NATONAL ACTION PLANS for EE SECTOR in ROMANIA – SWOT analysis of results

DRAFT FINAL REPORT

Recommendations for 3rd NEEAP

Delivered to:	European Bank for Reconstruction and Development
Project beneficiary:	National Regulatory Authority (ANRE)
Implemented by:	FPJ Consult, Denmark
Implementation Period:	4 September 2013 to 4 March 2014
Project supported by:	Ministry for European Funds (MEF), Romania
Implementation Authority:	European Bank for Reconstruction and Development Energy Efficiency and Climate Change team One Exchange Square, London EC2A 2JN, United Kingdom Operation Leader : Ms Ştefania Racolţa Cruceru
Date of submission of the report:	November 28, 2013

Contents

Executive Summary i

1 Conclusions from the analysis of the past two NEEAPs 1

1.1 Effectiveness of implementation 1

1.2 Analysis of major obstacles 1

1.3 Current set of responsibilities on energy efficiency in Romania 2

1.3.1 Current responsibilities of ANRE 2

1.3.2 Tasks of previous institutions in the EE sector integrated into ANRE 3

1.3.3 Gap analysis of responsibilities 3

1.4 Overcoming identified obstacles 5

1.5 Recommended structure for NEEAP III 7

1.5.1 Key attributes of National EE Action Plan 7

1.5.2 Recommended structure 7

1.5.3 Recommended schedule for preparation of NEEAP III 8

2 Recommendations for Third NEEAP and for the Energy efficiency strategy and action plan; The holistic approach to address energy efficiency 10

2.1 Step 1: Crafting an inspiring national energy efficiency vision by embedment of NEEAP in the actual political framework 10

2.2 Step 2: Translating the national energy efficiency vision into objectives and targets 11

2.2.1 Energy saving and GHG reduction targets 11

2.2.2 Scenarios for the calculation of the EE target 12

2.2.3 National Allocation Plan towards the emission trading scheme (ETS) 14

2.3 Step 3: Building National Commitment for Action 15

2.4 Step 4: Design and strategic management of energy efficiency action plans and programmes 17

2.4.1 Specification of sectors of intervention 18

2.4.2 Types of possible EE measures 19

2.4.3 Best Practice for packaging of complementary measures 19

2.4.4 Importance of combination of demand side and supply side measures 22

2.5 Enabling financing mechanisms 23

2.5.1 Leveraging financing sources 23

2.5.2 Available and up-coming Financing sources and mechanisms for EE 24

2.5.3 Brief outline of programmes and facilities 26

2.6 Institutional needs for energy efficiency implementation 27

3 Recommended packages of EE measures in NEEAP III 29

3.1 Structure and "Long-List" of possible EE measures 29

3.2 End use residential / household sector (R) 31

3.3 End use industry sector (I) 36

3.4 End use transport sector (T) 40

3.5 End use tertiary, service and municipal sector (S) 42

3.6 Energy supply system - transformation, transmission and distribution (E) 48

3.7 Cross sector horizontal measures (C) 52

3.8 Methodology of evaluation of the packages of measures 56

3.9 Assessment of EE achievement potential of recommended measures in comparison to the EE target 58

3.10 Evaluation and ranking of measures 59

3.10.1 Ranking of sector measures under the moderate growth scenario 59

3.10.2 Ranking of sector measures under the high growth scenario 62

3.10.3 Ranking of cross-sector horizontal measures 64

3.11 Energy saving potential resulting from measures and their contribution to EE targets 66

3.11.1 EE potential - moderate growth scenario 66

3.11.2 EE potential - high growth scenario 68

3.12 Indicative Cost-Benefit-Analysis of recommended packages of measures 71

3.12.1 Cost-Benefit-Analysis for moderate growth scenario 71

3.12.2 Cost-Benefit-Analysis for high growth scenario 73

4 Description of top priority packages of measures 76

4.1 Packages of measures in end use residential / household sector (H) 76

4.1.1 Measure: Building renovation roadmap (addressing EED Art 4) multi-storey residential buildings 76

4.1.2 Measure: Energy efficient household appliances 78

4.1.3 Measure: Consumption based billing and metering of electricity, gas, heat hot water 79

4.1.4 Measure: Energy audits and energy management systems 81

4.1.5 Measure: Rehabilitation programme "Warm house 82

4.1.6 Recommended general principles for the design of residential / household measures: 83

4.2 Packages of measures in end use Industry sector (I) 85

4.2.1 Measure: Incentives for large industrial consumer 85

4.2.2 Measure: EE in Heavy industry 86

4.2.3 Energy Efficiency in SME industry 87

Energy Efficiency in SME industry 87

4.3 Packages of measures in end use Tertiary, service and municipal sector (S) 88

4.3.1 Measure: Energy Efficiency in Governmental buildings 88

4.3.2 Measure: Development of Energy services EnPC/ ESCO market (S 08) 90

4.3.3 Measure: EE office equipment, lighting and appliances 93

4.4 Packages of measures in Energy supply system - transformation, transmission and distribution (E) 95

4.4.1 Measure: Loss reduction in power transmission and distribution network 95

4.4.2 Measure: Promotion of efficient heating/ cooling - CHP Promotion 97

4.4.3 Options to comply with EED 27/2012 - Article 7 - Energy efficiency obligation schemes 98

4.5 Top priority cross sector- horizontal packages of measures 101

4.5.1 Establishment of a dedicated EE authority (EEA) 101

4.5.2 Measure: Implementing an EE information policy 104

4.5.3 Measure: Energy Efficiency National Fund 106

4.5.4 Measure: Stakeholder involvement and training 109

4.5.5 Measure: Qualification, accreditation and certification schemes and training 110

5 Recommendations for NEW Energy Efficiency Law 112

5.1 Recommended elements for the new EE law 112

5.2 Specific considerations for the EE law 113

5.2.1 Need to be specific in chapter “Targets and objectives” 113

5.2.2 Need to be specific in chapter “Monitoring” 113

5.2.3 Need to be specific in chapter “Responsibility towards EE” 114

6 Risk analysis 115

6.1 Description of risks 115

6.1.1 Timing 115

6.1.2 Stakeholder commitment 115

6.1.3 Programmatic approach 116

6.1.4 Effort and analysis 116

6.1.5 EE legislation 116

6.1.6 EE authority 117

6.1.7 Availability of Financing for implementation 118

6.1.8 Availability of funding for EE authority 119

6.2 Summary of risk factors 119

6.3 Top priority risk mitigation strategy 120

7 Annexes 121

7.1 Annex 1: Prospects on energy demand and intensity of Romania 121

7.2 Annex 2: Classification of ESIF thematic objective for energy sector development needs . 124

7.3 ANNEX 3: overview of obligation schemes of selected EU-MS 126

List of tables

Table 1: Demand for definition of responsibilities on EE by areas and sector 4
Table 2: Estimated EE potential by final energy consumption sector 14
Table 3: EE and GHG targets according to the National Reform Plan 15
Table 4: Articles of EED to be addressed in NEEAP 18
Table 5: Outline of the general approach of the fife different types of measures applied 21
Table 6: Overview of potential financing sources for EE Programmes and Funds 25
Table 7: Summary long-list of identified packages of measures 29
Table 8: Assumptions for residential, household sub-sectors 31
Table 9: Long list of possible EE measures in the residential/ household sector 32
Table 10: Assumptions for industry sub-sectors 36
Table 11: Long list of possible EE measures in the industry sector 37
Table 12: Long list of possible EE measures in the transport sector 40
Table 13: Assumptions for tertiary/ service/ municipal sub-sectors 42
Table 14: Long list of possible EE measures in the tertiary, service and municipal sector 43
Table 15: Assumptions for Energy supply system sub-sectors 48
Table 16: Long list of possible EE measures in energy system sector 48
Table 17: Long list of possible cross sector horizontal measures 52
Table 18: Qualitative evaluation criteria 56
Table 19: Quantitative evaluation criteria 56
Table 20: Specification of sub-sector for intervention 59
Table 21: Ranking of measures under the moderate growth scenario 60
Table 22: Ranking of measure under criteria cost efficiency and absolute EE (moderate growth) 61
Table 23: Ranking of measures under the high growth scenario 62
Table 24: Ranking of measure under criteria cost efficiency and absolute EE (high growth) 63
Table 25: Ranking of cross sector horizontal measure 64
Table 26: Calculated EE potential selected top 10 EE measures under moderate growth scenario 66
Table 27: Calculated EE impact of selected top 10 EE measures under moderate growth scenario 67
Table 28: Calculated EE potential selected top 13 EE measures under high growth scenario 68
Table 29: Calculated EE impact of selected top 10 EE measures under high growth scenario 70
Table 30: Share of costs of top 10 measures (moderate scenario) over the implementation period 2015-2020 72
Table 31: Assumption on financing sources for covering the required annual investment and non-investment costs for the top 10 measures (moderate scenario) over the implementation period 2015-2020 73

Table 32: Share of costs of top 13 measures (high scenario) over the implementation period 2015-2020 74
Table 33: Assumption on financing sources for covering the required annual investment and non-investment costs for the top 13 measures (high scenario) over the implementation period 2015-2020 75
Table 34: Overview of recommended EE measures for moderate and high growth scenario 76
Table 35: Recommended elements for the new EE law 112
Table 36: Summary of risk factors concerning the establishment of the EEA 119
Table 37: Summary of risk factors concerning the implementation of NEEAP III 119
Table 38: Top priority risk mitigation strategy 120

List of figures

Figure 1: Overview of strategic documents with reference to energy efficiency 11
Figure 2: Primary energy consumption, Mtoe, reference scenario and projection to respect the energy efficiency target of 2020 12
Figure 3: Projection of Primary energy consumption (in Mtoe) for the moderate and high GDP growth scenario and respect to the energy efficiency target of 2020 13
Figure 4: Dynamic of the projected energy balance for 2020 without EE measures 14
Figure 5: Key pillars for building national commitment for energy efficiency action 16
Figure 6: Key stakeholders on EE strategy and NEEAP 16
Figure 7: The role of Key stakeholders on EE 17
Figure 8: Stakeholder involvement in the programme steps 17
Figure 9: Sector priorities for NEEAP III 19
Figure 10: Required complementarity of instruments 20
Figure 11: Leveraging financing sources 24
Figure 12: Cyclic process of programme implementation 27
Figure 13: Weight of the 7 evaluation criteria 58
Figure 14: Rated appropriateness of top 5 cross sector, horizontal measures 64
Figure 15: Share of costs for cross-sector measures 65
Figure 16: Share of costs for cross-sector measures by type of instrument 65
Figure 17: Cost curve of recommended top 10 measures under the moderate growth scenario 66
Figure 18: Areas of EE by top 10 measures 68
Figure 19: Targeted EE by sector through top 10 measures 68
Figure 20: Cost curve of recommended top 13 measures under the high growth scenario 69
Figure 20: Areas of EE by top 13 measures 70
Figure 21: Targeted EE by sector through top 13 measures 70
Figure 22: Sample of monitoring indicators 114

Abbreviations

ANRE	National Regulatory Authority for Energy
ANRSC	National Regulatory Authority for Community Services
ANRMAP	National Authority for regulation and Public Procurement Monitoring
ARCE	Romanian Agency for Energy Conservation
Art.	Article
C	Cross sector horizontal measures
CHP	Combined Heat and Power
CO2	Carbon Dioxide
DH	District Heating
E	Energy supply system – transformation, transmission and distribution
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EE	Energy Efficiency
EEA	Energy Efficiency Authority
EED	Energy Efficiency Directive
EGO	Energy Government Ordinance
EIB	European Investment Bank
EM	Energy Management
EPBD	Energy Performance in Buildings Directive
ENPC	Energy Performance Contract
ERDF	European Regional Development Fund
ESCF	European Structural and Cohesion Fund
ESCO	Energy Service Company
ESD	Energy Savings Directive
EU	European Union
EU - ETS	European Union Emission Trading Scheme
FEC	Final Energy Consumption
FI	Financial Intermediary
FM	Financial Management
GD	Government Decision
GDP	Gross Domestic Product
GHG	Green House Gas
GO	Government Ordinance
GoR	Government of Romania
H	End use residential / household sector
HH	Household
HOA	Home Owners' Association
I	End use industry sector
I&S	Industry and Services
kWh	Kilo Watt hour

LA	Local Authority
LTA	Long Term Agreement
MAB	Multi-Apartment Residential Buildings
ME	Ministry of Economy
MEF	Ministry for European Funds
MF	Ministry of Finance
MRDPA	Ministry of Regional Development and Public Administration
MS	Member State of the EU
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
NAP	National Allocation Plan
NEEAP	National Energy Efficiency Action Plan
NPTR	National Programme for Thermal Rehabilitation of Blocks and Flats
NRP	National Reform Programme
NSRF	National Strategic Reference Framework
OP	Operational Programme
PEC	Primary Energy Consumption
PND	National Development Plan
PPP	Public-Private Partnership
PRIMES	A computer model simulating the European energy system and markets
RON	Romanian Leu (pluralis: Lei)
ROP	Regional Operational Programme
S	End use tertiary, service and municipal sector
SMART	Specific, Measurable, Ambitious, Realistic, Time framed
SOP	Sectorial Operational Programme
SWOT	Strengths, Weaknesses, Opportunities, Threats
T	End use transport sector
TPF	Third Party Financing
UK	United Kingdom
UPT	Urban Public Transport

Currency Equivalents (as of December 2013)

1 RON = 0.225 EURO; 1 EUR = 4.444 RON

Weights and Measures (Metric and International Systems)

Gcal : Gigacalorie (10^6 kcal); (1 MWh = 0.86 Gcal)
GJ : Gigajoule (10^9 Joule); (1 MWh = 3.6 GJ;
1 GJ = 0.0341 tce; 1 GJ = 0,0239 toe)
kW : kilowatt
MW el : Megawatt electric (1000 kilowatts)
MW th : Megawatt thermal (0.86 Gcal/h)

toe : ton of oil equivalent (10^7 kcal or 41860 MJ or 11.628 MWh)
yr : year(s)

EXECUTIVE SUMMARY

The present document is the Final Report of the assignment "National Action Plans for EE sector in Romania – SWOT analysis of results" carried out in the period September – November 2013, with the main objective of supporting ANRE with the preparation of a complete evaluation of the results achieved after the implementation of the first and second NEEAP, in order to define the correct directions and actions to be taken in the third NEEAP, so as to achieve the targets set by EU for Romania in the EE sector.

The assignment's outcomes were structured in two reports. The first report, called Interim Report, reviewed the relevant changes of the European and Romanian legislation for energy efficiency of the last three years, and analysed the first and second NEEAP, both from an overall point of view, and regarding the measures included in each of them. The major obstacles which have prevented the achievement of better results were reviewed, and the relevance of these obstacles was assessed. Finally, the main barriers to energy efficiency investments and implementation measures were considered.

The current report aims, mainly at recommending the priority measures to be included in the third NEEAP.

Results of the analysis of NEEAP I and II

Romania has committed itself to a target of primary energy consumption (PEC) of 43 Million tonnes oil equivalent (Mtoe) in 2020 which represents a 19% reduction compared to the forecasted PEC. The economic crisis in 2009-2010 reduced the PEC from 40 to 34 Mtoe which was mainly affecting the industry sector and was in all probability not related to energy efficiency measures.

In 2011 the PEC was 35.6 Mtoe, leaving room for an increase of 7.4 Mtoe up to the committed limit of 43 Mtoe in 2020.

The implementation effectiveness of the planned measures of the First NEEAP (2007-2010) and the Second NEEAP (2011-2013) was relatively low. NEEAP I had clear targets, while in NEEAP II the targets were unclear. Reasons for the low effectiveness have been the weak engagement of partners and the insufficient allocation of human and financial resources. The effect of energy efficiency measures of NEEAP I were reported in NEEAP II, but lacked overall evaluation and adaptation on the situation. All in all, the approach was fragmented and ineffective, thus the reduction of PEC over the years 2007 to 2012 cannot be traced back to the energy savings as result of NEEAP measures.

In the NEEAP I period, the measures on energy efficiency had limited contribution to the energy efficiency targets. Only a few data are yet available related to the effect of NEEAP II (e.g. the Mure Database[1]).

The Consultant analysed the Strengths, Weaknesses, Opportunities and Threats of the past NEEAP results and came to the following conclusions:

(a) The entire planning cycle required for a successful NEEAP was missing, and should be established.

[1] Source: http://www.muredatabase.org/

(b) Target setting was incomplete and should be strengthened.
(c) The measures included in the NEEAPs have been a mixed bag – a few of the measures have been successful, but a large group of measures have performed less satisfactorily, or outright poorly. The set of measures to be included in the next NEEAP should build on the successes of the first two NEEAPs, and should change or remove unsuccessful measures.
(d) An overall structure of coordination and cooperation among the main stakeholders was missing, and should be established. One entity should assume the role of the coordinator, and a cooperation mechanism between the main stakeholders should be established.
(e) No resources were allocated for the NEEAP process. Sufficient resources in terms of institutional capacity and financial instruments should be allocated to the operation of the NEEAP process.
(f) No appropriate monitoring and evaluation mechanism was established for the first two NEEAPs. NEEAP II includes a record of achievements, but fails to make an evaluation. Future NEEAPs should include a coherent mechanism for monitoring and evaluation based on clearly defined targets and clearly defined ways of measuring the success of each measure.

The approach to achieve Energy Efficiency improvements under NEEAP III within an enabling framework

Energy Efficiency is getting an increased political **priority for sustainable development** and for improving the competitiveness of the economy. There is an imperative demand to reduce energy intensity, in order to be able to **achieve the national and EU energy efficiency targets** of 2016 and 2020, after the economic recovery.

It is now the right time to lay down the important strategic groundwork to achieve the targets and enable long-term benefits of energy efficiency with a **concise and robust Third National Action Plan for Energy Efficiency** as demonstrated by the up-coming schedule:

- The lessons and conclusions of the past NEEAPs are drawn which leads to clear recommendations for improvements in a programmatic and complementary NEEAP.
- The EC Directive nr. 2012/27/CE foresees the **obligation**, for each Member State to elaborate a National Energy Efficiency Action Plan (NEEAP). The Romanian Government must **notify to the Commission, in December 2013,** the policy measures that they plan to adopt, which means the presentation of a **strategy** on the compilation of the directive.
- Romania has the task to elaborate NEEAP III by mid-2014 on the fundament of strategic energy and economic development documents a **coherent and consistent legal framework** supporting **horizontally** the EE topic. A key obligation is to **embody energy efficiency in the primary and secondary legislation.**

It will be unique chance to utilize the current momentum to elaborate the action plan and the legal framework to fulfil the ex-ante conditionalities for future programming period, enabling smart the financing of EE measures through EU Structural Funds.

The third NEEAP for Romania **shall be a** powerful tool,

- Based on a **dialogue** with key-stakeholders to formulate concise, consistent and achievable targets and generate ownership,
- Define clear **responsibilities** for the implementation of activities and the monitoring of results,

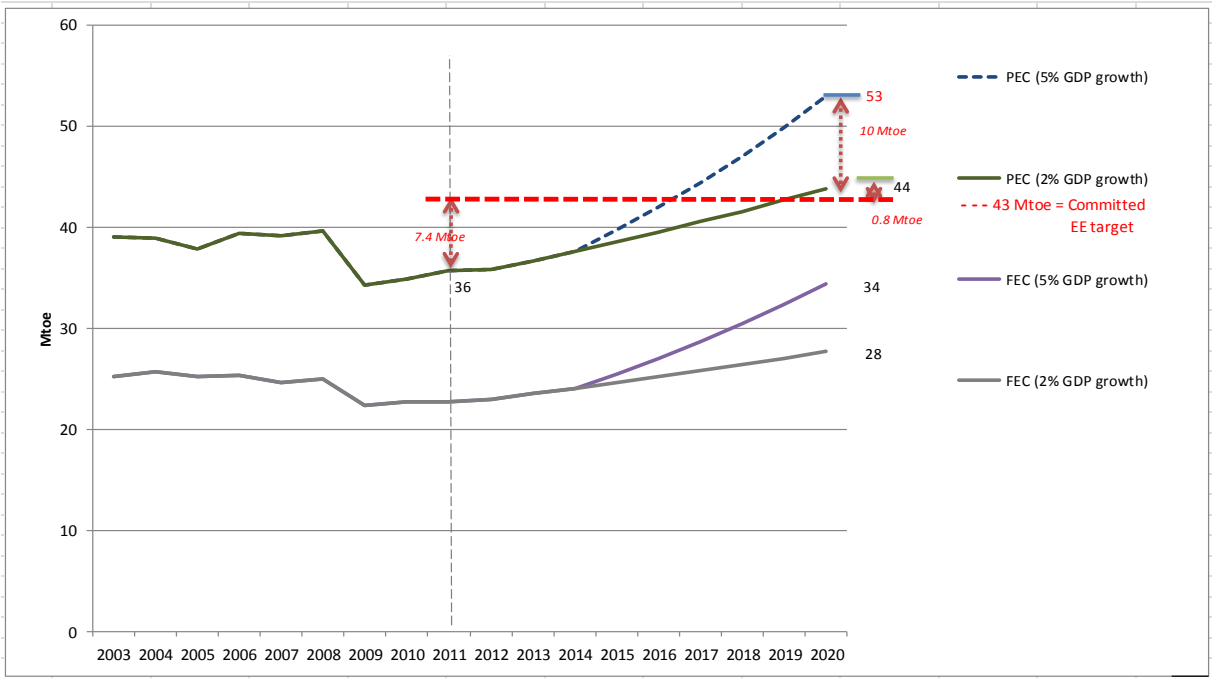
- Contain **complementary**, sector targeted measures to overcome the cross-sector barriers,
- Promote innovative and smart **financing mechanisms** to leverage available funding sources (private sector, financing institutions, EU and state funds).

Recommended Energy Efficiency measures under NEEAP III

The purpose of drafting an energy efficiency action plan is to develop over a defined period activities targeted at addressing the various barriers to energy efficiency. **The design of the energy efficiency action plan needs to prioritize actions that have the potential to achieve the maximum impact with limited resources.**

In order to estimate the amount of energy savings to be derived as results of measures of a NEEAP by the year 2020 two economic development scenarios have been drawn. **Under a scenario of moderate growth** of 2% GDP p.a., without any energy efficiency measures, in 2020 the PEC would exceed the committed limit of 43 Mtoe by 0.8 Mtoe. but **under a scenario of high growth** of 5% GDP p.a. the target would be exceeded by 10.0 Mtoe. Thus, under a moderate growth scenario the required EE measures would be limited, but under a high growth scenario there would be a need for considerable EE measures.

Figure i: Projection of Primary energy consumption (in Mtoe) for the moderate and high GDP growth scenario and respect to the energy efficiency target of 2020



Source: Consultant's calculations

The purpose of NEEAP III is to enable Romania to stay within the committed PEC of 43 Mtoe in 2020, irrespective of the economic growth scenario being realized up until year 2020. The optimal way to achieve this is to embark upon a set of relevant and cost effective **EE measures**, which are achievable and can be monitored. It is expected that initially, Romania would follow a growth trend similar to the moderate growth scenario. As soon as the economy shows sign of faster growth, EE measures must be adapted to keep the total energy consumption within the committed limit.

It is recommended that the measures in NEEAP III are applied in a coherent way by **grouping them into packages**, where each package includes relevant "push" and "pull" instruments. Some measures "push" energy efficiency improvements into reality, while other measures "pull" the improvements forward.

The "push" instruments include Legislation and Regulation, and Market Transformation:

Energy efficiency **laws and regulations** are considered prerequisites for the effective promotion of energy efficiency, providing legitimacy and direction, and outlining policies and strategies. **Regulations** are taking the form of energy codes, labels, and standards, provide the required information to the intended beneficiary and ensuring a minimum guarantee on the energy efficiency performance of equipment or products. Enforcement of regulations is important which requires monitoring methodology and capacities.

Government intervention may be required to **create a market** for energy efficiency technologies and processes. An important barrier to overcome is the lack of economy of scale for production of energy efficient equipment. Another barrier is consumer behavior, which should be overcome via information and awareness campaigns.

The "pull" instruments include Information and Awareness, Advice and Capacity Building, and Financing Mechanisms:

Limited knowledge and inadequate capacity of the target groups to adopt energy-efficient technologies and practices can be overcome by **information and awareness campaigns**, and can be supported by **advice, training and capacity building** aiming at the target groups, such as managers, engineers, architects, technicians and operators.

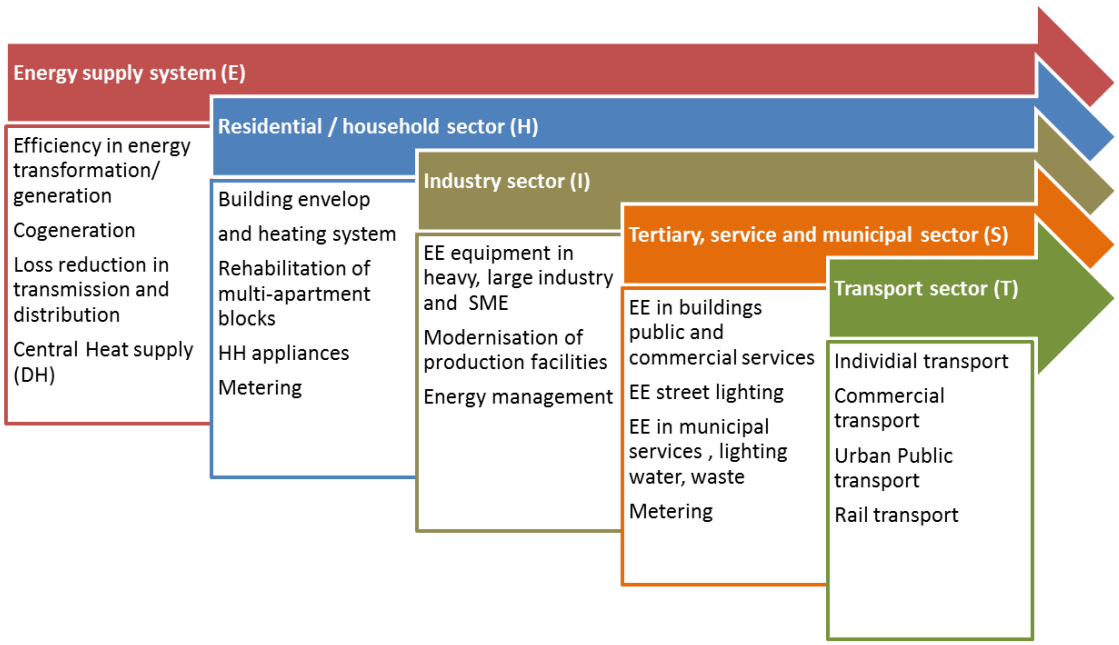
Access to capital for energy efficiency projects is a challenge. Energy efficiency investments have longer pay-back periods, and are to be implemented by beneficiaries lacking a strong equity base. A number of EU grant based programmes and facilities have been established to overcome this barrier, and a number of financial intermediaries have credit lines available for energy efficiency investments. It will be the challenge to develop and implement **innovative and smart financing mechanisms to leverage available funding sources** (private, EU, banks), such as the development of an ESCO market, and finally enable market mechanisms towards a functioning EE business. The NEEAP's packages of measures must consider the source of financing of the costs into EE investments, which finally deliver the main share of energy savings. Pure state budget support measures must be reserved for (a) intelligent mechanisms to **enable leveraging third party and donor financing and (b)** sensitive areas with social demand to avoid energy poverty due to increasing tariffs in the frame of the developing liberalization.

Each measure or package of activities shall have a quality approach of the planning of the **implementation targets**; "SMART" in terms of: Specific, Measurable, Ambitious, Realistic, Time framed.

The areas for sector intervention can be defined along the EE potential of the main final energy consumers and wasters: End use residential / household, industry, transport, tertiary, service and municipal sector as well efficiency in the Energy supply system - transformation, transmission and distribution. Those are in line with the areas to be obligatory addressed by EED 27/2012. Special attention is given to those areas which are under the responsibility and collaboration requirements of ANRE.

Applying the above outlined methodology, a "long-list" comprising 30 possible packages of measures was developed for the main relevant sectors: Households Industry, Transport, Service, and the Energy Supply System, This long-list was based on the priorities of these sectors.

Figure ii: Sector priorities for NEEAP III



In order to prioritize among the 30 packages a multi-criteria evaluation model was applied, with

- qualitative criteria: Contribution to the compliance of EED requirements; Market maturity; Development framework; and Financial sustainability; and
- quantitative criteria: Contribution to achievement of the EE target in terms of absolute energy saving potential in Mtoe; Total cost effectiveness (toe/EUR) and Potential for enabling financing mechanisms and leverage funding sources.

The criteria are scored and weighted, and the result is an order of ranking of the 30 packages.

The model results in the following **top 10 packages of measures required to generate energy savings as defined for the moderate scenario sorted by sector:**

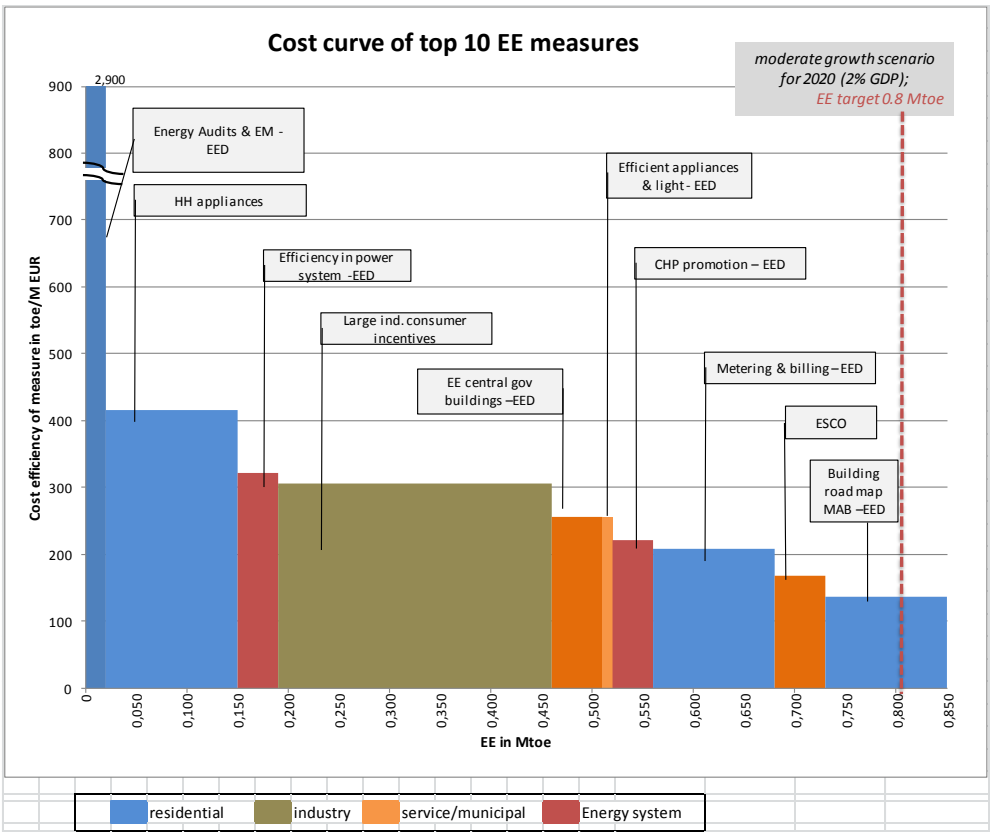
Efficiency in the Energy system	**End use industry sector**
• Loss reduction in the energy transmission and distribution systems (E 01) (addressing EED Art 15); • Promotion of combined heat and power production (addressing EED Art 14) (E 03)	• Energy efficiency incentives for large industries (I 02)

End use residential / household sector	End use tertiary, service and municipal sector
• Building renovation roadmap (addressing EED Art 4) multi-apartment residential buildings Implementing a road map for rehabilitation of the stock of multi-apartment building (H 01); • Promoting energy efficient household appliances (H 04). • Metering and billing of energy consumption in the residential housing stock (addressing EED Art 9 - 11) (H 05); • Systematic energy auditing and energy management in the housing stock (addressing EED Art 8, 16) (H 06);	• Improving the energy efficiency of the stock of government buildings (addressing EED Art. 4, 5) (S 03); • Promotion of the tool of Energy Service Company / Energy Performance Contracting (ESCO/ENPC) , (addressing EED Art 18), (S 08); • Promoting the energy efficiency of appliances and light (addressing EED Art 6) (S 02);

This leads to the result that **the 10 high efficient packages of measures will be sufficient to reach the EE target of 0.85 Mtoe in the projection year 2020 under the moderate growth scenario.** In the model it is calculated that the highest savings can be reached in the residential / household sector, where four selected packages (H05, H01, H06 and H04) can contribute up to 0.390 Mtoe, or 46% of the savings potential. A single package in industry (I 02) can contribute 0.275 Mtoe, or 32% of the total. The remaining 0.184 Mtoe, or22%, can be achieved by two packages in the energy system (E 01 and E 03), and three packages in the service sector (S 08, S 03 and S 02).

Among the top 10 there are eight measures are covered which address the requirements of the Energy Efficiency Directive (27/2012) as well as the key areas of ANRE responsibility. There are no individual measures ranked under to top 10 for the transport sector. However, they are partly included in the package of measure in industry and EnPC by means of triggering projects to reduce the fuel consumption of industrial or urban public transport vehicle fleets.

Figure iii: Cost curve of top 10 measures

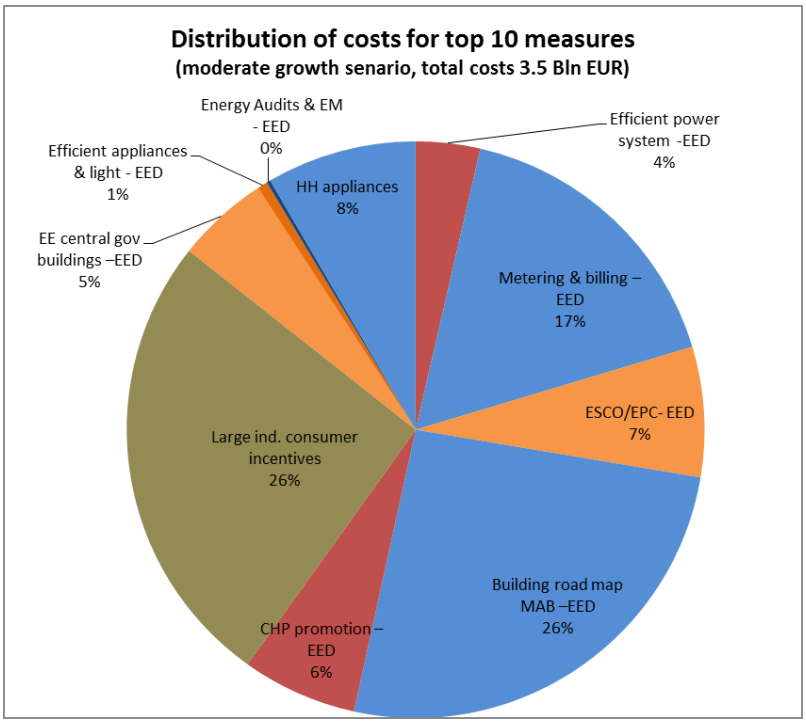


Source: Consultant's calculations

The **overall cost of the measures under the moderate growth scenario** will be approximately **3.5 Billion EUR**. Assuming that all 10 measures will commence in 2015 with an equal investment over the 5 years, the costs per annum will amount to approximately 700 MEUR. The breakdown of these costs on packages shows that two packages (H 01 and I 02) have costs of 900 MEUR each for the full 5-year period, while the other packages have smaller costs. The cost effectiveness indicators (one of the criteria) show that the cost effectiveness of I 02 is more than twice the cost effectiveness of H 01, etc.

By enabling innovative financing mechanisms, assuming a leveraging factor of 9, it would be possible to reduce the contribution of the Romanian state budget to the investment costs to some 11%, equal to 76 MEUR. The total 5-year cost of preparation and implementation of these packages is estimated to 7.7 MEUR, of which about 5.0 MEUR would need to be provided by the Romanian state budget. The average cost effectiveness of the top 10 packages is 243 toe/MEUR of investment.

Figure iv: Share of costs of top 10 measures (moderate scenario) over the implementation period 2015-2020



Under the **high growth scenario** the required energy efficiency improvement by 2020 is 9.54 Mtoe. Investigations in ways to reach this target in a cost effective way resulted in the choice of 13 packages of measures, comprising nine of the top 10 of the moderate growth scenario and four additional measures:

End use residential / household sector	**End use industry sector**
• Implementing the "Warm House" programme (H 03);	• Promoting energy efficiency in the heavy industry (I 01); • Promoting energy efficiency in small and medium-sized enterprises (I 04);
Efficiency in the Energy system	
• Implementing (the envisaged obligation scheme for utilities (E 05) addressing EED Article 7	

The model calculations showed that the 13 top priority packages can only generate energy savings of 8.4 Mtoe, leaving a gap of 1.15 Mtoe to the target. The 8.4 Mtoe would be sufficient, if the average GDP growth rate from 2015 to 2020 were to be only 4.6% p.a. instead of 5% p.a. Nine of the top-10 packages of the moderate growth scenario are found also on the top-13 list for the high growth scenario, but in the high growth scenario the efforts are higher, and thereby the packages have higher savings potentials and costs.

The highest savings can be reached in the residential / household sector with five packages (H 05, H 01, H 06, H 04 and H 03) with a total of up to 2.436 Mtoe, or 29% of the total. Three packages targeting the industry (I 02, I 01 and I 04) can achieve savings of up to 2.675 Mtoe, or 32% of the total. Two packages targeting the Service sector (S 08 and S 03) can achieve up to 0.703 Mtoe, or up to 8% of the total, while three packages targeting the Energy sector (E 01, E 03 and E 05) can achieve savings of 2.581 Mtoe, or 31% of the total. The implementing of the EE obligation scheme for utilities (E 05) has a potential of contributing up to 2.2 Mtoe in the forecast year 2020 under the assumption of a 100% outreach. However, under today's conditions the obligation scheme is not appropriate due to its high implementation costs and the expected effects in terms of drastically increased of energy costs and the related affordability impact.

Considering the top 13 measures of the **high growth scenario**, which have the potential to contribute 8.4 Mtoe, the overall costs will about **47 Billion EUR**, with preparation and implementation costs of 13.4 MEUR. Assuming that all 13 measures will commence in 2015 with an equal investment over the 5 years, the costs will amount to 9.3 billion EUR per year, with 2.7 MEUR per year for preparation and implementation. The breakdown of costs shows that the two most costly packages (H03 and E 05) would cost 21 billion EUR and 11.6 billion EUR, and would contribute 1.329 Mtoe and 2.198 Mtoe, respectively. The cost effectiveness of H 03 is among the lowest, while the cost effectiveness of E 05 is close to the average.

Each of the packages of measures has a potential of leveraging the state budget contribution with external financing sources (EU ESIF, TPF, ESCO, FIs, owner contribution) with a factor of 10 or more. A leverage of 10 would result in costs for the Romanian state budget of 930 MEUR per year, and the preparation and implementation costs for the Romanian state budget would amount to around 1.7 MEUR per year. The average cost effectiveness of the top 13 measures is 180 toe/MEUR.

Cross sector horizontal measures - Energy Efficiency Authority (EEA)

In addition to the sector specific packages, a number of cross sector horizontal measures should be implemented.

Based on the specifics of each measure or package of sector specific measures the **responsibility** of stakeholders can be clearly defined.

Involving **stakeholders** is the key to planning and implementation of the measures. This means generation of commitment and ownership by developing an understanding of the long term benefits of EE in a functional, realistic and sustainable way.

Surely, the implementation of actions will be the task of various governmental bodies, private sector entities, as well as the individual users of energy. In parallel with definition of the responsibilities, the required institutional and organizational **capacities and resources** must be provided, including sufficient expertise and financing. If such capacities are not yet available, the first step in the list of measures shall include respective activities and instruments to establish these capacities.

A **monitoring and advisory** scheme of implementation needs to be established to enable early recognition of risks and problems and interact with mitigation or emergency support. A coordinated **measuring of results** of the results is vital to comply with reporting requirements, evaluate the decree of achievements and learn lessons and demand for the future action plans.

The establishment of a dedicated Energy Efficiency Authority (EEA) plays a key role in the implementation of NEEAP III.

An **Energy Efficiency Authority (EEA)** must be established to serve as an effective institution with the key role of executing government policies and strategies through the coordination of energy efficiency policies and programmes, including programme design, administration, management, monitoring, evaluation, etc. The EEA should have the capacity to coordinate within and across levels of government, and engage key stakeholders in consultative processes to help build consensus. The EEA should have administrative and management authority and adequate human and financial resources should be made available to cover the expenditures of the organization itself, and to initiate programmes and activities envisaged.

Having considered various alternatives, it is recommended that ANRE, an existing and independent body, could take over the full function of the EEA. ANRE should be mandated by the primary EE law for this additional function of a National Energy Efficiency Agency. In addition to a central office, the EEA may have satellite and branch offices located in bigger cities or industrial zones. The EEA could be financed by proper reallocation of ANRE revenues, including energy fees, penalties, and taxes related to EE.

