



Co-funded by
the Intelligent Energy Europe Programme
of the European Union



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Article 4 and 5 (and 6): Public sector – public buildings and public purchasing

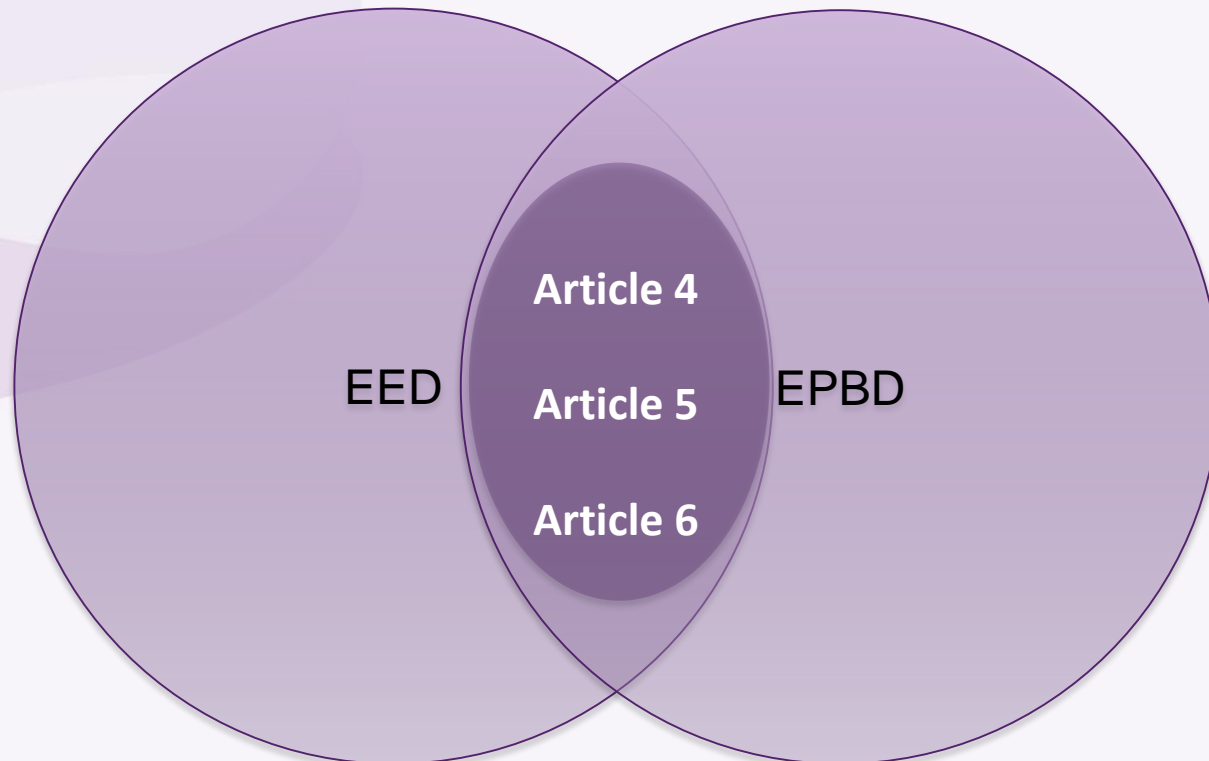
10th ENERGY EFFICIENCY COORDINATION GROUP MEETING

Dinis Rodrigues

Vienna

11-03-2016





Article 4 – Building Renovation

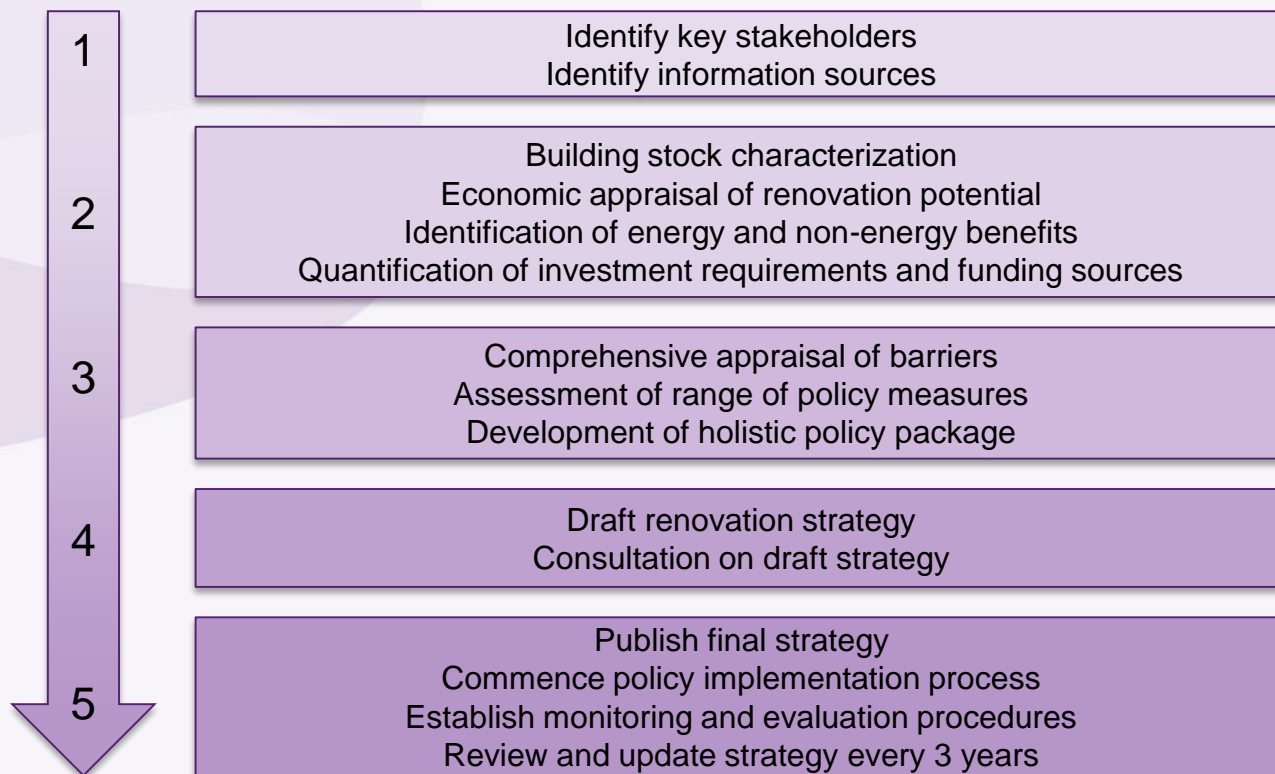


CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Member States shall establish a long-term strategy for mobilizing investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass:

- a) an overview of the national building stock based, as appropriate, on statistical sampling;
- b) identification of cost-effective approaches to renovations relevant to the building type and climatic zone;
- c) policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations;
- d) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions;
- e) an evidence-based estimate of expected energy savings and wider benefits.

Article 4 – Building Renovation



Source: [A Guide to Developing Strategies for Building Energy Renovation](#) , BPIE



Evaluate Renovation Options

- Identify opportunities for retrofit of energy efficiency measures for each building category;
- Identify opportunities for retrofit of renewable energy measures;
- Identify the opportunity to connect to a district heating system;
- Identify packages of measures (that can achieve at least 60% energy saving or achieve the requirements for new buildings);
- Determine whether deep renovations are undertaken as a single package, or staged over a period of time;
- Identify cost effectiveness of the different packages of measures using cost optimality methodology (EPBD);
- And then, determine a prioritized set of renovation packages for each building category, and a timeline for implementation.



National Data on the Building Stock

- Identify main building categories;
- Identify construction periods relevant for building energy performance;
- Identify climatic zones with impact on building energy performance;
- Identify number, type, size of each combination of building type and construction period;
- Identify ownership and tenure;
- Identify location (if appropriate);
- Identify energy use and performance characteristics of each building combination.

