



Measuring energy savings

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Today`s agenda

1. Overview of the study „*Analysis of options for implementing Energy Efficiency Directive in Estonia*“
 1. Energy efficiency obligation scheme
 2. Alternative policy measures
 3. How to calculate energy savings?
2. Energy audit as a useful tool for estimating energy efficiency improvement possibilities
 1. Energy audit
 2. Thermography



Energy efficiency related legislation in the Union

- **Energy Efficiency Directive (2012/27/EU)** establishes a common framework of measures for the promotion of energy efficiency within the Union.
- **Energy Performance of Buildings Directive (2010/31/EU)** promotes the improvement of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, indoor climate requirements and cost-effectiveness.
- **Energy Labelling Directive (2010/30/EU)** establishes a framework for the harmonisation of national measures on end-user information, particularly by means of labelling and standard product information, on the consumption of energy and where relevant of other essential resources during use, and supplementary information concerning energy-related products.
- **Ecodesign Directive (2009/125/EC)** establishes a framework for the setting of ecodesign requirements for energy-related products with the aim of ensuring the free movement of such products within the internal market.



Energy Efficiency Directive (*EED*)

- Directive 2012/27/EU
- Adopted in 2012
- EED establishes a common framework of measures for the promotion of energy efficiency within the Union in order to **ensure the achievement of the Union`s 2020 20% headline target on energy efficiency** and to pave the way for further energy efficiency improvements beyond that date.
- It lays down the rules designed to **remove barriers in the energy market and overcome market failures** that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets for 2020.
- The requirements laid down in EED are **minimum requirements** and shall not prevent any MS from maintaining or introducing more stringent measures.



Energy efficiency measures in EED

- Chapter II provides possible measures for the **efficiency in energy use** to reach the national energy saving targets adopted pursuant to Article 4(1) of Directive 2006/32/EC on energy and-use efficiency and energy-services:
 - Building renovation (Article 4); Exemplary role of public bodies buildings (Article 5); Purchasing by public bodies (Article 6); Energy efficiency obligation schemes (Article 7); Energy audits and energy management systems (Article 8); Metering (Article 9) and Billing (Article 10).
- Chapter III provides measures for the **efficiency in energy supply**:
 - Promotion of efficiency in heating and cooling (Article 14) and Energy transformation, transmission and distribution (Article 15).
- Chapter IV provides **horizontal provisions**:
 - Availability of qualification, accreditation and certification schemes (Article 16); Information and training (Article 17); Energy services (Article 18); Other measures to promote energy efficiency (Article 19); Energy Efficiency National Fund (Article 20).



Study: Analysis of options for implementing EED Article 7

- Client: Ministry of Economic Affairs and Communications (www.mkm.ee/en)
- Consultant: ÆF-Consulting AS (<http://www.estivo.ee/en/>)
- Time period: 30.09.2013 – 03.12.2013
- Results of the study:
 - Calculation of the total amount of required energy savings;
 - Determination of the targeted sectors where the energy efficiency obligation scheme should be implemented;
 - Impact analysis of the alternatives measures and proposal for policy measures (combination package);
 - Preparation of the draft documents for notifying European Commission;
 - Description of methods of calculating the possible achievable energy savings (bottom-up and top-down calculation methods).



Steps for energy savings calculation and reporting

- Article 7 of the Directive 2012/27/EU can be implemented in MS by having in place or establishing one or more combination of the following policy measures: i) energy efficiency obligation scheme or ii) alternative policy measures.
- These steps are needed to be followed by MS:
 - Establish the total quantity of energy savings that has to be achieved and its spread over the obligation period;
 - Decide whether to use energy efficiency obligation schemes or alternative policy measures, or both;
 - Establish which sectors and individual actions are to be targeted so that the required amount of energy savings is achieved;
 - Establish how energy savings from individual actions are to be calculated;
 - Ensure control, verification, monitoring and transparency of the scheme or alternative policy measures;
 - Report and publish the results.



