than anticipated, the target can be met without energy efficiency improvements, which were originally foreseen and therefore some of the potential cost will not be achieved.

To forecast efficiency saving measures necessary to move towards sectors with the greatest potential for reducing energy consumption.

### **3.3. Financing energy efficiency projects**

Regarding the financing of investments in energy efficiency are increasing funding through the Operational Programmes of the European structures.

Investment funds show an increase in the amounts allocated to low-carbon economy, in some cases, well above the minimum requirements for this goal. Also there is a general shift from grants towards greater use of financial instruments (leverage private) such as new loans or guarantees.

Reaching energy savings considered in this assessment will require significant additional investment that would be desirable to be primarily public-private.

Around € 38 billion were oriented investments in low carbon Structural Funds and Investment (ESIF) 2014-2020 - and this amount can be multiplied by attracting private capital through financial instruments. Additional investments in energy efficiency will range from € 48 billion to € 216 billion per year in the 2011-2030 period, depending on the chosen level.

If producers and distributors of energy efficiency measures is stated as the production and transport of energy as follows: up to 31 December 2015, Member States shall establish and notify the Commission of national potential for high efficiency cogeneration and district heating, situation updates every five years; will be adopted at local and regional policies to encourage the use of high efficiency cogeneration; will prepare cost-benefit analyzes for new installations or rehabilitated cogeneration power greater than 20 MW, which will operate under high efficiency; the same analysis is made for district heating networks with a power greater than 20 MW; until 30 June 2015 assessing the potential of energy efficiency natural gas infrastructure and electricity on the transmission, distribution, load management and interoperability; investment will identify concrete measures and effective in terms of cost for energy efficiency improvements in the network infrastructure (Directive 2012/27 / EU).

#### **4. Cost - benefit analysis of energy efficiency in Romania**

Gradual liberalization of the electricity market and gas in Romania is under an unsustainable energy sector, which faces a variety of challenges, including high energy losses. In the medium term, the energy market liberalization leads to an appreciable increase in electricity prices, gas and heat, a process that takes place very late and that will put high pressure on the capacity of all energy consumers (industrial and residential ) to pay energy bills. An obvious solution, but not convenient, is to reduce energy consumption through energy efficiency or by reducing energy losses.

The analysis results on reducing energy consumption of Romania between 2010 (reference consumption) and 2020 (target consumption, estimated) in a National Energy Efficiency Program, shows potential for improving energy efficiency capitalized 16-24%. The economic value of this potential can support a 2020 GDP growth of 4-6% and from 4.9 to 7,4 billion Euro, without additional energy consumption (Leca, 2013).

Romania has adopted a series of official documents and statements fundamental concept of sustainable development, and as a Member State of the European Union has obligations under political coverage in national legislation integrated strategy for energy and climate change, developed by the EU, strategic objective to reduce emissions of greenhouse gases. There are many opinions of experts the energy sector in Romania is not sustainable and this is connected, first, that the energy sector has not received due attention to strategic infrastructure that its development has been a long time, rather inertia, delayed restructuring of the sector that began and was primarily to pressure organizations and international financial institutions, today there are a large number of unresolved issues and unfavorable accumulated between large energy losses in the residential sector and heating systems and high energy intensity of the industry (Leca, 2013).

The World Bank has developed a checklist of conditions to be met by a country to implement sustainable energy policies. This list includes various elements that must exist and be functional, classified into eight categories. In a simple analysis of the current situation in Romania, it appears that a significant number of these conditions have not been met. If primary legislation is in place, some of the Implementing Rules or other parts of secondary legislation is adopted late. Regarding specialized agencies, a former Energy Conservation (ARCE) has been integrated into the regulator (ANRE), becoming a department with responsibilities and authority diminished. Law associations of owners not solve the problem of financing the share accruing to tenants / owners blocks are rehabilitated.