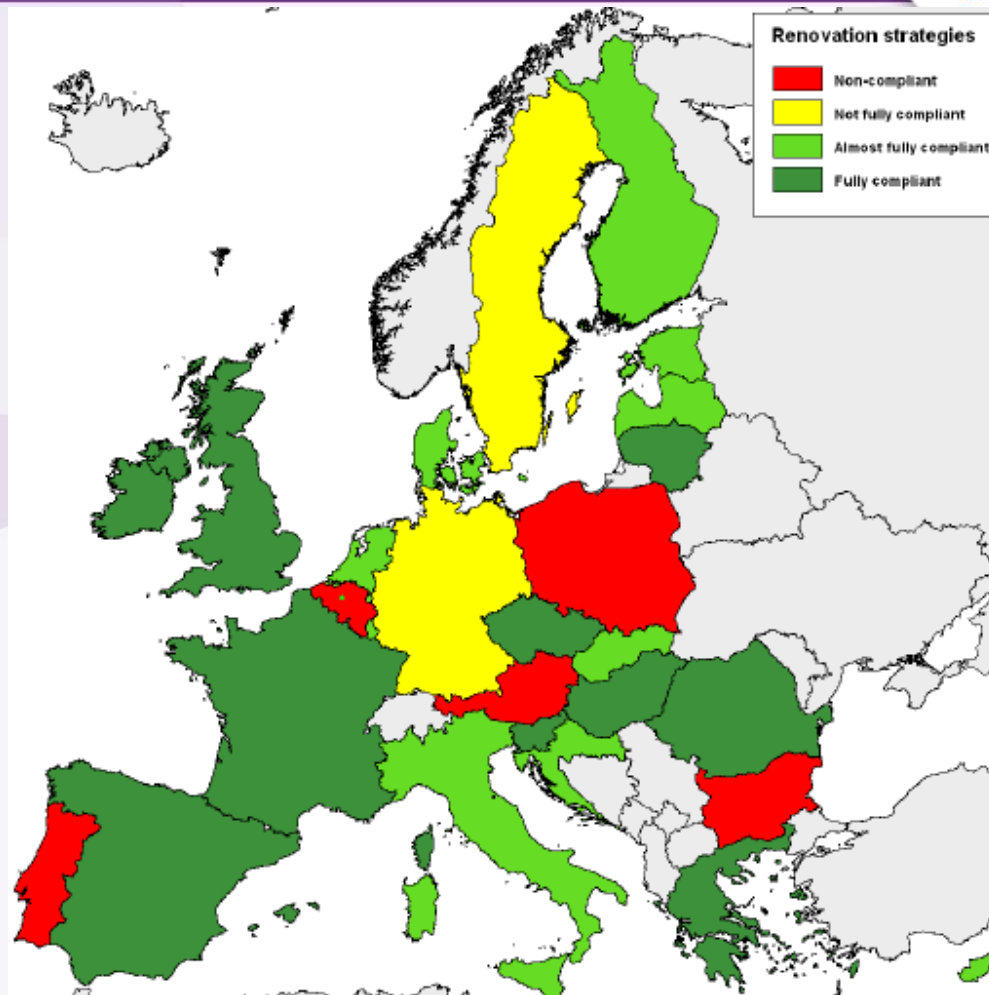
Define the Investment Horizon

- Quantify total annual investment requirements (to 2050);
- Identify existing sources of funding for building energy renovation;
- Identify possible new funding sources and mechanisms.

Quantify the Expected Benefits

- Identify the attractiveness (of energy savings to the building owners);
- Identify the societal benefits arising from deep renovation;
- Identify ways in which externalities can be internalized for the benefit of the investor.

Article 4 – Building Renovation



Source: [Synthesis Report on the assessment of Member States' building renovation strategies](#), JRC

Article 4 – Building Renovation Radar Chart



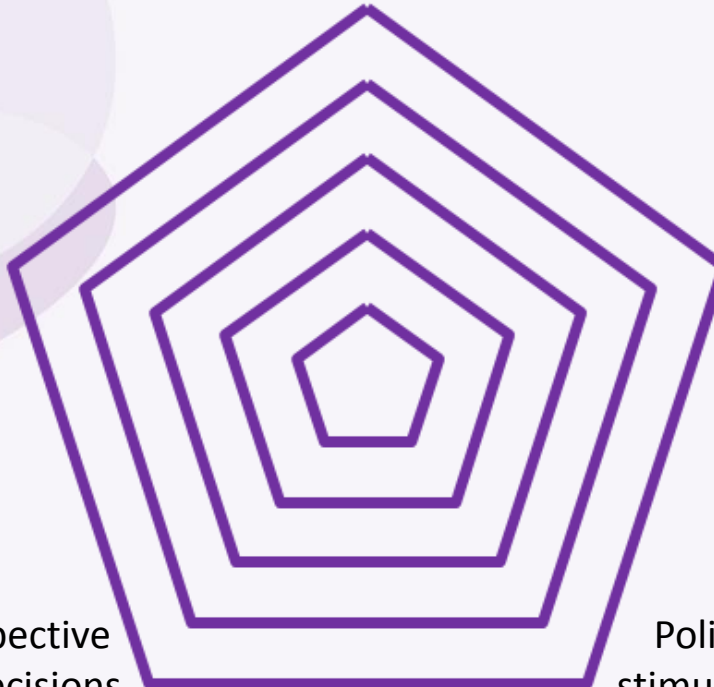
Overview of the National Building Stock – Art 4 (a)

Evidence-based estimate of expected energy savings and wider benefits – Art 4 (e)

Cost-effectiveness approaches of renovations – Art 4 (e)

Forward-looking perspective to guide investment decisions – Art 4 (d)

Policies and measures to stimulate cost-effective deep renovation of building – Art 4 (c)



Source: [Synthesis Report on the assessment of Member States' building renovation strategies, JRC](#)

Article 5 – Exemplary role of public bodies' buildings



Default Approach

- 3 % of the total floor area of heated and/or cooled buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements set by EPBD (Article 4);

Alternative Approach

- MSs may opt for an alternative approach to paragraphs 1 to 5 of this Article, whereby they take other cost effective measures, including deep renovations and measures for behavioral change of occupants, to achieve, by 2020, an amount of energy savings in eligible buildings owned and occupied by their central government that is at least equivalent to Default Approach, reported on an annual basis.

