Deliverable D2.7

“Policy Drivers and Regulatory Framework”

which may drive Re-Commissioning projects

Re-Co (www.re-co.eu) is a European Project supported by the Intelligent Energy – Europe programme of the European Commission.

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1 Contents

This report gives a short summary of European Energy policies and legislative norms/ standards of the participating countries of Re-Co which provide background for the implementation of Re-Co projects. The table in chapter 2 gives an overview of the EU energy efficiency legislation and the national energy efficiency legislation applied in the countries involved in the Re-Co project. The particular legislative acts and norms are described in more detail in the following chapters.

Re-Co Project

The report is compiled in the context of the European project Re-Co (www.re-co.eu) which is supported by the Intelligent Energy – Europe programme of the European Commission. The project aims at reducing energy consumption through the optimization of existing building technology systems and user behaviour.

Over the project duration (Sept. 2011 until May 2014) the project partner from 8 European countries (Germany, Austria, Slovenia, Croatia, Czech Republic, Norway, Finland, Belgium) realize low cost investment measures in 16 pilot projects.

The concrete target is 10% final energy savings through no-or-low-cost measures. We focus on existing non-residential buildings, namely in the health sector, universities and office buildings. What is important to us as external consultants is to join forces with the building management and on-site technical personal. In other words: success in Re-Commissioning projects strongly depends on mutual trust, support and learning.

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2 Overview of the EU and national energy efficiency and energy legislation

Number / abbreviation	Title	Year	Compulsory?	Valid in…	Savings End Energy	Low-cost mea-sures	Link with recommi-ssioning *** very important ** important * limited
2012/27/EU	Energy Efficiency Directive	2012	No	EU	Yes		***
2002/91/EG	Energy Performance of Buildings Directive	2002	Yes	EU	Yes		***
2009/125/EG	Eco Design Directive	2009	No	EU	Yes		*
EN ISO 50001	Energy Management Systems	2011	Yes	EU		Yes	**
EN ISO 14001	Environmental Management Systems	2009	No	EU		Yes	*
EN ISO 16484	Building Automation	2004	No	EU		Yes	*
various	Regional regulations and decrees on compulsory inspection of air conditioning and ventilation systems	2007-2009	Yes	Austria		Yes	*
Kälteanlagen-verordnung	Kälteanlagenverordnung (Federal decree on refrigerating plants), BGBl. Nr. 234/1972	1972	Yes	Austria			*
ÖNORM H 6020	Standard on ventilation systems in hospitals	2005	No	Austria	Yes	Yes	**
ÖNORM H 6041-1 (Draft)	Draft standard on maintenance and inspection of ventilation systems	no final version available yet	No	Austria		Yes	*
NBN EN 13779	Ventilation in non-residential buildings	2007	Yes	Europe (compulsory in Belgium)	No	Yes	*
Legislation Energy performance in buildings	Ordonnantie van de Brusselse Hoofdstedelijk Regering van 7 juni 2007 betreffende de EPB (Legislation of the Brussels government concerning the energy performance of buildings)	2007	Yes	Belgium (Brussels)	Yes	Yes	*
Legislation in energy performance on installations in buildings	Besluit van de Brusselse Hoofdstedelijke Regering van 3 juni 2010 betreffende de voor de verwarmingssystemen van gebouwen geldende EPB-eisen bij hun installatie en tijdens hun uitbatingsperiode (Legislation of the Brussels government concerning the performance of heating systems in buildings at installation and during the use of the building)	2010	Yes	Belgium (Brussels)	Yes	Yes	**
Legislation Energy performance in buildings	Décret cadre le 19 avril 2007: la Performance Energétique des bâtiments (Legislation of the Wallon government concerning the energy performance of buildings)	2007	Yes	Belgium (Wallonia)	Yes	Yes	*
HRN EN 832/AC:2004	Thermal Performance of Buildings -- Calculation of Energy Use for Heating -- Residential Buildings (EN 832:1998/AC:2002)	2002	Yes	Croatia	Yes	No	**

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Number / abbreviation	Title	Year	Compulsory?	Valid in…	Savings End Energy	Low-cost measures	Link with recommissioning *** very important ** important * limited
HRN EN ISO 13788:2002	Hydrothermal Performance of Building Components and Building Elements -- Internal Surface Temperature to Avoid Critical Surface Humidity and Interstitial Condensation -- Calculation Methods(ISO 13788:2001; EN ISO 13788:2001)	2001	Yes	Croatia	Yes	No	**
	Law on Energy Efficiency in Final Consumption OG152/08	2008	Yes	Croatia	Yes	Yes	***
	General Conditions for the Supply of Thermal Energy OG 129/06	2006	Yes	Croatia	No	Yes	*
	Regulation on Gas Distribution OG 104/02	2002	Yes	Croatia	No	Yes	*
	Regulations on Licenses for Energy Activities	2007	Yes	Croatia	No	No	**
	Regulation on Conditions for Performing Energy Activities OG 6/03	2003	Yes	Croatia	No	No	**
	Regulation on Energy Audits of Buildings OG 5/11	2011	Yes	Croatia	Yes	No	**
	Regulation on Methodology for Calculating and Determining the Indicative Energy Savings Target in the Final Consumption	2010	Yes	Croatia	Yes	Yes	***
	Technical Regulation on Rational Use of Energy and Thermal Protection in Buildings OG 110/08	2008	Yes	Croatia	Yes	Yes	***
	Technical Regulation on Heating and Cooling of Buildings OG110/08	2008	Yes	Croatia	Yes	Yes	**
	Regulations on the Energy Certification of Buildings OG36/2010	2010	Yes	Croatia	No	No	*
	Regulation on Conditions and Criteria for Persons Who Perform Energy Audits and Energy Certification of Buildings OG 113/08	2008	Yes	Croatia	No	No	*
	Energy Development Strategy of Republic of Croatia, OG 130/2009	2009	Yes	Croatia	Yes	Yes	**
Regulation 78/2013	Regulation on Energy Performance of Buildings	2013 (instead of old regulation from 2007)	Yes	Czech Republic	Yes	Yes	**
CSN 73 0540 – parts 1,2,3,4	Thermal protection of buildings	1976, Last amendment 2011	Yes	Czech Republic	Yes	No	*
TNI 73 0329	Simplified numerical evaluation and the classification of residential housing with very low demand for heat for heating – Family houses	2009, Last amendment 2010	No (but required for some subsidy programs)	Czech Republic	Yes	Yes	*