The EEA should be mandated to coordinate the EE process, and to monitor its progress. The mandate should include steering and advice on the EE improvement process, information and promotion, legal advice and support to the implementation of the packages. The key tasks and activities of the EEA should include policy support, advisory services and technical assistance, information and dissemination services, education and training, management support to measures and programmes, and facilitation of the access to finance for energy efficiency projects. In the short term (2014-2020) the operating costs of the EEA are estimated to 0.9 MEUR per year. The EEA should be established during 2014 with appropriate mandate, staffing and funding.

1 CONCLUSIONS FROM THE ANALYSIS OF THE PAST TWO NEEAPS

1.1 Effectiveness of implementation

The implementation effectiveness of the planned measures of the First NEEAP (2007-2010) and the Second NEEAP (2011-2013) was relatively low. NEEAP I had clear targets, while in NEEAP II the targets were rather unclear.

Reasons for the low effectiveness have been mainly the weak engagement of partners and the insufficient allocation of human and financial resources. The effect of energy efficiency measures of NEEAP I was reported in NEEAP II, but lacked overall evaluation and adaptation on the situation. All in all, the approach was fragmented and ineffective, thus the reduction of PEC over the years 2007-2012 cannot be traced back to the energy savings as result of NEEAP measures. In the NEEAP I period the measures on energy efficiency had limited contribution to the energy efficiency targets. No specific, processed data are yet available on the effect of NEEAP II. In order to assess its effect, the Consultant carried out a number of stakeholder interviews, and analysed the energy balance of 2011. Also, some data related to the effect of NEEAP II were found in the Mure Database[2]and used in the present report for the analysis carried out. .

1.2 Analysis of major obstacles

The major obstacles identified were:

- Lack of coordination regarding energy efficiency ;
- Lack of institutional capacity for implementing the NEEAPs;
- Lack of sustainable financial instruments;
- Incomplete legal and regulatory basis;
- Lack of ownership and low priority of EE.

With respect to lack of coordination it was observed that there was no designated coordinator and monitor of the NEEAP implementation process, although there seemed to be a unanimous understanding among the main stakeholders that an entity should be entrusted with this task, and that this entity should have a sufficiently strong mandate to do so.

The required institutional capacity has neither been allocated in sufficient amounts to drive the NEEAP formulation process, nor to drive the NEEAP implementation process. This is most probably rooted partly in the economic crisis and the related cut-backs of the public sector, partly in the indecision with respect to energy efficiency.

Due to the reliance on state and local budget (grant) resources, in combination with the financial crisis, financial resources have not sufficed to implement the NEEAPs. Funding sources have dried up, and it can be concluded that the state budget funding mechanisms have not been sustainable.

[2] Source: http://www.muredatabase.org/

The legal and regulatory basis for the implementation of the NEEAP has been incomplete. Although the primary legislation of Romania reflects almost all of the relevant EC Directives, as only Directive 2012/27/EU remains to be transposed, the secondary legislation still needs to be aligned, setting the norms and procedures to achieve the targets for savings assumed by Romania. The regulatory basis for the implementation of energy efficiency measures is deficient, as it lacks provisions allowing other than public (budget, grant) funding of measures, including investments. The legal and regulatory basis is not developed to support the use of financial instruments such as energy performance contracts and the use of financial intermediaries such as ESCOs.

The financial and economic crisis of the last years and the accompanying reduction of energy primary consumption lead to the impression and that Romania will reach the set energy efficiency targets easily. As a consequence the importance of the EE subject dropped in all sectors, budgets for the implementation of planned measures/ programmes were cut and capacities reduced.

1.3 Current set of responsibilities on energy efficiency in Romania

Currently responsibilities for Energy Efficiency are spread across many entities, resulting in a lack of ownership of the EE topic, and a weak coordination amongst the entities. This is reflected in poor overall performance of coordination and commitment regarding EE.

1.3.1 Current responsibilities of ANRE

ANRE an independent body subordinated to the Parliament. ANRE's tasks and responsibilities, as well as its funding and regulation are set forth through the Electricity and Gas law no 123/2012 and through other secondary legislation such as GO 46/2012.

Some of the most important competences and tasks are:

- Elaboration and monitoring of the application of regulations in the gas and electricity field at national level
- Elaboration of market regulations and pricing methodologies in the electricity and gas fields
- Provision and revoke licenses and permits for generation companies, including cogeneration or heat energy producers
- Elaboration of electricity and gas supply contracts and regulations
- Approval of commercial and technical regulations for economic operators.
- Control, monitoring of and compliance check of regulations, keeping a national database for delivering information to other authorities
- Periodical reporting to the Government and Prime minister, publishing yearly reports of the activity.
- Monitoring of several areas including the interconnection between authorities from other EU-MS and Romania, the congestions in the national grid, transparency and competition in the market, the transport and system operator methodologies and so forth
- The tariff levels are decided upon by ANRE, in accordance with the law

According to Law no. 160/2012, GO no. 46/2012 ANRE is currently primarily financed from their own income:

- fees acquired through tariffs, licensing, authorizations, permits and penalties.

- annual contributions from economic operators regulated in the electricity, heat and gas domains, as well as from funds given by international institutions

The annual budget is approved by ANRE and the execution of the budget is done according to the procedures of control and internal audit. The annual profit is reported as a source for financing for the next year while the deficit is covered from next year's income, including bank and treasury loans.

1.3.2 Tasks of previous institutions in the EE sector integrated into ANRE

ARCE was the institution specialized in Energy Efficiency. ARCE was dissolved in 2009, including its regional offices, and has been incorporated into ANRE.

ANRE's EE department suffers from similar governance issues as did ARCE before. It is not autonomous, properly resourced and accountable, lacks good data, and is not in the position to design, implement, evaluate, and redesign programs.

Some of ARCE's main tasks in the EE sector, which have been transferred to ANRE are as follows:

- Elaborating national policies for the utilization of EE, together with the Ministry of Industry and Resources (current Ministry of Economy);
- Implementing and monitoring the national policies on EE and the usage of EE programmes;
- Cooperating with other local and external institutions with the aim of using EE and reducing the negative environmental impact;
- Participating in the elaboration of norms and technical regulations as to increase EE for machines, equipment, transport, distribution and building energy consumption;
- Authorizing companies and individuals wishing to make energy audits;
- Coordinating EE programmes which are financed by international institutions on the basis of governmental agreements;
- Promoting RES in Romania.

The National Energy Observer *(NEO)* was established in 2003 in order to analyse data on energy generation and consumption. NEO was formed as a distinct institution within ICEMENERG, R&D institute subordinated to the Ministry of Economy. The services offered by NEO, have been:

- Elaborating and updating the energy database on generation, consumption, prices and tariffs

- Elaborating research and studies regarding the sustainable development of the energy sector

- Elaborating research and studies needed for policies and energy strategies on a national level

- Comparing international indices for energy and EE

- Elaborating energy forecasts

The activities of the National Energy Observer *(NEO)* have been terminated in 2009 with the integration of ARCE into ANRE. Due to the drastic reduction of the funding and human resources of ANRE, the above activities have been continued only for elaboration of data for tariff regulation.

1.3.3 Gap analysis of responsibilities

A gap has been identified between the currently defined responsibilities and the required responsibilities from the view point of sectors, areas and tasks to be covered by the EE law and the NEEAP III.

Table 1: Demand for definition of responsibilities on EE by areas and sector

Sector / area with demand of responsible body	Current responsible	Current Responsibilities	Areas with <u>insufficiently</u> defined responsibility
Legislation implementation and application	-	-	*Competent EE Authority* Legal advice for required extension (secondary legislation, regulation) or amendment
Reporting of EE targets	-	-	*Competent EE Authority*
NEEAP	Ministry of Economy	Compilation of measures	Programmatic approach and planning Complementarity of measures and instruments Stakeholder involvement Coordination of contribution Coordination and monition of NEEAP implementation Monitoring of results
Data collection	ANRE Ministry of Environment	data collection and EE programme development Emission data	Compilation of reporting Verification and valuation of data Analysis of target achievements, etc.
Financing mechanisms	Romanian Energy Efficiency Fund	Receive funds and spend in projects	This is a sum-optimal approach. REFF should be one financing instrument of many. The Competent Authority shall be the motor for development of FM, combining a grant mechanism with sourcing and fund raising and implementation support.
EED transposition	Spread but incomplete and overlapping	ANRE:CHP ANRE: Art 7 MRDPA: ESCO	EnPC for municipal sector
Procurement	ANRMAP (National Authority for regulation and Public Procurement Monitoring)	public procurement the monitoring of acquisitions for public authority EE projects.	*Competent EE Authority*
Energy tariffs	ANRE	Approval, procedures	Cross financing schemes e.g. taxes by penalties, etc.
Promotion of EE	-	-	Policy advice General promotion and awareness
Residential and tertiary sector-municipal	Ministry of Regional Development and Public Administration (MDRAP)	making strategies for the residential and public buildings sector	Tertiary sector, service and central government facilities Municipal central heating systems (DH); in general with the municipality but not backed by the central government.
	ANRSC National Regulatory Authority for Community Services	Monitoring and controlling the centralized generation, transport and supply of DH. Sets the heat prices for the heat operators using boilers only. Approves the heat transport, distribution and supply tariffs.	
Transport sector	Ministry of Transport		Urban (and municipal) public transport; in general with the municipality but not backed by the central government.
Industry sector	Ministry of	policies to improve	SME in the industry and tertiary sector

Sector / area with demand of responsible body	Current responsible	Current Responsibilities	Areas with insufficiently defined responsibility
	Economy	market conditions (mainly large industry)	
Energy system	ANRE and Ministry of economy	obligations schemes for utilities assessment of project performance and allocation of EE gains, targets and fund	Coordination and monitoring of EE measures
Municipal energy management	- ANRMAP	- Public Procurement Monitoring	Supporting projects Monitoring obligations Implementation of procurement rules and standards

To conclude, there is a clear necessity for a coordinating authority, an authority which should not only monitor the implementation of the legislation, but also keep track of the results and improvements that occur. At the same time, this chosen competent authority must have enough power to complete the required tasks and intervene where necessary.

1.4 Overcoming identified obstacles

Energy Efficiency is getting an increased political **priority for sustainable development** and for improving the competitiveness of the economy. There is an imperative demand to reduce energy intensity, in order to be able to **achieve the national and EU energy efficiency targets** of 2016 and 2020, after the economic recovery.

It is now the right time to lay down the important strategic groundwork to achieve the targets and enable long-term benefits of energy efficiency with a **concise and robust Third National Action Plan for Energy Efficiency** as demonstrated by the up-coming schedule:

- The lessons and conclusions of the past NEEAPs are drawn which leads to clear recommendations for improvements in a programmatic and complementary NEEAP.
- The EC Directive nr. 2012/27/CE foresees the **obligation**, for each Member State to elaborate a National Energy Efficiency Action Plan (NEEAP). The Romanian Government must **notify to the Commission, in December 2013,** the policy measures that they plan to adopt, which means the presentation of a **strategy** on the compilation of the directive.
- Romania has the task to elaborate NEEAP III by mid-2014 on the fundament of strategic energy and economic development documents a **coherent and consistent legal framework** supporting **horizontally** the EE topic. A key obligation is to **embody energy efficiency in the primary and secondary legislation.**

It will be unique chance to utilize the current momentum to elaborate the action plan and the legal framework to fulfil the ex-ante conditions for future programming period, enabling smart the financing of EE measures through EU Structural Funds.

The third NEEAP for Romania **shall be a** powerful tool,

- Based on a **dialogue** with key-stakeholders to formulate concise, consistent and achievable targets and generate ownership,

- Define clear **responsibilities** for the implementation of activities and the monitoring of results,
- Contain **complementary**, sector targeted measures to overcome the cross-sector barriers,
- Promote innovative and smart **financing mechanisms** to leverage available funding sources (private sector, financing institutions, and EU and state funds).

The sartorial EE target can be reached best by the "stick and carrot" strategy. With "stick" instruments are meant as regulation or obligation (by law, labelling, standards, etc.) while as "carrot" instruments are meant for the motivation of the actors, enabling and intensifying measures (information & awareness, financing instruments, incentives, assistance in preparation and implementation, capacity building and resource provision).

The challenge is the intelligent combination of instruments which can be implemented by different stakeholders – end users/ target groups as well as intermediaries, but must be initiated by the responsible governmental body.

It is **important for the appropriate planning of a package of measures** to identify what is demanded, what is possible, and what is required under consideration of:

- The **MATURITY of the market** → Meeting the demand of the sector, type of measure relevant to solve the problem, absorption capacity of end users.
  Key-question for the designer of the action plan: what are the main obstacles of the target group and which measures need to be planned to overcome?
- The **FRAMEWORK** conditions in terms of legal/ regulatory frame, market and energy tariffs
  Key-question for the designer of the action plan: Is there a need for obligatory and push measures to provide the impulse?
- The needs of **COORDINATION** of the measure among stakeholders (governmental bodies, implementing agencies and target groups) and complementarity with other sector related measures as well as the provision of institutional **CAPACITIES** for implementation.
  Key-question for the designer of the action plan: What are the stakeholders and which consensus need to be reached? Which capacities and are necessary and how it can be coordinated and monitored?
- Justified, realistic and achievable energy saving **TARGETS.**
  Question for the designer of the action plan: What is the contribution to the national EE targets? Are the targets achievable under which scenarios and conditions?
- **BUDGET** planning and provision of the implementation**.**
  Key- question for the designer of the action plan: Which financial resources are required, what are financing sources and their related criteria? Which **FINANCING MECHANISMS** are appropriate to leverage external funds?
- The ability of the package of measures to enable a conducive **FRAMEWORK** and market mechanisms.
  Key-question for the designer of the action plan: What are sustainable sources for economic return from the EE measure and how they can be used?

This analysis must lead to a clear and consistent framework for the package of the measure:

I. After careful analysis of potential impacts, **addressing particular and well defined issues** (e.g. retrofitting of buildings older than 20 years, efficiency of electric motors in industry) and **targets specific groups of players** (e.g. building cooperatives, producers/importers of domestic appliances) in an efficient manner;

II. **Exploitation of positive interrelations** between different **laws and instruments**, avoiding inconsistent regulations and funding (avoids heating subsidies, support related to the size of installation irrespective of its efficiency, etc.);

III. **Envisaging the revision and improvement of instruments**, to allow sufficient **time and support** for market participants to adjust their behaviour;

IV. Definition the flexible and efficient **implementation strategy**, appoint a non-bureaucratic, competent and authorized implementing agency to oversee, monitor and coordinate.

1.5 Recommended structure for NEEAP III

1.5.1 Key attributes of National EE Action Plan

During the project it has been worked out with the involved stakeholders, that the NEEAP II shall have the following key attributes:

- Enabling **framework**: legislation + strategy;
- **Coordination** of planning and implementation;
- Involvement of **stakeholders** and generation of understanding and **ownership;**
- Definition of **responsibilities;**
- **Complementary** combination of measures to achieve a concrete (sector) target: legislation + regulation + information/education + financing mechanisms;
- Use of **financing mechanisms** (except state budget) and leveraging support funding;
- Provision of institutional **capacities;**
- Comprising **Monitoring** of implementation and results.

The areas for sectorial intervention can be defined along the EE potential of the main final energy consumers and wasters as well as the areas of the EED.

1.5.2 Recommended structure

The key reference document is the "Guidance for the Template of NEEAP" Version 0.6, issued 21th December 2012 by EC DG TREN.

The following table provides a recommendation on the structure of the NEEAP III considering the specific current requirements of Romanian situation and the reference document.

<table>
<tr><th>Main section</th><th colspan="3">Sub-chapters</th><th>Link to chapter of the report providing guidance</th></tr>
<tr><td>A) Set of targets</td><td colspan="3">• Economic development trend → PEC
• EE target 2020
• Adjustable mechanism to achieve targets under changing conditions
• EE targets by sector, share of contribution to overall target
• Transposition of EED
• Lessons from NEEAP I & II and extension of measures</td><td>Section 2.2

Section 1</td></tr>
<tr><td rowspan="2">B) EE measures sector catalogues</td><td>Sector</td><td>Instrument</td><td>Cycle</td><td rowspan="2">Section 3
and
Section 4</td></tr>
<tr><td>• Industry sector
• Building sector (res. + public)
• Service sector, Municipalities
• Transport sector</td><td>← Legislation & regulation
← Market transformation
← Information & awareness
← Advice & capacity building
← Financing mechanisms</td><td>← Defining Target
← Selecting Suitable Tools
← Engaging Partners
← Allocating Resources
← Monitoring & Evaluation</td></tr>
<tr><td>C) Financing</td><td colspan="2">• Development of financing mechanisms: EnPC, PPP, guarantee and EE funds</td><td>• Leveraging financing sources: State budget → ← Instruments (ESIF, FIs)</td><td>Section 2.5</td></tr>
<tr><td>D) Responsibilities and resources</td><td colspan="3">• Responsibilities by sector
• Energy saving contribution by sector: Industry, Transport, Services., Municipal Energy system
• Financial and human resources for implementation</td><td>Chapter 2.3
Section 2.6</td></tr>
<tr><td>E) Coordination/ Monitoring/ Reporting/Control</td><td colspan="3">One independent body with appropriate capacity and power to:
- Coordinate, monitor and advise
- Collect data to monitor and analyse EE achievements
Enabling environment
EE law</td><td>Section 4.4

Section 5</td></tr>
</table>

The reference document "Guidance for the Template" foresees the reporting of the achievements of the NEEAP II period within the NEEAP III document.

The consultant recommends preparing two separate documents:

- NEEAP III for period 2014-2017 up to 2020
- Reporting to EC the achievements of the NEEAP II

Reasons for this are different deadlines and currently different responsibilities. Of course the report of NEEA II achievements can have an outline towards NEEAP III. Certainly the NEEAP III shall have a link to lessons and measure learned from the past.

1.5.3 Recommended schedule for preparation of NEEAP III

To achieve the targets and enable long-term benefits of energy efficiency, a concise and robust National Action Plan for Energy Efficiency (NEEAP) must be formulated for the next period, with a respective high priority role and importance among strategic development documents of Romania.

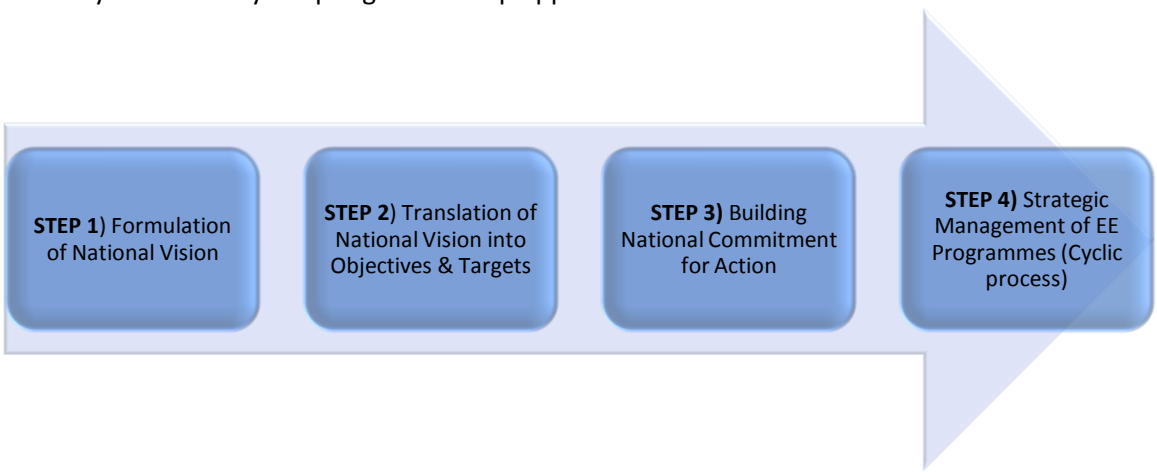
Third NEEAP for Romania is in very early stage of preparation; the deadline is mid-2014.

Recommended steps are:

Dec 2013 - 2014	Raising awareness on the importance of EE among the key political stakeholders	*ANRE,* *Chamber of Deputies Committee for I&S*
Beginning of Dec 2013	Notify to the Commission on the strategy for NEEAP and the application of the obligation scheme according Art. 7 of EC Directive. 2012/27/CE	*Romanian Government*
Dec 2013 – Jan 2014	Draft of EE law	*ANRE,* *other Ministries*
Jan/ Feb 2014	Decision on the establishment of an EE authority	*Chamber of Deputies, PM*
Jan-Mar 201	Provision of recommendations of sector related measure, initiatives, programmes and actions for NEEAP III to ME Establishment of the dialogue with stakeholders	*Ministries, ANRE*
Mar – Jun 2014	Elaboration of the NEEAP with concrete measures and instruments Accompanied by dialogue with stakeholders	*ME, Dep. Of Energy* *ANRE*
Jun -Nov 2014	Establishment of EE authority	*ANRE*
Jun 2014	Submission of NEEAP III to EC	*ME*

2 RECOMMENDATIONS FOR THIRD NEEAP AND FOR THE ENERGY EFFICIENCY STRATEGY AND ACTION PLAN; THE HOLISTIC APPROACH TO ADDRESS ENERGY EFFICIENCY

It is estimated that energy efficiency could make up for half of the reduction needed to drastically diminish greenhouse emissions by 2050, in scenarios with strong CO_2 constraints.
Despite the growing awareness about the merits of energy efficiency, and energy efficiency programmes and measures initiated in most parts of the world, countries in the region are still far from realizing the significant energy efficiency potential because of a number of institutional, informational, technical, financial, and market barriers that have not been effectively tackled. Taking account of the specific socioeconomic context of Romania, energy efficiency policies need to be designed and implemented to address those barriers effectively.
It is recommended to undertake at national level strategic planning and management of energy efficiency initiatives by adopting a four-step approach.



2.1 Step 1: Crafting an inspiring national energy efficiency vision by embedment of NEEAP in the actual political framework

The first step consists of formulating an energy efficiency vision that links it with national developmental goals, including those related to the energy sector. The main energy efficiency drivers are:

- **Internal:** enhanced energy security, easing infrastructure bottlenecks, reduced operation costs and improved competiveness, job creation, etc.
- **External:** lower GHG emission, European EE targets for 2020, climate mitigation, regional/ global environmental protection

The importance of EE in the country is underlined in most of the documents but especially in the following articles:

- Articles 2 and 3 of the Strategy for Energy Efficiency 2004,
- Article 2 of the Romanian Energy Strategy 2007-2020.
- Articles 1, 3 and 4 of the National Development Programme 2007-2013,
- Articles 2, 3 and 6 of the Energy Strategy Elements for 2011-2035,
- Article 1 of the draft World Bank Report 2013

The articles show that EE measures are present within the strategic plans and that there is awareness on the demand and benefits of EE. Moreover, quite a few of these documents describe EE as a clear necessity for economic development and a clear need for every sector in the country.

Figure 1: Overview of strategic documents with reference to energy efficiency

Further details on the **Appropriateness of the provisions in those documents have been provided in the interim (task 1) report.**

To conclude, we can see that most of the strategic documents include EE in their contents. Unfortunately, having just targets without a clear coordination and without proper responsibility will be worthless. The plans/documents must contain a clear distribution of tasks, clear interactions between institutions and clear responsibilities for both the authorities and private sector.

Aligning the next NEEAP with all strategic documents (energy and economic development) is a pre-condition for its acceptance and functionality to fulfil the conditions for EU Funding.

2.2 Step 2: Translating the national energy efficiency vision into objectives and targets

The second step consists of translating this vision into objectives and targets.

2.2.1 Energy saving and GHG reduction targets

EE targets have been identified in most key strategic documents but they are more seriously described in the following articles:

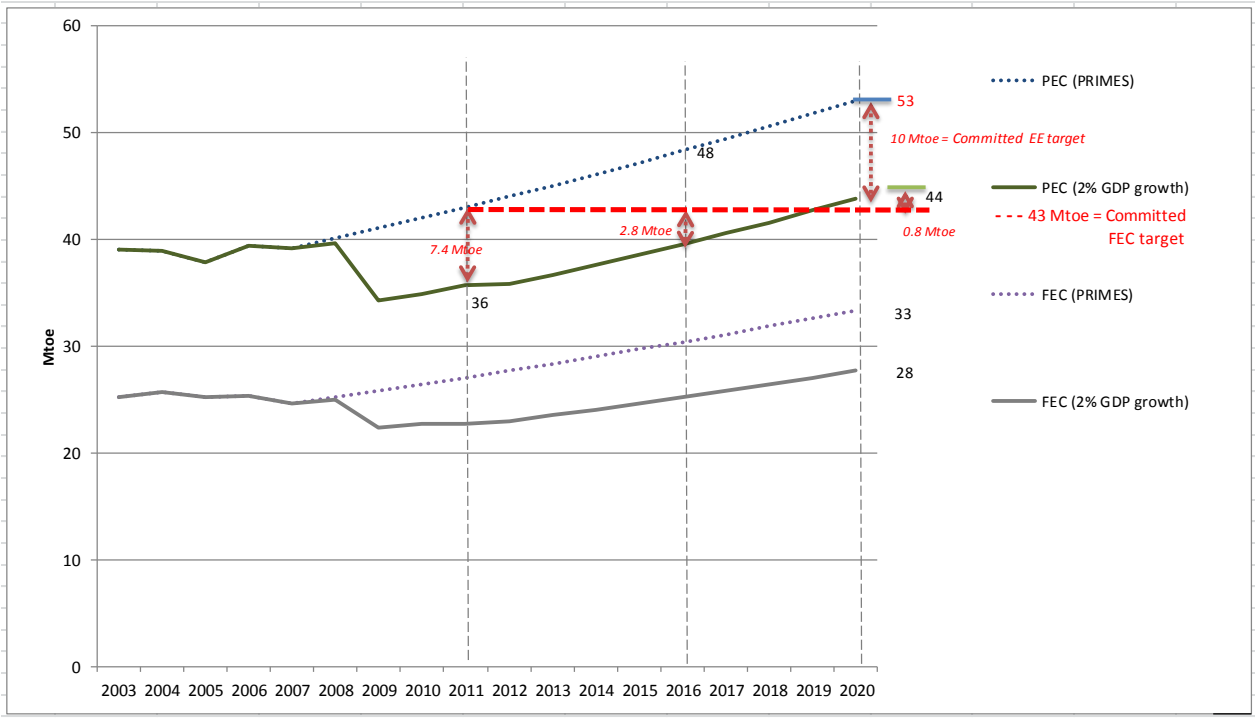
- Article 5 of the Strategy for Energy Efficiency 2004
- Article 4 of the Romanian Energy Strategy 2007-2020
- Article 6 of the National Reform Programme 2011-2013
- Article 3 of the National Strategic Reference Framework 2007-2013
- Article 6 from the Energy Strategy Elements 2011-235
- Article 2 from the draft World Bank Report 2013

Although some benefits or expectations are mentioned within the other documents, these articles are the ones that stand out the most. They define clear EE targets and measures to be implemented, even by different sectors such as transport or heat distribution.

2.2.2 Scenarios for the calculation of the EE target

As shown in the following figure above (blue graph), the reference scenario of PRIMES, 2007, illustrates a growth trend in primary energy consumption from 40 Mtoe in 2007 to 53 Mtoe in 2020. The target PEC for 2020 is fixes with 42.99 Mtoe, committed at the basis of Forecast (PRIMES, 2007, realistic scenario).

Figure 2: Primary energy consumption, Mtoe, reference scenario and projection to respect the energy efficiency target of 2020



Source: Consultant's calculations.

While the target value of 43 Mtoe in the year 2020 would stay constant, the trend of actual consumption during the years up until 2020 would be subject to change according to actual development year by year. Thus, the distance between the actual consumption and the target value would change over time.

The energy saving target for 2020 is a ***Moving Target***. The key influencing factor for the FEC will be the annual growth of the GDP and the respective economic performance.

According to the latest available data, in 2011 the PEC amounted to 35.648 Mtoe (available, consolidated data).

EE target definition under moderate growth scenario

The assumed realistic scenario for economic development is expressed in a **moderate** growth of GDP in 0.7% in 2012 and annually 2% from 2013 to 2020. This will result into a PEC in 2020 of 43.800 Mtoe. Consequently the target EE in 2020 is 0,8 Mtoe to respect the commitment for PEC of 42.99 Mtoe.

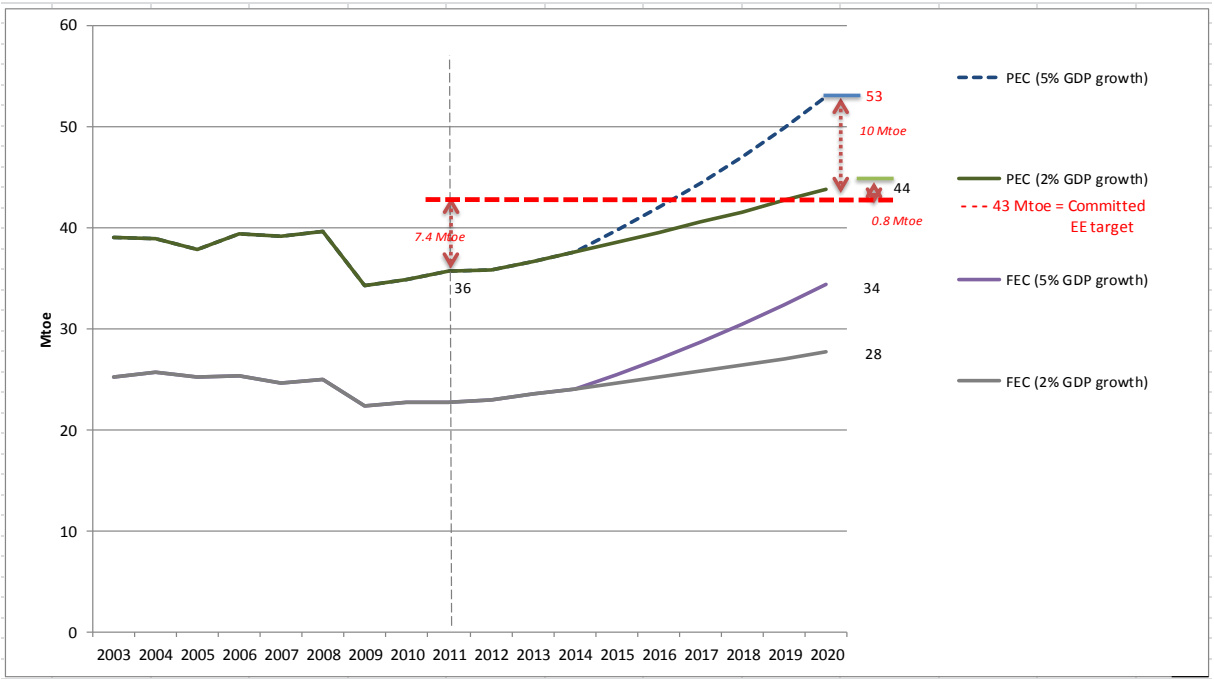
EE target definition under high growth scenario

In case the industry sector recovered and picks-up from 2015 with an annual growth rate of 5% the PEC in 2020 would raise up to 52.99 Mtoe, considering the related FEC in the

transport, household, agriculture and other sector. . Consequently the target EE in 2020 is 10 Mtoe to the target PEC of 42.99 Mtoe.

In order to estimate the variation of the FEC and PEC depending on the GDP growth a simple forecast model of the energy balance of Romania has been prepared.

Figure 3: Projection of Primary energy consumption (in Mtoe) for the moderate and high GDP growth scenario and respect to the energy efficiency target of 2020

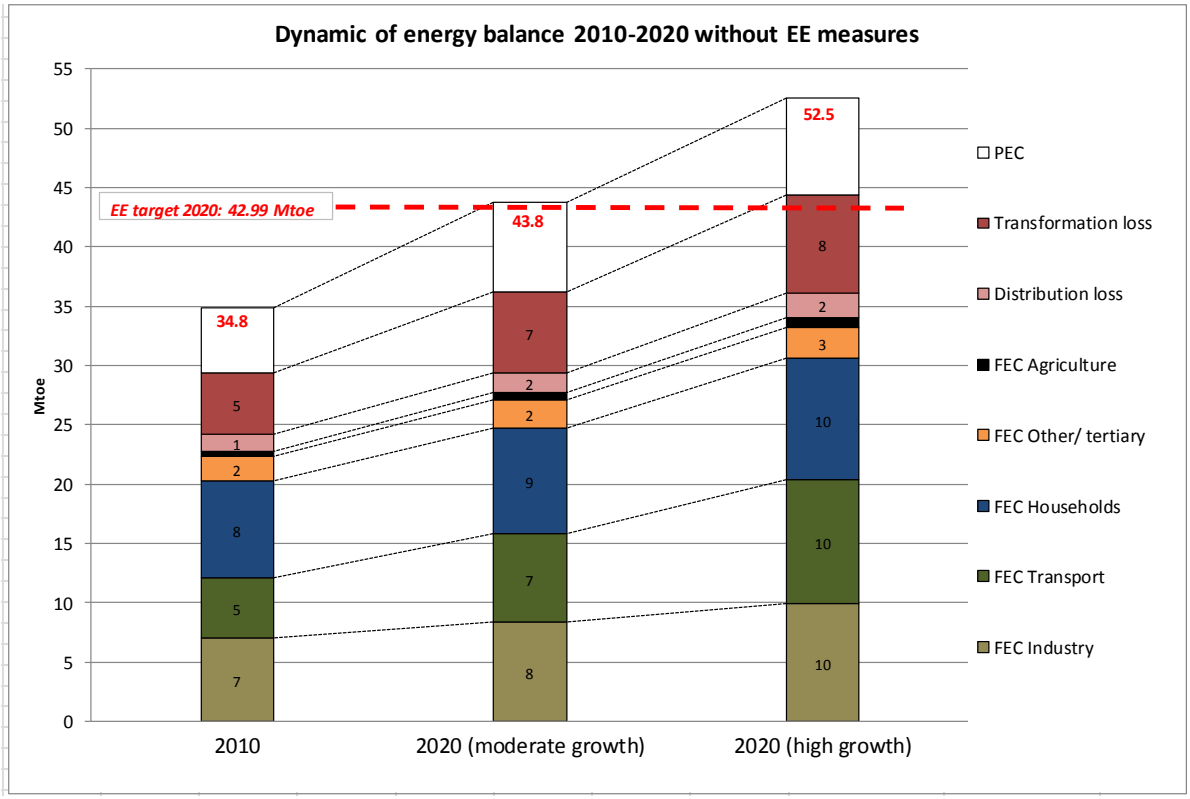


Source: Consultant's calculations.

Typically the FEC in the sectors develops unevenly with the GDP growth. Under the moderate growth scenario it is assumed, that the FEC of the industry sector will grow faster than the GDP, while household and other sector growth will be 75% of the growth rate of GDP, and the growth rate of the FEC of the transport and agriculture/ forest sector will be twice the growth rate of the GDP.

For the sake of simplicity the FEC in the energy balance for the year 2020 is projected and broken down into the FEC of the targeted sub-sectors of packages of measures. Those FEC figures of 2020 are utilised to calculate the effect of the respective measure to reduce the energy consumption of the respective sub-sectors. In addition to the FEC in end consuming sectors there are two areas of the energy system - transformation, transmission & distribution losses which influence the demand for PEC.

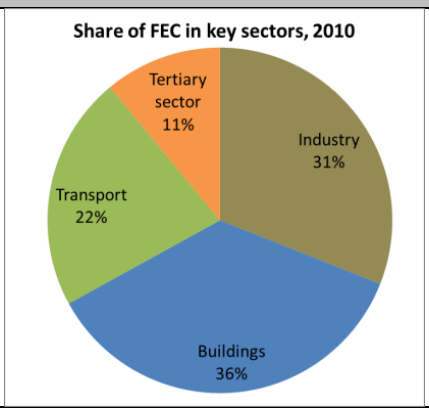
Figure 4: Dynamic of the projected energy balance for 2020 without EE measures



Source: Consultant's calculation

Estimates on EE potential are from 13% in the industry sector up to 60% in the public building sector.

Table 2: Estimated EE potential by final energy consumption sector

Sector	FEC Consumption	Energy Saving potential of FEC by sector
Industry		13%
Buildings		41.5%(up to 60% in public lighting)
Transport		31.5%
Tertiary sector		14%

Source: EBRD, ANRE

2.2.3 National Allocation Plan towards the emission trading scheme (ETS)

The EU – ETS is a Community - wide scheme established by Directive 2003/87/EC1 for trading allowances covering emissions of greenhouse gases from different installations set out in the Directive. The first phase of the scheme started on January 1st 2005 and ended on the 31st of December 2007. The second phase ran from 2008 to 2012, corresponding to the first commitment period under the Kyoto Protocol. As part of the preparation for participating in the scheme, Romania had to develop the National Allocation Plan (NAP) which was submitted to the European Commission. The NAP contains the total amount of allowances that the Romanian Government intended to issue during the phases (2007 and 2008 – 2012), and how it intended to distribute these allowances among the installations subject to the scheme. EU - ETS concerned entities are those of the energy industry as well as heavy and large energy consumers (above 20 MW electricity load), in total approx. 260 entities. For those related entities, an emission monitoring and verification scheme is in place under the supervision of the Ministry of Environment. Non- EU - ETS concerned entities are all other sectors including households and transport, for which emissions are not monitored, just calculated.

The Ministry of Environment and Climate Change commenced a World Bank project in 7/2013 to elaborate an Action Plan on national GHG reduction. The project will have a duration of two years with the expected outcome by the end of 2014 of: emission inventory, emission forecast by sectors, strategy for emission reduction on the basis of scenarios and action plan of measures.

Some of the targets related to EE from within the NAP are:

Table 3: EE and GHG targets according to the National Reform Plan

Targets for 2020	**Current Situation of achievement** (source of consolidated data)
19% reduction in GHG emissions, compared to 1990 *(compared to 2005)*	51.84% (2011)
24% of Energy consumption to come from renewables	20.79% (2012)
10 Mtoe (19%) reduction in primary energy consumption	7.3 Mtoe / 16.6% (2012)

Source: ANRE, Ministry of Environment

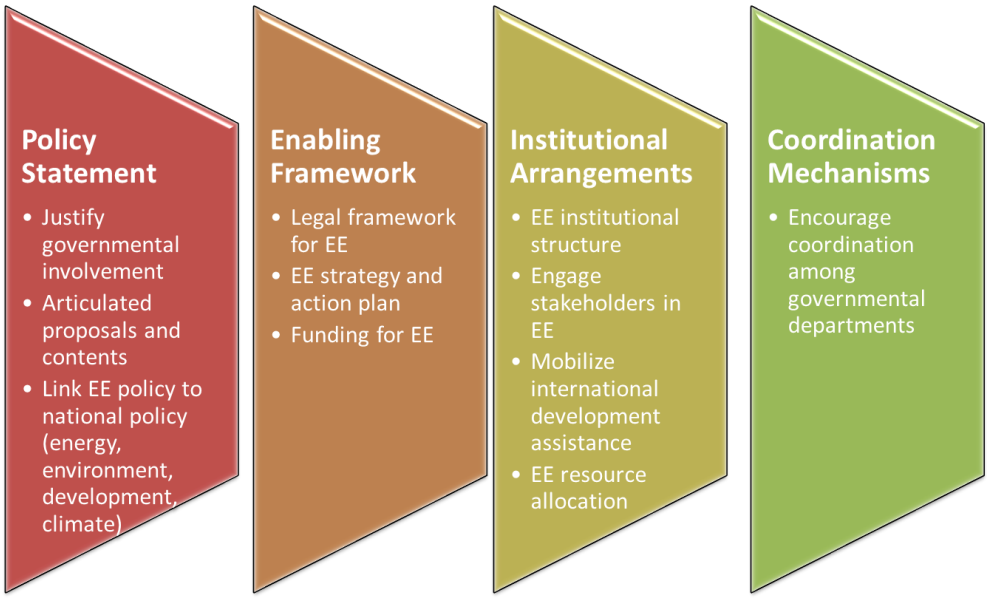
On the EE targets as in the above table one must note that the reported reduction of PEC (7.3 Mtoe) is due to the effects of the economic crisis and the consequent drop of the FEC.

ANRE intends to consider EU-ETS related entities under the obligation scheme according to article 7 of the EED. The respective challenge will be the proof of eligibility of related EU-ETS entities for state aid.

2.3 Step 3: Building National Commitment for Action

The third step involves building national commitment for energy efficiency action through the development of 4 pillars:

Figure 5: Key pillars for building national commitment for energy efficiency action



Actively **involving all key stakeholders** in the process is the key to get wider support among national decision-makers in consolidating the energy efficiency vision.