Rules for energy savings calculation

- According to Directive 2012/27/EU, each MS must calculate the total energy sales (by volume) following the instructions set out in the guidance document on Article 7.
- Data is available in Eurostat (<http://ec.europa.eu/eurostat>). Other national data sources can also be used, including data from energy providers, as far as these contain the same elements and lead to similar quantities.
- There are a few exceptions:
 - Energy sales for the transport sector can be partially or fully excluded from this calculation.
 - The use of electricity for electric cars and energy generated by households for their own use can be excluded from this calculation.

However, MS would need to develop a methodology and justify this in the notification to the Commission.



Required energy savings calculation

- To calculate the overall amount of savings required, the average of the annual energy sales (by volume) to final customers of all energy distributors or all retail energy sales companies for the three years before 1.01.2013 (*i.e.* 2010–2012) needs first to be calculated.

2010	2011	2012	Three year average
22 800 GWh	22 439 GWh	22 738 GWh	22 659 GWh

- The next step is to multiply by 1.5% the average figure established for 2010–2012 so as to calculate the yearly amount to be saved.
- In addition, under the concept of lifetimes in Annex V, part 2(e), each individual energy-saving action is considered to deliver savings not only in the year of implementation, but in also in future years up to 2020. For this reason, the required amount of savings has to be 'cumulated' year-on-year.



The overall amount to be reached over the whole period is a sum of the following **cumulative percentages**: 2014 – **1.5%**; 2015 – **3%**; 2016 – **4.5%**; 2017 – **6%**; 2018 – **7.5%**; 2019 – **9%**; 2020 – **10.5%**. **Total amount of required energy savings over the whole period is 42%.**

Year	Energy savings (GWh)							Total
2014	340							340
2015	340	340						680
2016	340	340	340					1 020
2017	340	340	340	340				1 360
2018	340	340	340	340	340			1 700
2019	340	340	340	340	340	340		2 040
2020	340	340	340	340	340	340	340	2 380
Total								9 520



How to spread the energy savings over the whole period?

- If energy efficiency obligation schemes are used, there is no obligation to report how the effort is spread over the obligation period. However, MS should **establish how the savings are to be phased over the period**:
 - MS might choose a linear increase of the savings over time?
 - MS may decide to start later but require higher savings towards the middle/end of the period?
- If alternative policy measures (under Article 7(9)) and/or national energy efficiency fund (under Article 20(6)) are used, **at least two intermediate periods** need to be introduced.
- There are no requirements for how long these intermediate periods should be and what levels of savings must be achieved.



Possible exclusions in Article 7(2)

- MS may carry out the calculation using values of **1%** in 2014 and 2015; **1.25%** in 2016 and 2017; **1.5%** in 2018, 2019 and 2020.
- MS may **exclude** from the calculation all or part of the sales, by volume, of **energy used in industrial activities listed in Annex I to Directive 2003/87/EC**.
- MS may allow **energy savings achieved in the energy transformation, distribution and transmission sectors**, including efficient district heating and cooling infrastructure, as a result of the implementation of the requirements set out in Article 14(4), Article 14(5)(b) and Article 15(1) to (6) and (9) to be counted towards the amount of energy savings.
- MS may count energy savings resulting from **individual actions** newly implemented since 31.12.2008 **that continue to have an impact in 2020** and that can be measured and verified, towards the amount of energy savings.



The application of Article 7(2) shall **not lead to a reduction of more than 25 %** of the amount of energy savings referred to in Article 7(1) – 9 520 GWh (42%). **Total required alternative energy savings over the whole period is 33%.**

Year	Energy savings (GWh)							Total
2014	227							227
2015	227	227						454
2016	227	227	283					735
2017	227	227	283	283				1 020
2018	227	227	283	283	340			1 360
2019	227	227	283	283	340	340		1 700
2020	227	227	283	283	340	340	340	2 040
Total								7 534



What policy measures or combinations are to be applied?