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Number / abbreviation	Title	Year	Compulsory?	Valid in…	Savings End Energy	Low-cost measures	Link with recommissioning *** very important ** important * limited
TNI 73 0330	Simplified numerical evaluation and the classification of residential housing with very low demand for heat for heating – Apartment buildings	2009, Last amendment 2010	No ((but required for some subsidy programs)	Czech Republic	Yes	Yes	*
TNI 73 0331	Energy Performance of Buildings – Typical values for calculation	2013	No	Czech Republic	Yes	No	*
SRakMK part D3 2012	Suomen rakentamismääräyskokoelma osa D3 (2012) –Rakennusten energiatehokkuus [The National Building Code of Finland part D3 (2012) – Energy Management in Buildings]	2012	Yes	Finland	Yes	No	*
Act on Energy Certificates for Buildings (50/2013). and decrees (170/2013, 176/2013)	The new law and regulations on energy performance certifications in Finland	2013	Yes	Finland	Yes	Yes	*
	The National Energy Efficiency Agreements	2008 - 2016	No	Finland	Yes	Yes	***
EnEV 2009	Energieeinsparverordnung (Decree on Saving Energy in Buildings)	2009	Yes	Germany	Yes		**
DIN V 18599	Energetische Bewertung von Gebäuden (Energetic Evaluation of Buildings)	2006	Yes	Germany	Yes		*
GEFMA 124	Energiemanagement (energy management)	2009	No	Germany		Yes	*
AMEV „Energie 2010“	Energiemanagement in öffentlichen Gebäuden (Energy Management in Public Buildings)	2010	No	Germany		Yes	**
VDI 4602	Energiemanagement – Definitionen, Begriffe (Energy Management – Definitions, Terms)	2007	No	Germany		Yes	*
VDI 3814-3	Building Automation and Control Systems (BAC) – Advices for technical building mangement	2007	No	Germany	Yes	Yes	*
DIN ISO 17359	Controlling Machine Conditions	2011	No	Germany		Yes	*
	Functional Performance Tests		No	Germany		Yes	*
FOR 2009-12-18 nr 1665	Regulation on energy labeling of buildings and installations	2009	Yes	Norway	No	No	**
	National planning guideline for municipal climate and energy planning (Statlig planretningslinje for klima- og energiplanlegging i kommunene)	2009	Yes	Norway	No	No	*
NS3456:2010	Documentation of real estate management, maintenance, and development for buildings.	2010	No	Norway	No	No	*

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Number / abbreviation	Title	Year	Compulsory?	Valid in…	Savings End Energy	Low-cost mea-sures	Link with recommi-ssioning *** very important ** important * limited
NS-EN15603:2008/ NS3031:2007	Energy use in buildings – determination of total energy use and energy performance – methode and data	2007	No	Norway	No	No	**
EZ	Energetski zakon (Energy Act)	1999 (last change 2012)	Yes	Slovenia	Yes		*
PURES	Pravilnik o učinkoviti rabi energije v stavbah and Tehnična smernica TSG-1-004:2010 Energy Efficient Use (Rules on efficient use of energy in buildings with a technical guideline and Technical Guideline TSG-1-004:2010 Efficient Energy Use)	2010	Yes	Slovenia	Yes		**
	Uredba o zagotavljanju prihrankov energije pri končnih odjemalcih (Decree on energy savings at end-users)	2009 (last change 2011)	Yes	Slovenia	Yes	Yes	**
	Pravilnik o metodah za določanje prihrankov energije pri končnih odjemalcih (Rules on the methods for deteremination of energy savings at final customers)	2010	Yes	Slovenia	Yes	Yes	**
	Pravilnik o rednih pregledih klimatskih sistemov (Rules on regular inspection of air-conditioning systems)	2008	Yes	Slovenia		Yes	*
NEN 2767	Norm for maintenance inspections and classification	2006	Yes	The Nether-lands	No	No	*

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3 EU Policy and Legislation Supporting Energy Efficiency

The EU policy influencing the energy efficiency markets and application of the energy efficiency measures is mostly being applied through a number of EU directives. The directives are implemented by the Member States through the national legislative acts. These national policies comply with the requirements of the EU directives, but they differ across the countries in details of the policy design, especially in cases where the Directive leaves several options of achieving the goals to the Member States. Thus to understand the legislative requirement in the particular states, more detailed overview of the national legislation is provided in the next chapter.

The most relevant directives include the Energy Efficiency Directive replacing Energy Services Directive, further Energy Performance of Buildings Directive, EPBD, CHP Directive, Energy Labeling Directive and EU Emissions Trading System Directive. These provide for mandatory labeling of appliances, mandatory inspection of heating systems, air-conditioning and ventilation (HVAC), building codes, obligations to implement the energy management and perform audits at the end-user site etc.

In addition, there are EU policy instruments directly affecting European actors. These include, for example, minimum energy efficiency standards set by the Eco-design directive, which force appliance manufacturers to produce more efficient boilers, electric appliances, etc.

3.1 New Energy Efficiency Directive 2012/27/EU (EED)

Since 2006 the **Energy Service Directive (ESD)** of the European Commission (2006) had been the main legal basis in the EU supporting the energy service market. Its purpose was to make the end-use of energy more economic and efficient e.g. by creating the conditions for the development and promotion of a market for energy services.

- Objective: Until 2016 all Member States should save 9% of their end energy compared to their average end energy used between 2001 and 2005.
- The savings in end energy should be reached in all sectors of consumption
- The savings should be reached by energy suppliers and energy efficiency measures on the demand side.
- Directive, but no obligation

However, the new **Energy Efficiency Directive (EED),** which amends and subsequently repeals the Cogeneration Directive (2004/8/EC) and the Energy Services Directive (2006/32/EC), was formally adopted by the Council of Ministers and European Parliament in October 2012.