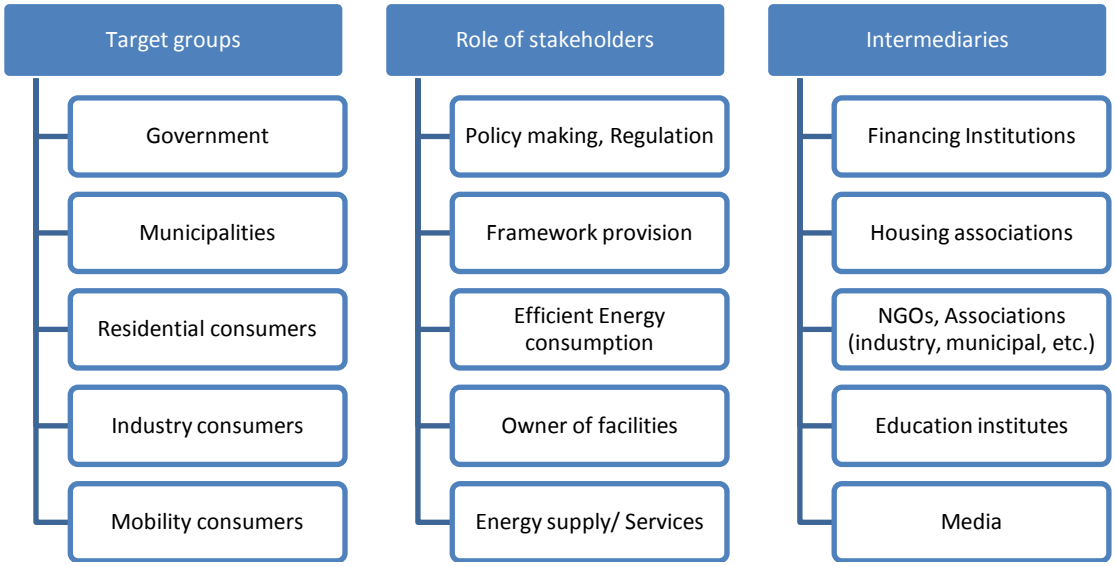
One of the most critical factors for the success of the programme is the manner in which the energy efficiency organization engages partners and involves stakeholders in the various activities aimed at removing barriers to energy efficiency. While some activities are to be performed in a completely unbiased and business-free environment in order to raise the confidence of target beneficiaries, other activities will need to be performed in a full-business environment.

Figure 6: Key stakeholders on EE strategy and NEEAP

For example, awareness and sensitization as well as advice and capacity-building activities have to be conducted such that information or advice remains unbiased and factual without any exaggeration. Accordingly, due care should be taken to avoid engaging partners who may have vested interests. On the other hand, activities related to market transformation and innovative financing are aimed at

making energy efficiency a business case. In this case, it is crucial to forge partnerships and involve stakeholders who understand the market well and are willing to take financial risks to some extent, with the knowledge that state support is extended to minimize perceived risks.

Figure 7: The role of Key stakeholders on EE



The **responsibility towards EE** development is mentioned in quite a few of the strategic documents but more thoroughly in the Strategy for Energy Efficiency 2004. In some other documents, there are authorities mentioned for implementing the plan but there is no clear distribution of tasks, especially on the EE side. With respect to **coordination of EE**, there is very limited information within the documents. The only relevant provision is Article 5 of the Strategy for Energy Efficiency 2004. The only place where an **EE authority** is mentioned is within the 2004 Strategy for Energy Efficiency.

Clearly, the involvement of stakeholders is essential in the process of development and implementation as well as monitoring and follow-up of the action plan, to (i) generate commitment, (ii) to bundle forces , (iii) utilise synergies and ensure complementarity and finally (iv) to generate common responsibility towards an energy efficiency culture.

Figure 8: Stakeholder involvement in the programme steps

2.4 Step 4: Design and strategic management of energy efficiency action plans and programmes

The last step refers to the design and the strategic management of energy efficiency programmes and action plans. The guidelines cover this particular aspect by recommending simple yet pragmatic strategies and action plans. The purpose of developing an energy efficiency action plan is to define activities targeted at addressing the various barriers to energy efficiency. **The design of the energy efficiency action plan needs to prioritize actions that have the potential to achieve the maximum impact with limited resources.**

2.4.1 Specification of sectors of intervention

It is recommended to structure the potential EE measures along the sectors as provided in the Guidance for the Template for the National Energy Efficiency Action Plan, EC, 12/2012:

A) End use residential / household sector
B) End use industry sector
C) End use transport sector
D) End use tertiary, service and municipal sector
E) Energy supply system - transformation, transmission and distribution
F) In addition, so call "horizontal measures" are considered which comprise cross-cutting sector issues.

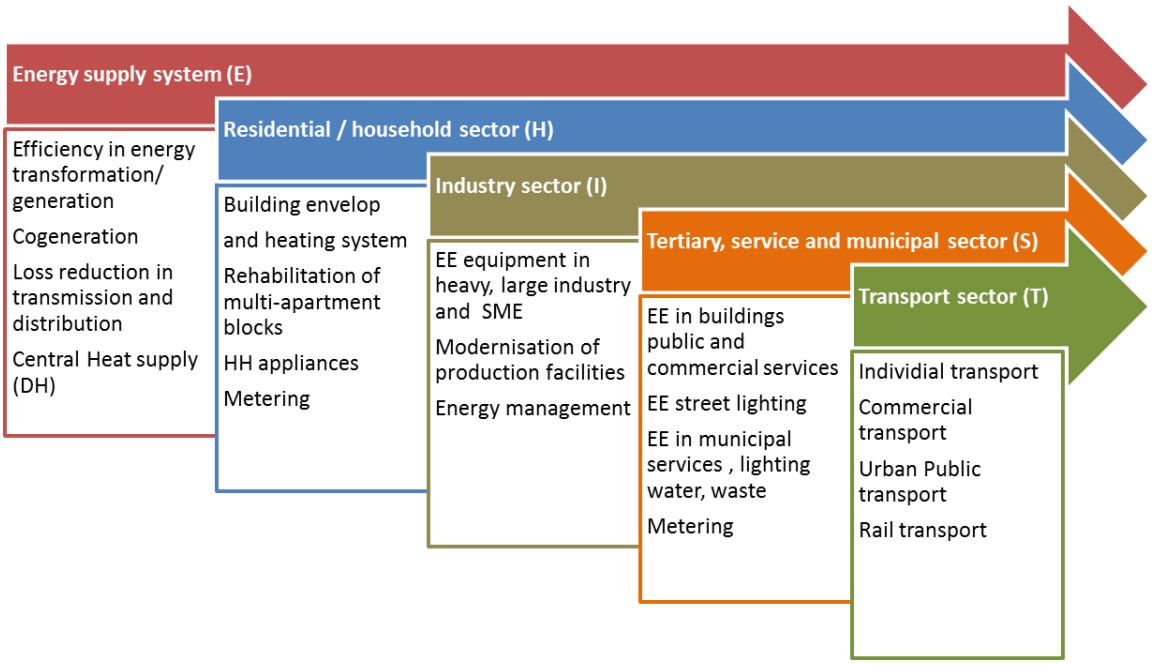
Special attention will be given to those measures which are required by EED 27/2012, with particular focus on areas of the responsibility and collaboration requirements of ANRE. Those are, along the articles of the EED:

Table 4: Articles of EED to be addressed in NEEAP

EED Articles under the main responsibility of ANRE			**Other EED provisions with collaboration of ANRE**	
Efficiency in end use sectors (buildings, industry, transport)				
Art. 8	Energy audits and energy management systems		Art 4	Building renovation roadmaps
			Art 5	Energy efficiency measures in public bodies
			Art. 6	Purchasing by public bodies
			Art. 7	EE obligation schemes
			Art. 9	Metering
			Art. 10	Billing information
			Art. 11	Cost of access to metering and billing information
			Art. 12	Consumer information programmes
			Art. 13	Penalties
Efficiency in Energy supply				
Art. 14	Promotion of efficiency in heating and cooling			
Art. 15	Energy transformation, transmission and distribution			
Horizontal/ cross-sector issues				
Art. 16	Qualification, accreditation and certification schemes		Art 19	other measures to promote EE
Art. 17	Information and training		Art 20	Energy Efficiency National Fund
Art. 18	Energy services			

In addition, according to the above outlined forecast the energy balance on PEC for 2020 is varying, but shows clearly the main areas of energy consumption and wastes to be addressed by measures of the NEEAP III.

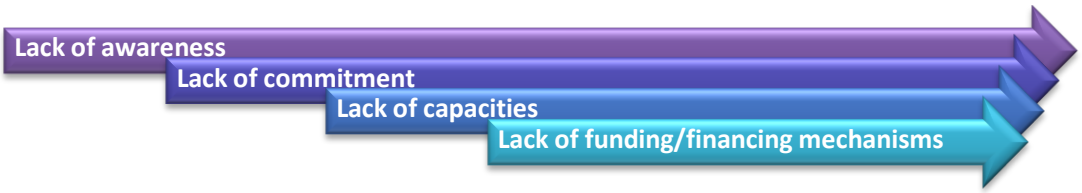
Figure 9: Sector priorities for NEEAP III



2.4.2 Types of possible EE measures

Experience around the world shows that in order to effectively tackle barriers, a multi-pronged approach with a package of measures leads to the best results instead of only focusing on legislative or market-based approaches.

Key barriers are:



The success of the EE programmes lies in adopting an approach that offers simultaneously the various instruments/measures as a package in order to address the problem holistically.

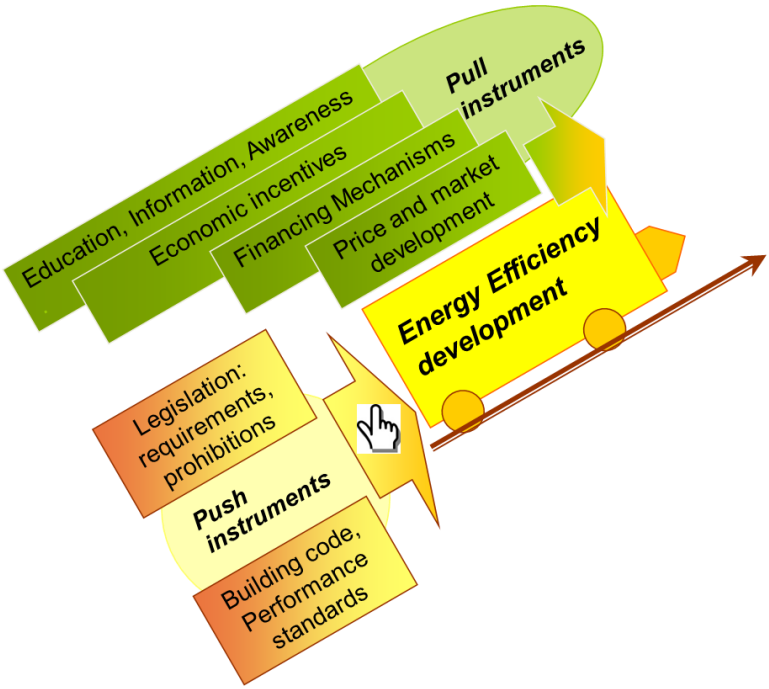
2.4.3 Best Practice for packaging of complementary measures

The challenge is the intelligent combination of instruments which can be implemented by different stakeholders – end users/ target groups as well as intermediaries, but must be initiated by the responsible governmental body.

It must be clearly understood, that instruments which are strictly against the interest of a key-stakeholder will risk the success of the entire package of measures. Consequently incentives – of whatever format - must be integrated to develop compromises to take all stakeholders "on board" for the implementation.

To enable the effective functioning of a package a complementary set of instruments shall be considered to force from both sides to "push" and "pull" the EE development, as shown in the simple graphic below:

Figure 10: Required complementarity of instruments



Five different types of measures are applied:

"push" instruments of the type (i) Legislation& Regulation and (ii) Market transformation and

"pull" instruments of the type (iii) Information & Awareness, (iv) Advice & Capacity building and (v) Financing mechanisms.

Table 5: Outline of the general approach of the fife different types of measures applied

Type	Approach	Instruments
Legislation & regulation	**Energy efficiency law and decrees** are considered as prerequisites for the effective promotion of energy efficiency. Laws and decrees provide a certain direction to energy efficiency policies by defining objectives as well as the policies and strategies to achieve them. Furthermore, these provide legitimacy for developing energy efficiency strategies and action plans for targeted economic sectors. Experience shows, however, that the results expected from such strategies and action plans will not be achieved satisfactorily if there are no suitable institutional arrangement, funding, and coordination mechanisms in place for the effective implementation of the action plans. **Regulations taking the form of energy codes, labels, and standards** may serve various purposes: providing the required information to the intended beneficiary, ensuring a minimum guarantee on the energy efficiency performance of the equipment or product, or even eliminating very low-quality products from the market. A very important factor that needs to be kept in mind is the futility of promulgating a law or regulation if its enforcement is lax or poor.	- Primary legislation - Secondary legislation/ codes - Labelling - Certification - Building Codes - Minimum Energy Performance Standards - Obligatory Energy Audits
Information & awareness	**Creating awareness and/or sensitization** requires identification of the target groups and "speaking the language" they understand. The target groups in this case are not only the energy users but also politicians elected at the national or regional level as well as planners, policy makers, and economic players. *An awareness campaign is not likely to be effective if it does not highlight the gains that the beneficiaries can reap, in the form of more affordable energy bills or improved industrial competitiveness.*	- Energy audits - Accompanying promotion - General technology + application Information
Market transformation	Once target energy users are convinced of the ways in which they can reduce operating energy costs of their facilities, they will be keen to know from where and what cost they can get access to such energy-efficient technologies and processes. At this stage, it becomes important to address the **barrier** related to the need to **create a market for energy efficiency**. In general, the private sector is most active in the marketplace and the government does not have much of a role to play there. However, when the energy efficiency market is not mature, equipment manufacturers and suppliers tend to market less efficient products that are "*affordable*" to their clients. As a result, energy-efficient products are not commercialized or due to the lack of economies of scale, their costs remain out of bound for most buyers. Government intervention may therefore be required to trigger the market transformation towards energy efficiency and make energy efficiency more affordable. It is essential for the energy promoting institution **to favour public and private cooperation** so that the private sector participates actively in the programme implementation and the limited public funding is leveraged by private sector investment to accelerate the process of market transformation. Market transformation happens through **interventions that pull and push** the market simultaneously: manufacturers or suppliers influence consumers' behaviour by providing energy efficient products. **Government intervention may be required to trigger the market transformation towards energy efficiency and make energy efficiency more affordable.** Market transformation may take various forms. For example, one way of market transformation may be through support extended for projects that may demonstrate or validate the real energy saving potential of an energy-efficient but unproven technology or process. Successfully demonstrated projects serve as good models to convince others about their techno-economic viability and such projects normally lead to widespread replication. The **medium or long-term objective** in such circumstances should be to establish an innovative "energy efficiency" sector which is in direct competition with the traditional "energy supply" sector.	- LTAs - Voluntary agreements - Pilot projects, cases - Demonstration - Leading by Example - Education and Training - Information Centres, Advisory services, Networking Activities - Technology benchmarking - Public procurement programme

Type	Approach	Instruments
Advice & Capacity building	The barrier is to handle is the **limited knowledge and inadequate capacity** of the target groups to adopt energy-efficient technologies and practices. There is constant evolution of technologies with regards to the way energy can be used more efficiently. It is necessary to assist important energy users to upgrade their knowledge on energy efficiency and help them to understand the multiple benefits of making investment not on first-cost alone but on the basis of life-cycle analysis. *A successful advisory service ensures that target groups get convinced to take concrete action, in terms of adopting better energy management practices and seeking more energy-efficient technologies.* Another type of support may be in the form of **training and capacity building** of targeted energy end-users so that they are capable of making their own decision and taking appropriate steps towards the implementation of suitable energy efficiency measures. There can be different categories of training on the basis of requirement. For example, training can be in the form of specialized programmes aimed at managers, engineers, architects, technicians, and operators. In addition to educating end-users, it is essential to **improve the competencies of professionals** such as architects, designing and consulting agencies, installers, service companies, etc. Instead of training such practitioners on their specific domains of interventions, they should be exposed to a **holistic approach to systems.**	- Information campaigns - Training (e.g. energy auditors) - Institutional support - Support to Research and Development
FM	**Financing mechanisms** Refer to next section	

2.4.4 Importance of combination of demand side and supply side measures

It is extremely **important that energy-efficiency measures on the supply side be coordinated with measures on the demand side**, particularly for heating projects. Lack of coordination can lead to an increase in heat losses in that consumers will end up paying for.

As demonstrated in the early implementation phase of the thermo-modernization and district heating modernization program in Poland—when a few "pilot project" buildings were weatherized and retrofitted with automated heat controls—the residents of those buildings saved money on heat bills. However, neighbouring buildings without these retrofits were overheated because the heat supply network was not equipped with technologies to decrease the flow of heat being diverted from buildings that no longer needed the original amount. Buildings that could not pay for thermal improvements and automate heat flow coming into the buildings would end up with higher heating bills as soon as metering were introduced, and unless the efficiency improvements involved both suppliers and consumers of heat.

Since this lesson was learned, the coordination improved among the Warsaw heat supply and distribution companies (owned respectively by a private operator Vattenfall and the municipality) and the building administrators. The heat companies' primary interest is in attracting new heat customers, while the residents' interest is in affordable comfort and reliable service, and both suppliers and consumers invest in energy-efficient improvements to their respective end of the heat networks.

In other countries, the need to coordinate supply and demand efficiency is evident though harder to replicate without financing and institutional capacity. Still, the potential for cost effective efficiency improvements has been demonstrated.

A public-private partnership in Sibiu, Romania involving Dutch financing showed that energy-efficiency improvements in the entire network (including generation, transmission, distribution and end-use in the internal building networks) resulted in at least a 15 % reduction in household energy bills, enabling low income families to save as much as 50 % of their net income.

The supply side improvements were necessary to improve the quality of supply and service and enable the district heat company to compete with decentralized heating. The demand-side improvements – i.e. retrofit of building-level pipes from horizontal to vertical distribution and introduction of water flow meters and HCAs – enabled residents to monitor and control their consumption. A large rate of disconnected district heating customers in Romania made it difficult for the heat company to recover its costs and for consumers still on the network to afford rising tariffs.

Most of those customers still on the network were in the lower income brackets and had been receiving subsidies from the municipality; after the supply-side energy-efficiency improvements were made, the city was able to reduce its heat subsidies to residents by over 15 %.

2.5 Enabling financing mechanisms

(continued table from previous section)

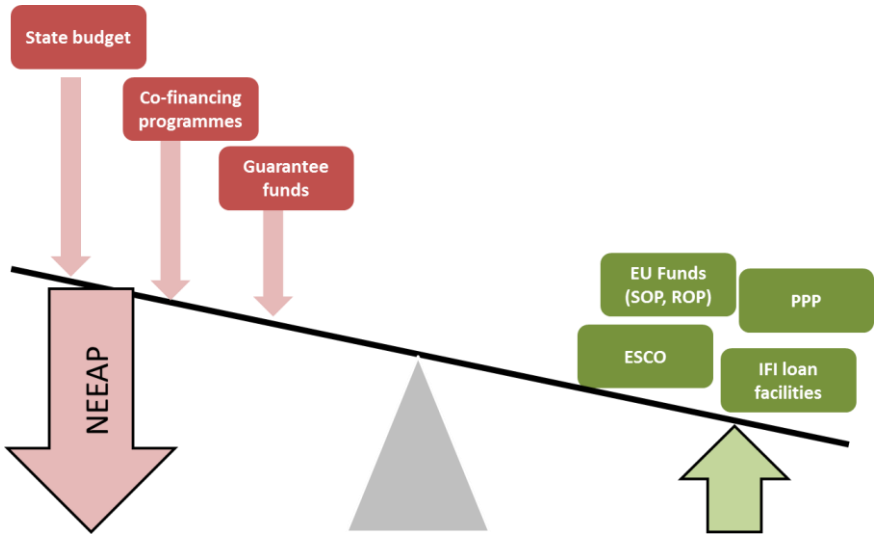
Type	Approach	Instruments
Financing mechanisms	Target beneficiaries face the challenge of financing their projects because of the **barrier** one comes across in reality: access to capital for **energy efficiency financing**. Financial players have a natural bias towards energy suppliers, and energy consumers find it more difficult to access finance at affordable rates in comparison with energy suppliers. Moreover, the fact that an energy efficiency investment does not generate revenue but leads to energy cost reductions is not well recognized by financial institutions whose lending is normally conditioned by the capacity of the borrower to generate revenue from the capital investment. On the one hand, there is a need to create awareness among financial institutions that energy efficiency can actually render the loan repayment more attractive. On the other hand, the main challenge is to **avoid providing "free money" to promote energy efficiency** investment but adopt innovative financing mechanisms that address the genuine problem of the target beneficiaries not having access to funds to make energy efficiency investment. This is an important aspect to take into consideration in order to avoid market distortions because energy-efficient solutions that are intended to be financed should make business sense. Financial incentives through public funding can take various forms: grants, subsidies, or soft loans to shorten the time needed to recover the investment to a reasonable extent, tax allowances (or exemption from income or sales tax) and accelerated depreciation to spur energy efficiency investments, or other innovative forms such as third party financing, lease purchase scheme, guarantee fund for energy efficiency projects, etc. **A dedicated Energy Efficiency Fund** created through national legislation in order to support such financial incentives in a sustainable manner without depending on the national budget on an ad-hoc basis.	- Grant (state) Investment programme - Credit lines - Reduced-interest Loans - EU ESCF - Tariff incentives - Tax incentives - Energy pricing - Project or Product-related Subsidies - Financing Guarantees - Financing Facilitation - EnPC, including Third-Party Financing and ESCO

2.5.1 Leveraging financing sources

It will be the challenge to develop and implement **innovative and smart financing mechanisms to leverage available funding sources** (private, EU, banks), such as the development of an ESCO market, and finally enable market mechanisms towards a functioning EE business.

The NEEAP's packages of measures must consider the source of financing of the costs into EE investments, which finally deliver the main share of energy savings. Pure state budget support measures must be reserved for (a) intelligent mechanisms to **enable leveraging third party and donor financing and (b)** sensitive areas with social demand to avoid energy poverty due to increasing tariffs in the frame of the developing liberalisation.

Figure 11: Leveraging financing sources



Of particular interest in the long term is the use of financial instruments to increase the leverage of public funds in energy efficiency investments in the public sector and residential sector, for thermal retrofit of buildings in particular. Increasing the role of energy service companies (ESCOs) in delivery of energy efficiency projects also has the added benefit of bringing in third party commercial financing (TPF), especially in public sector energy efficiency investments.

More specifically:

- Manufacturing sector energy efficiency investments should in general financed through commercial means. Nevertheless, public funding in supporting information dissemination, awareness raising and capacity building among key stakeholders (enterprises, ESCOs and banks) have proven to be of catalytic value.
- A dedicated energy efficiency revolving fund for the public sector could be an effective way of addressing some of the critical financing and implementation constraints faced by municipal public entities while also help nurture and develop Romania's nascent ESCO market. Such a fund may be seeded by a combination of EU funds and government grants and could potentially attract private financing if proven successful.
- A financing mechanism/platform that matches the needs for long-term (up to 20 years) and low interest rate loans in residential thermal retrofit while also provides streamlined processing and necessary assistance to home owners associations will help mitigate the challenges facing thermal retrofit program in Romania. There have been some successful operations of housing renovation loan funds in other EU countries, which could inform the design of a similar program in Romania.

2.5.2 Available and up-coming Financing sources and mechanisms for EE

The most important financing instrument for EE measures in all sector are the European Structural and Investment Funds (ESIF) which will focus on Europe 2020 objectives for smart, sustainable and

inclusive growth[3]. The common list of 11 thematic objectives for ESIF developed around the Europe 2020 priorities.

The Partnership Agreement between the EU and the Romanian Government for the 2014-2020 programming period includes some targets and future directions for developing the country, as well as funding sources. In this period, Romania will make investments using ESIF resources under 11 thematic objectives that related to the EU 2020 strategy, objectives which are closely linked to the 5 main challenges and future development needs:

Competitiveness – Resources – Infrastructure - People and Society - **Governance**

The main energy sector development needs are classified under the Resources section of the table of **Annex 2** (thematic objective number 4), and they have been identified as follows:

- Increasing the share of **energy generation from renewable sources**, focusing mostly on resources currently lagging behind and facing low interest from investors.
- Strengthening **security of energy supply, by expanding and improving energy transmission and distribution networks** for better integration of energy produced from renewable sources.
- Rehabilitating and extending the use of modern and **efficient public area heating systems** where these are demonstrably financially sustainable.
- Enhancing **energy efficiency in the residential and public building stock** and the public the realm, including in public lighting.
- Improving the **energy efficiency of transport**, including urban transport systems and the fishing vessels.
- High efficiency **cogeneration**
- Exploiting **public investment in energy efficiency**, to create new markets potentially available to SMEs and social enterprises and additional jobs, particularly in Romania's less developed regions and in rural areas.
- Reducing greenhouse gas emissions in agricultural sector.
- Solutions to stock green energy.

Table 6: Overview of potential financing sources for EE Programmes and Funds[4]

Sector	EU		Other Donor grant programmes	National Romanian programmes	Credit lines		
	ESIF	Energy programmes			Title	IFI	Partner IFI
End use: Industry *Large ind.*	ESF ESCF	JASPERS EUREKA				EEFF (EBRD) SEI(EBRD)	
Special SME *Trade*	ESF ESCF	GBP JEREMIE	CIP GIF		RoSEFF Green Initiative EPMF	EBRD EIB	5 banks BRD , CDP
End use:		JESSICA		Casa Verde			

[3] Regional Policy - ERDF: European Regional Development Fund (→ activities)
CF: Cohesion Fund (→"basic" infrastructures, not for R&I)
Common Agricultural Policy - EAFRD: European Agricultural Fund for Rural Development
Common Fisheries Policy - EMFF: European Maritime and Fisheries Fund

[4] Abbreviation of programmes used: CEB – Central European Bank; EIB – European Investment Bank; EBRD - the European Bank for Reconstruction and Development; EEFF – Energy Efficiency Financing Facility, SEI- Sustainable Energy Initiative of EBRD; EIF – European Investment Fund; ERDF - European Regional Development Fund; KfW – KfW Bank Germany; CF – Cohesion fund; CEF – Connecting Europe Facility; EEEF – European Energy Efficiency Fund

Residential							
End use: Transport	ESF ESCF CF	JASPERS CEF	MLEI	Rabla			
End use: Municipalities and Infrastructure		IEE	CIP MLEI ELENA (EIB			EEEF SEI(EBRD)	Cassa Depositi e Prestiti Deutsche Bank EIB
Energy sector: Utilities		FP7 EEPR	MLEI				

2.5.3 Brief outline of programmes and facilities

CIP - With small and medium-sized enterprises (SMEs) as its main target, the Competitiveness and **Innovation Framework Programme (CIP**) supports innovation activities (including eco-innovation), provides better access to finance and delivers business support services in the regions.

EEPR – European Energy Programme for Recovery - A €4bn programme was set up in 2009 to co-finance projects designed to make energy supplies more reliable and help reduce greenhouse emissions, while simultaneously boosting Europe's economic recovery. The projects cover 3 broad fields: gas and electricity infrastructure projects, offshore wind projects and carbon capture and storage projects.

MLEI - Mobilizing Local Energy Investments - Project development assistance addressing projects between EUR 6 million and EUR 50 million, run through annual call for proposals managed by the Executive Agency for Competitiveness and Innovation (EACI).

EPMF – The European Progress Microfinance Facility -provides microloans to people who want to develop their existing business, but do not have access to traditional banking services.

FP7 – Under the EU Research & Development Framework Programme (FP7 2007- 2013), about EUR 2.3 billion was dedicated to energy-related research. Most of this budget is used to support research, technological development and demonstration projects through the annual Calls for Proposals.

ELENA – The European Local Energy Assistance (ELENA). This initiative provides technical assistance grants to local and regional authorities for development and launch of sustainable energy investments.

IEE - The Intelligent Energy – Europe Programme II (IEE II) focuses on removal of non-technological barriers to energy efficiency and renewable energy market uptake. The IEE helps creating favourable market conditions, shaping policy development and implementation, preparing the ground for investments, building capacity and skills, informing stakeholders and fostering commitment. This also includes projects on financing energy efficiency in public buildings.

JASPERS – Joint Assistance to Support Projects in European Regions - partnership between the European Commission (DG REGIO), EIB, the EBRD and KfW. It provides the EU-MS concerned with the support they need to prepare high quality major projects, which will be co-financed by EU funds.

JEREMIE – The Joint European Resources to Micro to medium-sized Enterprises allows EU countries to use EU structural funds to support small and very small businesses. In some EU countries, microcredit providers benefit from guarantees, loans and equity.

GBP - The Green Building Programme aims to enhance the realization of cost-effective energy efficiency potentials by creating awareness and providing information support and public recognition to companies whose top management is ready to show actual commitment to adopt energy efficient measures in non-residential buildings.

GIF – High Growth and Innovative Facility - It allows the Commission to participate in venture and risk capital funds set up to provide equity to small businesses. Part of CIP and managed by the EIF.

2.6 Institutional needs for energy efficiency implementation

Energy efficiency governance can be defined as the combination of legislative frameworks and funding mechanisms, institutional arrangements, and coordination mechanisms, which work together to support the implementation of energy efficiency strategies, policies and programmes.

Figure 12: Cyclic process of programme implementation

The overall energy efficiency promotion process is cyclic in nature because the potential for energy efficiency improvement is not static and the energy efficiency resource base is constantly expanding.

With a monitoring and evaluation system in place, one can keep track of the actual savings achieved by comparing the baseline set at the beginning of the programme and the improved energy performances of industries after the first cycle of energy efficiency activities.

In the overall **process of energy efficiency governance, it is essential to create an energy efficiency authority** or agency which serves as an effective institution with the key role of executing government policies and strategies through the coordination of energy efficiency policies and programmes, including programme design, administration, management, monitoring, evaluation, etc.

The EE authority should demonstrate strong leadership and have the capacity to coordinate within and across levels of government, and engage key stakeholders in consultative processes to help build consensus.

The onus of implementing energy efficiency improvement activities at the decentralized level lies with government services, regional and local authorities, service sector firms, manufacturers and distributors, households, etc. The role of the energy efficiency authority is to take the lead in promoting, supporting, and facilitating the **creation of an enabling environment** for the above

stakeholders to execute activities in order to have the best impacts on the economy, society, and the environment.

Studies conducted around the world have shown that there is no such universal model of energy efficiency authority or organisation. The **different types of energy efficiency organizations** that one comes across can be categorized as follows:

a) **Government agencies** that deal with all aspects of energy: energy security, supply, pricing, legislation, efficiency and conservation, renewable energy, etc.
b) Government agencies specialized in energy efficiency, renewable energy, or clean energy
c) **Independent statutory authorities** with the mandate of executing government energy efficiency policies and strategies
d) **"Parastatal"** corporations in-charge of energy efficiency programme implementation
e) **Public–private partnerships** to promote energy efficiency
f) **Nongovernmental organizations** specialized in implementing energy efficiency programmes

The **most critical aspect for the success** of an energy efficiency authority is the people who form the organization. They should have an appropriate background and training suited for the job and should project leadership and professionalism in their day-to-day activities involving interaction with the major stakeholders and beneficiaries. **Administrative and management autonomy** should be granted and adequate financial resources should be made available to them not only to cover the organizational expenditures but also initiate programmes and activities in order to achieve the energy efficiency targets set for specific sectors.

Taking into consideration the **specificities of Romania**, the authority should design programmes that are well suited to the targeted economic sectors and empower the partners and stakeholders in making decisions at the decentralized level. Results can be reached only by **empowering a dedicated, independent, powerful and competent body** to act as initiator, advisor and monitor of all EE activities.

ANRE, as existing, independent body, could play this role and take over the full function of EE Agency.

The important role will be the **coordination** of initiatives to ensure complementarity in the planning and implementation process.

The (re-) establishment of the required dedicated capacities in terms of expertise, tools and regional network will require efforts. By proper reallocation of revenues (energy fees, penalties, taxes related to EE) the EE Agency (within ANRE) can be refinanced.

ANRE shall be **empowered by the primary EE law** for this additional function of a National Energy Efficiency Agency.

For this to happen, the EE authority need to be structured such that in addition to the central office conveniently located close to the central government, there may be satellite and branch offices located in bigger cities or industrial zones so that the local units are closer to the local stakeholders and have a better knowledge of the local requirements. They will then be able to develop programmes that are in line with the national objectives and meet the specific local requirements. With active interaction with the local decision-makers and through the consultation process, the local counterparts of the organization can leverage the local budget and funds, including those mobilized by private players, EU, FIs with national budget allocated specifically for energy efficiency promotion.

A preliminary plan for the cross-sector horizontal measure on "Establishment of a dedicated EE authority" is provided in section 4.5.

3 RECOMMENDED PACKAGES OF EE MEASURES IN NEEAP III

3.1 Structure and "Long-List" of possible EE measures

By applying the above outline methodology and approach a "long-list" comprising 38 possible packages of measures has been developed. They are grouped along the above mentioned five sectors and an additional group on cross sector horizontal measures.

Table 7: Summary long-list of identified packages of measures

Code	*Title of package of measures*	*Short title*
End use residential / household sector (H)		
H 01	Building renovation roadmap (addressing EED Art 4) multi-apartment residential buildings	Building road map MAB –EED 4
H 02	Rehabilitation programme "Warm apartment"	"Warm apartment"
H 03	Rehabilitation programme "Warm house"	"Warm house"
H 04	Energy efficient household appliances	HH appliances
H 05	Consumption based billing and metering of electricity, gas, heat hot water (addressing EED Art 9 - 11)	Metering & billing – EED
H 06	Energy audits and energy management systems (addressing EED Art 8, 16)	Energy Audits & EM - EED
H 07	Nearly zero energy buildings (addressing EED)	Zero Energy Building -EED
End use Industry sector (I)		
I 01	EE in Heavy industry	EE Heavy industry
I 02	Energy taxation for large energy consumers	Large ind. consumer tax
I 03	EE in other large industry	EE large industry
I 04	EE in SME	EE in SME
I 05	Horizontal industrial EE equipment	Industry EE equipment
End use Transport sector (T)		
T 01	EE individual cars	Transport EE cars
T 02	EE commercial vehicles	Transport EE commercial
T 03	EE rail transport	Transport EE rail
T 04	EE Urban Public Transport (UPT)	Urban Public Transport EE
T 05	Alternative mobility	Alternative mobility
End use Tertiary, service and municipal sector (S)		
S 01	EE in trade and service sector	Trade and service EE
S 02	EE office equipment, lighting and appliances (addressing EED Art 6)	Efficient appliances & light - EED
S 03	EE in central Government public buildings (addressing EED Art. 4, 5)	EE central gov buildings –EED
S 04	EE in municipal public buildings	EE municipal buildings
S 05	EE public lighting	EE public lighting
S 06	Energy efficient water, waste-water and waste management	EE municipal water
S 07	Promotion of municipal energy efficiency	Municipal EE and EM
S 08	Development of Energy services / ESCO market (addressing EED Art 18)	ESCO/ENPC- EED
Energy supply system - transformation, transmission and distribution (E)		
E 01	Loss reduction in power transmission and distribution network (addressing EED Art 15)	Efficient power system -EED
E 02	Smart electricity metering	Smart metering
E 03	Promotion of efficient heating and cooling (addressing EED Art 14) – promotion of CHP	CHP promotion – EED
E 04	Continuation "Heating Programme - heat and comfort 2006-2015"	DH EE programme
E 05	Obligation scheme of EE to all distributors	Obligation scheme utilities
Cross sector horizontal measures (C)		
C 01	Establishment of dedicated EE body for advice, supervision and monitoring of NEEAP	EE body/agency
C 02	Information on EE policy , schemes and facilities (addressing EED Art 12, 17, 19)	EE information policy

Code	*Title of package of measures*	*Short title*
End use residential / household sector (H)		
C 03	Horizontal EE promotion	Horizontal EE promotion
C 04	Stakeholder involvement and training (addressing EED Art. 17)	Stakeholder involvement
C 05	Qualification, accreditation and certification schemes and training (addressing EED Art 16)	Certification scheme
C 06	Activate the research potential on EE	EE research
C 07	Stimulate local production of energy saving equipment	Local production of equipment
C 08	Energy Efficiency National Fund (addressing EED Art. 20)	National EE Fund

3.2 End use residential / household sector (R)

Data gathering and analysis can be initiated by focusing on the main forms of energy use in the residential/ household sector. Apart from electricity, fuel consumption for space heating is considerable in Romania.

Surveys can be carried out among these buildings using standard sampling techniques to gather more pertinent data such as the type of activity in the building (office, hotel, hospital, shopping centre, etc.). Such information can be further analysed to have a fairly good idea of the parameters that may have important influence on the energy use, and also to distinguish the influence of technology and usage (behavioural pattern) on the energy consumption. Surveys can be carried out among households using standard sampling techniques to gather more pertinent data such as the share of individual versus collective housing technology and usage (behavioural pattern) on the energy consumption.

Household appliance ownership rate is also a good example of assessing to what extent the targeted households are equipped with high energy–consuming appliances such as refrigerator, air conditioner, water heater, washing machine, dryer, cooking and heating stoves, TV, computer, etc.

More detailed **energy surveys/audits** may be conducted in a selected number of housing units representing different sizes and both high and low specific energy consumption. Such surveys would provide information on the share of energy use according to the type of appliance.

By carrying out measurements of instantaneous power demands of different equipment and appliances one can conclude techno-economic analysis that compares costs and benefits of their substitution by more energy-efficient products.

Questions related to the typical barriers to the adoption of energy-efficient solutions at the housing level may shed light on the steps to be taken to overcome those barriers. The initial action plan can be developed for a reasonable time span of 3-4 years, providing adequate time to cover all the steps from awareness and sensitization, to advice and capacity building, market transformation, innovative financing, and legislation and regulation with the active support of suitable partners.