Article 5 – Exemplary role of public bodies' buildings



Energy Savings Calculation

$$\sum_{i=1}^n \left(\frac{b - c}{d} \right)$$

where:

- 'b' is the energy consumption of each building not meeting EPBD requirements;
- 'c' is the minimum consumption required under EPBD;
- 'd' is the surface of each building not meeting EPBD requirements.

Article 5 – Exemplary role of public bodies' buildings



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Energy Savings Calculation (Alternative Approach)

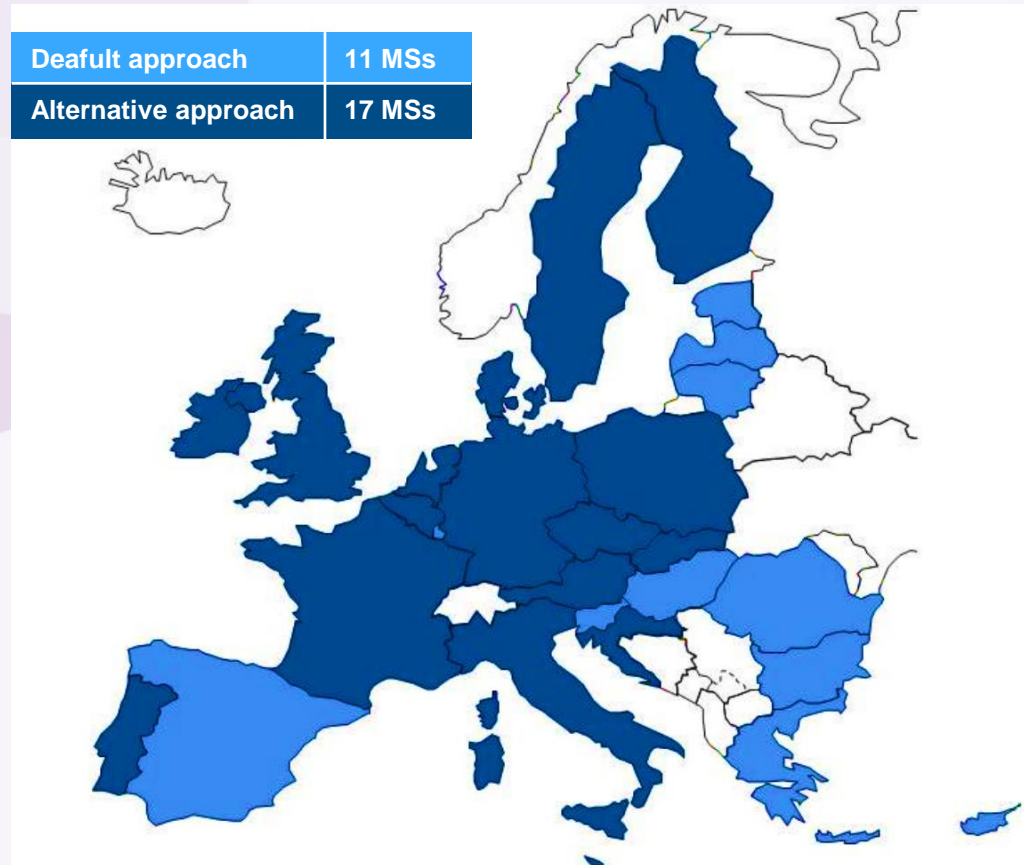
$$\sum_{i=1}^n \left(\frac{b - c}{d} \right)$$

On the Alternative Approach “it is possible to meet the obligation through any combination of renovations with different levels of intensity, behavioral changes or building management that have an impact on the energy consumption”

Article 5 – Exemplary role of public bodies' buildings



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE



Source: <http://energycoalition.eu/sites/default/files/20150520%20Coalition%20for%20Energy%20Savings%20-%20Article%205%20analysis%20Report.pdf>

The Alternative Approach in Article 5 in Practice: CA EED WG 2.2



- **Success factors:** political support, well-co-ordinated administrative infrastructure, human and financial resources and involvement of main stakeholders.
- Existence of reliable data related was considered a prerequisite. **There is a general shortage of information on the number of buildings belonging to the central government that fall within the scope of the obligation** (partly due to the lack of precise interpretation of “central government”), the energy consumed and the potential energy savings.
- It was suggested that the “**default approach**” is **too prescriptive**, and too detailed in that **it allows less flexibility at operative level to achieve the “3%” renovation** that shall be fulfilled annually.