The EED directive establishes a common framework for the promotion of energy efficiency within the EU in order to achieve its 2020 20 % headline target on energy efficiency. Mandatory energy-saving measures, including renovating public buildings, energy-saving schemes for utilities, and energy audits for all large firms, will be required by an EU energy efficiency directive.

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- One of the most important requirements supporting the implementation of the re-commissioning measures is the one demanding the EU Member States to **renovate 3% of the total floor area of "heated and/or cooled buildings owned and occupied by their central government**" (administrative departments whose responsibilities cover the entire territory of a Member State) to meet at least the **minimum energy performance requirements** set by the Member State concerned in application of Article 4 of Directive 2010/31/EU. This will apply to buildings with a "total useful floor area" of more than 500 m², and as from July 2015, of more than 250 m². However, Member States will also be able to use alternative means to achieve equivalent energy savings.
- Further, according to the directive, Member States are obligated to encourage public bodies to adopt an **energy efficiency plan** containing specific energy saving objectives and actions with a view to continuously improving the body's energy efficiency and put in place an **energy management system** including energy audits, as part of the implementation of their plan. Further, they should encourage public bodies to use, where appropriate, ESCOs, and **energy performance contracting** to finance renovations and implement plans to maintain or improve energy efficiency in the long term. According to MEMO/11/440 of the EC, currently, the same percentage of 3% is renovated per year but in only half of the cases energy efficiency improvements are included. In practice, this could mean that walls are insulated, double glazing windows are installed in kindergardens, schools or townhouses, roofs are redone and inefficient heating boilers replaced. In many cases a cost optimal renovation can bring up to 60% energy savings. Due to the important share of public buildings (about 12% of the EU build up area), it could serve as a strong driver for higher market uptake of energy efficiency in other sectors and development of the skills and knowledge required.
- Further, the directive obliges the Member States to establish and make publicly available an **inventory of heated and/or cooled central government buildings** with a total useful floor area over 500 m² and from middle of 2015 over 250 m². The inventory shall contain the information on the floor area in m^2 and the energy performance of each building or relevant energy data.
- Further, **energy companies** covered by the directive will have to achieve a "cumulative end-use energy savings target" by 2020. This target will have to be at least equivalent to **achieving new savings**, each year, from 2014 to 2020, of **1.5% of annual energy sales** to final customers, by volume, and averaged over the most recent three-year period before the directive takes effect.
- All large enterprises will be required to undergo an **energy audit**. These audits will need to start within three years of the directive's entry into force and should be carried out every four years by qualified and accredited experts. Further, the Member States shall promote the **availability to all final customers of high quality energy audits** which are cost-effective and carried out in an independent manner by qualified and/or accredited experts according to qualification criteria or implemented and supervised by independent authorities under national legislation.
- Member States will have to facilitate the establishment of **financing facilities** for energy efficiency measures or the use of existing ones according to the specific conditions given by the directive.

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Consistency with the goals of Re-Co project and implementation of re-commissioning measures:

- The requirement of 3% annual energy efficient renovation of the public buildings increases awareness and demand for re-commissioning measures. This requirement may also support combination of re-commissioning measures with investment measures in order to achieve the minimum energy performance requirements set by the Member State concerned in application of Article 4 of Directive 2010/31/EU
- The requirement to publish the energy data in the inventory will support the data monitoring and will ease contacting the potential clients of re-commissioning by the external consultants and providers. Similarly, the energy efficiency plans adopted by the public bodies and energy audits provided by the large companies will provide information on possible re-commissioning measures. However, the high quality of the plans and audits need to be ensured to achieve appropriate recommendations and effectiveness of such policy. Thus it is important that the directive requires the Member States hall promote the availability of high quality energy audits.
- The requirement to put in place the energy management system will lead to higher application of re-commissioning measures.

3.2 Directive 2002/91/EG (EPBD) – Energy Performance of Buildings Directive

- Objective: improve the energy performance of buildings within the EU through cost-effective measures
- requirements for a methodology for the calculation of the energy performance of buildings
- minimum energy requirements for new and existing buildings when they get retrofitted
- obligation for Member States to compile energy performance certificates for buildings which are constructed, sold or rented out
- obligation for Member States to regulate the requirement of regular inspections of boilers and air-conditioning systems and inspection of heating systems when the boiler is older than 15 years
- Talking about “energy efficiency” started in Germany with this directive
- Requirements realized in Germany with the “Energieeinspargesetz (EnEG)” and the “Energieeinsparverordnung (EnEV)”
- **Consistency with the goals of Re-Co project and implementation of re-commissioning measures**: Re-Co also aims at energy efficiency of buildings through cost effective measures. An important goal within Re-Co is to guarantee an efficient use of heating and air-conditioning systems.

3.3 Directive 2009/125/EG – Eco Design Directive

- Objective: improve the energy efficiency and reduce the environmental impact of appliances, including the energy consumption throughout their entire life cycle
- The directive establishes a framework for the setting of ecodesign requirements for energy-using products (labelling of products to raise awareness of consumers on the

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real energy use, energy efficiency requirements imposed to products from the early stage on the design phase)
- The Directive 2009/125/EG replaces the 2005/32/EG
- A new working plan was published in December 2012 setting out an indicative list of energy-related product groups which will be considered priorities for the undertaking of preparatory studies and eventual adoption of implementing measures.

3.4 EN ISO 50001 – Energy Management Systems

- available since December 2011
- replaces the norm EN16001
- structured according to the norm EN ISO 9001 (quality management systems) and EN ISO 14001 (environmental management system)
- guidelines for establishing an energy management system in order to increase the energy efficiency in the company
- describes the requirements which have to be fulfilled by the management system (→ Plan-Do-Check-Act (PDCA) Cycle)
- describes the methods, but does not describe concrete devices for the realization of the methods
- suggests the nomination of an "energy agent" in the company
- **Consistency with the goals of Re-Co project and implementation of re-commissioning measures**: Re-Co aims at the increase of the energy efficiency e.g. by involving the technical staff
- **Motivation for the Re-Co customer:** From 2013, German companies can only apply for getting the energy tax refunded if an energy management according to the DIN ISO 50001 is established.