Residential, household sub-sectors can be grouped into three distinct categories:

Table 8: Assumptions for residential, household sub-sectors

Category	Type of end user	Facilities	FEC according to energy balance 2010 (estimate)	Estimated number of facilities
Space heat and domestic hot water	In Multi-apartment buildings (urban)	Building envelop, windows, Heat distribution in the building (excluding district heat)	1.5 Mtoe	Estimate 7.500 buildings containing in average 30 apartments
	in individual houses	Boilers and heating stoves, building envelop,	3 Mtoe	Approx. 3 million buildings

	(urban and rural)	windows, water heaters		(any type and size)
Household appliances and lighting	All households	Individual lighting, energy–consuming appliances such as refrigerator, air conditioner, water heater, washing machine, dryer, cooking, TV, personal computer	2.0 Mtoe	7.3 million households, average 1 appliance per HH

Table 9: Long list of possible EE measures in the residential/ household sector

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
H 01	Building renovation roadmap (addressing EED Art 4) multi-storey residential buildings	Heat supply of Multi-apartment buildings	Energy efficiency rehabilitation of building envelop	Energy Performance Standards Mandatory energy efficiency certificates for existing buildings Mandatory audits in residential buildings Mandatory heating pipe insulation Mandatory measures for efficient lighting (stair, outside) Minimum thermal insulation standards	Obligatory energy audits and post completion verification audits Technology procurement for energy efficient appliances and buildings	Complementary information and standard project development	Building renovation roadmap (EED Art 4) Integrated database, in coordination with the thermal rehabilitation of buildings Study on the national building stock with cost-effective approaches to renovations Analysis of ENPC opportunities Strengthening HOAs	Incentives for investments in new buildings exceeding building regulation Split incentives in multi-owner properties long-term strategy for mobilising investment in the renovation of buildings (use of EU Structural and Cohesion Funds) Utilisation of TPF (ESCO, IFI loans)
H 02	Rehabilitation programme "Warm apartment"	Heat supply of Multi-apartment buildings	Window replacement, heating system improvement	Minimum thermal insulation standards	Local production of EE equipment	Promotion programme "Warm apartment"	standard project development	Loan facility with banks Grant component for EE investments linked with loan

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
								Special grant support programmes for the lower income groups
H 03	Rehabilitation programme "Warm house"	Heat supply in individual houses	Boiler improvement Use of renewable energies Building envelop	Mandatory energy efficiency certificates for existing buildings Mandatory energy efficiency certificates for new buildings Labelling appliances of cooling/heating systems in individual homes Mandatory use of solar thermal energy in buildings Periodic mandatory inspection of boilers Minimum thermal insulation standards Minimum efficiency standards for	Local production of EE equipment	Programme promotion campaign with complementary information and standard project development advice to users concerning the replacement of boilers and/or air conditioning systems	Control mechanism for individual boilers with involvement of maintenance services of chimneys (chimney sweeps association)	Reduced interest rates (soft loans, e.g. by EEF) for energy efficient building renovation Grant co-financing of energy audits Grant co-funding of investment in renewables and micro CHP VAT reduction on retrofitting investment

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
				boilers Compulsory replacement of old boilers above a certain age Control systems for heating (Regulation)				
H 04	Energy efficient household appliances	Appliances in households	High performance HH appliances and lighting	Minimum efficiency standards for electrical appliances Labelling of EE lighting and household appliances		Promotion of higher EE performing appliances and LED lighting	Voluntary agreements with producers of White/ Brown Goods	Vendor financing scheme with favourable conditions for high performing labelled products (grant component) VAT reduction on retrofitting investment
H 05	Consumption based billing and metering of electricity, gas, heat hot water (addressing EED Art 9 - 11)	Cross-sub-sector	Individual meters in combination with control devices	Billing information scheme (free of charge) Obligation to utilities to implement smart metering (for new and replacement need) Thermostatic zone control	Public procurement programmes	Awareness campaign on the benefits, opportunities to influence the energy bill communication and information measures facilitating the engagement of during the roll-out of smart meters Demonstrate the	Preparation, supervision and control of standardised demonstration project "Heat control and measuring" training courses for installers Train owners of multi-storey houses on the process:	Grant component for smart meters installed by utilities Grant component for installation of heat control devices Energy bill incentives for low income residents

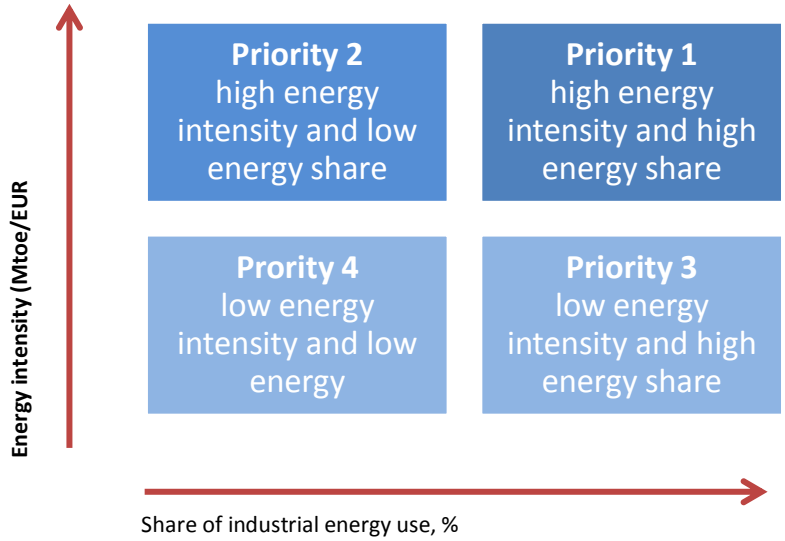
Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
						efficiency of remote control and metering of DH substations	installation, reading and billing	support schemes for housing cooperatives and similar organisations of end-users
H 06	Energy audits and energy management systems (addressing EED Art 8, 16)	Cross-sub-sector	Identification of EE investments	Improvement of energy audit methodology Regulation on supervision by independent authority Accreditation and certification schemes for energy auditors		Programme to raise awareness among households of the benefits of energy audits	Training programmes for the qualification of energy auditors Training of installation companies for building envelop EE Cooperation with energy services and installers monitoring of results and accuracy of energy audits	Grant co-financing of energy audits
H 07	Nearly zero energy buildings (addressing EED)	Cross-sub-sector	Nearly zero energy new buildings (nZEB)	Performance standards for nZEB	Voluntary labelling of buildings/ components (existing and new	Promotion programme for nZEB	Analyse of potential Elaboration of national targets and plan	Support programme for nZEB

3.3 End use industry sector (I)

The industrial sector is more complex to deal with as it involves manufacturing of a wide range of products by using various types of processes. Moreover, while some industries concentrate on a single product, many others have facilities to have heterogeneous products from a single factory. Just like the macro-economic analysis at the country level, the different industrial sub-sectors can be assessed according to their shares of the overall energy use in industry and their sub-sectorial energy intensities. Industrial sub-sectors can be grouped into four distinct categories:

Table 10: Assumptions for industry sub-sectors

Category	Sub-sector in Romania	Share of FEC according to energy balance 2010 (estimate)	Estimated number of entities
1) high energy intensity and high energy share	Heavy ind. (iron, steel, chemicals, minerals)	4 Mtoe, 59%	200
2) high energy intensity and low energy share	Other large industry Food, wood, etc.	1.5 Mtoe, 21%	400
3) low energy intensity and high energy share	SME	1.4 Mtoe, 20%	50,000
4) low energy intensity and low energy	Trade and service	1 Mtoe, considered in "other/ tertiary sector, under Service and trade	500,000



It is good to start with those industrial sub-sectors that are in Priority 1 so that there are greater chances of saving more energy by targeting a limited number of industrial sub-sectors. However, heavy industry energy consumption depends to a high degree on market and economic development. Thus, EE measures for heavy and large industry sub-sector need to be activated in parallel with the economic recovery, which usually requires anyhow investments in the modernisation or extension of the production facilities.

Table 11: Long list of possible EE measures in the industry sector

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
I 01	EE in Heavy industry	Heavy industry	EE in energy intensive production processes	Implementation of secondary legislation for EE certification of industrial company based on certified audit	Voluntary/Negotiation to reduce energy consumption/CO2 emission of industrial processes	Sector specific information on EE technologies	Training for top-level management/ energy managers Continuation of Energy management scheme and Energy auditors for large industrial consumers Project preparation support for Emission trading system	Incentives for investment in clean fuels (renewables, waste and waste heat, industrial CHP, etc.): Tax reduction, accelerated depreciation Dedicated credit line for EE investments
I 02	Energy taxation for large energy consumers	Heavy and large industry	EE in energy intensive production processes	Obligations to reduce EE by Surplus Tax of energy costs for over exceed benchmark (Justification: CO2 emission intensity linked to energy consumption)	Benchmarking of energy intensity for heavy industry (Use energy consumption of company compared with EU average benchmark for product)	Information on benchmarking, EE opportunities, taxation and support facilities	Transparent collecting scheme of additional energy tax (energy balance information by utilities, System by ANRE)	Co-financing of investment by EEF (soft conditions) Grant refunding of energy audit costs
I 03	EE in other large industry	Other large industry	All industrial EE equipment	Implementation of secondary legislation for EE certification of industrial company based on certified audits		Information on energy efficiency in industry and knowhow transfer on application		Incentives for investment in clean fuels (renewables, waste and waste heat, small CHP, etc.): Grant co-

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
								financing, Tax reduction, accelerated depreciation Dedicated credit line for EE investments Strengthening of EEF
I 04	EE in SME	SME	All industrial EE equipment	Adaptation of energy tariffs	Voluntary audits	Information and training on EE opportunities and technologies Complementary information and project development capacities to increase the outreach of the financing mechanisms and approach SME	Follow-up training of Energy managers to utilisation of financing mechanisms	Dedicated Credit line for EE in SME Grant programme for EE investments Guarantee or equity fund for EE lending Utilisation of ESCF TOP SME
I 05	Horizontal industrial EE equipment and DSM	Cross sub-sector	All industry sub-sector EE equipment	Mandatory DSM for energy suppliers / other actors in energy sector Mandatory standards for the efficiency of industrial boilers Mandatory standards for the	Voluntary labelling of cross-cutting technology (e.g. industrial motors)	Benchmarking of industrial production Information campaigns (by energy agencies, energy suppliers etc) guidelines for industry sectors for	Information and training on EE opportunities and technologies Preparation support of demonstration and investment projects	Incentives for energy audits, training activities Use of TA for preparation of bankable projects

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
				efficiency of electric motors Standards and promotion of efficient production technologies Mandatory appointment of an energy manager Mandatory audits for industrial processes / buildings		implementation of EE and CHP Promotion of RE to selected industry sectors (food) Promotion of use of renewable energies in industry		

3.4 End use transport sector (T)

The transport sector has the fastest growth of fossil energy consumption of all sectors.
This is even more pronounced because of the rapid growth in the number of passenger vehicles associated with rising urban population and income.
In comparison with the other economic sectors, transport is one of the more challenging sectors for adopting energy efficiency measures because of the difficulty in establishing a reliable baseline in the absence of a wide set of data necessary to develop accurate transport energy efficiency indicators.
Moreover, people have much more freedom when it comes to the selection of the mode of transport (air, rail, road, and water) and it is difficult to bring in effective policy measures, especially where resources to provide adequate public transport services are often limited and there is a lack of a good set of indicators to initiate effective policy implementation.
One of the effective options to reduce the energy consumption in the transport sector is to increase the efficiency of new motor vehicles. EE bodies need to target motor vehicle manufacturers in order to introduce standards and labelling programmes that help the buyers in making the right choice. However, this solution will not be adequate to deal with the transport energy problem because of the transport sector's heavy reliance on fossil fuels. Other important non-technical options to reduce the demand for fossil fuels include improved quality of urban public transport plans to popularize transport modes other than personal vehicles, higher fuel and vehicle taxes, and effective land use planning focusing on mixed activity zones that helps to contain urban sprawl and minimize the need to commute.

Table 12: Long list of possible EE measures in the transport sector

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
T 01	EE individual cars	Individual road transport	Private cars , up-grade investment to higher efficient vehicle	Mandatory fuel consumption standard regulation for emission control for vehicles Mandatory labelling of vehicles (EU)	Voluntary agreement with car producers	Information campaign on energy efficient driving behaviour Labelling and promotion of high efficient vehicles Promotion of eco-driving Promotion of car sharing	Assessment of applicability of EE obligation schemes for transport fuel distributors or retailers	Incentives for low fuel consuming vehicles Incentives for scrapping of old cars Tax on the purchase of cars (if linked to efficiency improvement)

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
T 02	EE commercial vehicles	Commercial road transport	changing of vehicle fleets rationalisation of transport routes	Speed limiters for lorries Periodic mandatory inspection of vehicles / pollution control Mandatory fuel substitution	Voluntary agreement for trucks / light vehicles Procurement guidelines for energy efficient or green vehicles	Promotion of fleet management measures Guidelines for decreasing fuel consumption	Training on energy efficient driving behaviour	Incentives for clean vehicles (bio-fuelled/ electric/ LPG / natural gas cars) Incentives for implementation of fleet management Redesign of large vehicle replacement grant programmes as co-financing (e.g. commercial loans)
T 03	EE rail transport	Rail transport	EE in rail transport	Obligation scheme for EE of rail system operator			Improve time schedule improvement of infrastructure, park & ride schemes	State budget co-financing programme for EE vehicle replacement and Increase fleet management
T 04	EE Urban Public Transport (UPT)	Public transport	EE in UPT vehicles and increase overall efficiency and attractiveness of UPT	Mandatory energy audit for municipal transport companies	Voluntary agreement for public transport companies Technology procurement for energy efficient or green vehicles	Promotion of public transport Preparation, supervision and control of demonstration project “Bus /Tram	Integration of UPT issues in SEAP Improve service in UPT for better acceptance of UPT Demonstration	Grant component programme for EE vehicle replacement and improvement of infrastructure; use of state/

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
					Assessment of options for ESCO or PPP in UPT	improvement in UTP"	of Mobility stations	municipal funds to leverage TPF
T 05	Alternative mobility	Cross sub-sector	Individual users			bike-sharing programmes development of cycling lanes		

3.5 End use tertiary, service and municipal sector (S)

Similar to the approach proposed for the residential sector, data gathering and analysis can be initiated by focusing on the main forms of energy use in the tertiary/ service/ municipal sector. Apart from electricity, fuel consumption for space heating is considerable in Romania.
Surveys can be carried out among these buildings using standard sampling techniques to gather more pertinent data such as the type of activity in the building (office, hotel, hospital, shopping centre, etc.). Such information can be further analysed to have a fairly good idea of the parameters that may have important influence on the energy use, and also to distinguish the influence of technology and usage (behavioural pattern) on the energy consumption.
Tertiary, service and municipal sub-sectors can be grouped into three distinct categories:

Table 13: Assumptions for tertiary/ service/ municipal sub-sectors

Category	**Type**	**Facilities**	**Share of FEC according to energy balance 2010 (estimate)**	**Estimated number of entities**
1) high energy intensity and low energy share	Municipal services	Street lighting Water supply Waste water and waste services Note: heat supply is categorized in the energy system section, transformation	0.15 Mtoe	320
2) low energy intensity and high energy share	Service and trade	office, hotel, hospital, shopping centre	1.1 Mtoe	520,000
	Municipal buildings	Schools, kindergartens administrations, etc	0.6 Mtoe, 20%	320 municipalities, average 10 buildings
3) low energy intensity and low energy share	Central government buildings	Administrative buildings and services	0.3 Mtoe	750

More detailed energy surveys/audits may be conducted in a selected number of commercial buildings representing different areas and both high and low specific energy consumption. Such surveys would provide information on the share of energy use according to the type of heating or air conditioning system and use of appliance.
With the measurements of instantaneous power demands of the buildings as well as important equipment and appliances and number of hours of their use, one can conclude techno-economic analysis that compares costs and benefits of their substitution by more energy efficient products.
Starting with the analysis of the macro-economic data, followed by the techno-economic analysis can help to initiate implementation activities in the tertiary/service sector. One can thus initiate the action in a limited number of high-energy consumers to achieve the best result. The initial action plan can be developed for a reasonable time span of 3-5 years, providing adequate time to cover all the steps from awareness and sensitization, to advice and capacity building, market transformation, innovative financing and legislation and regulation with the active support of suitable partners.

Table 14: Long list of possible EE measures in the tertiary, service and municipal sector

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
S 01	EE in trade and service sector	Tertiary sector – trade and services	Trade and service sector facilities' EE	Mandatory audits in tertiary sector buildings – Trade and service Periodic mandatory inspection of boilers and HVAC	Introducing Consumption based billing in offices/shops	Information and training on EE opportunities and technologies	TA for energy management, energy auditing, preparation of projects	Dedicated Credit line for EE in Tertiary sector Preferential loan guarantee conditions (Grant programme for EE investments) Guarantee or equity fund for EE lending Accelerated depreciation Tax reduction / Tax credit
S 02	EE office equipment, lighting and appliances (addressing EED Art 6)	Municipal/ regional administrations	All public facilities, office equipment	Voluntary labelling of office equipment Energy Performance Standards Regulation to	public purchasing and annual budgeting and accounting of public bodies	Promotion EE appliances and lamps in the public sector	Establish cross sector public procurement agent trained on EE to support and supervise procurement	

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
				purchase products, services and buildings with high-energy efficiency performance			processes	
S 03	EE in central Government public buildings (addressing EED Art. 4, 5)	Public buildings	Central Government public buildings (administration, education, health) Energy efficiency rehabilitation of building	obligations regarding the renovation of central government buildings Obligatory energy audits and post completion verification audits Mandatory appointment of an energy manager Mandatory energy efficiency certificates for buildings Mandatory measures for efficient lighting (stair, outside) Maximum indoor temperature limit(s)	Assessment of obligatory renovation scheme (3%/y) or alternative measures Road map for renovation of central public buildings Voluntary agreements with actors of the building sector Voluntary labelling of buildings Voluntary agreements with public or private services Technology procurement for energy efficient appliances and buildings	Complementary information and standard project development Guidelines for viable and sustainable Heating system	Preparation, supervision and control of demonstration project in the public buildings inventory of heated and cooled central government buildings (Integrated database) Building renovation roadmap Analysis of ENPC opportunities	Rehabilitation, modernisation, equipment programme of public buildings with state grant funds to leverage SOP/axis 3 funding
S 04	EE in municipal public buildings	Public buildings	Municipal public buildings (education, health, sports, culture, administration)	Voluntary energy audits Mandatory appointment of an energy manager Periodic mandatory	Standardised Technology procurement rules for energy efficient buildings / components	Promote small scale CHP (SSCHP) for selected applications for specific building types (hospitals, indoor swimming	Preparation, supervision and control of demonstration project in the public buildings	Dedicated incentive programme for energy efficiency investment, use of renewable energies, CHP

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
				inspection of HVAC and boilers		pools, greenhouses) Demonstrate the use of solar thermal collector systems at schools, swimming pools, etc. with guaranteed positive demonstration effect		Incentive programme for energy audits/ training/ benchmarking activities Draft the model for municipal energy saving revolving fund, start with energy saving contracts in school Develop and manage a fund for small projects in public building sector (financed by EEF)
S 05	EE public lighting	Municipal street lighting	Improvement of public lighting systems	Energy efficiency regulation for public lighting	Standardised Technology procurement rules for energy efficient lighting / components	Development and promotion of successful pilot projects	Technical assistance in preparation of bankable lighting projects	Preferential loan guarantee conditions Support ENPC application
S 06	Energy efficient water, waste-water and waste management	Other municipal services	Water supply, waste-water systems, waste management			Increase efficiency and reduce consumption of water supply facilities	Technical assistance in preparation of bankable projects	Rehabilitation, modernisation, equipment programme of by use of SOP/axis 3 funding Support ENPC application and PPP
S 07	Promotion of municipal energy efficiency	Municipalities	All municipal facilities	Mandatory Energy Action Plan for municipalities	Voluntary DSM measures of energy suppliers	encourage to Adopt energy efficiency plans	Municipal EE action plans Implement	Financial incentives for architects who

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
				Mandatory annual energy report for municipalities	and distributors	and put in place energy management systems Information campaigns (by energy agencies, energy suppliers etc) Energy efficiency/ renewables awards Preparation of demonstration and investment projects Demonstrate the use of biomass in rural areas or geothermal energy for specific applications (greenhouse, heating)	municipal energy manager services Support local energy planning at municipalities Education programme for energy managers (municipal, consultants, planners, installers) Guidelines for local energy planning Establish regional energy efficiency consultation centres and energy managers training centre Training for top-level management/ energy managers Regional and local information centre on energy efficiency	integrate EE measures
S 08	Development of Energy services / ESCO market (addressing EED Art 18)	Cross sub-sector	Public and residential buildings Public service facilities	Establishment of tertiary legislation ESCO/EnPC fully compatible with the current EE legislation, Alignment of the legal basis for tendering EnPCs	Analysis of potential for ENPC, Providing favourable conditions for the ESCO market development extension of functioning,	Promoting the development of energy service companies Demonstration of commercial returns from EE, model contract	Establishment of confidence on ground of insufficient legislation. Establish national contact and advisory point for ENPC	Development of financial mechanisms Strengthen and extend EEF reduction of risks for ESCOs (e.g. guarantee funds) attraction of the

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
				under the concessions law (OUG 34) and services law (Law 51). Enacting a specific EnPC law to address the missing elements and solve uncertainties. Tertiary legislation supporting this EnPC contract (i.e. the models for EnPC contract, methodology for implementation) according to EED 2012/27, ANNEX XIII - Minimum items to be included in EnPC with the public sector	commercial financing instruments to other segments (ESCO, public)		Analysis of prevalence of ESCOs (total value of ESCO energy saving projects, total value of possible energy efficiency projects in the non-residential sector) Assess the size and types of companies providing services interactions with other policy measures (e.g. energy savings obligation schemes, EU Cohesion Policy Fund)	participation of the private sector in the co-financing and implementation of EE projects

3.6 Energy supply system - transformation, transmission and distribution (E)

Energy Efficiency in the Energy supply system focuses mainly on the reduction of energy losses

- in the energy transformation facilities (power and heating plants) by increase of the transformation efficiency
- in the transmission and distribution of energy (electricity, gas, central heating)

The operation of facilities of the sub-sectors is to a large extent in private ownership in a liberalised market. The government provides the regulatory frame, which enables intervention for energy efficiency, while investment measures for the increase of the efficiency/ reduction of losses are under the responsibility of the private or commercially structured companies (energy utilities).

An exemption is municipal district heating companies, where the central or local government has access to the operation, which established the basis for intervention. Some features of the municipal DH in Romania are in brief:

- current heat distribution networks are functioning at around 30% of their capacity, Outworn facilities with high losses due to age of 60-70 years
- municipal DH systems with highest losses of 41-55% are: Reşiţa, Braşov, Bacău, Botoşani, Brăila; Heat losses amount in 2008 to 0.45-0.5 Mtoe
- All heat generation facilities with a consumption of more than 1000 Toe per year have employed new regulations to increase EE. Ordinance 22/2008.
- During the last 10 years, some stations have been modernized, representing up to 10% of the total installed capacity.

Energy supply system sub-sectors can be grouped into two distinct categories:

Table 15: Assumptions for Energy supply system sub-sectors

Category	Type	Facilities	Losses according to energy balance 2010 (estimate)	Estimated number of entities/ facilities
1) Energy transformation	Power generation	Power plants (any fuel type) CHP	4.0 Mtoe	Approx. 150 power plants and CHP
	Central heat generation	Boiler houses, Heat-only boilers CHP supplying DH networks	1.0 Mtoe	Approx. 400
2) transmission and distribution of energy	Power transmission and distribution	Power transmission and distribution network	1.0 Mtoe, 60% of transmission and distribution losses	100.000 km transmission and distribution lines
	Central heating transmission and distribution	DH network	0.4 Mtoe	Approx. 7.500 km DH transmission and distribution network

Measures focussing on metering and the “EE Obligation scheme” will affect the FEC of the final energy consumers (If all consumers are considered, some 8 million metering dots).

Table 16: Long list of possible EE measures in energy system sector

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
E 01	Loss reduction in power transmission and distribution network (addressing EED Art 15)	Power transmission and distribution	Power transmission and distribution network	Assessment and decision on obligation scheme Tariff regulation towards enabling overall efficiency of the generation, transmission, distribution, elimination of cross subsidies Integration of EE criteria in network tariffs and regulation	Demand response study and detailed forecast and load management Embedment of EE in network design	Facilitate and promote demand response	Assessment of EE potentials of national gas and electricity infrastructure	Leveraging external financing (FI, private) Support power utilities in consultation with financing structure Investments programme for the introduction of cost-effective EE improvements in the network infrastructure
E 02	Smart electricity metering	Power distribution	Individual smart meters at all consumers, metering infrastructure		Preparation of standardised smart meter procurement programmes Voluntary agreements with power distribution companies to install smart metering of new or replacement	Awareness campaign on the benefits, opportunities to influence the energy bill communication and information measures facilitating the engagement of during the roll-out of smart meters	Preparation, supervision and control of standardised demonstration project "Smart electricity metering"	Incentives for grid operators to make available system services to network users to take advantage of the potential of smart grids
E 03	Promotion of	Central heating	Heat generation	Regulation for	Analysis of	Benchmarking of	Potential	Revolving fund of

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
	efficient heating and cooling (addressing EED Art 14) – promotion of CHP	(generation and distribution), (DH)	facilities of Central heating systems	CHP application for new, industrial and existing facilities (over 20 MW) Regulation for power by CHP grid feed-in	opportunities for Energy Supply Contracting opening the heat markets to new investments or private management, privatizations or PPPs to limit political influence.	performance of CHP	assessment of CHP in DH cost-benefit analysis of CHP Assessment of use of RE for CHP (biomass, GT) Further capacity building of municipal/ local energy managers	CHP installation for municipal CHP in DH , with favourable conditions Grant support to CHP projects using renewable energy Support for CHP subject to the electricity produced and subject to State aid rules Reduction of risks for ESCO CHP supply contract projects (e.g. guarantee funds) leaving non-performing companies in insolvency and creating new entities which can get accredited to obtain new funds
E 04	Continuation "Heating Programme - heat and	Central heating (generation and distribution), (DH)	Component: Rehabilitation of DH system	Review of heating tariff structure balancing needs		Demonstrate the efficiency of remote control and metering of	Support DH companies' management to prepare and	Financial/grant scheme for bringing in financing for the

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
	comfort 2006-2015"			for refinancing of investments with low income customer needs Enforcement of GO 22/2008 for companies with consumption of over 1kToe		DH substations	implement EE programmes Verification of results of obligatory energy audits Support in preparation of bankable projects	rehabilitation and modernization (addressing lack of equity and bankability of DH companies) Utilisation of ESCF for grant programme Guarantee fund for municipalities /DH companies Extended use for IFI funding mechanisms Extended use for IFI funding mechanism and bundling of projects for direct funding by IFI
E 05	Obligation scheme EE	All end consumers of energy	All sector EE equipment	Regulation for energy tariff allowing to cover cost of obligation scheme	Obligation scheme to all distributors to save 1.5%/yr from 2014-20		Monitoring and supervision of obligation scheme	

3.7 Cross sector horizontal measures (C)

From EED 27/2012 the demand for a number of cross-sector horizontal measures can be drawn. The following long-list is completed with cross-sector measures which have been applied in the past and which are complementary to above sector measures but of general nature.

Table 17: Long list of possible cross sector horizontal measures

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
C 01	Establishment of dedicated EE body for advice, supervision and monitoring of NEEAP	Cross sector	Cross sector Energy Efficiency application	Regulation on the responsibilities, rights and obligations of the Energy Agency	Charter of the EE organisation, working processes continuous evaluation and monitoring of the results of the programmes	Regularly reviewing and up-dating the energy strategy, programme and forecast Analyse the effects of specific project implementation and adjust the programmes on demand	Empowering of EE organisation or Energy Agency at national level Support to the Statistical Institution to improve energy consumption reporting, data collection and processing	Financing scheme using State budget, and ANRE income for the costs of the institution
C 02	Information on EE policy , schemes and facilities (addressing EED Art 12, 17, 19)	Cross sector	Cross sector Energy Efficiency application		Regional and local information centres on energy efficiency	Information about labelling of energy efficient products and installations Establishment of electronic energy information system (Intranet: facts, figures, trends, events) Disseminate the energy programme results at a wide-scale (homepage, newspaper article and newsletters)	Catalogue of quality criteria for energy installation, equipment, construction and establish an appropriate control mechanism Energy consumption benchmark catalogue (all sectors) Continuous documentation of energy sector responsibilities (structure, role, contact)	
C 03	Horizontal EE	Cross sector	Cross sector EE			Public information		

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
	technology promotion		technologies			campaign for saving power and heat with low cost measures Promotion of se of renewable energy for rural, de-central heating Promotion and facilitation of EE to small energy customers Guideline for preparation and implementation of energy efficiency projects Collect best practice cases studies of energy efficiency		
C 04	Stakeholder involvement and training (addressing EED Art. 17)	Cross sector	n/a			Information campaigns (by energy agencies, energy suppliers etc) regular round table sessions with associations and municipalities Strengthen international co-operation	Create networking with European EA, Active membership of European associations and search for strategic co-operation alliances with agencies	Utilisation of donor programmes for events, etc Participation in donor financed projects Raising of Funds and sponsoring
C 05	Qualification, accreditation and certification schemes and training (addressing EED	Cross sector	Cross sector EE technologies	Improvement of energy audit methodology Regulation on supervision by independent		Programme to raise awareness of the benefits of energy audits	Training programmes for the qualification of energy auditors Training of installation	Grant co-financing of energy audits

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
	Art 16)			authority Accreditation and certification schemes for energy auditors Review regulation on preparation of feasibility studies to include a requirement for EE component			companies Cooperation with energy services and installers monitoring of results and accuracy of energy audits energy audit quality assurance and control scheme	
C 06	Activate the research potential on EE	Cross sector	Industry and building sector EE applications		Concerted actions for targeted implementation of energy saving in education: e.g. training plan for teachers, courses at universities	Stimulate the technical universities for active participation in application oriented research	Programme "EE Research-Development-Demonstration" Preparation of suitable proposals for international co-operation projects	Participation in international research projects/ programmes on applied EE technologies
C 07	Stimulate local production of energy saving equipment	Cross sector	Building and HH sector EE applications		Voluntary agreements with public entities to purchase locally produced EE equipment	Promotion of locally produced EE technologies	Market assessment of widely used E equipment with potential for local production Support the establishment of Joint Ventures for local production of EE equipment	provision of financial incentives (e.g. tax exemption) Stimulate local banks to provide (soft) loans for energy saving equipment manufacturers
C 08	Energy Efficiency National Fund (addressing EED Art. 20)	Cross sector	Cross sector EE applications		Better use of Environment Funds for higher demanding EE measures / programmes	Promotion of EEF	Strengthening the capacities and extend of EEF to other than industry sector and smaller projects	facilitate the existing EEF, for EE improvement measures to maximise the benefits of multiple streams

Identification of the package				Instruments recommended within the package				
Code	**Title of package of measures**	Targeted sub-sector	Targeted installation	Legislation& Regulation	Market transformation	Information& Awareness	Advice & Capacity building	Financing mechanisms
								of financing: utilisation as co-financing to leverage TPF

3.8 Methodology of evaluation of the packages of measures

In order to identify out of the identified long list of 38 the most effective and appropriate packages of measures a scheme was developed which applies quantitative and qualitative evaluation criteria, in total 7 criteria.

The **qualitative evaluation** will answer the question on the appropriateness of the respective package of measures along four criteria:

Table 18: Qualitative evaluation criteria

Criteria	Key points of consideration	Weight of criteria for scoring
1) Contribution to the compliance of EED requirements	- Need for obligatory action by EED → 10 points. This will be considered as overwriting aspect, as it has highest priority.	25%
2) Market Maturity	- Decree of meeting the demand of the sector, - type of measure relevant to solve the problem or overcome barriers - general absorption capacity of respective end users or applicants of the measure - existence or perspective for the legal/ regulatory frame - Readiness of the market for application and implementation - State of the art of the measure from a technical perspective	8.3%
3) Development of framework	- ability to develop a conducive framework in terms of market mechanisms and cost coverage of the EE investment on a medium to long-term perspective • Potential of measure as flagship project with replication potential • Possibility for adaptation on variable demand and possible changes in the future -	8.3%
4) Economic Sustainability	- Decree of potential generation of economic return from the EE measure - Potential for an acceptable dynamic amortization, considering factors of energy tariffs, market mechanisms and legal frame	8.3%

A scoring of maximum 10 points can be given per criteria: 10 for high, 0 for low. Consequently, the total evaluation score for quantitative evaluation can be 5 points, representing 50% of the total scoring.

The qualitative evaluation is based on experience of international and Romanian energy efficiency experts on respective in design and evaluation of EE measures and programmes. But it remains a subjective evaluation, which may vary by the point of few and the taken assumptions.

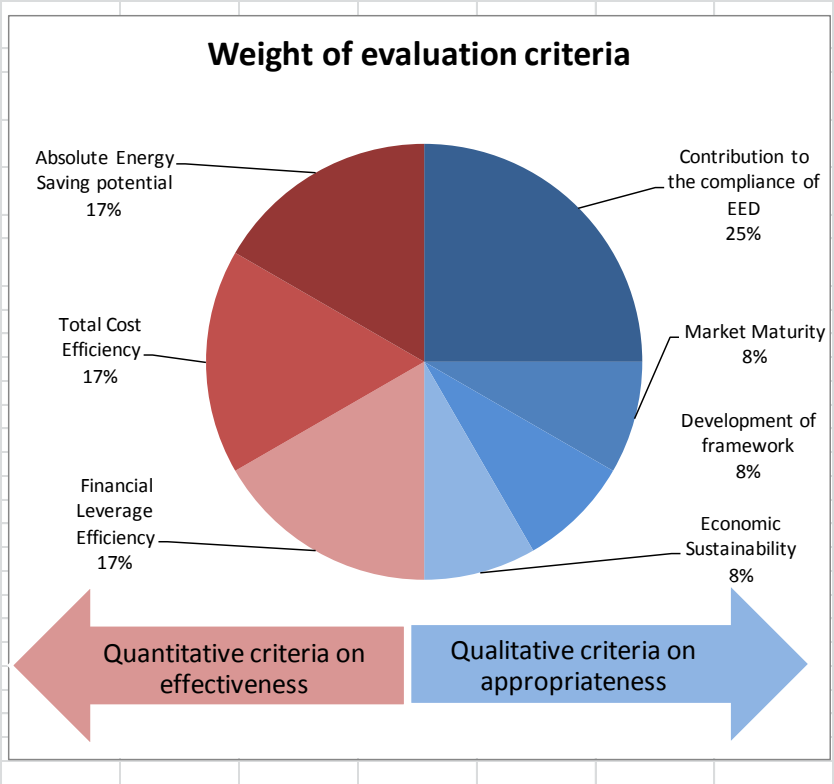
The **quantitative evaluation** will answer the question on the effectiveness of the respective package of measures along three criteria:

Table 19: Quantitative evaluation criteria

Criteria	Methodology and assumptions for calculation of consideration	Weight of criteria for scoring
5) Contribution to achievement of the EE target Absolute Energy Saving potential (Mtoe)	For the estimation of the EE potential of the specific package of measures the following calculation path has been applied: i. "Total investment costs (EUR)" = "Estimated total number of applications of the entire market of respective sub-sector (units)" x "Estimated average unit cost of investment measure (EUR/unit)" x "Assumed outreach of	16.7 % For the scoring in the evaluation the share of EE potential on EE target 2020 (in %) is

Criteria	Methodology and assumptions for calculation of consideration	Weight of criteria for scoring
	the measure, in % of the total market (%)" ii. "EE potential, variant A (Mtoe)" = "Assumed, projected Final Energy Consumption of sub-sector in 2020 (Mtoe)" x "Assumed outreach of the measure, in % of the total market (%)" x "Estimated EE potential for this segment by application of the measure (%)" For a cross check of the EE potential the calculation with the Specific EE achievement per investment (kWh EE per EUR invest) has been used: iii. "EE potential, variant B (Mtoe)" = "Specific EE achievement per investment (kWh/EUR)" x "Total investment costs (EUR)" iv. "Realistic EE potential (Mtoe)" = average of "EE potential variant A and B" Essential, but critical assumptions for the calculation: - Outreach of the measure in 2020, of the total market considering the - Time required for installation - Number of all possible applications at the market - Unit costs of the investment - % EE potential of measure - Assumed, projected FEC of sub-sector in 2020 - Specific EE achievement per investment (kWh/EUR)	used (limited at 100% = 10 points)
6) Total Cost Efficiency (kWh/EUR) **specific investment needed for energy saving**	For the estimation of the cost efficiency of the specific package of measures the following formula has been applied: i. "Cost of non-investment measures (EUR)" = ∑ of estimated "costs for Legislation& Regulation; Market transformation; Information& Awareness; Advice & Capacity building; Financing mechanisms (only part for development of FM)" ii. "Total cost of measure (EUR)" = "Total investment costs (EUR)" + "Cost of non-investment measures (EUR)" iii. "Total Cost Efficiency (kWh/EUR)" ="Realistic EE potential (GWh)" / "Total cost of measure (EUR)"	16.7 % For the scoring the Cost efficiency factor is multiplied by 2.5 per kWh/EUR and limited at 10 points
7) Financial Leverage Efficiency (%)	For the estimation of the Financial Leverage efficiency of the specific package of measures the following formula has been applied: i. "Leveraging of external funding (%)" = "Total investment costs of measure (EUR)" / " ∑ of estimated financial contribution / co-or own financing (in EUR) to the entire investment package from i) ESCF; ii) TPF FM (ESCO, FIs CL) or iii) from owner/ operator of the facility" Consequently, the "Share of Romanian State Budget funds for investment" =100% "Total investment costs of measure" – "Leverage factor external funding"	16.7 % For the scoring 1 point is given for 10% of external (Third party) Financing

Figure 13: Weight of the 7 evaluation criteria



An additional result of the model is the "Total costs of measure for the State Budget of Romania", which is the required funding after deduction of external funding from the total costs. This factor might be used for later assessment on demand.

Cross-sector **horizontal packages** of measures do not generate energy savings "per se" as they are no concrete energy efficiency investments are dedicated to them. The application of cross-sector horizontal measures is the **accompanying key** to enable or improve the effectiveness of the packages of measures in the sectors (residential/household, industry, transport, and service/trade and energy system). Thus, only the qualitative evaluation criteria are applicable. This suffices for the ranking of the appropriateness of the measure.

3.9 Assessment of EE achievement potential of recommended measures in comparison to the EE target

As outlined in section 2.2.2 above, the energy saving target for 2020 is a ***Moving Target***. The key influencing factor for the FEC will be the annual growth of the GDP and the respective economic performance.

The target PEC for 2020 is fixes with 42.99 Mtoe, committed at the basis of Forecast (PRIMES, 2007, realistic scenario). The PEC forecast for this scenario is 52.99 Mtoe. The committed amount for EE is 10 Mtoe for this scenario. In 2011 the PEC amounted to 35.648 Mtoe (available, consolidated data).

EE target definition under moderate growth scenario

The assumed realistic scenario for economic development is expressed in a **moderate** growth of GDP in 0.7% in 2012 and annually 2% from 2013 to 2020. This will result into a PEC in 2020 of 43.800 Mtoe. Consequently the target EE in 2020 is 0,8 Mtoe to respect the commitment of PEC of 42.99 Mtoe.

EE target definition under high growth scenario

In case the industry sector recovered and picks-up from 2015 with an annual growth rate of 5% the PEC in 2020 would increase up to 52.99 Mtoe, considering the related FEC in the transport, household, agriculture and other sector. Consequently the target EE in 2020 is 10 Mtoe to the target PEC of 42.99 Mtoe.

In order to estimate the variation of the FEC and PEC depending on the GDP growth a simple forecast model of the energy balance of Romania has been prepared.

Typically the FEC in the sectors develops unevenly with the GDP growth. Under the moderate growth scenario it is assumed, that the FEC of the industry sector will increase with the same growth rate as that of the GDP growth, while household and other sector growth with 75% of the GDP, and the FEC of the transport and agriculture/ forest sector will grow with twice the growth rate of the GDP.

For the sake of simplicity the FEC in the energy balance for the year 2020 is projected and broken down into the FEC of the targeted sub-sectors of packages of measures. Those FEC figures of 2020 are utilised to calculate the effect of the respective measure to reduce the energy consumption of the respective sub-sectors. In addition to the FEC in end consuming sectors there are two areas of the energy system - transformation, transmission & distribution losses which influence the demand for PEC.

Table 20: Specification of sub-sector for intervention

Sector	Sub-sectors, identified for effecting by packages of measures of NEEAP
Industry (I)	Heavy industry (iron, steel, chemicals, minerals)
	Other large industries
	SME
Transport (T)	Individual road transport
	Commercial road transport
	Rail transport
	Urban Public transport
Residential/household sector (H)	Heating& DWH (divided 50/50 for multi-apartment buildings and individual houses)
	Household appliances & lighting
Tertiary, service and municipal sector (S)	Service & trade facilities
	Municipal services (in an assumed share of: water supply 5%, lighting 10%, municipal buildings 50%, central government buildings 25%, appliances 10%)
Agro sector & forest	No sub-sector diversification
Energy system (E)	Transmission and distribution network losses (66% power system, 33% heat system)
	Transformation losses (Heat generation 20%)

3.10 Evaluation and ranking of measures

3.10.1 Ranking of sector measures under the moderate growth scenario

The first evaluation is made for the **moderate growth scenario with a** target EE in 2020 of 0.8 Mtoe.

By applying the above described evaluation scheme at the 30 identified packages of measures which include a dedicated EE investment in the sectors residential/household, industry, transport, service/trade and energy system, the scoring results in a ranking as follow.

Table 21: Ranking of measures under the moderate growth scenario

Rank	Code	Short title of measure (package)	Total evaluation points	Absolute Energy Saving potential (Mtoe)	Total Cost Efficiency (toe/MEUR)	Total Points of Appropriateness
1	E 01	Efficient power system -EED	7,39	0,040	322	4,00
2	H 05	Metering & billing – EED	7,01	0,122	208	4,00
3	S 08	ESCO/ENPC- EED	6,91	0,043	168	4,42
4	H 01	Building road map MAB –EED 4	6,42	0,123	137	3,75
5	E 03	CHP promotion – EED	6,36	0,050	221	3,75
6	I 02	Large ind. consumer incentive	6,01	0,275	306	1,75
7	S 03	EE central gov buildings –EED	5,60	0,046	256	3,67
8	S 02	Efficient appliances & light - EED	5,09	0,005	255	3,33
9	H 06	Energy Audits & EM - EED	5,01	0,023	2.895	3,25
10	H 04	HH appliances	4,97	0,122	416	1,17
11	H 02	“Warm apartment”	4,79	0,092	171	1,92
12	I 01	EE Heavy industry	4,56	0,056	937	1,17
13	I 04	EE in SME	4,37	0,085	228	1,42
14	I 03	EE large industry	4,25	0,019	311	1,17
15	I 05	Industry EE equipment	4,14	0,013	462	0,92
16	T 04	Urban Public Transport EE	4,14	0,037	324	1,25
17	H 03	“Warm house”	3,96	0,319	106	0,50
18	S 05	EE public lighting	3,91	0,017	88	2,08
19	S 06	EE municipal water	3,67	0,001	397	0,83
20	S 04	EE municipal buildings	3,59	0,021	276	0,83
21	S 01	Trade and service EE	3,44	0,057	181	1,00
22	H 07	Zero Energy Building -EED	3,04	0,000	196	1,25
23	E 04	DH EE programme	2,99	0,068	61	1,25
24	T 02	Transport EE commercial	2,73	0,036	24	0,83
25	E 02	Smart metering	2,67	0,019	121	0,50
26	T 01	Transport EE cars	2,43	0,030	20	0,58
27	S 07	Municipal EE and EM	2,17	0,000	0	2,17
28	T 03	Transport EE rail	2,12	0,036	200	0,83
29	T 05	Alternative mobility	1,69	0,004	631	0,00
30	E 05	Obligation scheme utilities	0,00	1,625	175	0,00

The 10 highest scored packages of measure can generate, according to the assumptions in the model energy savings of 0.85 Mtoe.

Within those 10 measures all requirements of the EED are covered, as well as the key areas of ANRE responsibility. The exemption is the Obligation scheme for utilities (EED Art 7), which is the "alternative" to the set of the 10 measures. This measure E 05 has the potential to generate up to 1.6 Mtoe. Due to the low appropriateness of E 05 it is recommended to apply the alternative of 10 measures.

Another angle for ranking can be primary on the Total Cost Efficiency (kWh/EUR). The 16 highest scored measures, which means highest cost efficient once, all above 2.5 kWh saving per EUR costs, would be required to implement to reach the EE target in 2020 of 0,8 Mtoe.

Another angle for ranking can be primary on the Absolute Energy Saving (Mtoe). The 4 highest scored measures would be required to implement to reach the EE target in 2020 of 0.8 Mtoe.