[Source: http://www.ca-eed.eu/outcomes/working-group-executive-summaries/public-sector-the-alternative-approach-in-article-5-in-practice.](http://www.ca-eed.eu/outcomes/working-group-executive-summaries/public-sector-the-alternative-approach-in-article-5-in-practice)

The Alternative Approach in Article 5 in Practice: CA EED WG 2.2



- **In MSs where heat standards of buildings are high**, the payback time of deep renovation can be unacceptably long. In these cases the **“alternative approach”** seems to be the most rational option.
- Alternatively, in MSs where the average energy consumption in buildings is high, the **“default”** approach should be chosen and accompanied by the allocation of sufficiently high funds within the **EU cohesion policy to cover the costs of the “3%” renovation.**
- **Cost effectiveness is one of the major criteria** when choosing between both approaches. For example, it should also be taken into account if the **building has an energy manager, energy monitoring/management system or whether full information and long-time energy consumption statistics are available.**

Source: <http://www.ca-eed.eu/outcomes/working-group-executive-summaries/public-sector-the-alternative-approach-in-article-5-in-practice>.

The Alternative Approach in Article 5 in Practice: CA EED WG 2.2



- MS **choosing the “alternative” approach** plan to use the whole spectrum of eligible measures; i.e. **deep and shallow renovation and behavioural change measures are being considered.**
- Finding adequate methodology to **measure savings resulting from behavioural change remains a challenge and very few MS reported that they possess a suitable approach**, such as bottom up methodology, smart metering or direct feedback from occupants.

Source: <http://www.ca-eed.eu/outcomes/working-group-executive-summaries/public-sector-the-alternative-approach-in-article-5-in-practice>.

Article 6 – Purchasing by public bodies



- “MSs shall ensure that central governments **purchase only products, services and buildings with high energy-efficiency performance**, insofar as that is consistent with **cost-effectiveness, economical feasibility, wider sustainability, technical suitability, as well as sufficient competition**”.
- “MSs shall encourage public bodies, including at regional and local levels, with due regard to their respective competences and administrative set-up, to follow the exemplary role of their central governments **to purchase only products, services and buildings with high energy-efficiency performance**. Member States shall encourage public bodies, when tendering service contracts with significant energy content, to assess the possibility of **concluding long-term energy performance contracts** that provide long-term energy savings.”

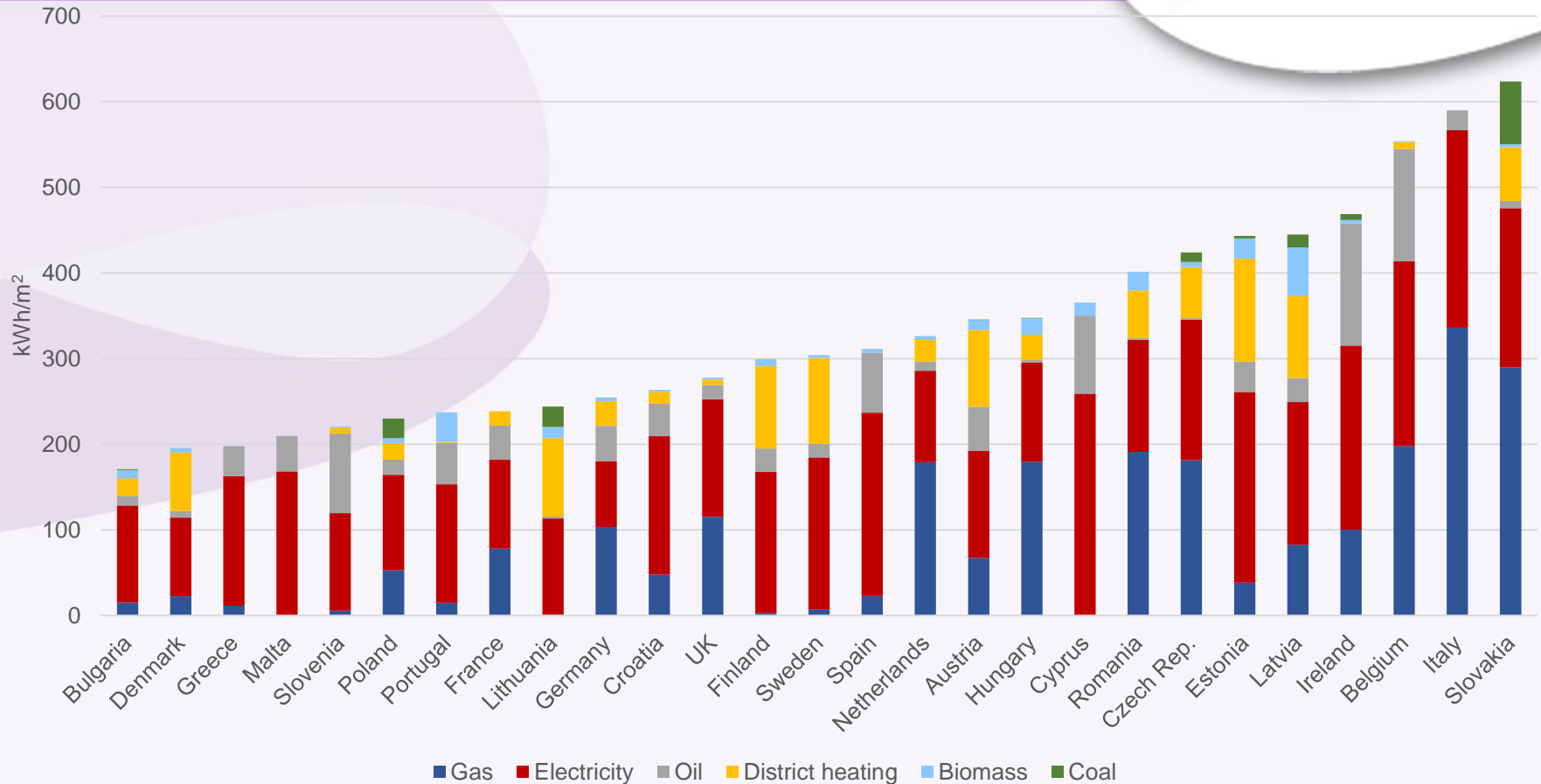
Challenges to energy efficiency in the public sector