3.5 EN ISO 14001 – Environmental Management Systems

- Norm about environmental management systems (management system for the realization of environmental policy in the company) for organizations (companies, service provider, public authority, etc.)
- the emphasis is put on a continuous improvement process in order to achieve the defined environmental targets of the organization
- the norm should help small and medium-sized companies to measure their energy consumption, to define target values for a continuous monitoring, to identify potentials for optimization and typical weak points
- No specific requirements for the environmental achievements are given

3.6 EN 16484 – Building Automation

- The norm defines the term building automation and gives an overview of hardware, functions, applications, data communication, project planning and handling

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- **Consistency with the goals of Re-Co project and implementation of re-commissioning measures**: with increasing technique in the buildings the building automation gets more and more important concerning energy efficiency

4 Legislative Norms and Standards

4.1 Austria

4.1.1 Compulsory inspection of air conditioning systems

The national transposition of Article 15 of the EPBD regarding the inspection of air conditioning systems fall into the competence of the regions (Bundesländer). The regions have transposed the requirements of Art. 14 in the following legal acts:

- Wien: Gesetz über die Feuerpolizei, Luftreinhaltung und die Überprüfung von Klimaanlagen in Wien
- Steiermark: Steiermärkisches Baugesetz Stmk. BauG § 63a (7)
- Tirol: Tiroler Heizungs- und Klimaanlagengesetz
- Vorarlberg: Verordnung der Landesregierung über die technischen Erfordernisse von Bauwerken (§ 46 - Inspektion von Klimaanlagen)
- Salzburg: Baupolizeigesetz
- Oberösterreich: Oö. Luftreinhalte- und Energietechnikgesetz
- Niederösterreich: NÖ BAUORDNUNG: § 34b Periodische Überprüfung von ortsfesten Klimaanlagen
- Burgenland: Burgenländisches Luftreinhalte-, Heizungsanlagen- und Klimaanlagengesetz 2008 § 19b
- Kärnten: Kärntner Bauvorschriften, § 144

In practice the regulated contents look quite different. Many regions have just transferred the wording of the EPBD without further detailing the precise application rules. The most detailed rules are those of Vienna, Styria and the region of Vorarlberg, which have the following characteristics:

- The respective legal acts include a detailed description of inspection activities to be implemented
- The legal rules for Vienna and Styria prescribe that in the frame of the compulsory inspection a specific set of maintenance measures needs to be implemented (cleaning of filters and heat exchangers)

In addition to the legal rules prescribed by regions there exists the federal decree on refrigerating plants (Kälteanlagenverordnung). This decree aims at preventing potential damages to the environment by trickling refrigerants. Therefore the inspection done for this purpose does not target at the improvement of energy performance.

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Benefit for Re-Co: In principle the compulsory inspection of air conditioning systems represents a good anchor point for Re-Commissioning services. But there is little evidence to which degree the legal requirements are really fulfilled on the facility market.

4.1.2 Compulsory inspection of heating systems

In principle the regulations concerning the national transposition of Article 14 of the EPBD are similar to those related to compulsory inspection of air conditioning systems. Therefore most regions (Bundesländer) have regulated these issues in the same decrees.

Benefit for Re-Co: In principle the compulsory inspection of heating systems represents a good anchor point for Re-Commissioning services. But as for air conditioning systems there is little evidence on how the legal requirements are implemented in reality. We suspect that in most cases only the compulsory emission measurement for boilers is implemented whereas a more comprehensive inspection of the heating system as a whole hardly takes place.

4.1.3 Standard on ventilation systems in hospitals

The standard ÖNORM H 6020 prescribes basic sanitary and technical requirements related to ventilation systems in hospitals. The requirements prescribed are prevailingly relevant for the quality of planning and construction works related to ventilation systems. In part 9 the standard includes a description of technical control activities. These activities aim at securing the plant functionality and the fulfillment of the sanitary requirements.

Benefit for Re-Co: Although the standard is not directly related to re-commissioning activities it offers a good point of departure for Re-Co services in the hospital sector.

4.1.4 Draft standard on maintenance and inspection of ventilation systems

There is on-going work on developing the standard H 6041-1, which aims at detailing the activities connected with maintenance and inspection of ventilation systems.

Benefit for Re-Co: Although the standard at the moment is not finished yet and thus has no impact on the market so far, the draft version already gives a good framework also for Re-Co related activities.

4.2 Belgium

4.2.1 NBN EN 13779 - Ventilation in non-residential buildings

This European Standard applies to the design and implementation of ventilation and room conditioning systems for non-residential buildings subject to human occupancy, excluding applications like industrial processes. It focuses on the definitions of the various parameters that are relevant for such systems.

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The guidance for design given in this standard and its annexes are mainly applicable to mechanical supply and exhaust ventilation systems, and the mechanical part of hybrid ventilation systems.

Applications for residential ventilation are not dealt with in this standard. Performance of ventilation systems in residential buildings are dealt with in CEN/TR 14788.

The classification uses different categories. For some values, examples are given and, for requirements, typical ranges with default values are presented. The default values given in this standard are not normative as such, and should be used where no other values are specified. Classification should always be appropriate to the type of building and its intended use, and the basis of the classification should be explained if the examples given in the standard are not to be used.

Benefit for Re-Co: This standard is to a certain extend made obligatory for new or heavily renovated buildings. That means for example also that certain provisions for regulation and control need to be made at the moment of construction. Also, Re-co is about control strategies and parameters, so this standard can be referred to when adjusting or adapting existing installations.

4.2.2 Legislation Energy performance in buildings

This legislation is covered at regional level in Belgium. That means that there are three “laws” implementing the European EPBD. The three regions have implemented more or less the same law, but with some minor differences.