- The **energy efficiency obligation schemes are mandatory** schemes. MS may decide to use alternative policy measures.
- The energy providers subject to obligations under these schemes are '*obligated parties*' and are to be designated by each MS, on the basis of objective and non-discriminatory criteria, amongst the **energy distributors and/or retail energy sales companies** operating on its territory.
- **Transport fuel distributors or transport fuel retailers** operating on a MS territory **may also be included**.
- Savings from policy measures in the **transport sector and ETS industries may be counted**, even if these sectors' energy use has been excluded from the calculation of the overall amount of energy savings.



Alternative policy measures

- Energy or CO₂ taxes
- Financing schemes and instruments, and fiscal incentives
- Energy Efficiency National Fund
- Regulations and voluntary agreements
- Standards and norms
- Energy labelling schemes
- Training and education, including energy advisory programmes
- Other alternative policy measures

Any combination of the policy instruments mentioned above may be used. Because of the diverse nature of the challenges for the different end-use sectors, there could be different policy instruments that target each of these sectors.



Energy audit

- Energy audit can be considered as a means to **evaluate the use of energy in a building**. Energy audit reveals the technical condition of the building, main energy losses, renovation priorities, including energy conservation and economic feasibility analysis.
- Energy auditor uses the **technical data**, on **field measurements** and **surveillance, questioning** of users and **past energy consumption** to conduct an energy audit. The heat losses are calculated for the building envelope and the data compared with the real energy consumption. The received data will allow the auditor to perform energy calculations, based upon which **renovation measures** in order to reduce energy consumption **can be offered**.
- Energy audit is performed in order to prove building's compliance with the **minimum requirements** for energy performance and/or in order to draw up the **energy performance certificate**.



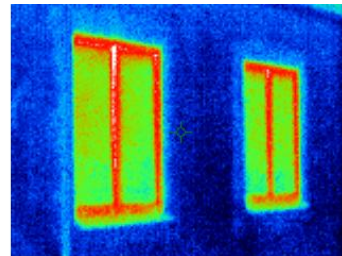
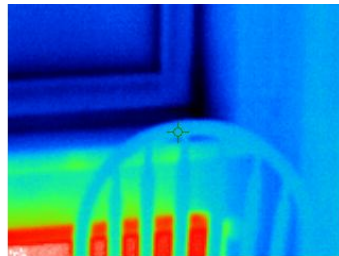
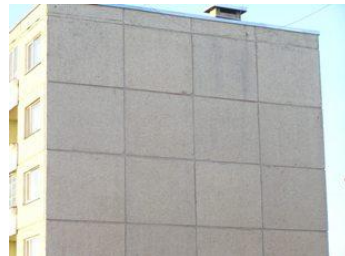
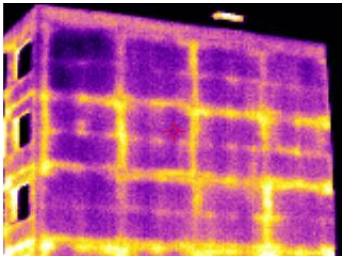
Energy audit and thermography

- Energy audit report consists of the following components:
 - Description of the building; General information of the building; Technical condition of the building; Description of the building`s energy situation; The heat balance of the building; Renovation packages with the energy savings calculation and feasibility analysis; Indoor climate measurement data; Illustrative photos; Other comments and observations.
- The auditor **may include thermography** in the energy audit.
- The purpose of thermography is to discover **heat leakages** and **cold bridges** of exterior walls, windows and doors.
- Adding thermal imagery to the energy audit will give next to measured heating system parameters also real exterior surface parameters.
- Thermal imagery is not a compulsory part of an energy audit, but it will make an energy audit more precise and credible.



Thermography

- shows a visual picture so that temperature differences over a large area can be compared;
- shows the heterogeneity of the wall surface and the most critical points on the wall, where the moisture has accumulated;
- enables to determine the heat leakages resulting from construction and cold bridges in the building`s envelope;
- enables to assess the work quality of installed doors, windows, walls and connections, incl. thermal bridges.





Thank you for the attention!

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