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

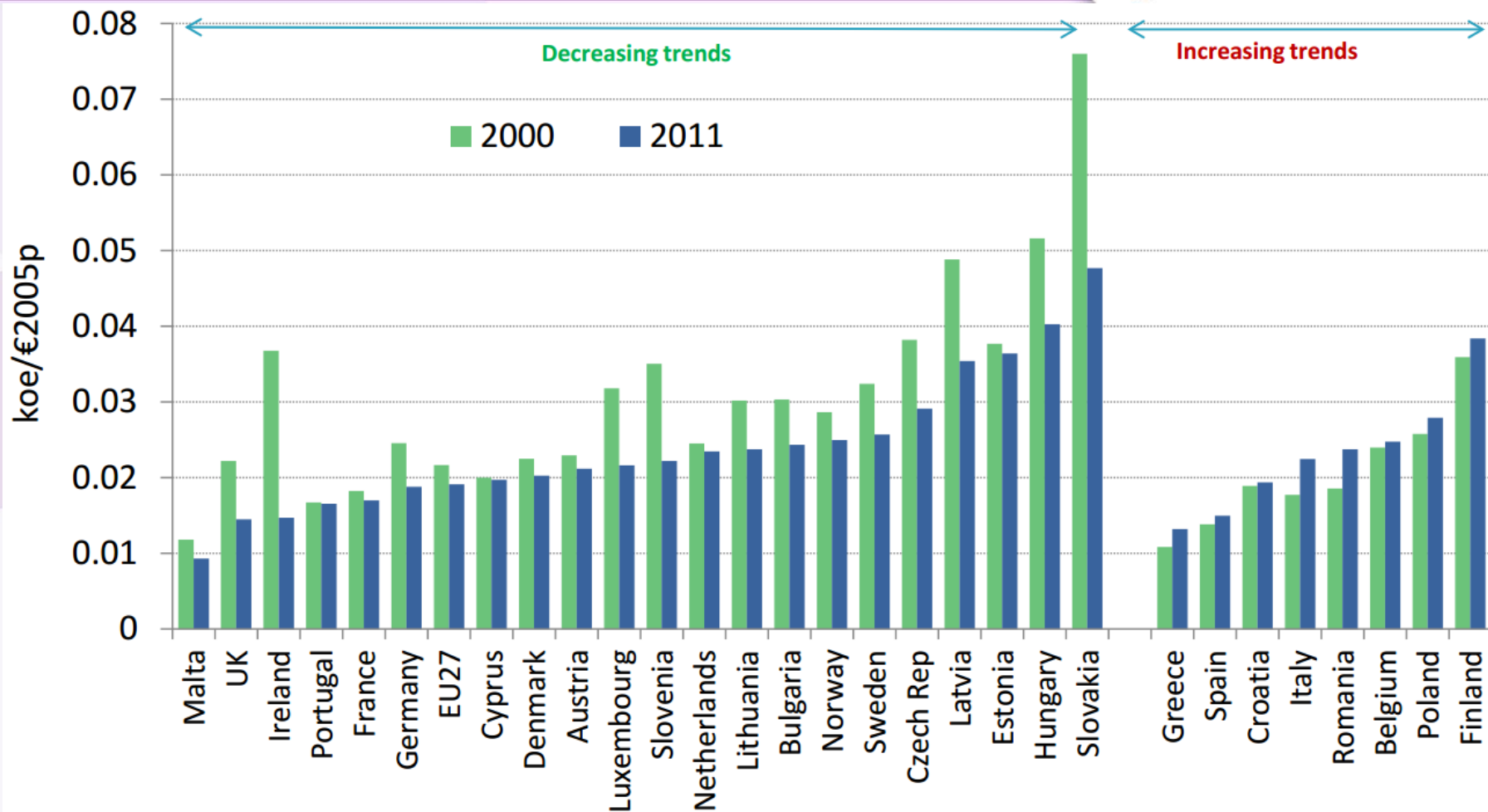


Total unit consumption per m² in non-residential (at normal climate)



Source: <http://www.entranze.enerdata.eu/total-unit-consumption-per-m2-in-non-residential-at-normal-climate.html#/total-unit-consumption-per-m2-in-non-residential-at-normal-climate.html>

Energy intensity in services



Source: <http://www.odyssee-mure.eu/publications/efficiency-by-sector/services/Services-profile.pdf>

Energy Efficiency Investments in Public Sector - Investment



Several Options may be considered to support the investments:

- Own budget from the public authority;
- European Structural and Investment Funds (ESIF);
- Horizon 2020;
- National Energy Efficiency Funds;
- Technical assistance initiatives;
- Other financing sources (receipts from the sale of buildings, or rents paid due to the use of public buildings);
- Private financing institutions.

A successful strategy for public buildings must, probably, make use of several of the previously referred options.

Technical assistance initiatives: Examples



Project & Location	Summary
BEAM GRAZ (AT) Graz	Energy retrofit of public buildings through EPCs , coupled with the large-scale implementation of energy management systems, and construction of new housing to passive house standards. The expected investment adds up to €19 million.
BRITE (UK) Bristol	Setting up a public energy service company to develop solar photovoltaic, district heating, public sector retrofit , as well as domestic retrofit through the Green Deal scheme. Expected investment adds up to €161 million.
Chieti (IT) Province of Chieti	The project aims to implement EPCs on street lighting and public buildings of the municipalities located in the Province. The expected investment is €80 million.
Eco.AP (PT) Lisbon region	Retrofitting of central government buildings and municipal street lighting through EPCs . EPCs will be procured through a framework contract. The expected investment adds up to €36 million.
EFIDISTRICT (ES) Pamplona	The project addresses a social housing district through the deep renovation of condominiums and the retrofit of the existing district heating network , which will be extended to neighboring public buildings and switched to biomass. The expected investment adds up to EUR 11 million.

Information based on the “Public workshop on innovative financing for energy efficiency and renewables, 28 April 2015, Brussels” available at: [http://managenergy.net/lib/documents/1393/original_Innovative_financing-Public_workshop_28042015_report_FINAL_\(1\).pdf?1434445647](http://managenergy.net/lib/documents/1393/original_Innovative_financing-Public_workshop_28042015_report_FINAL_(1).pdf?1434445647)