The main focus of the legislation is on new buildings, but especially the Brussels region has adopted some obligations that are interesting for Re-Co:

- periodical maintenance for all HVAC (also in existing buildings)
- energy monitoring system for large buildings
- division of the heating and cooling system in zones
- implementation of high performing regulation systems

All large existing public buildings need to have an “EPC” (Energy Performance Certificate). This consists of a quick scan and a certificate with some recommendations for improvement. So far, there no obligations linked to this.

Benefit for Re-Co: All these obligations are aimed to create awareness with owners and users and to improve the energy performance of the buildings (new and existing). This awareness and the provisions made in the construction (or heavy renovation) phase can help to define and initiate Re-co activities.

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4.3 Croatia

4.3.1 Law on Energy Efficiency in Final Consumption OG152/08

This Act regulates the efficient use of energy in final energy demand, adoption of programs and plans for improving energy efficiency and its management, energy efficiency measures, particularly the activity of energy services and energy audits, public sector, the energy operator and the large consumers and consumer rights in energy performance.

4.3.2 Regulation on Methodology for Calculating and Determining the Indicative Energy Savings Target in the Final Consumption

This regulation prescribes the methodology for calculating and determining indicative energy savings target in final energy consumption in accordance with Directive 2006/32/EC on energy efficiency and energy services.

4.3.3 Technical Regulation on Rational Use of Energy and Thermal Protection in Buildings OG 110/08

This technical regulation prescribes:

- technical requirements regarding the rational use of energy and thermal protection to be met during design and construction of new buildings and the use of existing
- technical requirements regarding the rational use of energy and thermal protection to be met when designing the reconstruction of existing buildings
- other technical requirements for the rational use of energy and thermal protection in buildings
- technical characteristics and other requirements for certain construction products that are installed in the building
- contents of the building design in relation to the rational use of energy for heating and cooling, thermal protection
- content identification cards necessary thermal energy for heating and thermal energy for cooling buildings
- maintenance of buildings in relation to the rational use of energy and thermal protection.

This Regulation implements Directive 2002/91/EC of the European Parliament of 16 December 2002 on the energy performance of buildings.

This regulation implements the Directive 89/108/EEC of the European Parliament of 22 December 1989.

4.3.4 EN 832:1998/AC:2002 - Thermal Performance of Buildings

Calculation of Energy Use for Heating - Residential Buildings

4.3.5 ISO 13788:2001; EN ISO 13788:2001- Hydrothermal Performance of Building

Components and Building Elements -- Internal Surface Temperature to Avoid Critical Surface Humidity and Interstitial Condensation -- Calculation Methods

4.4 Czech Republic

4.4.1 Regulation 78/2013 Coll. on thermal protection of buildings

The Regulation incorporates the relevant Directive of the European Communities, the European Parliament and the Council 98/34/EC on procedure for the provision of information in the field of technical standards and regulations and the rules on information society services, as amended by Directive 98/48/EC. The regulation implements the Energy Performance of Buildings Directive 2010/31/EU (EPBD 2) and specifies the **requirements for the energy performance of buildings**, comparative indicators and calculation method for determining the energy performance of buildings, the contents of the Energy Performance Certificate for Buildings and method of its processing, including the use of already processed energy audits, the scope of examination of persons concerning preparation of the Energy Performance Certificate for Buildings.

The regulation replaces previous regulation 148/2007 Coll. that adopted Energy Performance of Buildings Directive 2002/91/EC (EPBD 1).

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: Re-Co also aims at energy efficiency of buildings through cost effective measures.

4.4.2 ČSN 73 0540 Part 1 - 4 - Thermal protection of buildings

Part 1: Terminology

This standard specifies **terms used in the area of building thermal technology**, definition of values, their marks and units, describing the spread of heat, humidity and air through construction material and constructions, describing the status of indoor and outdoor environments used in CSN 73 0540 - 2, 3 and 4. Terms and definitions, their marks and units can also be used during the application of related standards, mainly the mentioned normative references of the standard and related standards. The standard standardizes and specifies terms and definitions in the mentioned areas.

Part 2: Requirements

The mentioned standard states **thermal technical requirements for the design and verification of buildings** with the required stated indoor environment during use, which ensure the fulfillment of basic requirements for constructions, in particular the economic fulfillment of basic requirements for the saving of energy and the thermal protection of buildings according to special regulations and ensuring the protection of health, healthy living conditions and the environment. It is valid for new buildings and for reconstructions, maintenance work, changes in the use of buildings and other changes to completed buildings.

Part 3: Design value quantities

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The mentioned standard states **national normative, characteristic and design values of the physical values of construction materials** and products, filling of holes, walling elements and masonry, designed values of parameters of outdoor environment, indoor environment and air for the design and verification of building constructions and buildings from the viewpoint of spreading of humidity and their thermal protection according to ČSN 73 0540-4 and related standards.

Part 4: Calculation methods

Revision of ČSN 73 0540-4 responds to changes in the structure of evaluated values according to the revision and change of requirements in part 2 of the standard, thereby introducing the wider set of **European and international standards for calculating** methods in this area into the system of Czech technical standards so as to ensure basic requirements for the saving of energy and the thermal protection of buildings and for the protection of health, healthy living conditions and the environment.

4.4.3 TNI 73 0329 - Simplified numerical evaluation – Family houses

Simplified numerical evaluation the classification of residential housing with very low demand for heat for heating – Family houses

The mentioned technical standardizing information states a unique procedure for the evaluation of family houses with very low energy usage, in particular, low-energy and passive housing according to Appendix A ČSN 73 0540-2.

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: Re-Co aims to save energy and its costs by analyzing the building.

4.4.4 TNI 73 0330 - Simplified numerical evaluation – Apartment buildings

Simplified numerical evaluation and classification of residential housing with very low demand for heat for heating– Apartment buildings

The mentioned standardizing information states a unique procedure for the evaluation of apartment buildings with very low energy usage, in particular, low-energy and passive housing according to Appendix A ČSN 73 0540-2.