Table 22: Ranking of measure under criteria cost efficiency and absolute EE (moderate growth)

Rank	Short title of measure (package)	Total Cost Efficiency (kWh/EUR)
1	Energy Audits & EM - EED	33,67
2	EE Heavy industry	10,89
3	Alternative mobility	7,34
4	Industry EE equipment	5,37
5	HH appliances	4,84
6	EE municipal water	4,62
7	Urban Public Transport EE	3,76
8	Efficient power system -EED	3,74
9	EE large industry	3,61
10	Large ind. consumer incentive	3,55
11	EE municipal buildings	3,21
12	EE central gov buildings –EED	2,98
13	Efficient appliances & light - EED	2,97
14	EE in SME	2,65
15	CHP promotion – EED	2,57
16	Metering & billing – EED	2,42

Rank	Short title of measure (package)	Absolute Energy Saving (Mtoe)
1	"Warm house"	0,319
2	Large ind. consumer tax	0,275
3	Building road map MAB –EED 4	0,123
4	Metering & billing – EED	0,122

As a result of this comparative ranking the following packages of measures in addition to the top-10 ranked measures shall be taken into consideration, as they are high efficient:

a) In industry sector, measures: EE Heavy industry, Industry EE equipment, EE large industry, EE in SME
b) Transport sector, measure: Urban Public Transport EE
c) In service sector, measure: EE municipal buildings

Other listed measures under this ranking, such as Alternative mobility and EE municipal water can be neglected due to the very low EE potential.

In addition, the "Warm house" programme (H 03) can achieve with an outreach of just 10% up to 0.32 Mtoe, which represents a third of the EE target.

3.10.2 Ranking of sector measures under the high growth scenario

The second evaluation is made for the **moderate high scenario with a** target EE in 2020 at 9.54 Mtoe.

Two assumptions of the described evaluation scheme will change in comparison with the moderate growth scenario:

- Outreach of the measure in 2020, of the total market: From average 32%, 50% higher in average → 73% in average
- In order to achieve a higher outreach the costs for non-investment measures (legislation, promotion, support instruments) need to be higher by 45% in average.

The respective scoring results in a ranking of measures for the high growth scenario as follow.

Table 23: Ranking of measures under the high growth scenario

Rank	Code	Short title of measure (package)	Total evaluation points	Absolute Energy Saving potential (Mtoe)	Total Cost Efficiency (toe/MEUR)	Total Points of Appropriateness
1	E 01	Efficient power system -EED	7,38	0,143	357	4,0
2	S 08	ESCO/ENPC- EED	7,01	0,641	180	4,4
3	H 05	Metering & billing – EED	6,69	0,122	237	4,0
4	E 03	CHP promotion – EED	6,36	0,240	246	3,8
5	H 01	Building road map MAB –EED 4	6,11	0,453	144	3,8
6	S 03	EE central gov buildings –EED	5,52	0,062	274	3,7
7	I 02	Large ind. consumer incentive	5,51	1,256	697	1,8
8	S 02	Efficient appliances & light - EED	5,16	0,023	272	3,3
9	H 06	Energy Audits & EM - EED	4,94	0,070	3.380	3,3
10	I 01	EE Heavy industry	4,68	0,980	2.040	1,2
11	H 04	HH appliances	4,63	0,462	451	1,2
12	H 02	"Warm apartment"	4,56	0,263	183	1,9
13	I 03	EE large industry	4,38	0,137	381	1,2
14	I 04	EE in SME	4,29	0,439	251	1,4
15	T 04	Urban Public Transport EE	4,13	0,137	404	1,3
16	I 05	Industry EE equipment	4,11	0,074	447	0,9
17	S 05	EE public lighting	3,89	0,048	94	2,1
18	S 06	EE municipal water	3,67	0,004	618	0,8
19	S 04	EE municipal buildings	3,64	0,081	299	0,8
20	S 01	Trade and service EE	3,33	0,209	191	1,0
21	H 07	Zero Energy Building -EED	3,18	0,002	226	1,3
22	H 03	"Warm house"	2,90	1,329	63	0,5
23	E 04	DH EE programme	2,81	0,202	67	1,3
24	E 02	Smart metering	2,68	0,126	131	0,5
25	T 02	Transport EE commercial	2,67	0,185	28	0,8

26	T 01	Transport EE cars	2,37	0,109	24	0,6
27	T 03	Transport EE rail	2,19	0,114	237	0,8
28	S 07	Municipal EE and EM	2,17	0,000	0	2,2
29	T 05	Alternative mobility	1,82	0,445	741	0,0
30	E 05	Obligation scheme utilities	3,35	2,198	189	0,0

The 10 highest scored packages of measure can generate, according to the assumptions in the model energy savings of 3.99 Mtoe.

The implementation of 29 packages of measures can generate energy saving at the amount of 8.4 Mtoe, which is still not sufficient to reach the EE target of 9.54 Mtoe. Consequently, all 30 packages of measures, including the "obligation scheme utilities" (with EE potential of 2.2 Mtoe), need to be implemented to reach the EE target in 2020 under the high growth scenario.

Within the top 10 ranked measures all requirements of the EED are covered, as well as the key areas of ANRE responsibility.

Another angle for ranking can be primary on the Total Cost Efficiency (kWh/EUR). The 10 highest scored measures, which mean highest cost efficient once, all above 4.0 kWh saving per EUR costs, can achieve EE of 3.7 Mtoe, which is 60% below the EE target in 2020 of 9.54 Mtoe.

Another angle for ranking can be primary on the Absolute Energy Saving (Mtoe). The 10 highest scored measures can achieve EE of 6.5 Mtoe, which is 30% below the EE target in 2020 of 9.54 Mtoe.

Table 24: Ranking of measure under criteria cost efficiency and absolute EE (high growth)

Rank	Short title of measure (package)	Total Cost Efficiency (kWh/EUR)
1	Energy Audits & EM - EED	39,31
2	EE Heavy industry	23,72
3	Alternative mobility	8,62
4	Large ind. consumer incentive	8,11
5	EE municipal water	7,19
6	HH appliances	5,25
7	Industry EE equipment	5,20
8	Urban Public Transport EE	4,70
9	EE large industry	4,43
10	Efficient power system -EED	4,15

Rank	Short title of measure (package)	Absolute Energy Saving (Mtoe)
1	"Warm house"	1,329
2	Large ind. consumer incentive	1,256
3	EE Heavy industry	0,980
4	ESCO/ENPC- EED	0,641
5	HH appliances	0,462
6	Building road map MAB –EED 4	0,453
7	Alternative mobility	0,445
8	EE in SME	0,439
9	"Warm apartment"	0,263
10	CHP promotion – EED	0,240

As a result of this comparative ranking the following packages of measures in addition to the top-10 ranked measures shall be taken into consideration for the high growth scenario, as they have a high potential of contribution to the EE target of 2020:

a) In residential/ household sector, measures: "Warm house" programme, "warm apartment" programme and EE appliances
b) In industry sector, measures : EE in SME

c) In Efficiency in energy system, measure: "obligation scheme utilities " E-05 ; EE potential of 2.2 Mtoe.

3.10.3 Ranking of cross-sector horizontal measures

The cross sector horizontal measures have been evaluated by applying the four qualitative criteria.

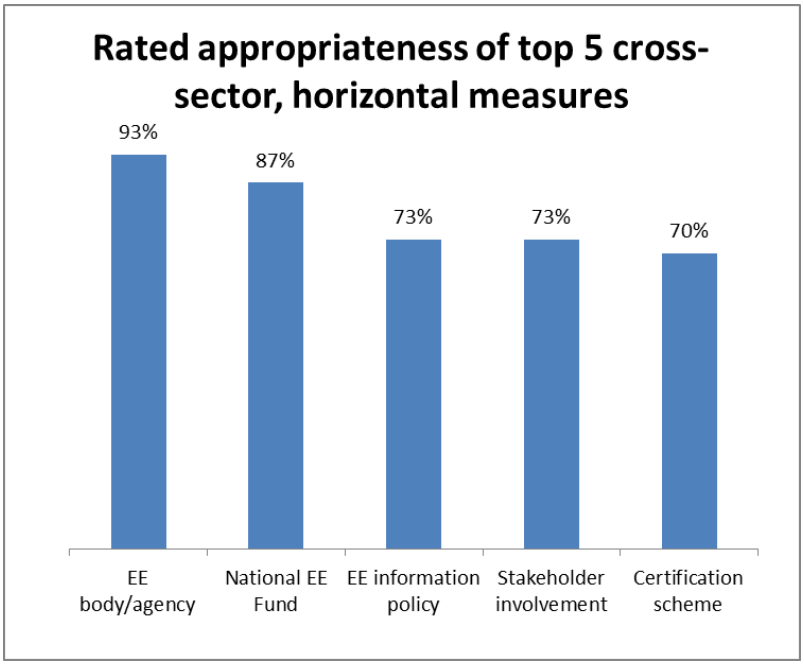
The ranking of 8 "long-listed" cross sector horizontal measures is as follow:

Table 25: Ranking of cross sector horizontal measure

Rank	Code	Title of measure (package)	Total Points of evaluation
1	C 01	Establishment of dedicated EE body for advice, supervision and monitoring of NEEAP	4,67
2	C 08	Energy Efficiency National Fund (addressing EED Art. 20)	4,33
3	C 02	Information on EE policy , schemes and facilities (addressing EED Art 12, 17, 19)	3,67
4	C 04	Stakeholder involvement and training (addressing EED Art. 17)	3,67
5	C 05	Qualification, accreditation and certification schemes and training (addressing EED Art 16)	3,50
6	C 07	Stimulate local production of energy saving equipment	0,83
7	C 03	Horizontal EE promotion	0,75
8	C 06	Activate the research potential on EE	0,50

The 5 highest scored packages of cross sector horizontal packages of measure are complementary to the 10 highest ranked sector packages. Those 5 measures reach a score of appropriateness of above 70% (representing < 3.5 points). They cover additional all requirements of the EED as well as the key areas of ANRE responsibility.

Figure 14: Rated appropriateness of top 5 cross sector, horizontal measures



Again, those cross-sector horizontal measures are a per-requisite for the effective implementation of the 10 sector related measures; they are complementary.

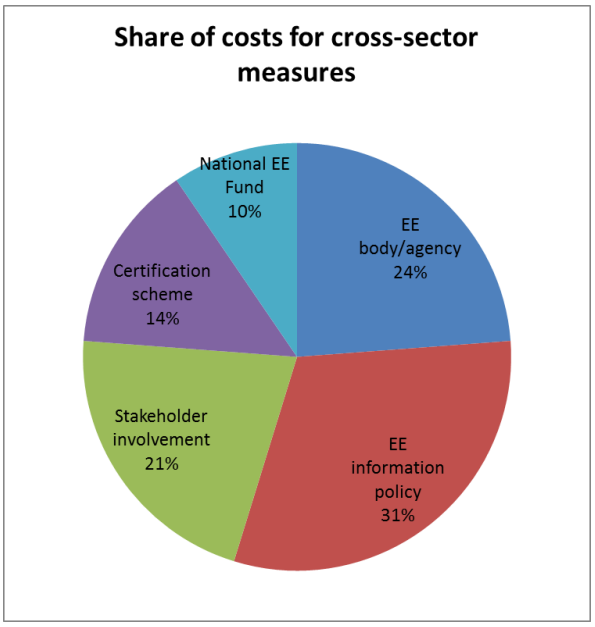
The remaining three horizontal measures can be neglected, as they reach a score below 1, which means less than 20% appropriateness form the evaluator point of view.

A preliminary description of the five cross sector horizontal measures with instruments, targets, budget and responsibilities is provided in section 4.5.

The overall costs for the recommended five cross-sector horizontal measures over a time period of 6 years (2014-20) are estimated with 2.1 million EUR.

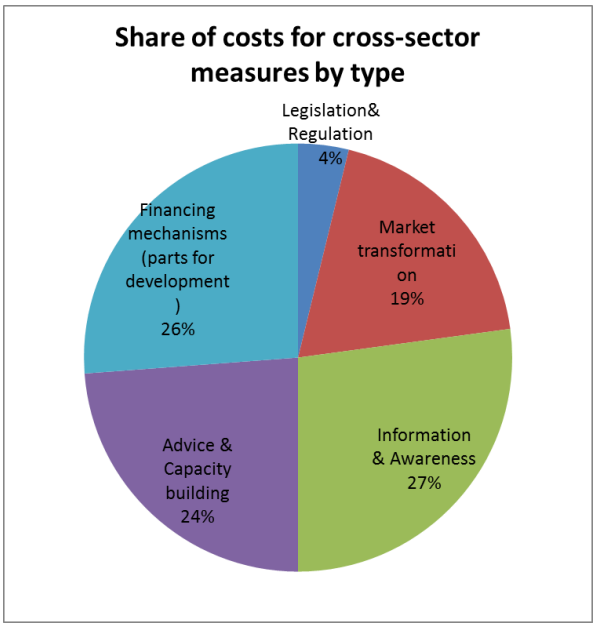
Most of the planned measures shall be implemented by the "dedicated EE Authority". Thus the major part of the costs of the measures will be covered by the budget for the operation of the EE Authority. External TA will be required, e.g. for the design of specific regulation or technical implementation of events and instruments.

Figure 15: Share of costs for cross-sector measures



Source: Consultant's estimation

Figure 16: Share of costs for cross-sector measures by type of instrument



Note: under the position "Financing mechanisms" only those costs are considered which are required for the preparation, acquisition and management of the instrument; not the direct volume of the financing instrument. The latter are allocated in the respective sartorial measure.

It will be possible to acquire some 10-20%, estimated at 300.00 EUR, of the costs as grant co-funding from ESCF, other EC EE programmes and from stakeholders (such as suppliers, utilities). Those co-financiers will request that the measure co-benefit their objectives. Consequently relevant elements of the measure shall be prepared (formulated or adjusted) to become eligible for co-financing.

The annual costs, remaining to be covered by the state budget for cross sector measures will be in the range of EUR 0.3-0.5 million. The costs of annual none-investment measures planned for the implementation of the 10 recommended sector measures amount to EUR 1 million (70% state budget, details refer to section 3.12). Taken together, the allocation of EUR 1.5 million annual from the state budget will provide the enabling framework for the implementation of the 10 measures required to achieve the EE target in 2020 under the moderate growth scenario.

3.11 Energy saving potential resulting from measures and their contribution to EE targets

3.11.1 EE potential - moderate growth scenario

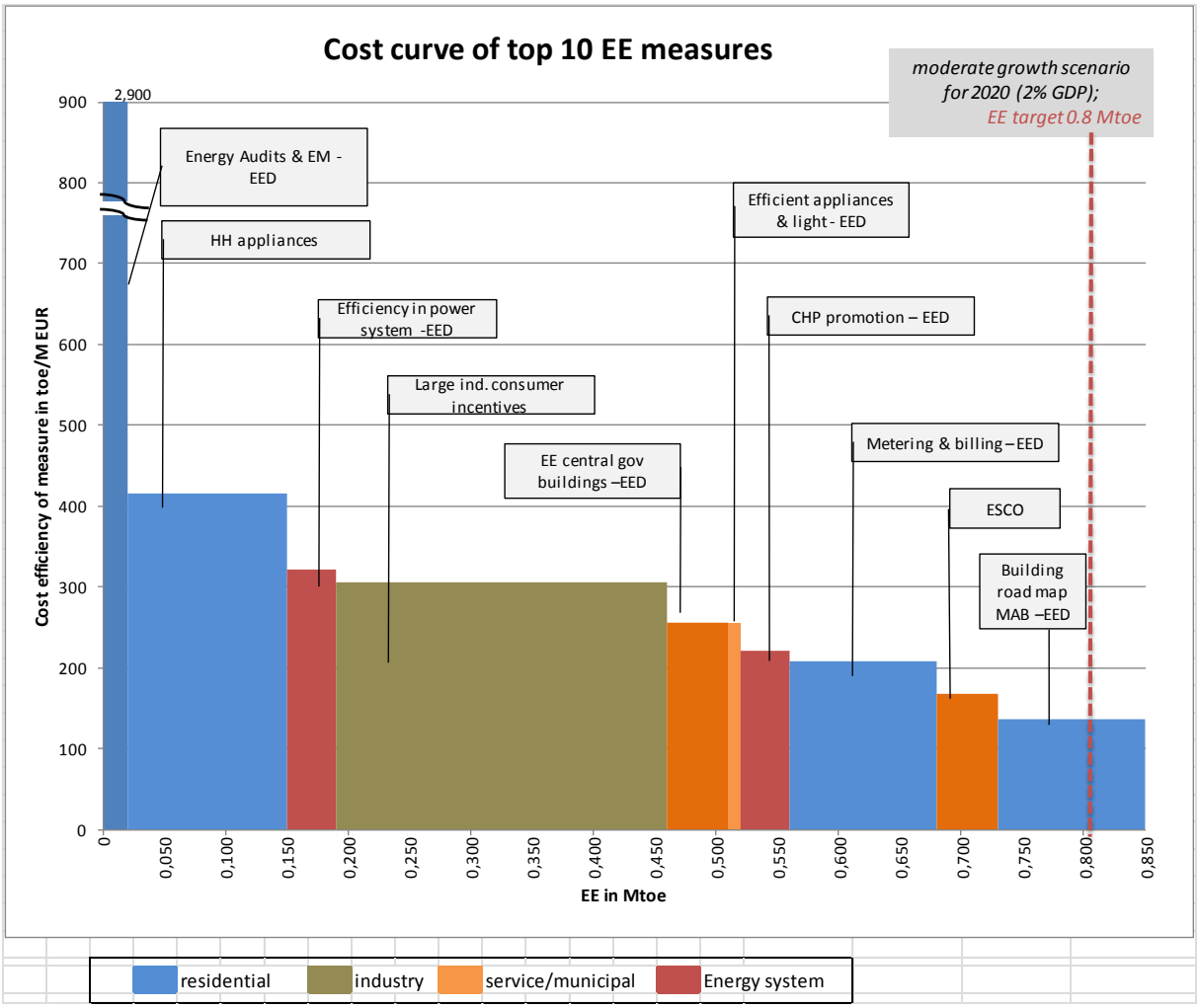
As a result of the multi-dimensional evaluation of 30 packages of measures with a related EE investment component under the moderate growth scenario it is recommended to consider in the NEEAP the following 10 packages:

Table 26: Calculated EE potential selected top 10 EE measures under moderate growth scenario

Rank	Code	Short title of measure (package)	Total evaluation points	Absolute Energy Saving potential (Mtoe)	Total Cost Efficiency (kWh/EUR)	Total Points of Appropriateness
1	E 01	Efficient power system -EED	7,39	0,040	3,74	4,00
2	H 05	Metering & billing – EED	7,01	0,122	2,42	4,00
3	S 08	ESCO/ENPC- EED	6,91	0,043	1,95	4,42
4	H 01	Building road map MAB –EED 4	6,42	0,123	1,59	3,75
5	E 03	CHP promotion – EED	6,36	0,050	2,57	3,75
6	I 02	Large ind. consumer tax	6,01	0,275	3,55	1,75
7	S 03	EE central gov buildings –EED	5,60	0,046	2,98	3,67
8	S 02	Efficient appliances & light - EED	5,09	0,005	2,97	3,33
9	H 06	Energy Audits & EM - EED	5,01	0,023	33,67	3,25
10	H 04	HH appliances	4,97	0,122	4,84	1,17

A next step in the prioritisation is to apply a cost curve which ranks the measures according to their total cost efficiency along the contribution to the EE target.

Figure 17: Cost curve of recommended top 10 measures under the moderate growth scenario



This leads to the result that the 10 high efficient packages of measures - the "low hanging fruit" will be sufficient to teach the EE target of 0.8 Mtoe in 2020 under the moderate growth scenario.

Within those 10 measures all requirements of the EED are covered, as well as the key areas of ANRE responsibility.

The impact of selected top 10 EE measures is shown in the following table.

Table 27: Calculated EE impact of selected top 10 EE measures under moderate growth scenario

Component of energy balance, projected (Mtoe)	in 2020	EE by application of measures	in 2020 with EE	% of EE by sector	% of total EE
Gross inland consumption (PEC)	43,80	0,85	42,95	2%	
(E) Transformation losses	*6,86*	0,05	*6,81*	1%	*6%*
(E) Transmission and Distribution losses	*1,65*	0,04	*1,61*	2%	*5%*
Final energy consumption	27,68	0,76	26,92	3%	
(I) Heavy industry	4,60		*4,60*		
(I) Other large industry	1,76	0,28	*1,48*	16%	*32%*
(I) SME	2,01		*2,01*		
(T) Individual road transport	3,34		*3,34*		
(T) Commercial road transport	2,22		*2,22*		
(T) Rail transport	0,37		*0,37*		
(T) Public transport	1,48		*1,48*		

(H) HH heating &DWH	6,10	0,29	*5,81*	5%	*34%*
(H) HH appliances & lighting	2,87	0,12	*2,75*	4%	*14%*
(S) Service, trade	1,15		*1,15*		
(S) Municipalities and municipal services	1,15	0,07	*1,08*	6%	*9%*
Agro sector	0,63		*0,63*		

The energy saving with the top 10 measures will represent 2.7 % of FEC and 1.9% of PEC and amount to 0.85 Mtoe in 2020, thus achieving the EE target. Highest savings can be reached in the residential / household sector of up to 50% with four measures and in industry sector up to 33% with one measure. Consequently fife measures can achieve 80% of the EE target.

Figure 18: Areas of EE by top 10 measures

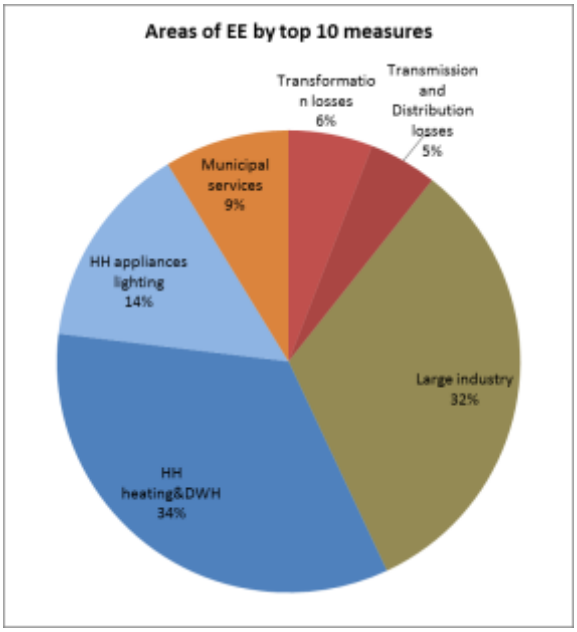
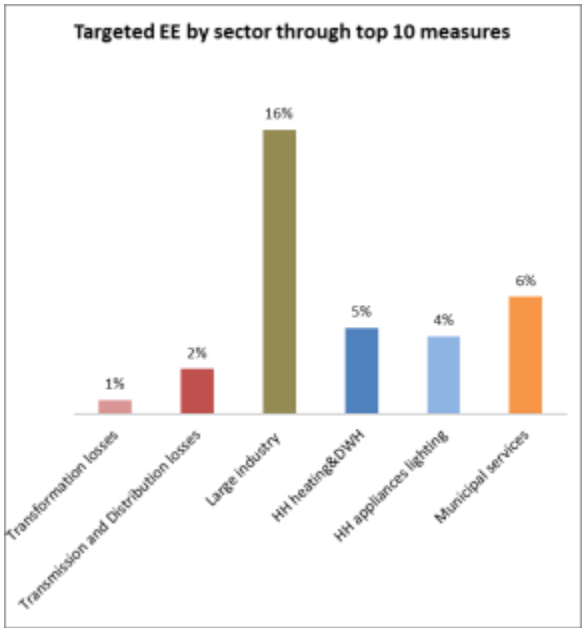


Figure 19: Targeted EE by sector through top 10 measures



3.11.2 EE potential - high growth scenario

As a result of the multi-dimensional evaluation of 30 packages of measures with a related EE investment component under the high growth scenario it is recommended to consider in the NEEAP the following 13 packages:

Table 28: Calculated EE potential selected top 13 EE measures under high growth scenario

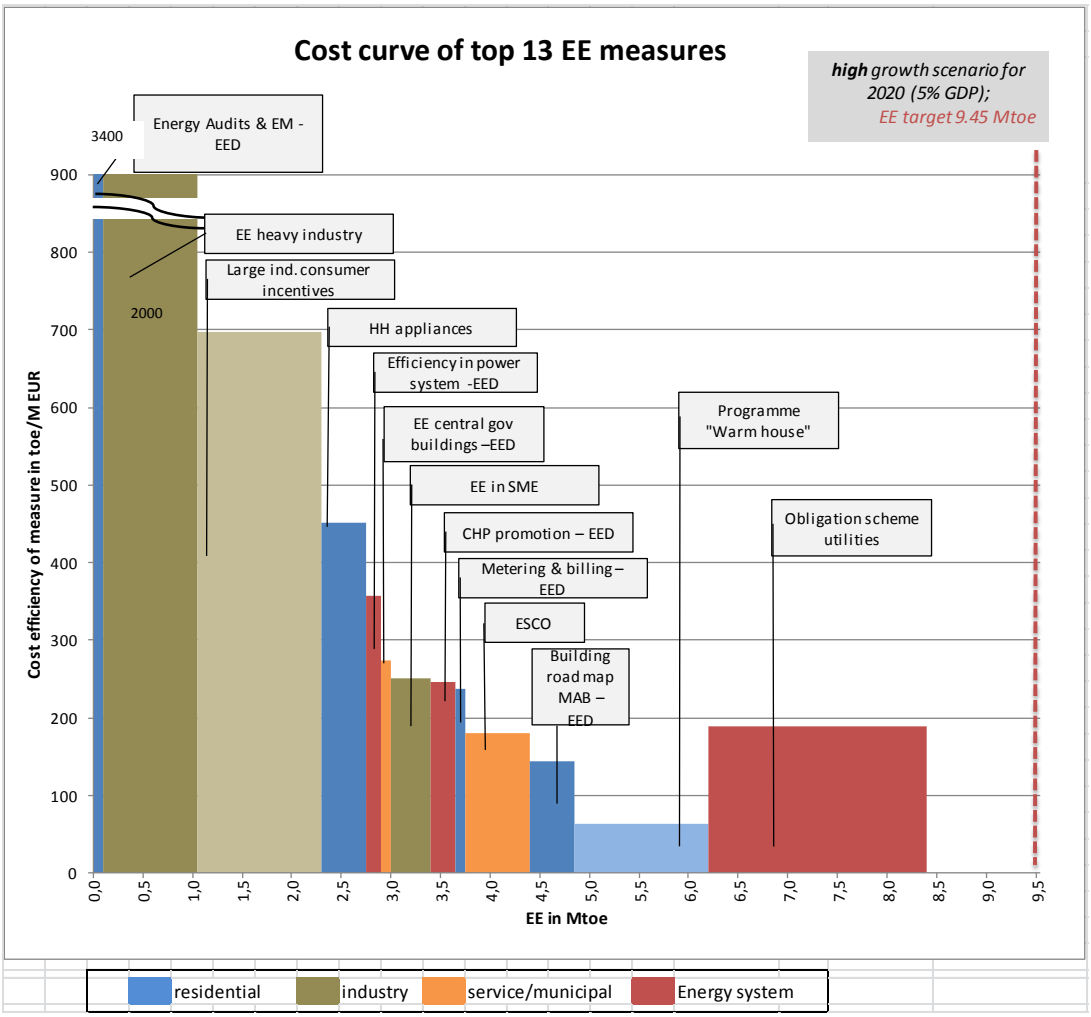
Rank	Code	Short title of measure (package)	Total evaluation points	Absolute Energy Saving potential (Mtoe)	Total Cost Efficiency (kWh/EUR)	Total Points of Appropriateness
1	E 01	Efficient power system -EED	7,38	0,143	4,15	4,0
2	S 08	ESCO/ENPC- EED	7,01	0,641	2,10	4,4
3	H 05	Metering & billing – EED	6,69	0,122	2,76	4,0

4	E 03	CHP promotion – EED	6,36	0,240	2,86	3,8
5	H 01	Building road map MAB –EED 4	6,11	0,453	1,67	3,8
6	S 03	EE central gov buildings –EED	5,52	0,062	3,18	3,7
7	I 02	Large ind. consumer tax	5,51	1,256	8,11	1,8
8	H 06	Energy Audits & EM - EED	4,94	0,070	39,31	3,3
9	I 01	EE Heavy industry	4,68	0,980	23,72	1,2
10	H 04	HH appliances	4,63	0,462	5,25	1,2
11	I 04	EE in SME	4,29	0,439	2,92	1,4
12	H 03	"Warm house"	2,90	1,329	0,74	0,5
	E 05	Obligation scheme utilities	3,35	2,198	2,20	0,0

They can generate energy saving at the amount of 8.4 Mtoe. Within the top 13 ranked measures all requirements of the EED are covered, as well as the key areas of ANRE responsibility.

The cost curve which ranks the measures according to their total cost efficiency along the contribution to the EE target is shown below.

Figure 20: Cost curve of recommended top 13 measures under the high growth scenario



The impact of selected top 10 EE measures is shown in the following table.

Table 29: Calculated EE impact of selected top 10 EE measures under high growth scenario

Component of energy balance, projected (Mtoe)	in 2020	EE by application of measures	in 2020 with EE	% of EE by sector	% of total EE
Gross inland consumption (PEC)	52,53	8,39	44,13	16%	
(E) Transformation losses	8,33	0,24	8,09	3%	3%
(E) Transmission and Distribution losses	2,00	0,14	1,86	7%	2%
Final energy consumption	34,08	8,01	26,07	24%	
(I) Heavy industry	5,48	2,25	3,23	41%	27%
(I) Other large industry	2,09	0,63	1,46	30%	7%
(I) SME	2,39	0,76	1,63	32%	9%
(T) Individual road transport	4,67		4,67		
(T) Commercial road transport	3,12		3,12		
(T) Rail transport	0,52		0,52		
(T) Public transport	2,08		2,08		
(H) HH heating &DWH	6,96	2,55	4,41	37%	30%
(H) HH appliances & lighting	3,27	1,45	1,83	44%	17%
(S) Service, trade	1,31		1,31		
(S) Municipalities and municipal services	1,31	0,38	0,93	29%	5%
Agro sector	0,88		0,88		

The energy saving with the top 13 measures will represent 24 % of FEC and 16 % of PEC and amount to 8.4 Mtoe in 2020. A gap of 1.15 Mtoe (12%) to the target EE in 2020 under the high growth scenario will remain. However, with a little slower GDP growth of annually 4.6% from 2015 instead of 5% the "moving" EE target of 8.4 Mtoe can be achieved with the 13 measures.

Highest savings can be reached in the residential / household sector of up to 47% with six measures and in industry sector up to 43% with four measures. Consequently ten measures can achieve 83% of the EE target.

Figure 21: Areas of EE by top 13 measures

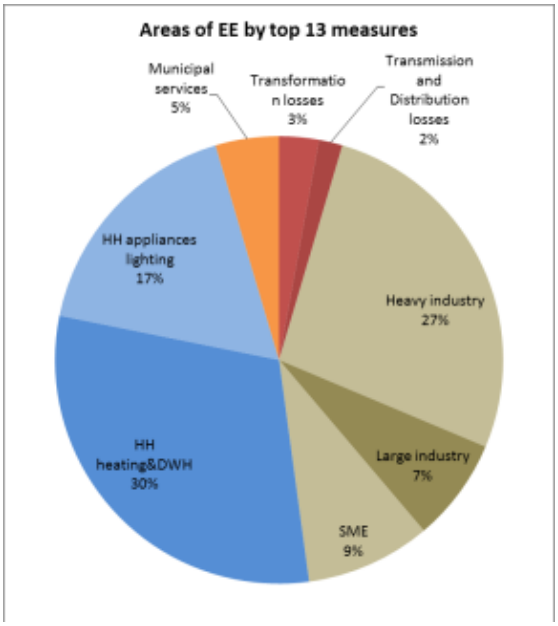
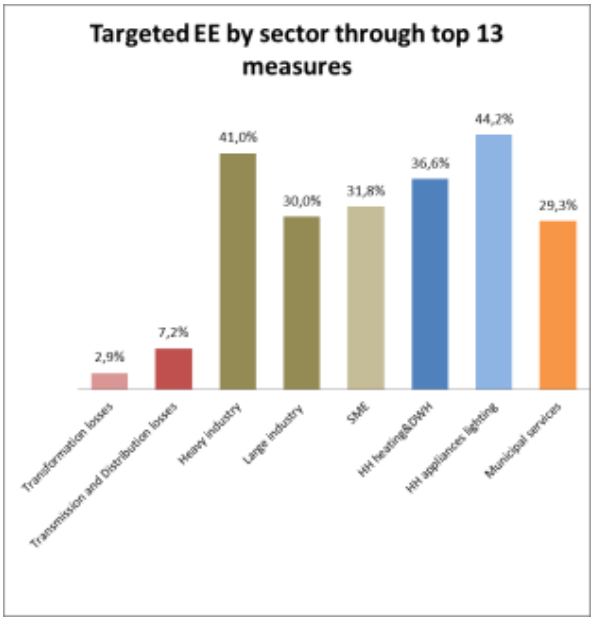


Figure 22: Targeted EE by sector through top 13 measures



3.12 Indicative Cost-Benefit-Analysis of recommended packages of measures

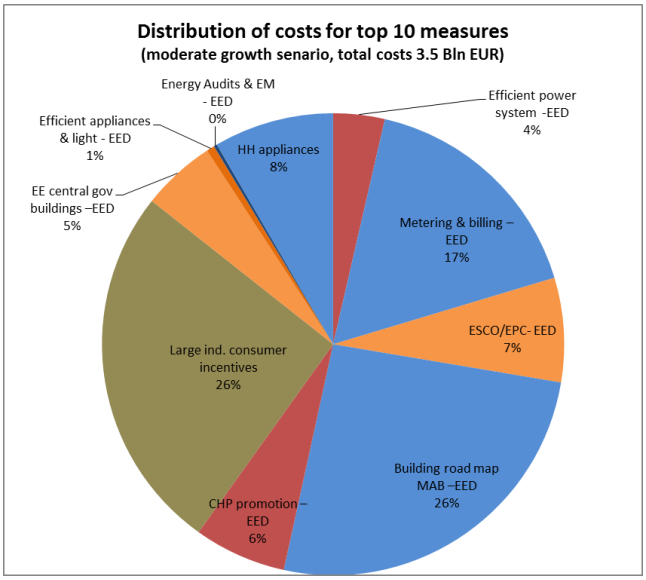
3.12.1 Cost-Benefit-Analysis for moderate growth scenario

Considering the top 10 measures of the **moderate growth scenario**, which have the potential to contribute 0.85 Mtoe per annum (100% of the EE target); the overall costs will about in the level of 3.5 Billion EUR. Those costs will occur over the period of implementation form 2015 to 2020, in average 5 years to reach the estimated outreach in the year 2020.

Assuming that all 10 measures will commence in 2015 with an equal investment over the 5 years, the costs per annum will amount to approx. 700 M EUR. Of this 1.5 million EUR shall be considered for non-investment costs, means for the preparation and implementation.

Table 30: Share of costs of top 10 measures (moderate scenario) over the implementation period 2015-2020

Top 10 ranked measures (package)	Investment costs (EUR)	Non-Investment costs (EUR)
Efficient power system - EED	125	0,8
Metering & billing – EED	584	1,5
ESCO/ENPC- EED	254	0,8
Building road map MAB – EED	900	0,9
CHP promotion – EED	225	0,5
Large ind. consumer incentives	900	0,4
EE central gov buildings – EED	180	0,6
Efficient appliances & light - EED	19	0,5
Energy Audits & EM - EED	8	0,4
HH appliances	292	1,3
TOTAL	**3487**	**7,7**
In %	**99.8%**	**0.2%**



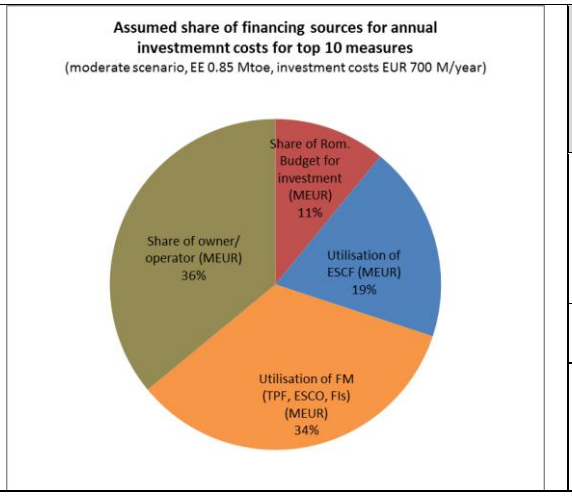
The annual EE by the investment of one fifth of the costs (equal annual share of 700 M EUR) will amount to approx. 0.17 Mtoe, summing up over the 5 years to 2.5 Mtoe energy savings.

The overall cost efficiency for those top 10 measures over an assumed implementation period of 5 years will be approx. 730 toe per M EUR investment , which is equal to 8.5 kWh/EUR annual EE per EURO costs.

The **financial effort for** the investment costs for those top 10 measures shall not be on the exclusively on the Romanian State budget. Each of the packages of measure has a potential of leveraging with the state budget contribution external financing sources (EU ESIF, TPF, ESCO, FIs, owner contribution) in average in the level of 1:9. For example; a high contribution of ESCF can be expected for building road map and EE in government building measures; a high share of financing form Banks' loan products can be expected for industry and energy sector measures; while a high share of own contribution from owners/operators can be expected energy sector and EE appliances.

Table 31: Assumption on financing sources for covering the required annual investment and non-investment costs for the top 10 measures (moderate scenario) over the implementation period 2015-2020

Potential source of funding	Assumed financing for annual investment costs (M EUR)	Assumed financing for annual non-investment costs
Utilisation of ESCF	134	EUR 0.4 M (30%)
Utilisation of FM (TPF, ESCO, FIs)	237	
Share of owner/ operator	251	
Share of Rom. Budget for investment	76	EUR 1.0 M (70%)
Total per annum : 697 M EUR		**EUR 1.5 M**



In addition, **co-financing of non-investment costs** can be acquired in the level of 30% of the total annual costs of EUR 1.5 M. An example is the contribution of equipment supplies (e.g. HH appliances) to the promotion of EE goods; or the financial involvement of energy utilities in the planning, implementation and promotion of the metering and billing and EE in energy system measures.

Summarising: To reach the target in 2020 of 0.80 Mtoe EE under the moderate growth scenario with the recommended top 10 measures annual funds of EUR 700 M are required. By enabling innovative financing mechanisms the share for the Romanian state budget can be reduced to 11%, equal to EUR 76 M. Approx. 70% of the required funds for non-investment costs need to be covered by the state budget. Both components sum up to an annual burden of EUR 77 M of the state budget for the top 10 measures planning, preparation, implementing and monitoring.

Considering this assumptions and ratio, the cost efficiency of the Romanian state budget contribution (5 yrs x EUR 77M) will be approx. 7 ktoe per M EUR investment (150 EUR/toe EE), which is equal to 80 kWh/EUR annual EE per EUR costs.

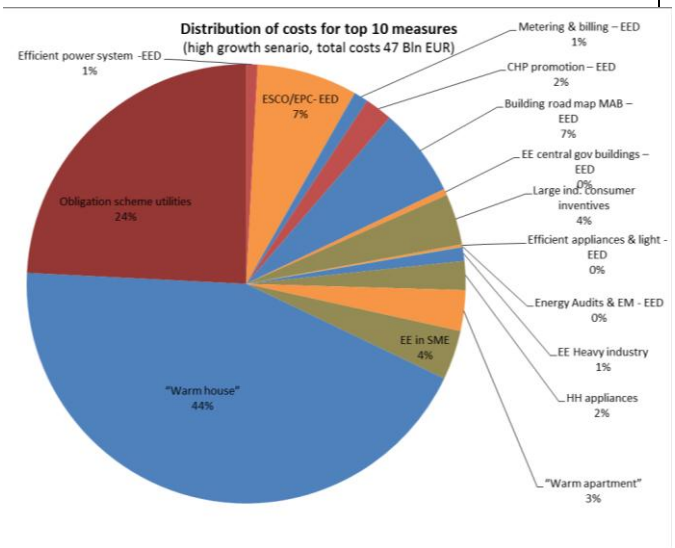
3.12.2 Cost-Benefit-Analysis for high growth scenario

Considering the top 13 measures of the **high growth scenario**, which have the potential to contribute 8.68 Mtoe per annum (100% of the EE target); the overall costs will about in the level of 47 Billion EUR. Those costs will occur over the period of implementation form 2015 to 2020, in average 5 years to reach the estimated outreach in the year 2020.

Assuming that all 13 measures will commence in 2015 with an equal investment over the 5 years, the costs per annum will amount to approx. 9.3 billion M EUR. Of this 2.7 million EUR shall be considered for non-investment costs, means for the preparation and implementation.