Energy Efficiency Investments in Public Sector - EPC



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

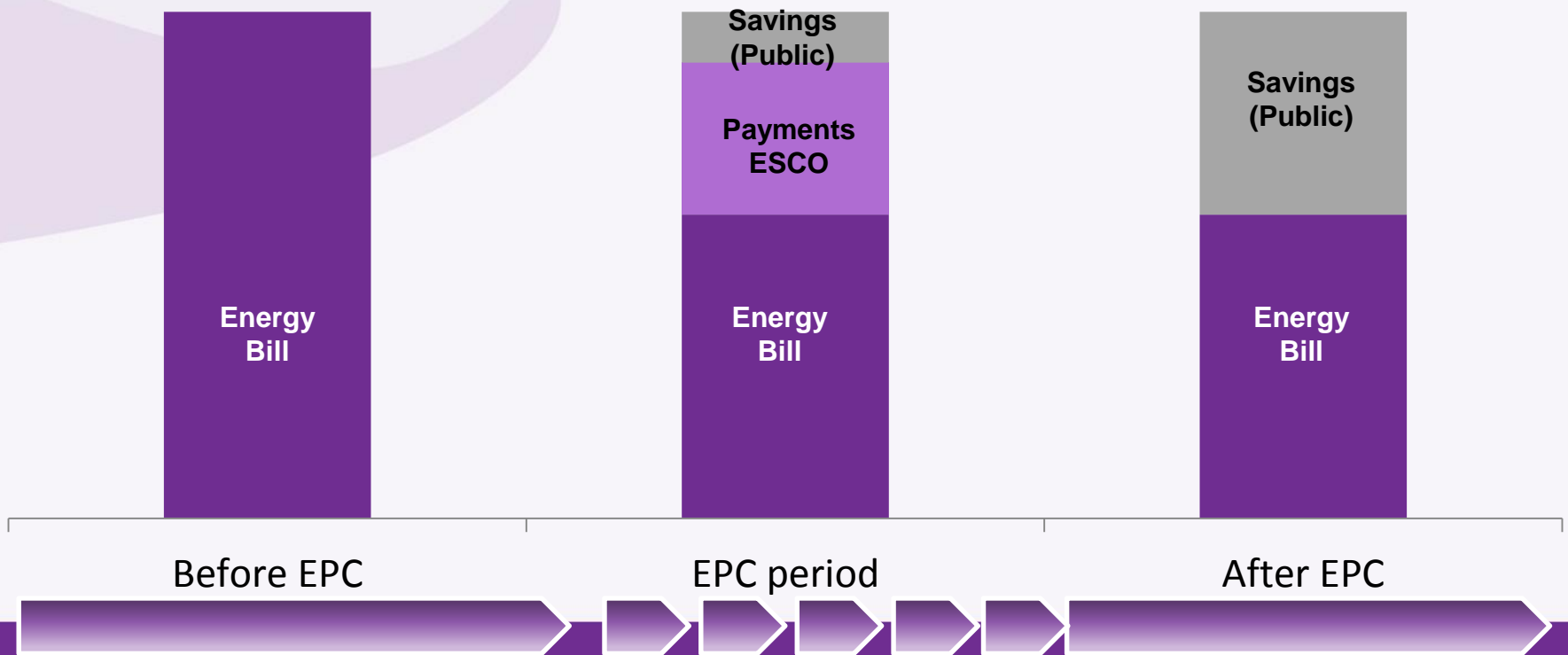
Energy Performance Contracts (mandatory under article 18) are an option in several countries, both in default and alternative approach to promote energy efficiency investments in public sector:



Energy Efficiency Investments in Public Sector - EPC



Energy Performance Contracts (mandatory under article 18) are an option in several countries, both in default and alternative approach to promote energy efficiency investments in public sector:



EPC Example: Lisbon Traffic Lighting



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

	GALP/VIVAPOWER	MANVIA
Total Energy Savings	94,36 %	94,36 %
Total Savings	6 502 934,73 €	6 485 256,73 €
Savings for the Municipality	26,40 %	23,00 %
Contract period	2 years	2,5 years
NPV	420 939,97 €	451 923,34 €
NPV min	304 165,35 €	375 848, 36 €
Overall classification	69%	54%

EPC Example: Evaluation methodology



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

$$P = \left[\frac{NPV - NPV_{min}}{NPV_{min}} \right] \times 50\% + \left[\frac{16 - n}{16 - 6} \right] \times 50\%$$

- P = Evaluation;
NPV = Real net present value of the contractual saving for public body;
NPV_{min} = Minimum net present value of the contractual saving for public body;
n = Contract period

Energy Efficiency Investments in Public Sector



- **Energy Performance of Buildings Directive implementation is essential** for the development of an integrated and effective energy efficiency policy in public buildings;
- **Public buildings inventory** is not mandatory in alternative approach, although its existence is essential for the success of both approaches;
- The existence of a **detailed characterization of the public building stock** (based on energy performance certificates information) can contribute decisively to evaluate and choose the more appropriate energy efficiency measures for each building typology, climate, construction period, HVAC system;

Energy Efficiency Investments in Public Sector



- The development of a public **building energy database** to monitor energy consumption may allow to continuously evaluate the success of the energy efficiency policies for public buildings and to develop new policies;
- Strong commitment of the policy makers, with the necessary **administrative, legal and financial instruments** to allow the development of an effective energy policy in the public administration;
- The existence of an **energy manager** in the public buildings is of key relevance to ensure the development of energy efficiency actions:
 - planning phase;
 - implementation phase;
 - monitoring and verification phase;

Energy Efficiency Investments in Public Sector



- Existence, or installation, of **Building Management Systems** in order to allow an optimized management of energy consumers, including its maintenance;
- Development of an **energy management system** (ISO 50001) in order to continuously ensure the development of the energy efficiency policy can also bring good results and is essential to ensure long-term behavioral energy savings;
- Single and integrated interventions in buildings technical systems and envelope, as well as the use of renewable energy sources;
- The use of energy performance contracts is also considered in several countries.

Thank you for your attention



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Dinis Rodrigues

Email: dinis.rodrigues@adene.pt