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: Re-Co aims to save energy and its costs by analyzing the building.

4.4.5 TNI 73 0331 - Energy Performance of Buildings – Typical values for calculation

This document is a supporting document that defines typical values that shall be used for calculation of standardized usage of a building. The standardized usage of a building is a basic feature of building evaluation for energy performance certificates. The certificate is necessary annex of a building permit documentation (for both newly built buildings and refurbishments) or for selling and renting purposes. Typical values relate to residential buildings, office buildings, hotels, restaurants, shops, hospitals and educational buildings as

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well as sport facilities. These values help to define typical heating, cooling, ventilation, hot water preparation, lighting and auxiliary systems.

4.5 Finland

4.5.1 The National Building Code of Finland part D3 (2012) – Energy Management in Buildings

(Suomen rakentamismääräyskokoelma osa D3 (2012) – Rakennusten energiatehokkuus)

The current version of energy management rules implementing the Energy Performance of Buildings Directive in the Finnish building code came into force this year. Energy efficiency demands were tightened approximately 20%. A major change was also a shift towards overall energy assessment to consider the way in which energy is produced. The E ratio of the building should be lower than the maximum value for the type of building according to the regulations. The E ratio is the net energy purchased for each net area heated (kWh/m²,a), weighted using an energy form factor.

There are also requirements for measurements in the buildings that provide valuable information for re-commissioning projects.

4.5.2 The new law and regulations on energy performance certifications in Finland

Finnish law and regulations on energy performance certification were renewed in 2013.The new regulations will adopt the overall energy assessment principle of building regulations part D3. New energy performance certificates are based on asset rating, but measured consumptions are also reported and the expert must visit the building and give recommendations for measures.

4.5.3 The National Energy Efficiency Agreements

The agreement scheme plays a central role in the national Climate and Energy Strategy (2008), which is the response to the international obligations set for Finland in the effort to combat the climate change.

The agreements covering different sectors have also an important role in implementing the EU Energy Services Directive (Directive on the Promotion of End-use Efficiency and Energy Services, 2006/32/EC) concerning energy use outside EU emissions trading scheme.

The voluntary Energy Efficiency Agreements includes municipalities and housing and are in force until 2016.

4.6 Germany

4.6.1 EnEV 2009 Energieeinsparverordnung

- Realization of the requirements of the European Directive 2002/91/EG (EPBD) in Germany
- Objective: a minimum energy standard is required for buildings (threshold is individually calculated by comparing the building with a reference building with same geometry but with standard U-values and standard heating system)
- Requirements are given for the heating system and thermal insulation of new and existing buildings when retrofitted
- Calculation of all necessary types of energy for the use of a building (for heating, domestic hot water, cooling, electricity)
- Calculation of the energy consumption according to DIN V 18599
- **Obligation for the customers of Re-Co:** periodic energetic inspections of air-conditioning systems > 12 kW are compulsory since 2009.

4.6.2 DIN V 18599 – Energetische Bewertung von Gebäuden

- Released in 2005 as calculation method for the total energy consumption of buildings required in the German norm EnEV
- The norm includes a method for simplifying the geometry of the building and the heating system
- alternative method for comparing the calculated energy demand with the actual energy consumption in existing buildings and ways of adaption aiming at a realistic economic calculation.

4.6.3 GEFMA-Richtlinie 124

- German Facility Management Association (founded in 1989)
- Directive concerning Facility Management
- Objective: minimizing the total costs for supplying, distributing and using energy in the building
- Necessary data are bills, usable potentials, documents of the existing building, documentations of the planning phase, supply contracts, contracts for maintenance and operation, set point values and measured values
- Only single measures are described for the optimization of costs
- **Consistency with the goals of Re-Co project and implementation of re-commissioning measures**: Re-Co aims to save energy and its costs by analyzing the building. Proceedings are also described in the directive.

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4.6.4 AMEV „Energie 2010“

- Describes the process „energy controlling“ (measuring, analyzing and regulating energy relevant information actively)
- Establishment of a quality control loop using characteristic data (comparing target values with actual values)
- **Benefit for Re-Co**: Re-Co is about energy controlling. The norm informs about devices supporting the process energy controlling (such as method of measurements, target values, concepts for reports, proceeding when operating a building).

4.6.5 VDI 4602 – Energiemanagement (energy management)

- available since December 2007
- describes measures subdivided into strategic, tactical and operative activities
- **Benefit for Re-Co**: Re-Co is about energy management. The norm explains the terms of energy management in the sectors energy supply, distribution and use.

4.6.6 Building Automation and Control Systems (BACS) – Advices for technical building management

- As the international norm EN 16484 does not include all regional requirements, the additional requirements for BACS in Central Europe are given in this norm. The norm gives details about planning, operation and maintenance of and with BACS.
- **Consistency with the goals of Re-Co project and implementation of re-commissioning measures**: with increasing technique in the buildings the building automation gets more and more important concerning energy efficiency

4.6.7 DIN ISO 17359

- Guidelines for controlling and diagnosing machine conditions
- Detailed plan of procedures for controlling
- The norm gives an overview of basic proceedings recommended for the development of a program for controlling and diagnosing machine conditions
- The norm mentions the international norms which are necessary or useful for this process

4.6.8 Functional Performance Tests (FPT)

Methods to analyze the current state of the building operation

- DIN EN 1382: Blower-Door-Test
- DIN 13779: Thermography / Measuring the specific performance of ventilators of ventilation systems
- EN 15459: Heating Systems

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- EN 12599: test and measurement method fort the commissioning of installed HVAC systems (Definition of the methods, components, evaluation)
- DIN EN 13779: ventilation systems of non-residential buildings – basic concepts and requirements for ventilation and air-conditioning systems (specifications for planning, parameter, check lists, specific fan power, etc.)
- EN 15239: ventilation systems of buildings – energy efficiency of buildings – guidelines for the inspection of ventilation systems (test methods, typical mistakes, …)
- EN 15240: ventilation systems of buildings – energy efficiency of buildings – guidelines for the inspection of ventilation systems (measuring of operating times, energy consumption, check lists, …)

4.7 Norway

4.7.1 FOR 2009-12-18 nr 1665 Energy labelling

National regulation following the Building directive aiming at providing the market with information about the energy use of buildings and building installations and possibilities for improvements, and hence increase the interest in energy efficiency measures, use of renewable energy sources and correct valuation of buildings.