Energy markets (both gas and electricity market part) are still distorted, including subsidies, regulated prices, without regard to the European ones, which can distort the decision on the bankability of energy efficiency projects.

Decentralization decision, even if it was good in terms of theory, not proven viable due to lack of funds and local understanding.

An important source of funding for energy efficiency in Romania was EBRD, which created in 2006 Sustainable Energy Initiative Program (IED). Of the total investment of 11 billion euros in the period 2006-2012, investments in Romania were 630 million. Total investment in energy efficiency in industry were 1.78 billion euros, of which 71 million euros in Romania. EBRD investment in Romania have produced reductions in greenhouse gas emissions (GHG) emissions by 1.5 million tons of CO / year and fuel savings of 460 toe / year. IED program comprises three main components: energy efficiency policy (dialogue with the government to support a strong institutional and regulatory framework for energy efficiency), technical assistance (energy audits to identify technical solutions and financial benefits, support for energy efficiency projects in different sectors, support for projects) and investment projects (in five categories of activities: industrial energy efficiency, investment in sustainable energy facilities, energy sector efficiency, renewable energy, energy efficiency in urban infrastructure).



## **Conclusions**

Current forecasts suggest that the current 2020 energy efficiency is about to be reached. The Commission does not intend to propose new measures, but calls on Member States to intensify their ongoing efforts to ensure that the collective target for 2020. The Commission will complement these efforts through appropriate guidance and disseminate best practices to ensure full use of funds available Union.

Commission Communication on a 2030 policy framework on climate change and energy levels identified energy savings of 25%, as part of a strategy to achieve the objective of reducing emissions of greenhouse gases by 40% most cost effective way. However, given the growing importance of strengthening the EU's energy security and reduce dependence on imports to the Union, the Commission considers it appropriate to propose a higher goal, namely 30%. This would lead to increased costs for 2030 frame 20 billion per year, but would bring tangible benefits in terms of economic and energy security in 2050, through a renewed industrial policy. However, the success of such an approach, Europe needs a development towards industrial and service sectors based more on new technologies and knowledge, with a higher added value, innovative, competitive and sustainable, funded through an ambitious investment plan.

Improving the energy efficiency of existing building fund is essential not only for achieving national targets for energy efficiency in the medium term, but also to meet long-term objectives of the strategy on climate change and the transition to a competitive, low emission carbon by 2030.

In a time when environmental concerns, economic and social becoming increasingly important, being represented by climate change or the endangering energy security, resource depletion or ability to pay energy bills, reduce energy consumption in buildings are of strategic, both nationally and internationally. In addition to efforts to build new buildings with low energy requirements, obtained from conventional sources of energy is essential to address the high levels of consumption of existing buildings. After a slow start, energy efficiency policy in Europe is now giving results.

Recent developments, especially the crisis in Ukraine, is a conclusive argument vulnerabilities in the EU in terms of energy security and in particular gas imports. The recent European energy security strategy emphasizes the role of energy efficiency as a means to improve security of supply of the Union - any additional energy savings of 1% reduce gas imports by 2.6%.

The current framework based on an indicative target at the EU level on a combination of compulsory measures of EU and national action proved to be effective in stimulating the significant progress made by Member States. This approach should therefore continue to apply in 2030 and energy efficiency should become an integral part of the governance framework proposed in the Communication "2030", which would streamline the current monitoring and reporting requirements. Energy efficiency should therefore be a key component of Member States' national plans for energy competitive, secure and sustainable that would bring greater consistency of national and regional policies and measures on climate change and energy. Based on their analysis of national plans and using energy and climate change at EU level, the Commission will monitor national plans and assess the prospects for achieving national objectives / EU climate and energy (including energy efficiency), prospects on EU energy dependency and efficient functioning of the internal energy market, based on key indicators suitable for energy.

Energy efficiency has a crucial role in the transition to a competitive energy system, safe and sustainable. Although the underlying energy companies and economies, future growth must be operated with less energy and lower costs.

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