Table 32: Share of costs of top 13 measures (high scenario) over the implementation period 2015-2020

Top 13 ranked measures (package)	Investment costs (EUR)	Non-Investment costs (EUR)
Efficient power system - EED	400	1,2
ESCO/ENPC- EED	3.558	1,2
Metering & billing – EED	511	2,1
CHP promotion – EED	975	0,7
Building road map MAB – EED	3.150	1,2
EE central gov buildings – EED	225	0,8
Large ind. consumer incentives	1.800	0,6
Energy Audits & EM - EED	20	0,6
EE Heavy industry	480	0,2
HH appliances	1.022	1,9
EE in SME	1.750	0,3
"Warm house"	21.000	1,2
Obligation scheme utilities	11.630	1,5
Total (MEUR)	**46.521**	**13,4**



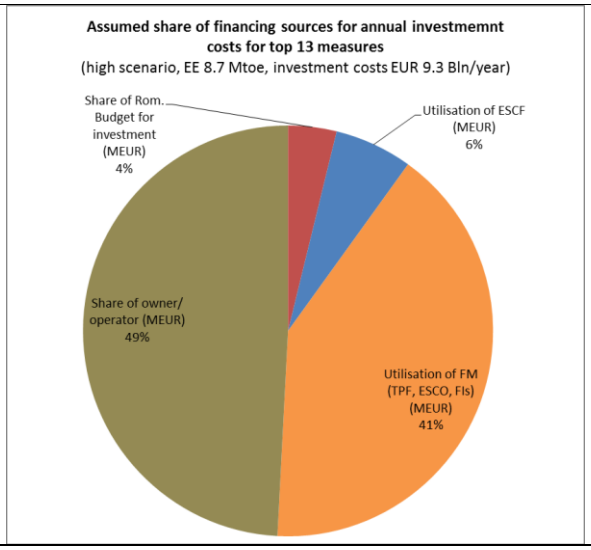
The annual EE by the investment of one fifth of the costs (equal annual share of 9.3 Bln EUR) will amount to approx. 1.74 Mtoe, summing up over the 5 years to 26 Mtoe energy savings.

The overall cost efficiency for those top 13 measures over an assumed implementation period of 5 years will be approx. 560 toe per M EUR investment, which is equal to 6.5 kWh/EUR annual EE per EURO costs.

Again, the **financial effort for** the investment costs for those top 13 measures shall not be on the exclusively on the Romanian State budget. Each of the packages of measure has a potential of leveraging with the state budget contribution external financing sources (EU ESIF, TPF, ESCO, FIs, owner contribution) in the range of 1:10 to 1:25. For example; a high contribution of ESCF can be expected for building road map and EE in government building measures; while a high share of own contribution from owners/operators can be expected for industry and energy sector, the latter in particulate for the obligations scheme measure.

Table 33: Assumption on financing sources for covering the required annual investment and non-investment costs for the top 13 measures (high scenario) over the implementation period 2015-2020

Potential source of funding	**Assumed financing for annual investment costs (M EUR)**		**Assumed financing for annual non-investment costs**
Utilisation of ESCF	571		EUR 1.0 M (40%)
Utilisation of FM (TPF, ESCO, FIs)	3,803		
Share of owner/ operator	4,575		
Share of Rom. Budget for investment	355		EUR 1.7 M (60%)
Total per annum : 9,300 M EUR			**EUR 2.7 M**



In addition, **co-financing of non-investment costs** can be acquired in the level of 35- 40% of the total annual costs of EUR 2.7 M.

Summarising: To reach the target in 2020 of 8.4 Mtoe EE under the high growth scenario with the recommended top 13 measures annual funds of EUR 9.3 billion are required. By enabling innovative financing mechanisms the share for the Romanian state budget can be reduced to 4%, equal to EUR 355 M. Approx. 60 % of the required funds for non-investment costs need to be covered by the state budget. Both components sum up to an annual burden of EUR 357 M of the state budget for the top 13 measures planning, preparation, implementing and monitoring.

Considering this assumptions and ratio, the cost efficiency of the Romanian state budget contribution (5 yrs x EUR 357 M, sum up to EUR 1.75 Billion) will be approx. 15 ktoe per M EUR investment (70 EUR/toe EE), which is equal to 170 kWh/EUR annual EE per EUR costs.

4 DESCRIPTION OF TOP PRIORITY PACKAGES OF MEASURES

The two scenarios "moderate" and "high" growth lead to a combined set of measures to be considered for the NEEAP as follow:

Table 34: Overview of recommended EE measures for moderate and high growth scenario

Packages of measures recommended for moderate growth scenario		Additional packages of measures recommended for high growth scenario	
End use residential / household sector (H)			
H 01	Building road map MAB –EED		
H 04	HH appliances		
H 05	Metering & billing – EED		
H 06	Energy Audits & EM - EED		
		H 03	"Warm house"
End use Industry sector (I)			
I 02	Large ind. consumer incentives		
		I 01	EE Heavy industry
		I 04	EE in SME
End use Tertiary, service and municipal sector (S)			
S 03	EE central gov buildings –EED		
S 08	ESCO/ENPC- EED		
S 02	Efficient appliances & light - EED	← *only for moderate growth scenario*	
Energy supply system - transformation, transmission and distribution (E)			
E 01	Efficient power system -EED		
E 03	CHP promotion – EED		
		E 05	Obligation scheme utilities
End use Transport sector (T)			
- none-			
Cross sector horizontal measures (C)			
C 01	EE body/agency		
C 08	National EE Fund		
C 02	EE information policy		
C 04	Stakeholder involvement		
C 05	Certification scheme		

These 19 packages of measures will be outlined as follow.

4.1 Packages of measures in end use residential / household sector (H)

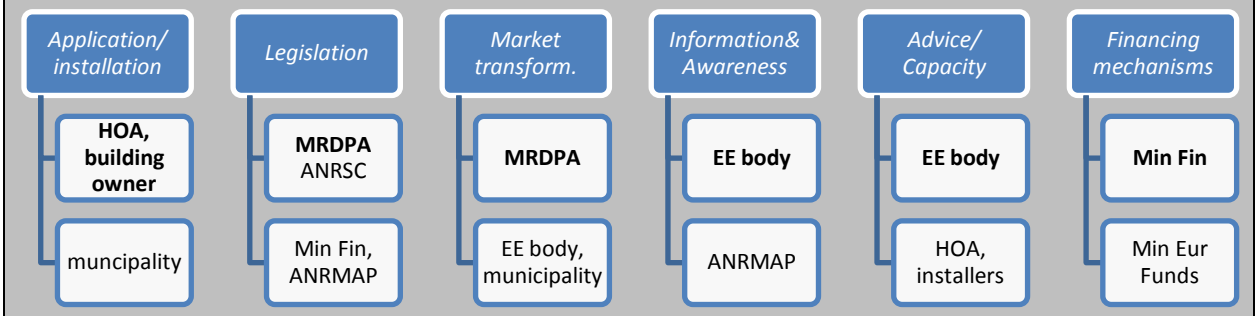
In the residential / household sector four packages of measures are recommended under the moderate growth scenario:

- H 01 Building renovation roadmap (addressing EED Art 4) multi-storey residential buildings
- H 04 Energy efficient household appliances
- H 05 Consumption based billing and metering of electricity, gas, heat hot water (addressing EED Art 9 - 11)
- H 06 Energy audits and energy management systems (addressing EED Art 8, 16).

In addition the package of measure H 03 "Rehabilitation programme "Warm house" is recommended for the high growth scenario, in the event that the GDP development picks up form year 2015.

4.1.1 Measure: Building renovation roadmap (addressing EED Art 4) multi-storey residential buildings

Title of package of measures H 01	**Building renovation roadmap (addressing EED Art 4) multi-storey residential buildings**			
Target of the package to be achieved in 2020	addressing EED Art 4 EE target in 2020: 0.123 Mtoe moderate scenario; 0.45 Mtoe high scenario Estimated FEC of this segment in2020: 1.52 Mtoe up to 1.74 Mtoe for high scenario			
Target group	Residents and owners of central heat supplied Multi-apartment buildings (multi-storey blocks)			
Description of measures NEEAP	Combination of 18 non-investment instruments			
Legislation& Regulation	1) Energy Performance Standards 2) Mandatory energy efficiency certificates for existing buildings 3) Mandatory audits in residential buildings 4) Mandatory heating pipe insulation 5) Mandatory measures for efficient lighting (stair, outside) 6) Minimum thermal insulation standards			
Market transformation	7) Obligatory energy audits and post completion verification audits 8) Technology procurement for energy efficient appliances and buildings			
Information& Awareness	9) Complementary information and standard project development			
Advice & Capacity building	10) Building renovation roadmap (EED Art 4) 11) Integrated database, in coordination with the thermal rehabilitation of buildings 12) Study on the national building stock with cost-effective approaches to renovations 13) Analysis of ENPC opportunities 14) Strengthening HOAs			
Financing mechanisms (parts for development)	15) Incentives for investments in new buildings exceeding building regulation 16) Split incentives in multi-owner properties 17) long-term strategy for mobilising investment in the renovation of buildings (use of EU Structural and Cohesion Funds) 18) Utilisation of TPF (ESCO, IFI loans)			
Target EE installations/ investments	Energy efficiency rehabilitation of building envelop Total applications entire market of respective sub-sector: 75,000 buildings Unit cost of investment measure: 60,000 EUR Expected outreach: 20% ; up to 70 % for high growth scenario Number of realised EE applications: 15,000 buildings / 52.000 buildings Estimated EE potential at application site: 30% Estimated Specific EE achievement per investment: 2.0 kWh/EUR			
Estimated Costs	costs of investment component			**900 million EUR**
	Costs of non-investment components (measures)			**850.000 EUR**
	Legislation& Regulation			300.000 EUR
	Market transformation			100.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			200.000 EUR
	Financing mechanisms			200.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 45 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	10%	100%		90,850,000 EUR
ESCF	45%			
ESCO	25%			
FI, credit line	20%			
Owner of the building	0%			
Potential Fin. Leverage Efficiency	1:9	0; all form state budget/ EE body		
Time schedule for implementation	2014: Immediate step: Building renovation roadmap, commence in 2014: Allocation of plan of measures and investments, regulatory measures, fund allocation 2015: commencement of all other non-investment measures Intended outreach of the measures in 2020 20%, 15,000 buildings			
Appropriateness of the package of the	Obligation/	Market	Development of	Economic

Title of package of measures H 01	**Building renovation roadmap (addressing EED Art 4) multi-storey residential buildings**			
measure	framework	Maturity	framework	Sustainability
	High – EED , art 4	medium	medium	Medium
Estimated Total Cost Efficiency	1.59 kWh per EUR investment + non-investment costs (moderate growth scenario) 4.2 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			
				
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 08 National EE Fund: for co-finding ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme: for monitoring			
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of applications/ installations in # and m² of building - Verification of EE by post implement energy audits			
Assumptions / specific considerations / Risks	- Capacities for implementation - Insufficient involvement of stakeholders - Insufficient raising of co-financing/ use of financing mechanisms - Lower EE result due to poor quality of installation - Appropriate planning and monitoring - Compliance with regulation due to lacking capacities and power and mechanisms			
Preconditions to reach the target	Road map, eligibility of investment measures under ECSF, operation of ESCO market			

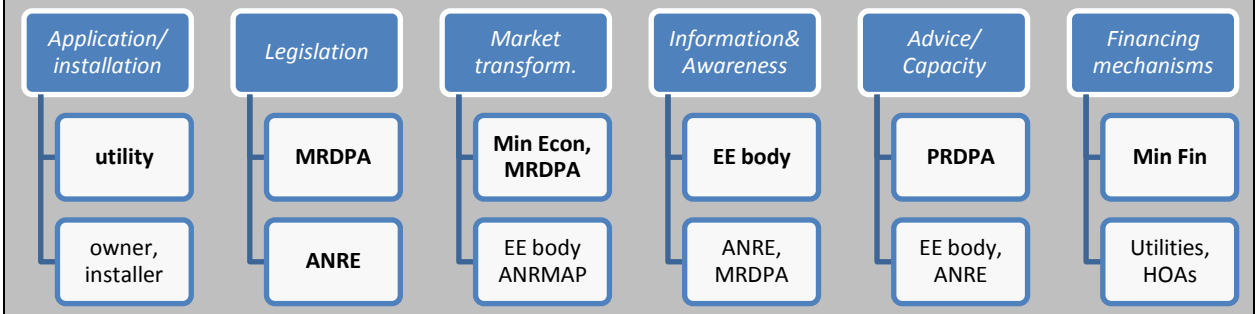
4.1.2 Measure: Energy efficient household appliances

Title of package of measures H 04	**Energy efficient household appliances**
Target of the package to be achieved in 2020	EE target in 2020: 0.122 Mtoe moderate scenario; 0.46 Mtoe high scenario Estimated FEC of this segment in2020: 2.87 Mtoe up to 3.72 Mtoe for high scenario
Target group	Residents in households
Description of measures NEEAP	Combination of 6 non-investment instruments
Legislation& Regulation	1) Minimum efficiency standards for electrical appliances 2) Labelling of EE lighting and household appliances
Information& Awareness	3) Promotion of higher EE performing appliances and LED lighting
Advice & Capacity building	4) Voluntary agreements with producers of White/ Brown Goods
Financing mechanisms (parts for development)	5) Vendor financing scheme with favourable conditions for high performing labelled products (grant component) 6) VAT reduction on retrofitting investment
Target EE installations/ investments	Appliances in households, High performance HH appliances and lighting Total applications entire market of respective sub-sector: 7.3 million households, 1 application per HH Unit cost of investment measure: 200 EUR (additional cost for higher energy

Title of package of measures H 04	**Energy efficient household appliances**			
	performance application) Expected outreach: 20% ; up to 70 % for high growth scenario Number of realised EE applications: 1.5 million / 5 million devices Estimated EE potential at application site: 25% Estimated Specific EE achievement per investment: 4.0 kWh/EUR			
Estimated Costs	costs of investment component			**292 million EUR**
	Costs of non-investment components (measures)			**1,3 million EUR**
	Legislation& Regulation			200.000 EUR
	Information& Awareness			400.000 EUR
	Advice & Capacity building			500.000 EUR
	Financing mechanisms			200.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 45 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	2%	100%		7,140,000 EUR
ESCF				
ESCO				
FI, credit line	70%			
Resident/ owner	28%			
Other/ vendor		0-20%		
Potential Fin. Leverage Efficiency	1:20	0; all form state budget/ EE body		
Time schedule for implementation	2015: standards, development of vendor financing scheme, promotion 2016: voluntary agreements 2015: commencement of all other non-investment measures Intended outreach of the measures in 2020 20%, 1.5 million devices			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	low	medium	low	Medium-high
Estimated Total Cost Efficiency	4.8 kWh per EUR investment + non-investment costs (moderate growth scenario) 5.2kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			
	Application/ installation: **resident**, supplier *Legislation*: **EE body**, performance instiute *Information& Awareness*: **EE body** *Advice/ Capacity*: **EE body**, installers *Financing mechanisms*: **Min Fin**, FIs, vendors			
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring, promotion ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: vendors			
Monitoring indicators of achievement	- EE achieved according to FEC in the HH sector (energy balance) - Number of applications/ installations based on sales figures			
Assumptions / specific considerations / Risks	- Awareness - Affordability of higher EE devices - Availability of vendors and financing mechanisms			
Preconditions to reach the target	n/a			

4.1.3 Measure: Consumption based billing and metering of electricity, gas, heat hot water

Title of package of measures H 05	**Consumption based billing and metering of electricity, gas, heat hot water**			
Target of the package to be achieved in 2020	addressing EED Art 9-11 EE target in 2020: 0.122 Mtoe Estimated FEC of this segment in2020: 6.1 Mtoe up to 7.0 Mtoe for high scenario			
Target group	Cross sector energy consumers (households, industry, service, public)			
Description of measures NEEAP	Combination of 14 non-investment instruments			
Legislation& Regulation	1) Billing information scheme (free of charge) 2) Obligation to utilities to implement smart metering (for new and replacement need) 3) Thermostatic zone control			
Market transformation	4) Public procurement programmes			
Information& Awareness	5) Awareness campaign on the benefits, opportunities to influence the energy bill 6) communication and information measures facilitating the engagement of during the roll-out of smart meters 7) Demonstrate the efficiency of remote control and metering of DH substations			
Advice & Capacity building	8) Preparation, supervision and control of standardised demonstration project "Heat control and measuring" 9) training courses for installers 10) Train owners of multi-storey houses on the process: installation, reading and billing			
Financing mechanisms (parts for development)	11) Grant component for smart meters installed by utilities 12) Grant component for installation of heat control devices 13) Energy bill incentives for low income residents 14) support schemes for housing cooperatives and similar organisations of end-users			
Target EE installations/ investments	Individual meters in combination with control devices Total applications entire market of respective sub-sector: 7.3 million households, 1-2 meters per HH Unit cost of investment measure: 100-150 EUR Expected outreach: 70-80% Number of realised EE applications: 5.8 million meters Estimated EE potential at application site: 5% due to change of behaviour			
Estimated Costs	costs of investment component			**585million EUR**
	Costs of non-investment components (measures)			**1.450.000 EUR**
	Legislation& Regulation			1.000.000 EUR
	Market transformation			50.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			150.000 EUR
	Financing mechanisms			200.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 45 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	10%	100%		58,400,000 EUR
ESCF				
ESCO/ utility	50%	0-10% from utility		
FI, credit line				
Owner of the apartment	40%			
Potential Fin. Leverage Efficiency	1:9	0; all form state budget/ EE body/		
Time schedule for implementation	2014: implementation plan Intended outreach of the measures in 2020 20%, 5.8 million meters			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High –EED, art 9-11	high	high	low
Estimated Total Cost Efficiency	2.4 kWh per EUR investment + non-investment costs (moderate growth scenario) 2.75 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			

Title of package of measures H 05	Consumption based billing and metering of electricity, gas, heat hot water
	
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme: for installers of meters
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of applications/ installations - Meter reading protocols and balances of utilities
Assumptions / specific considerations / Risks	- Capacities for implementation - quality of installation of meters - Appropriate planning and monitoring - Compliance with regulation
Preconditions to reach the target	n/a

4.1.4 Measure: Energy audits and energy management systems

Title of package of measures H 06	Energy audits and energy management systems	
Target of the package to be achieved in 2020	addressing EED Art 8 and 16 EE target in 2020: 0.02 Mtoe moderate scenario; 0.07 Mtoe high scenario Estimated FEC of this segment in2020: 1.52 Mtoe up to 1.74 Mtoe for high scenario	
Target group	Cross sub-sector (buildings and services)	
Description of measures NEEAP	Combination of 9 non-investment instruments	
Legislation& Regulation	1) Improvement of energy audit methodology 2) Regulation on supervision by independent authority 3) Accreditation and certification schemes for energy auditors	
Information& Awareness	4) Programme to raise awareness among households of the benefits of energy audits	
Advice & Capacity building	5) Training programmes for the qualification of energy auditors 6) Training of installation companies for building envelop EE 7) Cooperation with energy services and installers 8) monitoring of results and accuracy of energy audits	
Financing mechanisms (parts for development)	9) Grant and TPF co-financing of energy audits	
Target EE installations/ investments	Identification of EE investments through energy audits Triggering EE investments and installation of control devices (low cost) Total applications entire market of respective sub-sector: 50,000 buildings Unit cost of investment measure: 500 EUR Expected outreach: 30% ; up to 80 % for high growth scenario Number of realised EE applications: 15,000 buildings / 40.000 buildings Estimated EE potential at application site: 10% Estimated Specific EE achievement per investment: 34 kWh/EUR	
Estimated Costs	costs of investment component	**7.5 million EUR**
	Costs of non-investment components (measures)	**400.000 EUR**

Title of package of measures H 06	**Energy audits and energy management systems**			
	Legislation& Regulation			100.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			50.000 EUR
	Financing mechanisms			200.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be30 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	100%	100%		7.9 million EUR
ESCF				
ESCO				
FI, credit line				
Owner of the building	%			
Potential Fin. Leverage Efficiency		0; all form state budget/ EE body		
Time schedule for implementation	2014: Immediate steps: Improvement of energy audit methodology , Regulation on supervision by independent authority Accreditation and certification schemes for energy auditors 2014/15: Capacity development of energy auditors, stakeholder involvement, installation companies, energy suppliers (in case of activation of obligation scheme), etc. Intended outreach of the measures in 2020 20%, 15,000 buildings			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED , art 8,16	medium	Low	Medium
Estimated Total Cost Efficiency	34 kWh per EUR investment + non-investment costs (moderate growth scenario) 40 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			
	Application/ installation: **building owner**, Energy auditor *Legislation*: **ANRE**, MRDPA, ANRSC *Information& Awareness*: **EE body** *Advice/ Capacity*: **EE body**, installers, utilities *Financing mechanisms*: **Min Fin**, Min Eur Funds			
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring, training EA certification ➢ C 02 EE information policy: for awareness raising , promotion EAs ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme:			
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of implemented energy audits - Verification of EE by post implement energy audits			
Assumptions / specific considerations / Risks	- Capacities of energy auditors			
Preconditions to reach the target	Energy audits trigger EE investments			

4.1.5 Measure: Rehabilitation programme "Warm house

In the following only a summary of the package of measures H 03 is provided. The package H 03 shall be activated on demand, but needs at that time an adjustment of the planning on instruments, costs, benefits etc.

Title of package of measures H 03	**Rehabilitation programme "Warm house**			
Target of the package to be achieved in 2020	EE target in 2020: 1.33 Mtoe Estimated FEC of this segment in2020: up to 3.5 Mtoe for high scenario			
Target group	Heat supply in individual houses			
Description of measures NEEAP	Combination of 17 non-investment instruments			
Legislation& Regulation	1) Mandatory energy efficiency certificates for existing buildings 2) Mandatory energy efficiency certificates for new buildings 3) Labelling appliances of cooling/heating systems in individual homes 4) Mandatory use of solar thermal energy in buildings 5) Periodic mandatory inspection of boilers 6) Minimum thermal insulation standards 7) Minimum efficiency standards for boilers 8) Compulsory replacement of old boilers above a certain age 9) Control systems for heating (Regulation)			
Market transformation	10) Local production of EE equipment			
Information& Awareness	11) Programme promotion campaign with complementary information and standard project development 12) advice to users concerning the replacement of boilers and/or air conditioning systems			
Advice & Capacity building	13) Control mechanism for individual boilers with involvement of maintenance services of chimneys (chimney sweeps association)			
Financing mechanisms (parts for development)	14) Reduced interest rates (soft loans, e.g. by EEF) for energy efficient building renovation 15) Grant co-financing of energy audits 16) Grant co-funding of investment in renewables and micro CHP 17) VAT reduction on retrofitting investment			
Target EE installations/ investments	Heat supply in individual houses : Boiler improvement, Use of renewable energies, Building envelop Total applications entire market of respective sub-sector: 3 million individual houses Unit cost of investment measure: 10.000 EUR Expected outreach: 70% Number of realised EE applications: 2.1 million Estimated EE potential at application site: 35%			
Estimated Costs	costs of investment component			**21 billion EUR**
	Costs of non-investment components (measures)			**1.230.000 EUR**
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	low	low	low	low
Estimated Total Cost Efficiency	0.74 kWh per EUR investment + non-investment costs			

4.1.6 Recommended general principles for the design of residential / household measures:

- **Consumption based billing and thermal regulation are fundamental** – Metering of energy and water use at the building level needs to be universal. Once they have the knowledge of what they are consuming and a bill based on that consumption, households must have the means to regulate how much they consume.
- **Building energy performance standards and appliance labelling are essential** – To avoid future utility affordability problems, policies for new building construction and appliance standards should be enacted and enforced. Energy-efficiency procurement programs could

help increase the uptake of efficient technologies in existing housing that is still publicly owned, and set an example for residents in privatized housing.

- **Grant financing should be targeted** – Residential energy-efficiency programs for multifamily buildings should be structured to reach all households but have special provisions for vulnerable households so that they can afford to participate.
- **Existing social welfare benefits should help pay for efficiency** – The rules for using housing allowances and social benefit money should be made compatible with financing energy efficiency improvements. This feature allows pensioners and other lower-income households to pay for energy-efficiency investments by paying a higher amount in monthly fixed O&M costs until the loan is repaid.
- **Affordable housing programs should include energy efficiency** – Several countries have introduced programs to make housing more accessible and affordable to vulnerable populations. Affordable housing needs to be energy-efficient so that utility bills are manageable and to ensure satisfactory comfort and basic energy and water services.
- **Institutional strengthening is essential** – Many residential energy-efficiency programs work through housing associations, which may exclude many vulnerable households living in rented flats or buildings that have not associated. To reach these households requires working with community organizations, housing agencies and municipalities. One strategy to strengthen housing institutions is to offer an affordable consulting and information through housing advisory agencies (as in Lithuania, Armenia).
- **Municipalities need to be engaged** – Municipalities struggle with energy issues, need greater incentives to act and need to understand the longer term savings from short term residential energy efficiency investments.
- **Monitoring and evaluation of projects should include affordability impacts** – Better empirical data are needed about residential energy and water demand, and price elasticity for all income levels so that there is a greater understanding of which households are vulnerable to utility price reforms. Monitoring has to start from the beginning of a project.
- **Integrate end-use and supply-side efficiency** – Improvements in energy efficiency need to take place in both supply and end-use, as efficiently supplied utilities can be provided to consumers at a lower price. Better quality services must accompany price reforms.
- **Public awareness campaigns should make the link between affordability and efficient energy use** – as energy prices increase, the heat providers, government, private sector vendors of efficiency equipment, media and all institutions trying to address affordability concerns should publicize the results of local energy-efficiency projects and international experience when local examples are not available.

4.2 Packages of measures in end use Industry sector (I)

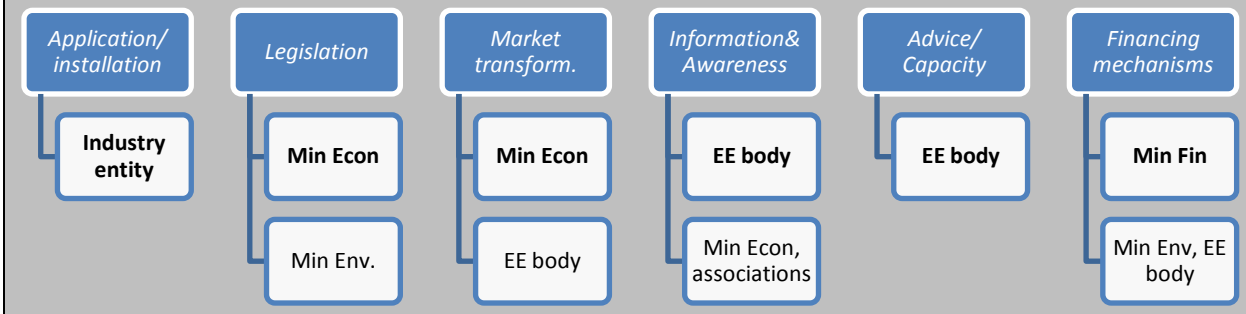
In the end energy use industry one packages of measures is recommended under the moderate growth scenario:

- I 02 Energy incentives for large energy consumers

In addition the package of measure I 01 "EE Heavy industry" and I 04 "EE in SME" are recommended for the high growth scenario, in the event that the industrial development picks up.

4.2.1 Measure: Incentives for large industrial consumer

Title of package of measures I 02	**Incentives for large industrial consumer**		
Target of the package to be achieved in 2020	EE target in 2020: 0.28 Mtoe moderate scenario; 1.25 Mtoe high scenario Estimated FEC of this segment in2020: 6.4 Mtoe up to 7.6 Mtoe for high scenario		
Target group	Heavy industry such as steel, refineries, chemical, large industry consumers such as food, wood, construction material		
Description of measures NEEAP	Combination of 6 non-investment instruments		
Legislation& Regulation	1) Obligations to reduce EE by Surplus Tax of energy costs for over exceed benchmark (Justification: CO2 emission intensity linked to energy consumption)		
Market transformation	2) Benchmarking of energy intensity for heavy industry (Use energy consumption of company compared with EU average benchmark for product)		
Information&Awareness	3) Information on benchmarking, EE opportunities, taxation and support facilities		
Advice & Capacity building	4) Transparent collecting scheme of additional energy tax (energy balance information by utilities, System by ANRE)		
Financing mechanisms (parts for development)	5) Co-financing of investment by EEF (soft conditions) 6) Grant refunding of energy audit costs		
Target EE installations/ investments	EE in large industry, intensive production processes and facilities and buildings Total applications entire market of respective sub-sector: 600 companies Unit cost of investment measure: 3 million EUR Expected outreach: 50 % for moderate scenario; 100% for high scenario Number of realised EE applications: 300 companies (moderate), 600 companies (high scenario) Estimated EE potential at application site: 20-25%		
Estimated Costs	costs of investment component		**900 million EUR**
	Costs of non-investment components (measures)		**380.000 EUR**
	Legislation& Regulation		50.000 EUR
	Market transformation		100.000 EUR
	Information& Awareness		50.000 EUR
	Advice & Capacity building		150.000 EUR
	Financing mechanisms		30.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 45 % higher		
Sources of financing/co-financing	for investment	For non-investment measure	Sum
Gov state budget	1%	100%	9 million EUR
ESCF	19%		
ESCO	0%		
FI, credit line	0%		
Owner of the building	80%		
Potential Fin. Leverage Efficiency	1:100	0; all form state budget/ EE body	
Time schedule for implementation	Intended outreach of the measures in 2020 50%, 300 companies		

Title of package of measures **I 02**	**Incentives for large industrial consumer**			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	no	medium	high	high
Estimated Total Cost Efficiency	3.5 kWh per EUR investment + non-investment costs (moderate growth scenario) 6-8.5 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			
				
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring, collection / incentive system ➢ C 08 National EE Fund: for co-finding ➢ C 02 EE information policy: for awareness raising, benchmarking ➢ C 04 Stakeholder involvement: for coordination and benchmarking ➢ C 05 Certification EA scheme: for monitoring and EAs			
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of installations in companies - Verification of EE by post implement energy audits			
Assumptions / specific considerations / Risks	- Risks of loss of competitiveness by higher energy costs/ taxes - Acceptance risk			
Preconditions to reach the target	Transparent obligation and collection system			

In the following only a summary of the packages I 01 and I 04 are provided. The packages shall be activated on demand, but need at that time an adjustment of the planning on instruments, costs, benefits etc.

4.2.2 Measure: EE in Heavy industry

Title of package of measures **I 01**	**EE in Heavy industry**
Target of the package to be achieved in 2020	EE target in 2020: 1 Mtoe Estimated FEC of this segment in2020: up to 5.5 Mtoe for high scenario
Target group	Heavy industry, such as steel, refineries, chemical
Description of measures NEEAP	Combination of 8 non-investment instruments
Legislation& Regulation	7) Implementation of secondary legislation for EE certification of industrial company based on certified audit
Market transformation	8) Voluntary/Negotiation to reduce energy consumption/CO2 emission of industrial processes
Information& Awareness	9) Sector specific information on EE technologies
Advice & Capacity building	10) Training for top-level management/ energy managers

Title of package of measures **I 01**	**EE in Heavy industry**			
	11) Continuation of Energy management scheme and Energy auditors for large industrial consumers 12) Project preparation support for Emission trading system			
Financing mechanisms (parts for development)	13) Incentives for investment in clean fuels (renewables, waste and waste heat, industrial CHP, etc.): Tax reduction, accelerated depreciation 14) Dedicated credit line for EE investments			
Target EE installations/ investments	EE in energy intensive production processes Total applications entire market of respective sub-sector: 200 companies Unit cost of investment measure: 3 million EUR Expected outreach: 80% Number of realised EE applications: 160 companies Estimated EE potential at application site: 40%			
Estimated Costs	costs of investment component			**480 million EUR**
	Costs of non-investment components (measures)			**220.000 EUR**
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	low	low	low	high
Estimated Total Cost Efficiency	5 – 23 kWh per EUR investment + non-investment costs			

4.2.3 Energy Efficiency in SME industry

Title of package of measures **I 04**	**Energy Efficiency in SME industry**			
Target of the package to be achieved in 2020	EE target in 2020: 0.44 Mtoe Estimated FEC of this segment in2020: up to 2.4 Mtoe for high scenario			
Target group	SME companies, mainly producing and service sector			
Description of measures NEEAP	Combination of 9 non-investment instruments			
Legislation& Regulation	1) Adaptation of energy tariffs			
Market transformation	2) Voluntary audits			
Information& Awareness	3) Information and training on EE opportunities and technologies 4) Complementary information and project development capacities to increase the outreach of the financing mechanisms and approach SME			
Advice & Capacity building	5) Follow-up training of Energy managers to utilisation of financing mechanisms			
Financing mechanisms (parts for development)	6) Dedicated Credit line for EE in SME 7) Grant programme for EE investments 8) Guarantee or equity fund for EE lending 9) Utilisation of ESCF TOP SME			
Target EE installations/ investments	All industrial EE equipment , production lines and EE in facilities/ buildings Total applications entire market of respective sub-sector: 50,000 SME Unit cost of investment measure: 50,000 EUR Expected outreach: 70% Number of realised EE applications: 35,000 SME Estimated EE potential at application site: 30%			
Estimated Costs	costs of investment component			**1.75 billion EUR**
	Costs of non-investment components (measures)			**1.230.000 EUR**
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	low	medium	medium	high
Estimated Total Cost Efficiency	2.9 kWh per EUR investment + non-investment costs			

4.3 Packages of measures in end use Tertiary, service and municipal sector (S)

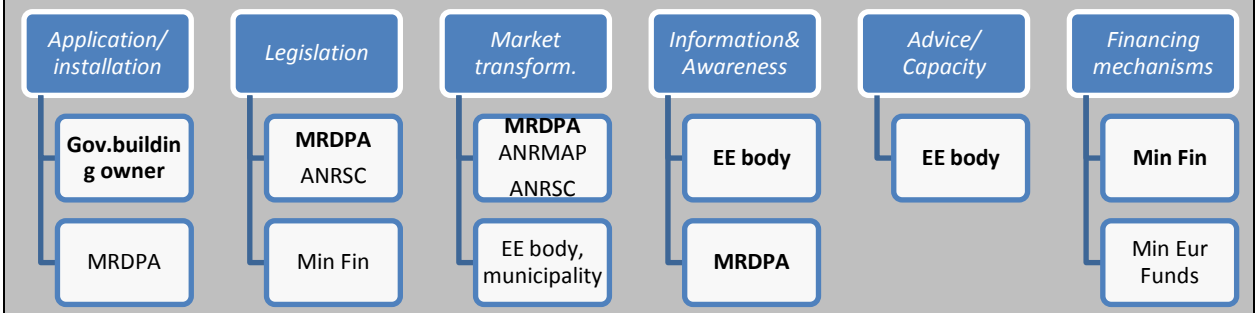
In the end energy use Tertiary, service and municipal sector three packages of measures are recommended under the moderate growth scenario:

- S 01 EE in trade and service sector
- S 03 EE in central Government public buildings (addressing EED Art. 4, 5)
- S 08 Development of Energy services / ESCO market (addressing EED Art 18)

4.3.1 Measure: Energy Efficiency in Governmental buildings

Title of package of measures S 03	**Energy Efficiency in Governmental buildings**	
Target of the package to be achieved in 2020	addressing EED Art 4 and 5 EE target in 2020: 0.05 Mtoe moderate scenario; 0.06 Mtoe high scenario Estimated FEC of this segment in2020: 0.3 Mtoe up to 0.3 Mtoe for high scenario	
Target group	Public buildings at central, regional and local level administrative buildings, schools, hospitals(not in stock of municipalities)	
Description of measures NEEAP	Combination of 19 non-investment instruments	
Legislation& Regulation	1) Obligations regarding the renovation of central government buildings 2) Obligatory energy audits and post completion verification audits 3) Mandatory appointment of an energy manager 4) Mandatory energy efficiency certificates for buildings 5) Mandatory measures for efficient lighting (stair, outside) 6) Maximum indoor temperature limit(s)	
Market transformation	7) Assessment of obligatory renovation scheme (3%/y) or alternative measures 8) Road map for renovation of central public buildings 9) Voluntary agreements with actors of the building sector 10) Voluntary labelling of buildings 11) Voluntary agreements with public or private services 12) Technology procurement for energy efficient appliances and buildings	
Information&Awareness	13) Complementary information and standard project development 14) Guidelines for viable and sustainable Heating system	
Advice & Capacity building	15) Preparation, supervision and control of demonstration project in the public buildings 16) inventory of heated and cooled central government buildings (Integrated database) 17) Building renovation roadmap 18) Analysis of ENPC opportunities	
Financing mechanisms (parts for development)	19) Rehabilitation, modernisation, equipment programme of public buildings with state grant funds to leverage SOP/axis 3 funding	
Target EE installations/ investments	Energy efficiency rehabilitation of buildings: building envelop, boilers, energy management systems, lighting Total applications entire market of respective sub-sector: 750 buildings Unit cost of investment measure: 300,000 EUR Expected outreach: 80% ; up to 100 % for high growth scenario Number of realised EE applications: 600 buildings / 750 buildings Estimated EE potential at application site: 20% Estimated Specific EE achievement per investment: 2 -3 kWh/EUR	
Estimated Costs	costs of investment component	**180 million EUR**

Title of package of measures **S 03**	**Energy Efficiency in Governmental buildings**			
	Costs of non-investment components (measures)			**550.000 EUR**
	Legislation& Regulation			100.000 EUR
	Market transformation			200.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			100.000 EUR
	Financing mechanisms			100.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 80 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	70%	80%		126 million EUR
ESCF	30%	20%		
ESCO	some			
FI, credit line				
Owner of the building				
Potential Fin. Leverage Efficiency	1:0.5	0; all form state budget/ EE body		
Time schedule for implementation	2014: Road map for renovation of central public buildings Intended outreach of the measures in 2020 80%, 600 buildings			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED , 4 and 5	medium	medium	Medium
Estimated Total Cost Efficiency	3.0 kWh per EUR investment + non-investment costs (moderate growth scenario) 3.2 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			



Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 08 National EE Fund: for co-finding ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme: for monitoring
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance of public buildings) - Number of applications/ installations in # and m² of building - Verification of EE by post implement energy audits
Assumptions / specific considerations / Risks	- Capacities - Compliance with regulation due to lacking capacities and power and mechanisms - Application of EnPC/ ESCO scheme

Title of package of measures **S 03**	**Energy Efficiency in Governmental buildings**
Preconditions to reach the target	Road map for renovation of central public buildings Availability of co-funding

4.3.2 Measure: Development of Energy services EnPC/ ESCO market (S 08)

Energy Performance Contracting (ENPC) is a form of 'innovative financing' for capital improvement which allows funding energy upgrades from cost reductions. Under an ENPC arrangement an external organization (ESCO) implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment.

Essentially the ESCO will not receive its payment unless the project delivers energy savings as expected. EnPCs is applied successfully in Europe in almost all sectors at the supply and end consumer side.

At this time in Romania, the ESCO market is growing but is still however in an "embryonic state". Currently, 14 companies are active in the market, with around EUR 50 million worth of projects. Most of these companies have up to 50 employees. At the same time, they are in competition with very ESCO experiences subsidiaries of international companies like Dalkia. These ESCOs are mainly involved in industrial and co-generation projects, but also in a few district heating and public lighting projects. The most common types of contracts used at this point are build-own-operate-transfer and shared savings contracts.

The lack of appropriate secondary legislation for energy efficiency has been the **main reason for the lack of ESCO development in the country**. To this point and despite the fact that legislation has been improved recently, there are still some well know barriers to the development of ESCOs and the application of ECPs:

- Mistrust from the clients, also due to the lack of an official certification/registration system for ESCOs;
- The public procurement rules (the complex and time consuming tendering process) and the unclear status of the energy performance contracting. No specific provision in the public procurement legislation; the reimbursement of the energy services from the energy bill savings are not allowed in the public sector;
- Lack of pilot projects in the public sector contributed to preserve the reluctance of the local authorities;
- Lack of interest and internal expertise at commercial banks to evaluate energy efficiency projects. Projects run by private customers without the proper guarantee receive a low interest from investors
- The poor understanding of the ESCO concept as well as the lack of 'the energy efficiency business culture' among the companies and local authorities.

The challenging sectors for the application of EnPC in Romania are

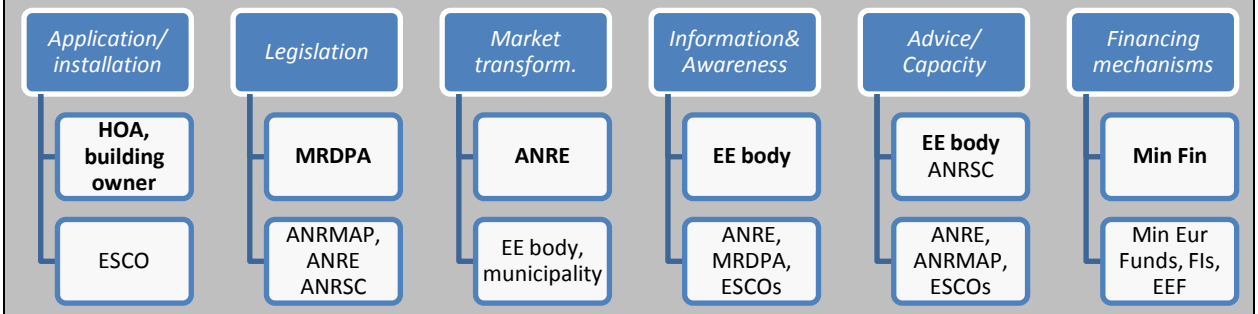
- Residential multi-storey buildings,
- Public buildings (central government of municipal level)
- Municipal services (heat supply, street lighting and water supply).