Energy labelling is mandatory for all buildings over 1000 m², and for non-private buildings the labelling has to be done by energy experts.

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: Re-Co can label your buildings cost effective while analyzing it for Re-Co purpose.

4.7.2 Climate and energy plans

The municipalities must incorporate measures and tools to reduce climate gas emissions and secure more effective energy use and environmentally friendly energy use in their plan systems. The plan should contain:

a. Information about climate gas emissions in the municipality by source/sector.
b. Information about energy systems, energy supply and consumption of energy, including available renewable energy sources
c. Development of emissions, energy use and production (next 10 years)
d. Ambitious targets for reduction of emissions
e. Ambitious targets for more effective and climate friendly energy use in public buildings and for the municipality in general
f. Measures and tools for reductions of climate emissions, more effective and environmentally friendly energy use.

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g. Discussion on the most effective tools to reach the targets
h. Action plan for realization of targets

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: Re-Co is a way of fulfilling energy saving requirements set in the plans for public buildings.

4.7.3 Other relevant standards

In addition to the mentioned standards and regulations there are national standards on calculation of energy use in buildings, building codes, regulations for indoor air climate, ventilation, lighting etc.

4.8 Slovenia

4.8.1 Energy Law

Energetski zakon

Energy Law itself does not specifically support nor energy services nor the implementation of low cost energy efficiency measurements, but it is important because it demands the preparation of the National Energy Plans and National Energy Efficiency Action Plans. In both documents energy services and low cost energy efficiency measures are incorporated as measures for improving energy efficiency, though the targets are set as savings in final energy consumption and not in primary energy. Certain measures foreseen in both documents are obligatory while others are set as proposals.

4.8.2 Regulation on Energy Efficiency in Buildings and Technical Guideline TSG-1-004:2010 Efficient Energy Use

Pravilnik o učinkoviti rabi energije v stavbah in Tehnična smernica TSG-1-004:2010 Energy Efficient Use

This regulation defines obligatory targets of primary energy consumption for buildings. The regulation concerns also different kind of building technologies, putting emphasize also on regulation and balancing, thus so called low-or-no-cost energy efficiency measures, which are though not explicitly mentioned. The regulation comes together with the Technical Guideline TSG-1-004:2010 Efficient Energy Use.

4.8.3 Regulation on the Provision of Energy Savings with End-users

Uredba o zagotavljanju prihrankov energije pri končnih odjemalcih

According to this regulation big energy companies are obliged to lower final energy consumption of their end-users by 1% every year. Possible measures include also

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optimization and regulation of energy systems, information and awareness raising etc., thus low-or-no-cost energy efficiency measures. The implementation of these measures can be either done by the energy company itself or it can be out-sourced.

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: optimization and regulation of energy systems and implementation of other low-or-no-cost energy efficiency measures can effectively help you reach your energy savings annual target and we can help you with that.

4.8.4 Regulation on the Methods Used for Calculation of Energy Savings with End-users

Pravilnik o metodah za določanje prihrankov energije pri končnih odjemalcih

This regulation goes together with the regulation under 4.3.3 and defines methods and expected savings for a limited number of energy efficiency measures, including also, for example, energy audits and balancing and regulation of central heating systems.

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: optimization and regulation of energy systems and implementation of other low-or-no-cost energy efficiency measures can effectively help you reach your energy savings annual target and we can help you with that.

4.8.5 Regulation on Regular Checkings of Air-Conditioning Systems

Pravilnik o rednih pregledih klimatskih sistemov

According to this regulation air-conditioning systems have to be checked at least every 5 years. The list of possible improvement measures proposed by the independent expert includes a lot of no-or-low-cost measures.

Consistency with the goals of Re-Co project and implementation of re-commissioning measures: Re-Co provider can help you to improve and optimize the operation of your air-conditioning system(s).

4.9 The Netherlands

4.9.1 NEN 2767 Norm for maintenance inspections and classification

The NEN 2767 is a Dutch standard for assessment of buildings' condition was published in 2006 (NEN 2767). This standard has three parts:

- Presentation of the method [NEN 2006]
- List of common defects by gravity [NEN 2008]
- Calculation formula [NEN 2009].

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This assessment method intends to guide the implementation of rigorous and independent technical buildings assessments. The information collected is used to support an objective definition of the condition of each building as well as to plan maintenance interventions, prioritize investments, monitor the progress of building elements degradation and compare the condition of different buildings. The assessment is based on the detection of defects in functional elements, and on the definition of their importance, extent and intensity.

The Dutch standard is presently only officially available in Dutch (a) and only officially valid on Dutch territory. The legislative value for other countries thus is – unless advanced contractual stipulations are developed (b) - presently limited for other member states. But CEN will develop a European standard based on the NEN 2767. The CEN workgroup 'CEN/TC 319/WG 11 Condition assessment methodologies' - that is part of "CEN/TC 319 Maintenance"(c).

Once the NEN 2767 is 'translated' to a CEN-standard, it will also become interesting for other member states. Indeed, via the NEN 2767 the 'condition' of the building elements can be scored objectively and this score could be used as an additional information source for detecting a recommissioning potential in a building.