To a certain extent, EnPC is already in operation in the industry and commercial buildings sectors. In the transport sector EnPC would mainly target public transport sector, which is currently not attractive for private funding.

In the following the package of measures for development of EnPC /ESCO market is presented.

Title of package of measures S 08	**Development of Energy services EnPC/ ESCO market**
Target of the package to be achieved in 2020	addressing EED Art 18 EE target in 2020: 0.043 Mtoe moderate scenario; 0.64 Mtoe high scenario Estimated FEC of this segment in2020: 4.2 Mtoe up to 4.8 Mtoe for high scenario
Target group	Public and residential buildings Public service facilities (buildings and heat & lighting services)
Description of measures NEEAP	Combination of 15 non-investment instruments
Legislation& Regulation	1) Establishment of tertiary legislation ESCO/EnPC fully compatible with the current EE legislation, Tertiary legislation supporting this EnPC contract (i.e. the models for EnPC contract, methodology for implementation) according to EED 2012/27, ANNEX XIII - Minimum items to be included in EnPC with the public sector 2) Alignment of the legal basis for tendering EnPCs under the concessions law (OUG 34) and services law (Law 51). 3) Enacting a specific EnPC law to address the missing elements and solve uncertainties.
Market transformation	4) Analysis of potential for ENPC, Providing favourable conditions for the ESCO market development 5) Extension of functioning, commercial financing instruments to other segments (ESCO, public)
Information& Awareness	6) Promoting the development of energy service companies 7) Demonstration of commercial returns from EE, model contract
Advice & Capacity building	8) Establishment of confidence on ground of insufficient legislation 9) Establish national contact and advisory point for ENPC 10) Analysis of prevalence of ESCOs (total value of ESCO energy saving projects, total value of possible energy efficiency projects in the non-residential sector) 11) Assess the size and types of companies providing services 12) interactions with other policy measures (e.g. energy savings obligation schemes, EU Cohesion Policy Fund)
Financing mechanisms	13) Attraction of the participation of the private sector in the co-

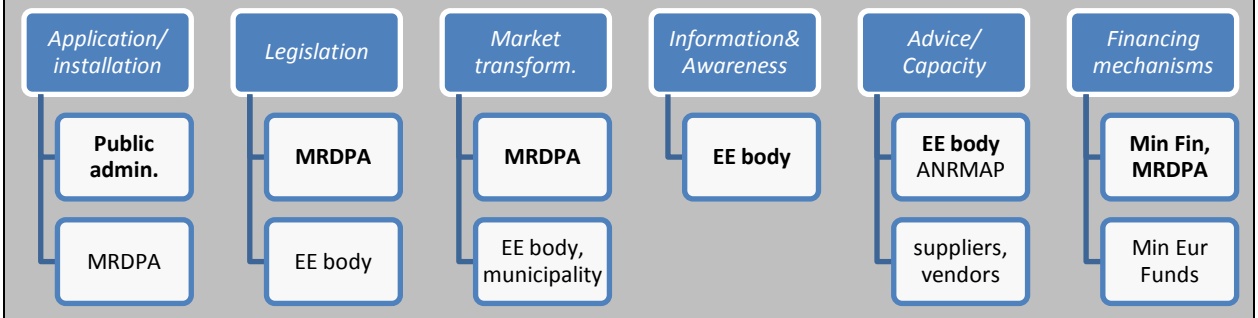
Title of package of measures S 08	**Development of Energy services EnPC/ ESCO market**			
(parts for development)	financing and implementation of EE projects 14) Development of financial mechanisms aiming to strengthen financial performance and reduction of financial risks for ESCOs (e.g. guarantee funds) 15) Strengthen and extend EEF towards EnPC			
Target EE installations/ investments	Energy efficiency rehabilitation of building envelop, heat supply Also municipal services (street lighting, Heat supply) Total applications entire market of respective sub-sector: 78,200 buildings (75,000 multi-storey residential + 3,200 public) Unit cost of investment measure: 65,000 EUR (average, estimate) Expected outreach: 5% ; up to 70 % for high growth scenario Number of realised EE applications: 3.900 buildings / 55.000 buildings Estimated EE potential at application site: 20% Estimated Specific EE achievement per investment: 2.0 kWh/EUR			
Estimated Costs	costs of investment component			**254 million EUR**
	Costs of non-investment components (measures)			**800.000 EUR**
	Legislation& Regulation			300.000 EUR
	Market transformation			200.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			150.000 EUR
	Financing mechanisms			100.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 20 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	10%	70%		26 million EUR
ESCF	15%			
ESCO	60%	10%		
FI, credit line	Via ESCO	10%		
Owner of the building	15%	10%		
Potential Fin. Leverage Efficiency	1:9	2:1		
Time schedule for implementation	2014: Immediate step: legislative framework, model contract, tertiary legislation 2014: Allocation of plan of measures and investments, regulatory measures, fund allocation, pilot EnPC 2015: commencement of all other non-investment measures Intended outreach of the measures in 2020 5%, 3.900 buildings, some 10 municipal service facilities (lighting); 20%, 55.00 buildings, some 30 municipal service facilities (lighting)			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED , art 18	high	medium	high
Estimated Total Cost Efficiency	1.95 kWh per EUR investment + non-investment costs (moderate growth scenario) 2.1 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			

Title of package of measures S 08	Development of Energy services EnPC/ ESCO market
	
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 08 National EE Fund: for co-finding ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme: for monitoring
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of applications/ installations in # and m² of building - Verification of EE by post implement energy audits
Assumptions / specific considerations / Risks	- Confidence by municipal actors - Participation of private sector - Capacities for implementation - Insufficient raising of co-financing/ use of financing mechanisms - Appropriate planning and monitoring
Preconditions to reach the target	Legal frame, eligibility of investment measures under ECSF, operation of ESCO mark

4.3.3 Measure: EE office equipment, lighting and appliances

Title of package of measures S 02	EE office equipment, lighting and appliances
Target of the package to be achieved in 2020	addressing EED Art 6 EE target in 2020: 0.005 Mtoe moderate scenario; 0.023 Mtoe high scenario Estimated FEC of this segment in2020: 0.12 Mtoe up to 0.13 Mtoe for high scenario
Target group	Municipal/ regional administrations
Description of measures NEEAP	Combination of 6 non-investment instruments
Legislation& Regulation	1) Voluntary labelling of office equipment 2) Energy Performance Standards 3) Regulation to purchase products, services and buildings with high-energy efficiency performance
Market transformation	4) public purchasing and annual budgeting and accounting of public bodies
Information&Awareness	5) Promotion EE appliances and lamps in the public sector
Advice & Capacity building	6) Establish cross sector public procurement agent trained on EE to support and supervise procurement processes
Target EE installations/ investments	All public facilities, office equipment and lighting Total applications entire market of respective sub-sector: 320

Title of package of measures **S 02**	**EE office equipment, lighting and appliances**			
	municipalities, each in average 2,000 applications Unit cost of investment measure: 200 EUR Expected outreach: 15% ; up to 65 % for high growth scenario Number of realised EE applications: 100,000 applications / 420,000 applications Estimated EE potential at application site: 20% Estimated Specific EE achievement per investment: 4.0 kWh/EUR			
Estimated Costs	costs of investment component			**19 million EUR**
	Costs of non-investment components (measures)			**500.000 EUR**
	Legislation& Regulation			150.000 EUR
	Market transformation			200.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			100.000 EUR
	Financing mechanisms			
	Costs of non-investment components (measures) for the high growth scenario might be 100 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	70%	100%		14 million EUR
ESCF				
ESCO				
FI, credit line				
Owner of the building	30%			
Potential Fin. Leverage Efficiency	1:2	0; all form state budget/ EE body		
Time schedule for implementation	2014: Obligation scheme for administrations on EE appliances Regulation on public purchase of EE appliances			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED , art 6	medium	low	Medium
Estimated Total Cost Efficiency	3.0 kWh per EUR investment + non-investment costs (moderate growth scenario) 3.1 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			



Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme: for monitoring
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of applications/ installations
Assumptions / specific considerations	- Compliance with regulation due to lacking capacities and

Title of package of measures S 02	EE office equipment, lighting and appliances
/ Risks	power and mechanisms
Preconditions to reach the target	Availability of co-funding

4.4 Packages of measures in Energy supply system - transformation, transmission and distribution (E)

In the sector efficiency f energy supply two packages of measures are recommended under the moderate growth scenario:

- E 01 Loss reduction in power transmission and distribution network(addressing EED Art 15)
- E 03 Promotion of efficient heating and cooling (addressing EED Art 14) – promotion of CHP

The implementing of the EE obligation scheme for utilities (E 05) has a potential of contributing up to 2.2 Mtoe under the high growth scenario in the forecast year 2020 under the assumption of a 100% outreach. However, the decision towards the obligation scheme under today's conditions is not appropriate due to high costs, burden and risk for the affordability of energy due to the expected effects of drastic increase of energy costs.

4.4.1 Measure: Loss reduction in power transmission and distribution network

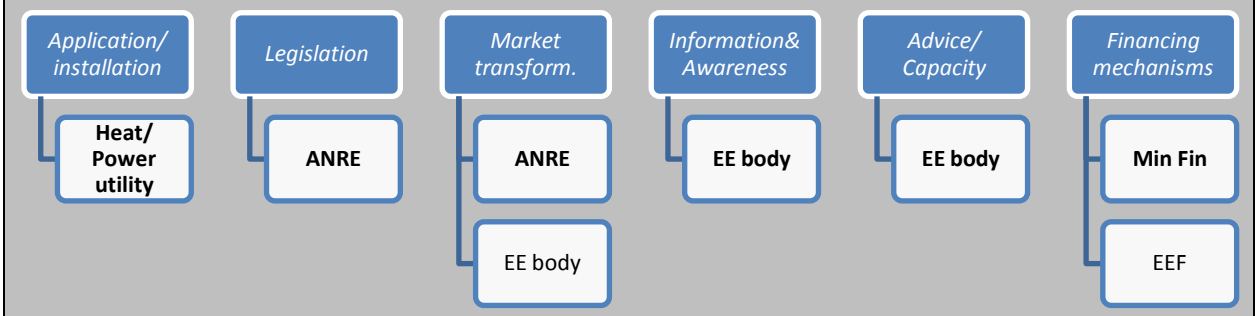
Title of package of measures E 01	Loss reduction in power transmission and distribution network
Target of the package to be achieved in 2020	addressing EED Art 15 EE target in 2020: 0.04 Mtoe moderate scenario; 0.14 Mtoe high scenario Estimated FEC of this segment in2020: 1.07 Mtoe up to 1.3 Mtoe for high scenario
Target group	Operators of Power transmission and distribution grid
Description of measures NEEAP	Combination of 10 non-investment instruments
Legislation& Regulation	1) Assessment and decision on obligation scheme 2) Tariff regulation towards enabling overall efficiency of the generation, transmission, distribution, elimination of cross subsidies 3) Integration of EE criteria in network tariffs and regulation
Market transformation	4) Demand response study and detailed forecast and load management 5) Embedment of EE in network design
Information&Awareness	6) Facilitate and promote demand response
Advice & Capacity building	7) Assessment of EE potentials of national gas and electricity infrastructure
Financing mechanisms (parts for development)	8) Leveraging external financing (FI, private) 9) Support power utilities in consultation with financing structure 10) Investments programme for the introduction of cost-effective EE improvements in the network infrastructure
Target EE installations/ investments	Loss reduction in Power transmission and distribution network Total applications entire market of respective sub-sector: 100.000 km transmission and distribution lines

Title of package of measures **E 01**	**Loss reduction in power transmission and distribution network**			
	Unit cost of investment measure: 5,000 EUR/km Expected outreach: 25% ; up to 80 % for high growth scenario Number of realised EE applications: 25,000 km / 80.000 km Estimated EE potential at application site: 15 % loss reduction Estimated Specific EE achievement per investment: 3-4 kWh/EUR			
Estimated Costs	costs of investment component			**125 million EUR**
	Costs of non-investment components (measures)			**800.000 EUR**
	Legislation& Regulation			200.000 EUR
	Market transformation			300.000 EUR
	Information& Awareness			50.000 EUR
	Advice & Capacity building			150.000 EUR
	Financing mechanisms			100.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be30 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	0%	70%		560.000 EUR
ESCF		30%		
ESCO				
FI, credit line	50%			
Owner of the facility	50%			
Potential Fin. Leverage Efficiency	n/a	1:0.5		
Time schedule for implementation	2014: Demand response study , analysis on overlap with obligation scheme 2015: Integration of EE criteria in network tariffs and regulation Intended outreach of the measures in 2020 25%, 25,000 km grid			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED , art 16	high	low	high
Estimated Total Cost Efficiency	3.7 kWh per EUR investment + non-investment costs (moderate growth scenario) 4.1 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			
	Application/ installation: **Power utility: TSO, DSO**; ANRE *Legislation*: **ANRE** *Market transform.*: **ANRE** *Information& Awareness*: **EE body**; **AUCE** *Advice/ Capacity*: **EE body**; ANRE *Financing mechanisms*: **Utilities**			
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 04 Stakeholder involvement: for coordination			
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Reporting by utilities on investments and Number of installations			
Assumptions / specific considerations / Risks	- network tariffs and regulation to consider investment costs			

Title of package of measures E 01	**Loss reduction in power transmission and distribution network**
Preconditions to reach the target	

4.4.2 Measure: Promotion of efficient heating/ cooling - CHP Promotion

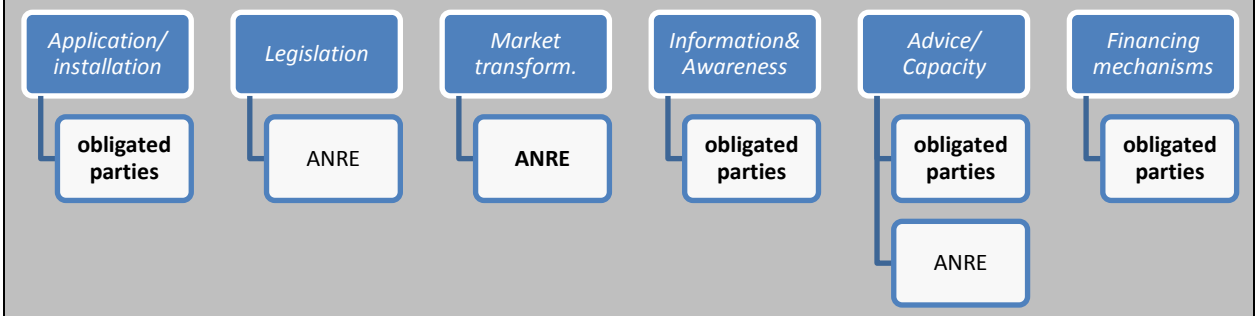
Title of package of measures E 03	**Promotion of efficient heating/ cooling -CHP Promotion**	
Target of the package to be achieved in 2020	addressing EED Art 14 EE target in 2020: 0.05 Mtoe moderate scenario; 0.24 Mtoe high scenario Estimated FEC of this segment in2020: 1.37 Mtoe up to 1.67 Mtoe for high scenario	
Target group	Operators of central heat and power generation facilities > 20 MW	
Description of measures NEEAP	Combination of 13 non-investment instruments	
Legislation& Regulation	1) Regulation for CHP application for new, industrial and existing facilities (over 20 MW) 2) Regulation for power by CHP grid feed-in	
Market transformation	3) Analysis of opportunities for Energy Supply Contracting 4) Opening the heat markets to new investments or private management, privatizations or PPPs to limit political influence.	
Information&Awareness	5) Benchmarking of performance of CHP	
Advice & Capacity building	6) Potential assessment of CHP in DH 7) cost-benefit analysis of CHP 8) Assessment of use of RE for CHP (biomass, GT) 9) Further capacity building of municipal/ local energy managers	
Financing mechanisms (parts for development)	10) Revolving fund of CHP installation for municipal CHP in DH , with favourable conditions 11) Grant support to CHP projects using renewable energy 12) Support for CHP subject to the electricity produced and subject to State aid rules 13) Reduction of risks for ESCO CHP supply contract projects (e.g. guarantee funds)	
Target EE installations/ investments	Large Heat generation facilities of Central heating systems > 20 MW Large Boiler houses and CHP supplying DH networks Conversion to co-generation or repowering CHP with increase of efficiency Total applications entire market of respective sub-sector: Approx. 150 Central heat generation Unit cost of investment measure: 10 million EUR Expected outreach: 15% ; up to 65 % for high growth scenario Number of realised EE applications: 23 CHP /100 CHP Estimated EE potential at application site: 25 % overall EE by cogeneration Estimated Specific EE achievement per investment: 2.5 kWh/EUR	
Estimated Costs	costs of investment component	**225 million EUR**
	Costs of non-investment components (measures)	**480.000 EUR**
	Legislation& Regulation	50.000 EUR
	Market transformation	50.000 EUR
	Information& Awareness	50.000 EUR
	Advice & Capacity building	80.000 EUR

Title of package of measures E 03	**Promotion of efficient heating/ cooling -CHP Promotion**			
	Financing mechanisms			250.000 EUR
	Costs of non-investment components (measures) for the high growth scenario might be 30 % higher			
Sources of financing/co-financing	for investment	For non-investment measure		Sum
Gov state budget	20%	90%		45.5 million EUR
ESCF	%	10%		
ESCO	10%			
FI, credit line	20%			
Owner of the building	50%			
Potential Fin. Leverage Efficiency	1:4	0; almost all form state budget/ EE body		
Time schedule for implementation	2014: Immediate step: Regulation for CHP application for new, industrial and existing facilities (over 20 MW) Intended outreach of the measures in 2020 15%, 23 CHP			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED , art 14	medium	medium	Medium
Estimated Total Cost Efficiency	2.5 kWh per EUR investment + non-investment costs (moderate growth scenario) 2.8 kWh per EUR (high growth scenario)			
Responsible for implementation	and stakeholders			
				
Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring, ➢ C 08 National EE Fund: for co-funding scheme ➢ C 04 Stakeholder involvement: for coordination			
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Number of CHP installations , capacity			
Assumptions / specific considerations / Risks	- Compliance with regulation due to lacking capacities and power and mechanisms			

4.4.3 Options to comply with EED 27/2012 - Article 7 - Energy efficiency obligation schemes

Title of package of measures E 05	**Energy efficiency obligation schemes**
Target of the package to be achieved in 2020	addressing EED Art 7 EE target in 2020: 1.68 to 2.2 Mtoe of which max 25% in energy sector (0.25 Mtoe) and FEC sector 1.3 Mtoe Estimated PEC of this segment in2020: 18.7 Mtoe Calculated on lower based saving rate and Exclusion EU-ETS industry (60% FEC industry.) according to paragraph 2 of article 7

Title of package of measures E 05	**Energy efficiency obligation schemes**			
	Accumulated EE target 2014-20 6.2 Mtoe			
Target group	All end consumers of energy			
Description of measures NEEAP	Combination of 3 non-investment instruments			
Legislation& Regulation	1) Regulation for energy tariff allowing to cover cost of obligation scheme			
Market transformation	2) Obligation scheme to all distributors to save 1.5%/yr from 2014-20			
Advice & Capacity building	3) Monitoring and supervision of obligation scheme			
Target EE installations/ investments	Energy efficiency measures at end consumer side and energy supply at discretion of the obliged party Total applications entire market: 8 million end consumers (all final grid connected customers: gas, heat, power) Unit cost of investment measure: 1,500 EUR (average, estimate) Expected outreach: 100% for high growth scenario Number of realised EE applications: 8 million Estimated EE potential at application site: 11% Estimated Specific EE achievement per investment: 2.0 kWh/EUR			
Estimated Costs	costs of investment component			**11.6 billion EUR**
	Costs of non-investment components (measures)			**1.5 million EUR**
Sources of financing/co-financing	for investment	For non-investment measure	Sum	
Gov state budget	0%	0%		
Obligated parties	100%		11.6 billon EUR	
Time schedule for implementation	Dec 2013: general decision to go for obligation scheme, If not decides in 2013 annual analysis of dynamic of FEC and PEC → review of forecast till 2020 → decision to activate the obligation scheme at later year			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED, but as alternative	low	low	low
Estimated Total Cost Efficiency	2.2 kWh per EUR investment + non-investment costs			
Responsible for implementation	and stakeholders			



Capacities required for the implementation link to horizontal measure →	➢ C 01 EE body/agency: for Advice, monitoring ➢ C 02 EE information policy: for awareness raising ➢ C 04 Stakeholder involvement: for coordination ➢ C 05 Certification EA scheme: for monitoring
Monitoring indicators of achievement	- EE achieved according to FEC in the sector (energy balance) - Energy sales reports of all utilities
Assumptions / specific considerations / Risks	- Participation of private sector - Capacities for implementation - Appropriate planning and monitoring

Title of package of measures E 05	**Energy efficiency obligation schemes**
	- Tariff increase, unaffordability for poor income households
Preconditions to reach the target	The decision for the obligation scheme means fixing the EE target (the real reduction) and not depending on GDP growth. In comparison to the moderate growth scenario with EE target 0.8 Mtoe the application of the obligation scheme would be costly and bears the risk of having agreed a fixed amount of EE instead of depending on GDP development.

An overview on how other EU-MS deal with obligation scheme is presented in ANNEX 3:

4.5 Top priority cross sector- horizontal packages of measures

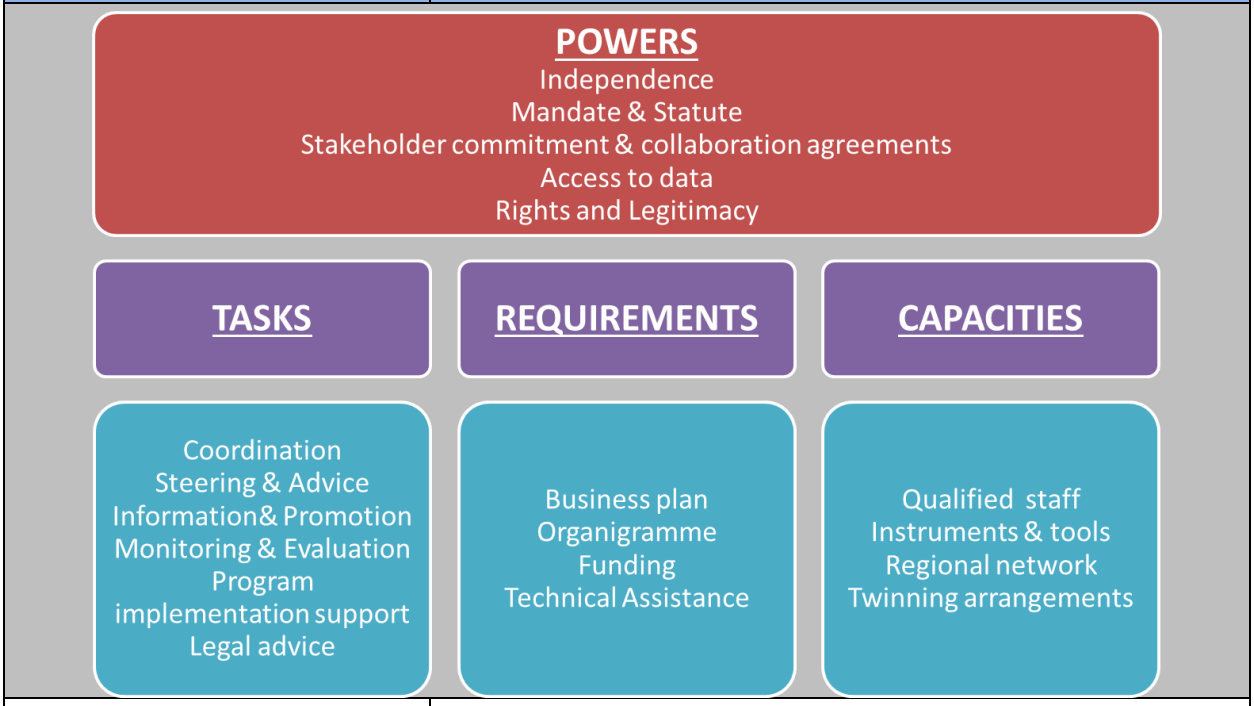
The effective implementation of the sector specific packages of measures will require cross sector horizontal packages of measure to complement the activities and establish a supporting environment. It is recommended that the following five horizontal measures be considered in NEEAP III:

- C 01 Establishment of dedicated EE body for advice, supervision and monitoring of NEEAP
- C 08 Energy Efficiency National Fund (addressing EED Art. 20)
- C 02 Information on EE policy , schemes and facilities (addressing EED Art 12, 17, 19)
- C 04 Stakeholder involvement and training (addressing EED Art. 17)
- C 05 Qualification, accreditation and certification schemes and training (addressing EED Art 16)

4.5.1 Establishment of a dedicated EE authority (EEA)

Title of package of measures C 01	**Establishment of dedicated EE authority**
Target of the package to be achieved in 2020	addressing EED no direct EE targets, but a pre-condition to enable all other EE measures
Target group	up-stream stakeholders (political) and downstream stakeholders - All end user sectors, consumers - energy utilities and generation companies - intermediaries
Description of measures NEEAP	Combination of non-investment instruments
Legislation& Regulation	1) Regulation on the responsibilities, rights and obligations of the Energy Agency
Market transformation	2) Charter of the EE organisation, working processes 3) continuous evaluation and monitoring of the results of the programmes
Information& Awareness	4) Regularly reviewing and up-dating the energy strategy, programme and forecast 5) Analyse the effects of specific project implementation and adjust the programmes on demand
Advice & Capacity building	6) Empowering of EE organisation or Energy Agency at national level 7) Support to the Statistical Institution to improve energy consumption reporting, data collection and processing
Financing mechanisms	8) Financing scheme using State budget and ANRE income for the costs of the institution

Title of package of measures **C 01**	**Establishment of dedicated EE authority**



Key tasks and activities of EEA	
Short term priorities for activities	Condensing the above developed actions within the measures, the most important activities of the EEA in the short term will be: • Support the setting of National Energy Efficiency legislation • Coordination of NEEAP Assist the development • Implementation support to sectoral EE measures • Assist regional and local authorities to prepare their EE action plans in compliance with the national strategy • Implement information, know-how transfer and cooperation: • Establish an Energy Efficiency Information policy • Implement municipal energy manager services • Establish the know-how transfer on energy efficiency equipment and methods for implementation • Prepare blue-print of energy audits • Procurement rules • international co-operation
Policy support	• Prepare the secondary legislation being relevant to energy efficiency, including assistance to the regulatory office in the field of price regulation (concerning price and tariff structures in order to incorporate incentives for energy saving) and other regulatory issues • Prepare norms and standards, documents and regulations needed for the harmonisation with European energy policy and legislation • Assist in the implementation of this policy (information, evaluation and monitoring)
Advisory services and technical assistance	• Advising municipalities and district heating companies on least cost rehabilitation measures • Advising municipalities in preparing local energy plans • Technical support for energy producers and users sectors/groups in the identification of opportunities for energy savings and energy efficiency improvements

Title of package of measures C 01	**Establishment of dedicated EE authority**	
	• Technical support for project development and market potential studies • Support and co-operation with existing structure in the field of research & development	
Information and dissemination services	• Establishing an EE information policy • Information on no-cost and low-cost energy efficiency measures and on best practices including lessons learned in projects • Promotion support of financial programmes (grants, loans) • Information about available loans and management of financing mechanisms • Assistance to the promotion and management of community and industrial programmes • Targeted transfer of EE technology know-how, e.g. Addressing small and medium-sized enterprises to carry out energy audits and implement EE • Compiling relevant information about energy consumers (such as housing sector, commercial and industrial sector, public institutions) benchmarking • Participation in international networks	
Education and training	• Efficient use of energy saving equipment • Preparing project proposals for EU and other programmes • Preparing sectoral and targeted information and awareness campaigns • Training operators (incl. flat owners), auditors, and others in energy management and establishing an energy manager training centre • Organise seminars, workshops, and conferences	
Management support to measures and programmes	• Identification of urgent measures for the most demanded effects in priority • Support to design of single measures: objective, target group, action plan - tasks, schedule, staffing, budget, • Carrying out the measure under the best involvement of international experiences, • Guaranteeing, that the measures are carried out by experienced staff. • In case of demand for specific know-how and experiences, appropriate external experts and international consultants will be employed, • Monitoring of the effects of the programme in comparison to the established targets, • Reporting to the MoE and Parliament and appropriate dissemination of results • Assisting in the whole project development process of pilot and demonstration projects from identification via commissioning up to monitoring and dissemination of results	
Facilitating the access to financing energy efficiency projects	• Management of governmental and other donation funds to be channelled into national projects • Stimulating the involvement of local and foreign private investors • Managing/assisting third-party financial support programmes for energy efficiency	
Estimated Costs	Total annual costs over 6 years (2014-2020) and establishment costs	**5 million EUR**
	EEA investment component, establishment office,	0.2 million EUR

Title of package of measures C 01	**Establishment of dedicated EE authority**			
	equipment			
	Annual costs for 15 experts (full-time staff) of EEA			0.4 million EUR
	EEA office running costs, annual			0.1 million EUR
	External consultants, national and international for support in programmes and tasks			0.3 million EUR
	Annual operation costs of EEA for the high growth scenario might be 50-100 % higher			
Sources of financing/co-financing	For non-investment measure			
Gov state budget	100%			
ESCF and other EC programmes	Possibly 10-20% for dedicated actions			
Time schedule for implementation	Early 2014: decision for set-up of EEA Mid 2014: establishment and staffing of EEA End 2014-2020: operation			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED	High	High	High
Responsible for implementation	GoR, Parliamentarian decision, ANRE			
Monitoring indicators of achievement	- Establishment of EEA in 2014, appropriate staffing - Number of applications/ installations in # and m² of building - Verification of EE by post implement energy audits			
Assumptions / specific considerations / Risks	In order for ANRE to become a proper dedicated EE authority, there is a clear need to strengthen its capabilities and its role within inter institutional projects. The regional offices around the country which have been operated by ARCE should also be reactivated in order to allow for better monitoring, better control and so that more advice is given at local levels. This is achievable by empowering the already weakened ARCE local structures that are already in place. ANRE must ensure that its control activities are properly planned, coordinated and resource funded so that the management of EE is well executed at both central and local levels. It is a must that the institution and its management is ready to take on tasks and responsibilities and that the necessary know-how in is present for what is to follow. If so, ANRE's capabilities and authority in relation to other institutions should be improved as there is a need for it to now coordinate the different Ministries that take part in the planning and implementation of EE projects. At the same time, the new organizational structure and new institutional capabilities should be established on the basis of an efficient TA project with a clear pre-analysis, clear future targets and directions for precise implementation.			
Preconditions to reach the target	Mandate and power appropriate staffing availability of funding or reallocation of ANRE revenues			

4.5.2 Measure: Implementing an EE information policy

Title of package of measures C 02	**EE information policy**
Targets	Addressing requirements of EES art 12, 17, 19

Title of package of measures C 02	**EE information policy**			
	Information of stakeholders and users about EE policy targets, activities and instruments to generate understanding, acceptance and participation No direct EE targets, but a pre-condition to enable all other EE measures			
Target group	Stakeholders and end users in all sectors Mainly end user sectors, consumers and intermediaries			
Description of measures NEEAP	Measures to promote and facilitate an efficient use of energy by small energy customers, including domestic customers to promote behavioural change. Information on available energy efficiency mechanisms and financial and legal frameworks is transparent and widely disseminated to all relevant market actors, such as consumers, builders, architects, engineers, energy auditors, and installers of building elements as defined in Directive 2010/31/EU. Provision of information to banks and other FIs on possibilities of participating, including through the creation of public/private partnerships, in the financing of energy efficiency improvement measures. Participation of stakeholders, including local and regional authorities, promotes suitable information, awareness-raising and training initiatives to inform citizens of the benefits and practicalities of taking energy efficiency improvement measures.			
Market transformation	1) Regional and local information centres on energy efficiency			
Information& Awareness	2) Information about labelling of energy efficient products and installations 3) Establishment of electronic energy information system (Intranet: facts, figures, trends, events) 4) Disseminate the energy programme results at a wide-scale (homepage, newspaper article and newsletters)			
Advice & Capacity building	5) Catalogue of quality criteria for energy installation, equipment, construction and establish an appropriate control mechanism 6) Energy consumption benchmark catalogue (all sectors) 7) Continuous documentation of energy sector responsibilities (structure, role, contact)			
Estimated Costs	Total costs over 6 years (2014-2020)			**650.000 EUR**
	Annual, approx. , depending on strategy			100.000 EUR
Sources of financing/co-financing	For non-investment measure			
Gov state budget	100%			
ESCF and other EC programmes	Possibly 10-20% for dedicated actions			
Time schedule for implementation	2014: Information strategy , developed by EEA End 2014: EE internet portal online			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED art 12, 17, 19	High	Medium	low
Responsible for implementation	EE authority			
Monitoring indicators of achievement	- Promotion and information strategy by EEA in 2014 - Up-dated internet portal - Number of events and its participation - Number and dissemination of print / media information - Intended outreach 80% of all target group by 2020 by different			

Title of package of measures C 02	**EE information policy**
	means of information
Assumptions / specific considerations / Risks	Option to apply for co-funding form ESCF and other EU programmes Aligning/ synergies with information&awereness activities of sectoral measures
Preconditions to reach the target	Budget available for dissemination activities, annual budget of EEA, cofounding by gov. bodies and stakeholders Cooperation with stakeholders for development and roll- out of information plan Capacities of EE body TA required to develop information strategy

4.5.3 Measure: Energy Efficiency National Fund

Title of package of measures C 08	**Energy Efficiency National Fund**
Targets	Addressing requirements of EES art 20 The purpose of this fund is to support national energy efficiency initiatives No direct, individual EE targets by this measure. The EE funds are to be allocated for financing part of the above sector measures. Those will generate the physical energy saving. The objectives of the Energy Efficiency Fund are • promote energy efficiency investment projects • give technical assistance for the development of such projects • Assist project financing by (i) direct financial contributions (through its own funds) and by (ii) acting as an agent or mediator for other sources (mostly loans), and (iii) by helping to find the optimal mix of financial sources. The Energy Efficiency Fund (EEF) can be a major tool for financing energy efficiency projects, which will usually be investment projects or closely connected to investment projects.
Target group	Private and public investors (project sponsors) in all sectors Nain focus on public, municipal and service sector, with limited access to finance
Description of measures NEEAP	Energy Efficiency National Fund, Financing and Technical Support Facilitate the establishment of financing facilities, or use of existing ones, for energy efficiency improvement measures to maximise the benefits of multiple streams of financing. Option to support by EEF the financial needs arising from the obligation scheme.
Market transformation	- Better use of Environment Funds for higher demanding EE measures / programmes - facilitate the existing EEF, for EE improvement measures to maximise the benefits of multiple streams of financing: utilisation as co-financing to leverage TPF
Information& Awareness	- Promotion of EEF

Title of package of measures C 08	**Energy Efficiency National Fund**	
Advice & Capacity building	- Strengthening the capacities and extend of EEF to other than industry sector and smaller projects	
Outline of options and functioning of the EEF	The EEF could finance: • pre-feasibility studies • feasibility studies • business plans • other documents and reports necessary for developing and implementing investment projects • investments (equipment and works) • other services required for developing and implementing such projects • monitoring activities connected with these investment projects. The types of financing are: • soft loans (without or with low interest rates) • loans from International Financial Institutions • commercial loans. For a specific project the types of finance can be mixed. For example, the pre-feasibility and the feasibility study might receive a grant, while the business plan will be financed by a soft loan, and the investment measures would be financed by a commercial loan (or a mixture of grants and commercial loan). The criteria for the right mixture will be developed by the EEA. Generally, investment projects with various groups of recipients and the mix of financial sources might be structured as follows: • private households/ residential building sector: grants and EEF soft loans • commercial and industrial sector: EEF soft loans and commercial loans • municipalities and district heating companies: EEF soft loans and IFI loans. Typical financing mixes for the various customer groups would be as follows: • private households: grants for services, grants and/or soft loans for equipment and installations • municipalities and district heating companies: grant for pre-feasibility study, grant and/or soft loan for feasibility study and business plan, loans from IFI and/or commercial banks for equipment and works • industrial and commercial companies: grant for pre-feasibility study, soft-loan and/or grant for feasibility study and business plan, commercial loan for equipment and works. Another form of soft loan would be awarding of credit with (approx.) commercial terms, but only repayable in the case of a later successful financing of the respective project.	
Estimated Costs	Total costs over 5 years (2015-2020)	**200.000 EUR**
	Annual, approx. for fund management, depending on structure, strategy, instruments and extend	50.000 EUR
Sources of financing/co-financing	The actual and potential sources of finance will be: • grant from the ESCF • state budget • revenues from annual emission allocations under Decision No 406/2009/EC for the development of innovative financing	

<table>
<tr><td>Title of package of measures
C 08</td><td colspan="4">Energy Efficiency National Fund</td></tr>
<tr><td></td><td colspan="4">mechanisms to give practical effect to the objective in Article 5 of improving the energy performance of buildings.
• grant and/or soft loan of the World Bank (probably for housing sector)
• IFI loan (potentially an EBRD loan for municipalities)
• commercial bank loans.
Some of the financial sources will be linked to the EEF in relatively loose forms, such as in the case of loans from commercial banks and IFIs. This might even be true if special credit lines for energy efficiency would be provided. In such cases, the EEF might be an important promoter for these credit lines, but not the only one. The objective of the EEF is not to hinder these IFIs or other sponsors from directly financing energy efficiency investment projects (however, this should be discussed and agreed on with the EEF and the EEA to ensure that such projects are in line with the general energy efficiency strategy).
Contributions from the EEF can be supplemented by
• self financing (co-financing) by recipients
• any other financial sources.
The EEF will have direct or indirect access to the various financial sources. For example, IFI loans and commercial loans have to be approved by the respective banks and moreover, these banks will also prescribe their own specific rules and terms for such loans.</td></tr>
<tr><td>Time schedule for implementation</td><td colspan="4">2014: Business plan for the EEF
2015: EEF operational, offering financing instruments</td></tr>
<tr><td rowspan="2">Appropriateness of the package of the measure</td><td>Obligation/ framework</td><td>Market Maturity</td><td>Development of framework</td><td>Economic Sustainability</td></tr>
<tr><td>High – EED art 20</td><td>High</td><td>Medium</td><td>high</td></tr>
<tr><td>Responsible for implementation</td><td colspan="4">EE authority, Ministry of Finance
Existing EEFF, Financing institutions (on demand)</td></tr>
<tr><td>Monitoring indicators of achievement</td><td colspan="4">- Number of projects identified, assessed and financed
- Volume of disbursed funds
- Financial performance of the fund</td></tr>
<tr><td>Assumptions / specific considerations / Risks</td><td colspan="4">Aligning/ synergies with financing mechanism activities of sectoral measures
Assessment of market for the EEF activities and appropriateness of instruments under consideration of market distortion and competition rules
Option to apply for co-funding form ESCF or via the European financial institutions the setting up financing facilities and technical support schemes

European networking, supported by the EC, to facilitate the exchange of best practice between the competent national or regional authorities or bodies, e.g. through annual meetings of the regulatory bodies, public databases, etc.</td></tr>
<tr><td>Preconditions to reach the target</td><td colspan="4">Transparent conditions and procedures for participation/ fund application
Promotion of the additional financing instrument
TA required to set-up and operation support of the fund</td></tr>
</table>

4.5.4 Measure: Stakeholder involvement and training

Title of package of measures C 04	**Stakeholder involvement and training**	
Targets	Addressing requirements of EES art 17 There is huge demand for establishing a "**concerted voice for energy efficiency in Romania".** The design of the Action Plan and its must be based on a **dialogue with key-stakeholders** to formulate concise, consistent and achievable targets. Filling the gap of stakeholder awareness and commitment as analysis in section 1.3, 1.4 Information of stakeholders and users about EE policy targets, activities and instruments to generate understanding, acceptance and participation No direct EE targets, but a pre-condition to enable all other EE measures	
Target group	Stakeholders and end users in all sectors	
Description of measures NEEAP	Objective is to ensure that information on available energy efficiency mechanisms and financial and legal frameworks is transparent and widely disseminated to all relevant market actors, such as consumers, builders, architects, engineers, environmental and energy auditors, and installers. Establishment of appropriate conditions for market operators to provide adequate and targeted information and advice to energy consumers on energy efficiency. Enable the participation of stakeholders, including local and regional authorities, promote suitable information, awareness-raising and training initiatives to inform citizens of the benefits and practicalities of taking energy efficiency improvement measures. Provision of information to banks and other FIs on possibilities of participating, including through the creation of public/private partnerships, in the financing of energy efficiency improvement measures.	
Information& Awareness	1) Information campaigns (by energy agencies, energy suppliers etc) 2) regular round table sessions with associations and municipalities 3) Strengthen international co-operation 4) Public information campaign for saving power and heat with low cost measures 5) Promotion of use of renewable energy for rural, de-central heating 6) Promotion and facilitation of EE to small energy customers 7) Guideline for preparation and implementation of energy efficiency projects 8) Collect best practice cases studies of energy efficiency	
Advice & Capacity building	9) Create networking with European EA, 10) Active membership of European associations and search for strategic co-operation alliances with agencies 11) Regional and local information events	
Financing mechanisms	12) Utilisation of donor programmes for events, etc 13) Participation in donor financed projects 14) Raising of Funds and sponsoring	
Estimated Costs	Total costs over 6 years (2014-2020)	**450.000 EUR**
	Of which information and awareness campaigns	250.000 EUR Annually 50.000
Sources of financing/co-financing	For non-investment measure	
Gov state budget	100%	

Title of package of measures C 04	**Stakeholder involvement and training**			
ESCF and other EC programmes	Possibly 10-20% for dedicated actions			
Time schedule for implementation	2014: Information strategy , developed by EEA End 2014: EE internet portal online			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED art 17	High	Medium	low
Responsible for implementation	EE authority			
Monitoring indicators of achievement	- Stakeholders communication strategy by EEA in 2014 - Establishment of inter-ministerial, sectoral working groups - Number of events and its participation			
Assumptions / specific considerations / Risks	Option to apply for co-funding form ESCF and other EU programmes Aligning/ synergies with information&awereness activities of sectoral measures			
Preconditions to reach the target	Budget available for networking activities, annual budget of EEA, co-founding by gov. bodies and stakeholders Cooperation with stakeholders for development and roll- out plan Capacities of EE body			

4.5.5 Measure: Qualification, accreditation and certification schemes and training

Title of package of measures C 05	**Qualification, accreditation and certification schemes and training**
Targets	Addressing requirements of EES art 16 Availability of qualification, accreditation and certification schemes No direct EE targets, but a pre-condition to enable other EE measures in particular ion buildings
Target group	Stakeholders and end users in all sectors
Description of measure for NEEAP	certification and/or accreditation schemes and/or equivalent qualification schemes, including, suitable training programmes, available for providers of energy services, energy audits, energy managers and installers of energy-related building elements as defined in Article 2(9) of Directive 2010/31/EU. ensure that the schemes provide transparency to consumers, are reliable and contribute to national energy efficiency objectives. make publicly available the certification and/or accreditation schemes to make consumers aware of the availability of qualification and/or certification schemes
Legislation& Regulation	1) Improvement of energy audit methodology 2) Regulation on supervision by independent authority 3) Accreditation and certification schemes for energy auditors 4) Review regulation on preparation of feasibility studies to include a requirement for EE component
Information& Awareness	5) Programme to raise awareness of the benefits of energy audits
Advice & Capacity building	6) Training programmes for the qualification of energy auditors 7) Training of installation companies Cooperation with energy services and installers 8) monitoring of results and accuracy of energy audits 9) energy audit quality assurance and control scheme
Financing mechanisms	10) Grant co-financing of energy audits

Title of package of measures C 05	**Qualification, accreditation and certification schemes and training**			
Estimated Costs	Total costs over 6 years (2014-2020)			**300.000 EUR**
	Of which financing of EAs			200.000 EUR
Sources of financing/co-financing	For non-investment measure			
Gov state budget	100%			
ESCF and other EC programmes	Possibly 10-20% for dedicated actions			
Time schedule for implementation	2014: Legislation and implementation strategy for certification/accreditation 2015: Training programme End 2015: Certification scheme in force			
Appropriateness of the package of the measure	Obligation/ framework	Market Maturity	Development of framework	Economic Sustainability
	High – EED art 16	High	Medium	low
Responsible for implementation	EE authority			
Monitoring indicators of achievement	- Certification regulation in place - Number of certification trainings and its participation - Number of certifications in practice			
Assumptions / specific considerations / Risks	Option to apply for co-funding form ESCF and other EU programmes Aligning/ synergies with advice&capacity building and energy audit activities of sectoral measures			
Preconditions to reach the target	Budget available for certification and training, Cooperation with stakeholders for development and roll- out of training Capacities of EE body TA required to develop the scheme			

5 RECOMMENDATIONS FOR NEW ENERGY EFFICIENCY LAW

There is a common understanding and general consensus among the governmental stakeholders, that the new EE law, due in early 2014 needs to be customised, obligating and path-pointing. A powerful law will be the pre-condition for the successful implementation of measures and mechanisms of the NEEAP towards achieving committed EE targets.