Footnotes:

(a) There is also an unofficial translated version available in French, realized in the frame of an EPC-facilitation project coordinated by Factor4 on demand of Fedesco. For more information: contact Factor4 (johan.coolen@factor4.be) or Fedesco

(b) As is done in the EPC-contract realized in the frame of the EPC-facilitation project mentioned above

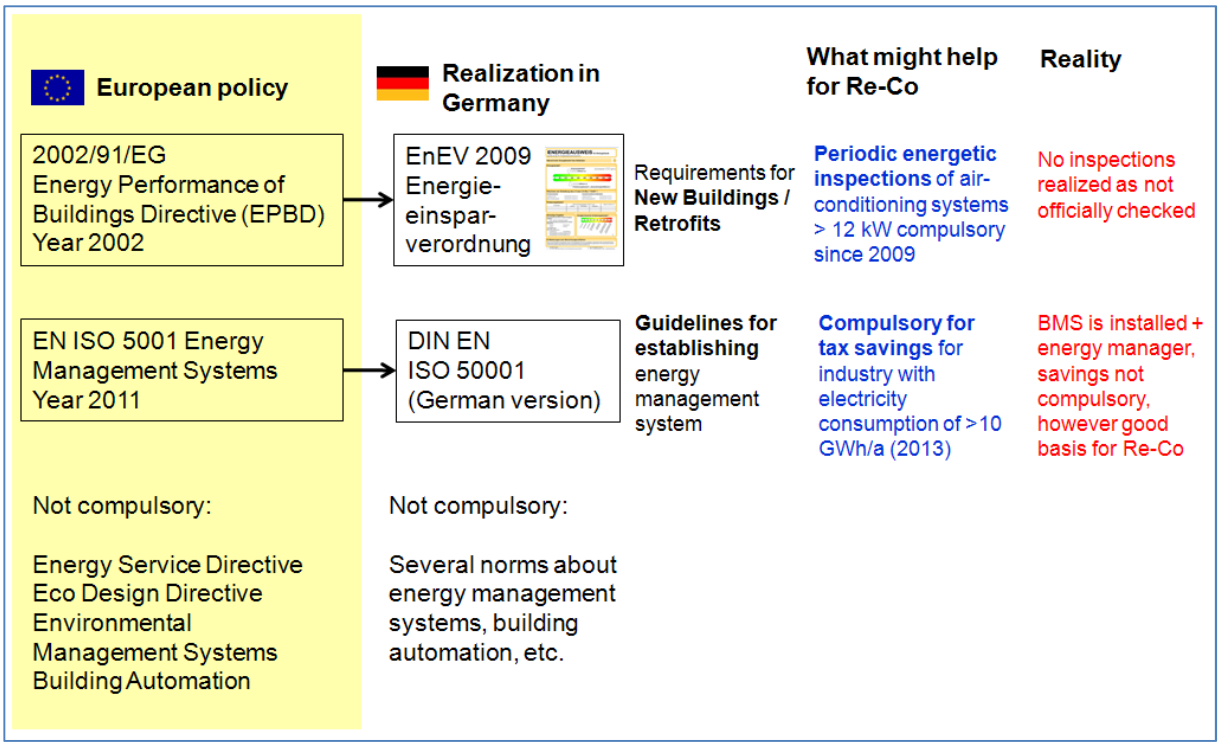
(c) http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/TCStruc.aspx?param=6300&title=CEN/TC%20319. Factor4 is in close contact with the original developers of the NEN 2767."

Benefit for Re-Co:. An audit based on the standard NEN 2767 brings awareness to malfunctioning elements of the installation and the building envelope. Note however that an audit based on the standard is purely based on an objective, visual inspection of the building elements. Thus defects that are not visual or that can only be detected via more subjective interpretation will not be reported as a defect.

e.g. a building managements system that is functioning but not set up properly/optimally, will not receive a negative condition score and will not be detected via a NEN 2767 audit as an energy saving possibility via recommissioning..

Note: Blue text: special content regarding Re-Co

5 Conclusions



Example of Germany (see chart above):

Status quo of the national legislation

- Norms for **new buildings exist** (insulation standard, energy efficiency)
- Norms for **retrofits exist** (improvement insulation, percentage regenerative energy)

Weak points in the existing legislation:

- Norms describe **process in general** but do not specify how to save energy
- **The norms do not give requirements for operating the building**
- So far **no official checks how building is operated** are carried out
- Norms might help to create **good basis for energy savings in existing buildings** but **do not demand specific measures**

Important driver for energy saving measures:

- **National Subsidies** (e.g. KfW) might result in energy saving measures
- An important driver for energy saving measures is the resulting **cost saving in €/a**
- Measures are mostly realized if **amortization time is less than 3 years**
- If **required and checked by legislation** buildings will be operated more efficiently

Note: Blue text: special content regarding Re-Co

General Conclusions:

The analysis of the current legislative situation on Re-Commissioning reveals an almost complete lack of laws, norms and standards for this important field of increasing energy efficiency in the building stock. While there are numerous and partially very ambitious standards for new constructions ("Near-Zero") and retrofits there are only very few guidelines and general recommendations for Re-Co measures. The implementation of ISO 50001 and compulsory inspections may support greater sensitivity towards these improvements.

New constructions and retrofits are always initiated through a concrete demand, e.g. for more space or inacceptable indoor climate. This is usually not the case for Re-Co measures. They are considered part of operation & maintenance (O&M) and do therefore not form a individual project but ongoing work. This special situation is reflected in the few standards that refer to Re-Co activities - reflected by their conceptual approaches as well as by their deficits.

ISO 50001 defines energy management as a continuous process of improvement (Plan-Do-Check-act). As much as it includes lots of characteristics of the process, it greatly lacks concrete requirements for the operation of a building of the implementation of measures. Moreover it does not provide a precise and effective way to determine whether a building is running energy efficiently or not so that the initial stimulus and important question of "who's responsible" is not being answered. The quality of building operation is undetermined. The existing standards might help to focus more on the topic of energy and can help to create more transparency regarding energy consumption and cost.

Inspections of technical systems seem to be a feasible way of improving energy efficiency. Nevertheless the precise definition of what needs to be measured and the actual initiation of controls and supervision of consequences still need to be worked out in an effective way. So far even compulsory measures are only rarely carried out in practice.

Although standards are moving in the right direction the existing norms seem too weak to actually initiate measures and to reduce energy consumption. Besides a general increase in energy prices it is recommended to precisely describe what up-to-date systems and "good" operation actually are. For this the Re-Co project will develop practical examples.

Note: Blue text: special content regarding Re-Co