Currently the draft of the EE law is a focusing on the transposition of the EED only.

From the view point of obligations and needs to enable mechanisms as proposed for the NEEAP the EE law should have in general 3 layers of chapters:

a) General provisions, as usual in primary laws, such as markets, procedures, definitions, responsibilities, principles on financing and mechanisms, etc.
b) Cross sector issues which provide an enabling frame or principles of mechanisms, such as financing mechanisms, including EnPC and Transposition of cross sector EE Directive
c) Sector related issues to be addressed in genera in the primary law, such as, tariffs, incentives, general support schemes intended, sector obligations

5.1 Recommended elements for the new EE law

An overview on the issues to be addressed is provided in the following table

Table 35: Recommended elements for the new EE law

Required chapter	Key issues to be addressed in the primary law
General provisions	Scope & Targets
	Implementing bodies
	Responsibilities by sector, NEEAP etc.
	Coordination
References	To strategic documents
	Existing legislation
	To NEEAP as instrument to achieve the targets my measures
Procedural provisions	Monitoring & processes
	Alignment & amendment
	Settlement of disputes
"Competent" EE authority	Mandate
	Rights &duties
	Financing
Financing mechanisms	Instruments
	Sanctions
	Eligibility
Energy Performance Contracting	ESCO, Targeted application areas
	Link to secondary and tertiary Legislation
	Principles of Contract model
	Financing, intention for supporting instruments
Transposition of EE Directive 27/2012	Reference to all articles 4-20
	Obligation scheme with Inventory, Monitoring, Enforcement
Building sector	Performance standards & Labelling
	Audits & certificates
	Mandatory replacement& RE
	Financing mechanisms
Tertiary sector and municipal sector	Standards & Labelling
	Mandatory AP& Audits

Required chapter	Key issues to be addressed in the primary law
	Inspections
Transport sector	Performance standards
	Inspection& certification
	Audits& obligations
Industry sector	CHP, co-generation
	Audits, obligation and certification schemes
	Tariffs, incentives, penalties
Energy sector	CHP, cogeneration
	Tariffs
	Other obligations, such as Audits

5.2 Specific considerations for the EE law

5.2.1 Need to be specific in chapter "Targets and objectives"

The legislation must include absolute or "moving" EE targets or being based on indices. Targets of concrete measures or instruments belong to the NEEAP. Monitoring of key indicators may lead to adjustment of measures to reach the target. Regular analysis of degree of achievement and correction mechanisms needs to be planned.

"**SMART**" objectives for the policies

- **S**pecified: be as concrete as possible, what is aimed for, who is targeted, what seems the most appropriate instrument or policy package to achieve maximum impact;
- **M**easurable: objectives have to be measurable to determine whether results and effects have been achieved;
- **A**mbitious: targets should go beyond business as usual;
- **R**ealistic but acceptable: with respect to desired effect, available budget and timeframe;
- **T**ime framed: it should be clear when the results and effects are to be achieved.

5.2.2 Need to be specific in chapter "Monitoring"

There is no doubt about the importance of monitoring and verification for measuring the success and effects of instruments applied in order to enable adjustments to the policy framework where and when required. Evaluation should be incorporated in the overall policy, and may focus on the following key analytic elements for assessing the effectiveness:

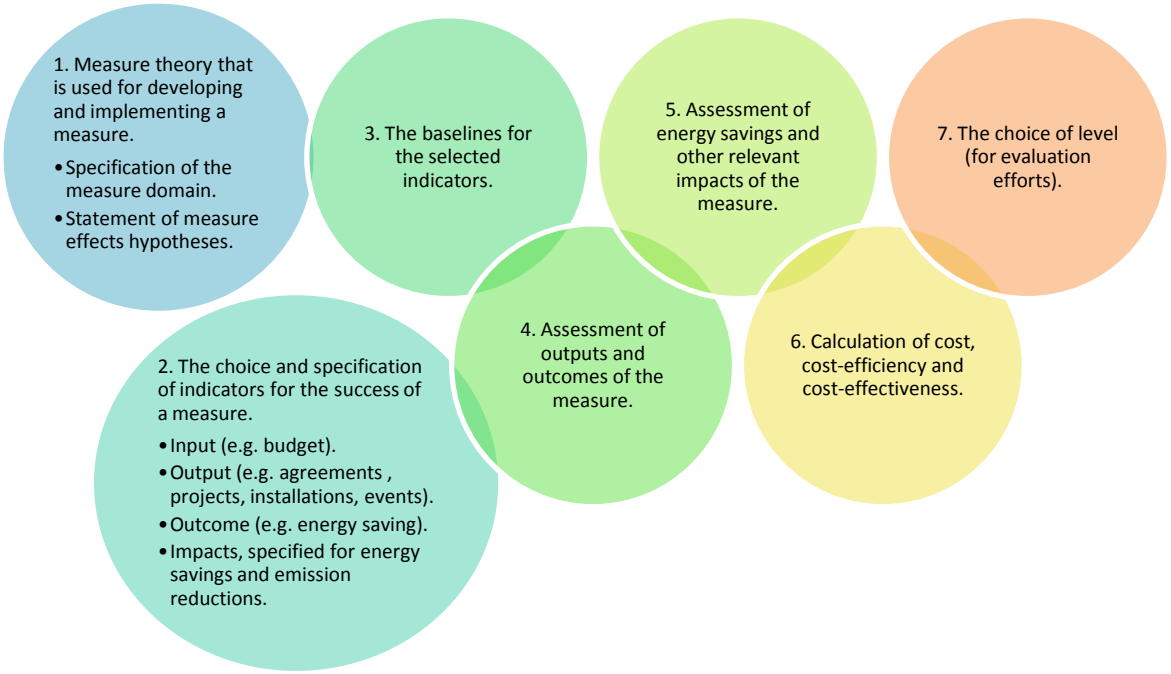
- On **SUCCESS** and degree of implementation in the planned time frame
- On **RESULTS** in terms of EE value
- Of contribution to the achievement of EC Directive or policy targets, Provision to the development of a conducive **FRAMEWORK** and market mechanisms
- On development and efficient use of sustainable **FINANCING MECHANISMS**
- **SUSTAINABILITY** of implementation such as enabling market mechanisms and economic return from the EE measure

With a monitoring and evaluation system in place, one can keep track of the actual savings achieved by comparing the baseline set at the beginning of the programme and the improved energy performances of industries after the first cycle of energy efficiency activities.

The overall monitoring and regular evaluation of the measures shall be clearly given to the dedicated EE authority. Annual evaluation reports, containing the degree of achievements to the EE target under the consideration of the economic and PEC development, shall be prepared for the delivery to the GoR and the EC.

The choice of indicators that need to be monitored should be adjusted to the policy scope and embedded in the implementation framework.

Figure 23: Sample of monitoring indicators



Specific monitoring indicators for each package of measure are outlined in the above description of measures.

It should also be acknowledged that certain effects are difficult to monitor, which does not necessarily mean that they are less important. Given the needs of the evaluation process, required time and costs, a conscious decision should be taken about which scope of monitoring is justifiable for the particular measure. Certainly, embedding the data collection in the policy framework is the most effective strategy.

Monitoring forms, procedures and analysis of monitored data for amendment need to be specified.

5.2.3 Need to be specific in chapter "Responsibility towards EE"

There are many references within the draft legislation that mention individual responsibility for EE development. The downside is that many responsibilities are given to the so called "Competent Authority" which is yet to be defined.

Currently responsibilities for Energy Efficiency are spread across many entities, resulting in a lack of ownership of the EE topic, and a weak coordination amongst the entities. This is reflected in poor overall performance of coordination and commitment regarding EE.

Please refer to section 1.3.3 of the present report regarding gap analysis of responsibilities

For example, the responsibilities of public, local and central authorities need specification: e.g. must monitor and manage/reduce their own fuel/ energy consumption.

6 RISK ANALYSIS

6.1 Description of risks

Risks related to the preparation and implementation of NEEAP III are analysed with respect to the following aspects: Timing, stakeholder commitment, programmatic approach, effort and analysis, EE legislation, EE authority, availability of financing for implementation, and availability of funding for the EE authority.

6.1.1 Timing

- According to the recommended schedule laid out in Chapter 1.5.3 above, the preparation of NEEAP III would take place during March-May 2014, i.e. consuming three months. The deadline for the finalisation of NEEAP III is June 2014. Three months is seen as a minimum of time required for this to be accomplished, especially in the light of the recommendation for grouping the measures into packages.
- There are two risks related to this: Delays of the start of the preparation of NEEAP III, and loss of time during the preparation of the document.
- Probability of these risks: Medium and Medium.
- Impact of delays: Delays in the implementation of NEEAP III, with loss of EE improvement. The smaller, the GDP growth is during 2014, the less important losses of time will be.
- Mitigation measures: For the start: To initiate the preparation earlier, in anticipation of the falling in place of the formalities regarding the EE authority. ANRE staff could initiate preparing the NEEAP III already in December 2013 or January 2014, thereby gaining valuable time.

6.1.2 Stakeholder commitment

- ANRE management has demonstrated its commitment to the NEEAP III process, and so has the chairman of the Chamber of Deputies' Committee for I&S. Ministry of Economy, Ministry of Finance, Ministry of Environment, Ministry of Transport and others have shown little or no commitment to the process.

- The risk related to the lack of commitment would be lack of critical mass at government level for supporting wholeheartedly the establishment of the EEA and for allocating the required resources for driving forward the establishment and implementation of NEEAP III:
- The probability of this risk cannot be assessed objectively. There would probably be a minimum of commitment related to the propensity of the government to remain in compliance with EU directives, and related to the probability of obtaining funding support under the 2014-2020 ROP.
- The impact of lack of commitment would be high, as lack of commitment would delay the entire NEEAP III process.
- Mitigating measures: Awareness creation.

6.1.3 Programmatic approach

- The programmatic approach requires coordination among various institutions in order first to make agreements on the shape of the packages of measures, and second to carry out the implementation of these packages.
- There is a risk that the programmatic approach falls apart. This would be caused mainly by lack of commitment and lack of resources.
- Based on past experience the probability of this risk is high, as there was almost no concerted action present in NEEAP I and II.
- The impact of lack of programmatic approach would be high, as lack of programmatic approach would lead back to the fragmented approach which proved ineffective in the past.
- Mitigating measures: Early communication between key stakeholders, to generate commitment to the programmatic approach.

6.1.4 Effort and analysis

- A certain effort and analysis across key stakeholders is required to make NEEAP III a success. A less dedicated approach carries the risk of failure of certain parts of the plan. As NEEAP III will consist of packages of measures, the implementation of a certain package will depend on the implementation of all of the measures it includes. Therefore, if one measure within a package fails (e.g. lack of progress on legislation and regulation), then the entire package may fail.
- The risk related to this aspect is clearly linked to the political prioritisation.
- The probability of this risk is assessed to be medium or high, as a breakthrough is required for the political prioritisation of energy efficiency to increase from its present rather neglected status.
- The impact of this risk is assessed to being low to medium, depending on the extent of lack of political prioritisation and allocation of resources.
- Mitigating measures: To create awareness among key stakeholders at an early stage in the process of preparations for NEEAP III.

6.1.5 EE legislation

- EED requirements: The risk that EED requirements are not transposed into Romanian legislation. The probability of this risk is very low, and the impact of it happening is rather high. Mitigating

measures are sufficient manpower and efforts of the Ministry of Economy, who has the mandate to transpose the EED.

- Failure of the obligation scheme foreseen according to Article 7 of the EED could occur due to resistance from the energy distributors, and from resistance of the end-users of energy to accept any energy tariff increases related to such a scheme. The probability of this risk is seen as medium and the impact as high. Mitigating measures would include awareness creation, lobbying, and strengthening of the social safety net related to vulnerable and low income segments of the population.
- EE authority: Failure to establish the legal basis for the EE Authority would put the entire NEEAP III process at risk. The probability of this risk is medium, and the impact is high. Mitigating measures would include awareness creation and lobbying among members of parliament.
- EnPC secondary legislation, model contract: The risk of the secondary and tertiary regulations for Energy Performance Contracting not being prepared or being significantly delayed would limit the market development for such financing schemes. The probability of this risk is low, and the impact is high. Mitigating measures include upfront efforts for establishing these regulations; such work is already ongoing.
- Funding, revolving: The failure to establish a revolving fund (EE Fund) would limit the flexibility on financing of energy efficiency investments. The probability of this risk would seem to be medium, as it is hard to predict whether such a fund will receive the necessary political backing. The impact of this risk is low to medium, based on the assumption that attractive EE investment projects will always find the sources of finance. Mitigating measures are up-front investigations at government level to establish the pro's and con's of this kind of fund. Such investigations have already been initiated for the residential sector in collaboration between MDRPA and EBRD.
- Affordability of cost covering tariffs: Without energy savings implemented, cost covering tariffs may exceed conventional affordability limits (benchmarks), but when energy savings have been implemented, the costs should reduce to within these limits. Thus, the probability of this risk is linked to the energy efficiency efforts. Without mitigating measures this probability would be high, but with the mitigation measures it would become low. The impact of the risk is high. Mitigating measures: Combination of state grant financing and credit financing would enable the majority of households to afford the full cost of energy. Vulnerable and low income households should have access to a social safety net related to energy costs.

6.1.6 EE authority

- Mandate: There is a risk that action is not taken to establish the EEA with a proper mandate. The probability of this risk is hard to assess, so as a matter of prudence is set as high, until more specific information on the progress towards the creation of the EEA is available. The impact of this risk factor is large. Mitigating measures will consist in awareness creation, and lobbying, for the necessity of the EEA.
- Capacities: Even if an EEA is created with an appropriate mandate, if it is not provided with sufficient capacities, for the efforts required, it could fail becoming an effective coordinator of the NEEAP process. The probability of this risk would be medium to high, due to the general philosophy of austerity in the State Administration. The impact of lack of capacity is seen as similar to that of the mandate: high. Mitigating measures would be to prepare in advance of the inauguration of the EEA, thorough descriptions of the framework for its future activities, as well as guidelines for their implementation.

- Staffing: Again, even with the mandate and the capacity, if staffing is inadequate this may jeopardize the functioning of the EEA. The probability of lack of sufficient number and qualification of staff is quite high. The impact is high. Mitigating measures are: in the short run to hire external assistance and in the medium to long term to train permanent staff of the EEA. Another important mitigating measure is to offer sufficient incentives in terms of salaries in order to attract and retain high quality staff.
- Timing: If the EEA is not established up front, this will delay the entire process of formation and implementation of NEEAP III. The probability of delay is assessed to be medium. The impact of delay would be high in the short term, but once the EEA is up and running, this impact could be neutralized by extra effort. Mitigating measures: To create awareness and a critical mass of support among decision makers for the swift and timely establishment of the EEA.

6.1.7 Availability of Financing for implementation

- Sector programmes of the Romanian government and of the EU are already in place in most sectors. Romanian sector programmes have experienced cuts and have in some cases become ineffective. EU grant programmes are ongoing for their extension into the new planning period of 2014-2020. Failure of such programmes to be prepared in time and in sufficient quality would have a negative impact on the progress on energy efficiency.
- The risk linked to the failure of programme preparation depends on the specific contents of each programme. Some programmes will be decisive for the take-off of NEEAP III packages, while others may have a limited importance.
- Given the prior experience within the Romanian State Administration, the probability of this risk is seen as low.
- The impact of this risk may be high, medium or low, depending on the programme in question.
- Mitigating measures are for Romanian sector programmes to allocate more funds in the state budget, and allocating sufficient time and human resources in key ministries and organisations for the timely preparation of high-quality programmes. For EU grant programmes the mitigation measures are similar.
- Smart combination of government funds with donor and private funds. Government and donor funds are normally provided as grants, while private funds become available mainly through credit lines. Other financial instruments may be added. In order to stretch the availability of government and EU community grant funds, they should be leverage with credit funds. The leverage factor should be reasonable, i.e. at least 1, and up to 10-25, depending on the attractiveness of the intervention in question.
- There is a risk that government funds may not attract private co-financing, resulting in quick disbursement of the government funds and a vacuum thereafter.
- The magnitude of the risk will depend on the type of interventions, i.e. the financial attractiveness of the projects seeking finance. In some sectors the risk is high, in others - medium or low.
- The probability of the risk also depends on the type of intervention, and may vary from low to high.
- The impact of no co-financing is seen as high, because financial engineering is a significant factor in the realisation of EE projects.

- Mitigating measures include up-front coordination between the government, the EU and the suppliers of credit lines – on the one hand: International Financial Intermediaries, and on the other hand: Private loan and equity capital providers. The up-front cooperation would consist of common efforts for appropriate financing mechanisms, such as parallel co-financing, revolving funds, ESCOs, and others.

6.1.8 Availability of funding for EE authority

- Availability of financing for the EE Authority is decisive for the implementation of NEEAP III.
- The probability of non-availability of financing is medium to high, as no prior commitment of funding has yet been made.
- The impact of lack of financing is high.
- Mitigating measures are prior commitment, i.e. inclusion of appropriate funding in draft state budgets, as additional funds.

6.2 Summary of risk factors

The above assessment of risk factors is summarized below.

Table 36: Summary of risk factors concerning the establishment of the EEA

Influencing factor	Risk	Probability	Impact	Mitigating measures
Lack of commitment for EE Authority	Lack of a leader and coordinator of the NEEAP III process	Medium / High	High	Awareness, lobbying, careful planning
Lack of availability of financing for the EE Authority	Lack of financing would be a critical problem for the entire NEEAP III process	Medium / High	High	Prior commitment: Inclusion of appropriate funding in state budget
Lack of qualified staff for the EEA	Lack of qualified staff would be a critical problem for the entire NEEAP process	Medium/High	High	Recruitment of staff in a transparaent way, and appropriate incentives for suited candidates.
Lack of mandate and legal basis for the EEA	Without mandate and legal basis the EEA cannot be established	Low	High	To ensure that the EE Law includes appropriate articles for the EEA.

Table 37: Summary of risk factors concerning the implementation of NEEAP III

Influencing factor	Risk	Probability	Impact	Mitigating measures
Delays of preparation of NEEAP III	Delays of start, slower progress	Medium	Medium	Delays of implementation of EE improvement
Lack of stakeholder commitment	Lack of critical mass of support for the NEEAP III	Medium	High	Awareness creation among key stakeholders
Lack of programming approach	Deteriorating into a fragmented approach	High	High	Early communication between key stakeholders
Insufficient effort and analysis	Failure of one measure can bring	Medium / High	Low / Medium	Early awareness creation among key

	down a whole package			stakeholders
Insufficient progress with EE legislation	Delays will translate into delays of EE implementation	Low / Medium	High	Allocation of manpower, awareness creation
Lack of availability of financing for implementation of EE measures	Lack of government and EU grant funds, and lack of private financing	Low	Low / Medium / High	Coordination between the government, the EU, the IFIs and the local financial intermediaries

It is seen that there are several risks having both a high probability and a high impact. This leads to the conclusion that a strong early focus on the mitigating measures is very important. In the table below the top priority risk mitigation strategy is outlined.

6.3 Top priority risk mitigation strategy

Table 38: Top priority risk mitigation strategy

Risk		Initial solution	Addressed by measure/initiative
Political commitment	→	Lobbying, creating the critical mass for success	C 04: Stakeholder involvement C 02: EE information policy
Funding	→	Allocations in state budget	C 08: National EE Fund
Capacity	→	Allocate sufficient human resources at key stakeholders, especially the EEA	C 01: EE Authority
Expertise	→	Attract sufficient and qualified staff	C 01: EE Authority
Coordination	→	Creating a strong EEA	C 01: EE Authority
Legal frame	→	Gap analysis, preparation of primary, secondary, tertiary legislation	H 01: Building road map MAB I 02: Large industrial consumers incentives S 03 EE in central government buildings S 08: ESCO / EnPC E 05: Obligations scheme

As illustrated by the table, in order to ensure success of NEEAP III the selected cross sector horizontal measures should be given top priority. These measures are decisive for the development of political commitment, funding, capacity, expertise and coordination. Besides these measures, the establishment of the enabling legal framework should be given top priority.

7 ANNEXES

7.1 Annex 1: Prospects on energy demand and intensity of Romania

Energy intensity and the influencing factors

Energy Intensity is defined as the ratio of energy consumption per unit output or activity. On the other hand, **Energy Efficiency** improves when a given level of service is provided with reduced amounts of energy inputs or services are enhanced for a given amount of energy input. Accordingly, an increase in energy efficiency would mean a decline in energy intensity.

In reality, energy intensity includes not just energy efficiency but also some structural and behavioural components. For example, a decrease in energy consumption in steel manufacturing does not necessarily mean that steel production has become more energy efficient. Other factors such as changes in the structure of steel plants (production capacity, type of steel produced), changes in the fuel-mix, market demand for steel, or even the behaviour of steel plant staff can also affect energy intensity. Therefore, in addition to developing policy to address energy efficiency, it is also important to understand the influence of structural and behavioural components on energy intensity and explore policy options to address the associated issues.

When energy intensity of a whole economy is concerned (e.g., at the national level), it represents the most aggregate level of activity and is presented as the energy-GDP ratio which is calculated by dividing either primary energy consumption by the real GDP or final energy consumption by the gross value added of the various economic sectors. As the energy-GDP ratio does not require much detailed data, this indicator is widely used to undertake energy performance comparisons among countries, energy intensity being used as a proxy for energy efficiency. As stated earlier, it does not however reflect the structural and behavioural factors that influence energy intensity. The influence of these factors that are not related to energy efficiency can be better understood only when data are gathered and analyzed at more disaggregated sectoral or sub-sectoral levels.

Therefore, **international comparison of simple energy-GDP ratios to assess the energy efficiency performances of countries tends to be unfair when one does not have a good understanding of the various factors that affect the energy intensity at the level of a country**.

Some examples of factors influencing the **energy intensity at the macro level are** elaborated below.

Objective factors: physical parameters such as the geography as well as the population and demographics.

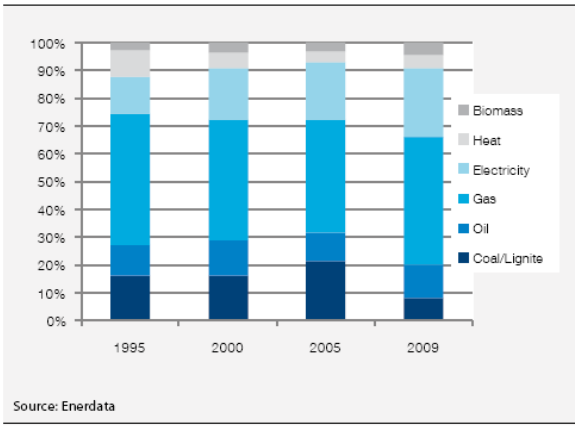
Semi-objective factors:

Techno-economic in nature and refer to the structure of the economy, the infrastructure for energy production and consumption, the level of industrial development, and the lifestyle adopted by the population.

The **sectorial shifts in industries** have a direct impact on the energy intensity.

Modal shifts in the transport systems due to the decentralization of business and industrial activities influence the energy intensity.

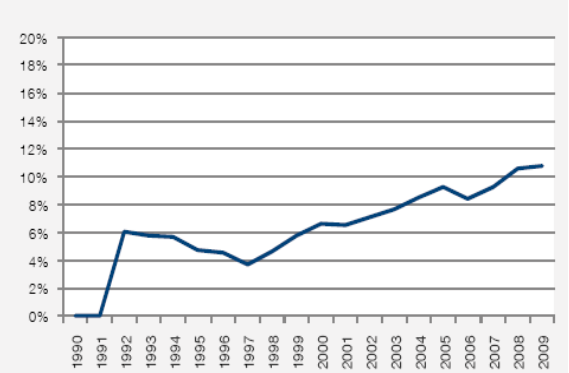
Figure 11: Energy consumption of industry, by source



Source: Enerdata

In the post-industrial phase, manufacturing gives way to the less energy-intensive services, helping to lower the energy intensity.
The **urbanization rate** influences the energy intensity
An increase in **energy prices** will encourage more efficient use of energy or the producers may decide to substitute energy for other inputs such as labour and capital, where feasible. While appropriate energy pricing can be an effective tool to improve energy efficiency and internalize some externalities such as resource depletion and environmental degradation, it is politically more difficult to implement.

Figure 14: Share of industrial CHP in industrial consumption



Source: Enerdata

Despite the current economic downturn, over the medium term, electricity consumption in Romania is expected to experience continued growth of 2-3%, reaching 72 TWh by 2026.
Romania has the second largest population in CEE after Poland, and is viewed as being one of the countries with the highest development potential in the region. Romania was one of the last EU economies to enter recession following the onset of the global economic downturn. Before the downturn, Romania had a strong real Gross Domestic Product (GDP) growth rate of 7.3% - far above the EU27 average – however this turned negative in 2009 and 2010.
According to the Economist Intelligence Unit (EIU), Romania reported a real GDP recovery of 2.3% in 2011. However, given the worsening outlook for the world economy, short-term prospects look modest, with estimated real GDP growth of 0.5% in 2012. By comparison, the GDP of the Euro area is estimated to decline by 1.2% in 2012, following estimated growth of 1.8% in 2011.

Challenges of decoupling economic growth from energy consumption

Romania needs to retrospect on the inherent constraints that impede its ultimate goal of achieving low energy intensity. After all, irrespective of the inherited objective or semiobjective factors, Romania face the ultimate challenge of decoupling economic growth from energy consumption, and have some degree of freedom in making choices that allow them to **do more and better with less energy and investment**.
A well-conceived energy efficiency strategy will not only allow them to achieve their goal with lower energy consumption but also enable to improve the living standards and quality of life, while making human and financial resources available for other aspects of societal development such as education, healthcare, etc. The general goal could be to ensure a certain level of production and services with the energy consumption optimized with respect to the cost.

Historically, electricity consumption and economic performance have showed a strong correlation. The development of electricity consumption per capita is positively correlated to the development of GDP per capita. This essentially means that the growth in demand for electricity per capita follows the growth of GDP per capita at a slower pace, starting from dynamic growth, which later slows down. Based on estimates of GDP, electricity demand is projected, by separate consumer groups, according to individual consumption patterns and correlated with the GDP per capita generated by

the respective segment. Accordingly, the gross annual electricity demand in Romania is expected to reach 72TWh by 2026.[5]

Energy Consumption

Energy consumption per capita is about 1.6 toe (2012), which is equal to half the EU average, and electricity consumption amounts to 2 240 kWh/cap (60% below the EU average).

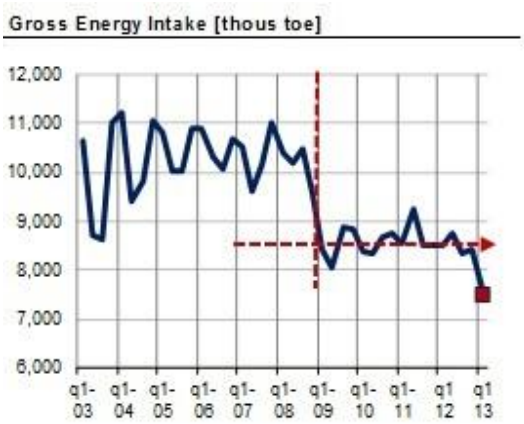
Total energy consumption has been decreasing since 2006, and even fell by 12% in 2009 due to the economic crisis.

Romania is facing a decline in production because of the lack of investments in installations, despite the increase of hydrocarbon reserves (in particular in gas). To boost its production, the country is increasingly opening up to foreign companies. The energy sector has had to make substantial effort to increase efficiency.

Energy efficiency can be considered as the **keystone** to achieve the goal of either "Green Growth" through the promotion of sustainable consumption and production at the country level, or "eco-efficiency" through resource productivity at the corporate level.

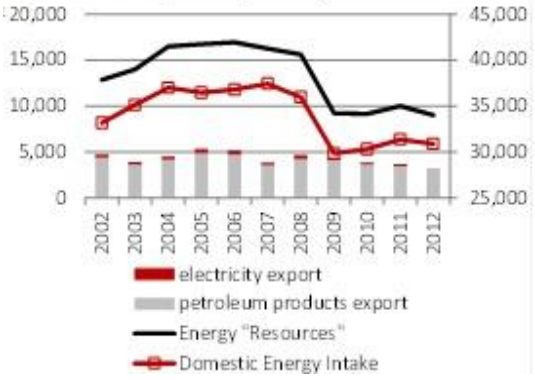
Energy efficiency is often looked upon as the "**low-hanging fruit**" that is waiting to be plucked with least efforts in our pursuit of energy security, inclusive development, and the transition to a low-carbon economy.

Investment in energy efficiency is extremely attractive as the incremental capital investment is recovered in a reasonable time frame, energy cost is lowered, and there is an increase the energy productivity, thus helping Romania and businesses to be better prepared against any sharp hikes in fossil fuel prices in the future.



Source: INS, IntelliNews

	2008	2012	y/y	1Q12	1Q13	y/y
Gros use of energy [thous toe]						
Resources - total	41,951	34,015	-19%	8,497	7,504	-12%
coal	9,066	7,151	-21%	1,932	1,445	-25%
oil	13,320	9,002	-32%	2,152	1,898	-12%
natural gas	15,041	10,883	-28%	2,898	2,697	-7%
hydro	1,577	1,051	-33%	226	290	28%
nuclear	1,381	2,817	104%	760	741	-2%
imp. electr.	85	80	-6%	23	14	-39%
Oil products from import	1,140	2,567	125%	389	309	-21%



[5] Source: Overview of The Romanian Electricity Sector: Development and Investment Opportunities; KPMG, March 2012

7.2 Annex 2: Classification of ESIF thematic objective for energy sector development needs

Development Challenge	Thematic Objective (TOs)	Programme	Fund	ESI Programme
Competitiveness	**1. Strengthening research, technological development and innovation**	- Competitiveness Operational Programme (OP) - Regional Operational Programme (ROP) - Human Capital OP - National Rural development Programme (RDP) - OP for Fishing and Maritime Affairs	- ESCF - EARDF	- COMP - HC - AC - AGRI - FISH - ETC - ROP
	2. Enhancing access to, and use and quality of, information and communication technologies	- Competitiveness OP	- ESCF	
	3. Enhancing the competitiveness of small and medium-sized enterprises, the agricultural sector and the fisheries and aquaculture sector	- Regional OP - National Rural development Programme (DP) - OP for Fishing and Maritime Affairs	- ESCF - EARDF - EMFF	
Resources	**4. Supporting the shift towards a low-carbon economy in all sectors**	- OP for Large Infrastructure	- CF - ESCF - EARDF - EMFF	- INFRA - ICT - COMP - AGRI - FISH - ETC
	5. Promoting climate change adaptation, risk prevention and management	- OP for Large Infrastructure - National RDP	- CF - EARDF	
	6. Protecting the environment and promoting resource efficiency	- OP for Large Infrastructure - National RDP - OP for Fishing and Maritime Affairs - ROP	- CF - FSE - ESCF - EARDF - EMFF	
Infrastructure	**7. Promoting sustainable transport and removing bottlenecks in key network infrastructures**	- OP for Large Infrastructure - ROP - National RDP	- CF - FEDR - FSE	- INFRA - COMP - ROP - HC - AC - AGRI - FISH - ETC
People and Society	8. Promoting employment and supporting labour mobility	- Human Capital OP - National Programme for RD - National Programme for Fisheries and Agriculture	- ESF - ESCF - EARDF - EMFF	- HR - COMP - AC - ICT - ROP - AGRI - FISH - ETC
	9. Promoting social inclusion and combating poverty	- Human Capital OP - ROP Programme / CLLD - Competitiveness OP - National PRD	- ESF - ESCF - EARDF	
	10. Investing in education, skills and lifelong learning	- Human Capital OP - National PRD - ROP	- ESF - ESCF - EARDF	

Development Challenge	Thematic Objective (TOs)	Programme	Fund	ESI Programme
Governance	**11. Enhancing institutional capacity and an efficient public administration**	- OP for Administrative capacity - ROP	- ESF - ESCF - EARDF - EMFF	- AC - COMP - TA

7.3 ANNEX 3: overview of obligation schemes of selected EU-MS

Country	Scheme Information	Policy Objectives	Obligated Parties
Belgium	The Flemish region of Belgium introduced an EEO in 2002 which helps meet the climate obligations under the Kyoto Protocol as well as the EU EED goals.	Encouraging the rational use of energy or efficient use of energy in a liberalized market.	The obligation scheme applies to the 16 electricity distributors in Flanders.
Denmark	The Danish scheme consists of an EEO with an annual binding energy saving target for all energy distributors.	The Energy Policy Agreement of 2008 which established the energy savings obligation aimed to reduce consumption by 2% in 2012 and by 4% in 2020 compared to 2006 levels	The obligated parties are distributors for electricity, natural gas, and district heating. Heating oil distributors participate on a voluntary basis. For electricity, natural gas, and heating oil, the obligation is negotiated with the sector trade association, whereas for district heating, the obligation is put on individual companies. Denmark has approximately 240 obligated parties: 75 in electricity and gas and 160 in district heating.
France	France has in place mandatory quantitative energy saving targets for energy suppliers and a scheme of tradable energy efficiency certificates to track energy savings and determine compliance with the targets.	The certificate programme aims to realize the diffuse but immediately available potential for energy efficiency in France, particularly in the residential and tertiary sectors. These sectors are responsible for 40 percent of final Energy consumption and one quarter of GHG emissions in France.	The 2005 Law allocated the target for the first phase of the certificate scheme among energy retailers, defined as legal entities who sell electricity, natural gas, and district heating and cooling to end consumers and the annual sales of which exceed a threshold, as well as natural persons or legal entities who sell heating oil to end consumers. In the second phase, wholesale suppliers of automobile fuels have been added as obligated parties. Although around 2,500 companies are obligated under the programme (mainly heating oil suppliers), 80 percent of the obligation falls to the largest two obligated companies, Electricité de France and Gaz de France.
Italy	Italy has the most active energy efficiency certificate market in Europe, characterized by significant market participation by energy efficiency providers, including some ESCOs, and high levels of certificate trading through the spot and over-the-counter markets. An EEO for electricity and gas distribution system operators was introduced as part of the legislation liberalizing Italy's electricity and gas sectors in 1999 and 2000. The energy efficiency certificate scheme, coupled with annual energy saving targets, commenced operation in January 2005.	The energy efficiency certificate scheme is designed to serve as the primary driver for end-use energy efficiency in Italy. End-use energy efficiency improvement is seen as essential for fulfilling Italy's commitments under the Kyoto Protocol, increasing competitiveness and employment, and ensuring security of energy supply	Obligated parties are distributors of electricity and natural gas who, as of 31 December of the preceding year, "have connected to more than 50,000 consumers through their distribution grid."285 At the end of 2009, 14 electricity and 62 natural gas distributors were obligated to meet energy saving targets. The electricity sector is responsible for over half of the total obligation, ENEL being responsible for over 80% of the target. There are more obligated parties in the gas sector, with three companies accounting for just under 45 % of the gas sector target, and all other gas distributors individually responsible for under five percent of the target.
Poland	In April 2011, Poland transposed European Directive 2006/32/EC on energy end-use efficiency and	The purpose of the Polish energy efficiency certificate scheme is to	The EEO covers electricity, natural gas, and district heating companies supplying customers connected to the grid within the

Country	Scheme Information	Policy Objectives	Obligated Parties
	energy services into national law with the adoption of an *Act on Energy Efficiency.* The Act introduces an obligation on suppliers of electricity, natural gas, and district heating, as well as brokerage firms and end-users transacting on the Polish Power Exchange, to meet annual energy efficiency targets between 2013 and 2016 in order to help meet the 9% economy-wide target. The obligation is planned to be in place for three years, commencing in 2013 and ending in 2016. The Act further introduces a system of tradable energy efficiency certificates to facilitate compliance with the obligation.	drive energy efficiency in the public sector.	borders of Poland. District heating companies supplying no more than 5MW of heat are exempted from the obligation. The obligation also covers brokerage firms and end-users connected to the Polish grid who conduct transactions on the Power Exchange. Targets for individual obligated parties will be set annually at a level needed to help meet the 2016 national energy saving target.
United Kingdom	The United Kingdom has in place two programmes that set mandatory carbon reduction targets for retail suppliers of electricity and natural gas and for electricity generators: - the Carbon Emissions Reduction Target; and - the Community Energy Savings Programme. Both programmes support the United Kingdom's national and international climate obligations, primarily by promoting energy efficiency retrofits in the residential sector.	The purpose of the Carbon Emissions Reduction Target is "to help electricity and gas consumers in the household sector to reduce the carbon impact of their home by using energy more efficiently, reducing consumption and using energy from renewable and micro-generation sources. The Community Energy Savings Programme has two goals: - to significantly reduce the fuel bills of those living in low-income areas; and - to help improve the energy efficiency of existing housing stock in order to reduce the UK's GHG emissions.	The schemes require retail suppliers of electricity and natural gas who have 50,000 or more domestic customers to meet a proportion of the overall targets based on their shares of residential customers. As of May 2010, there were six obligated electricity and gas retail suppliers.