IEA DSM TASK 25 - Business models for effective market uptake of EE energy services

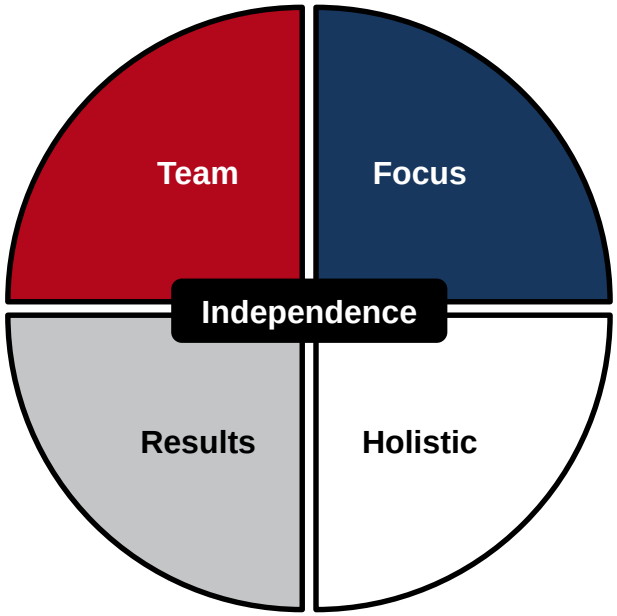
Context Analysis

May 2016

Since its foundation in Spain in 2003, CREARA has become a national and international household name in the provision of high value-added services in energy efficiency, renewable energy and smart grids

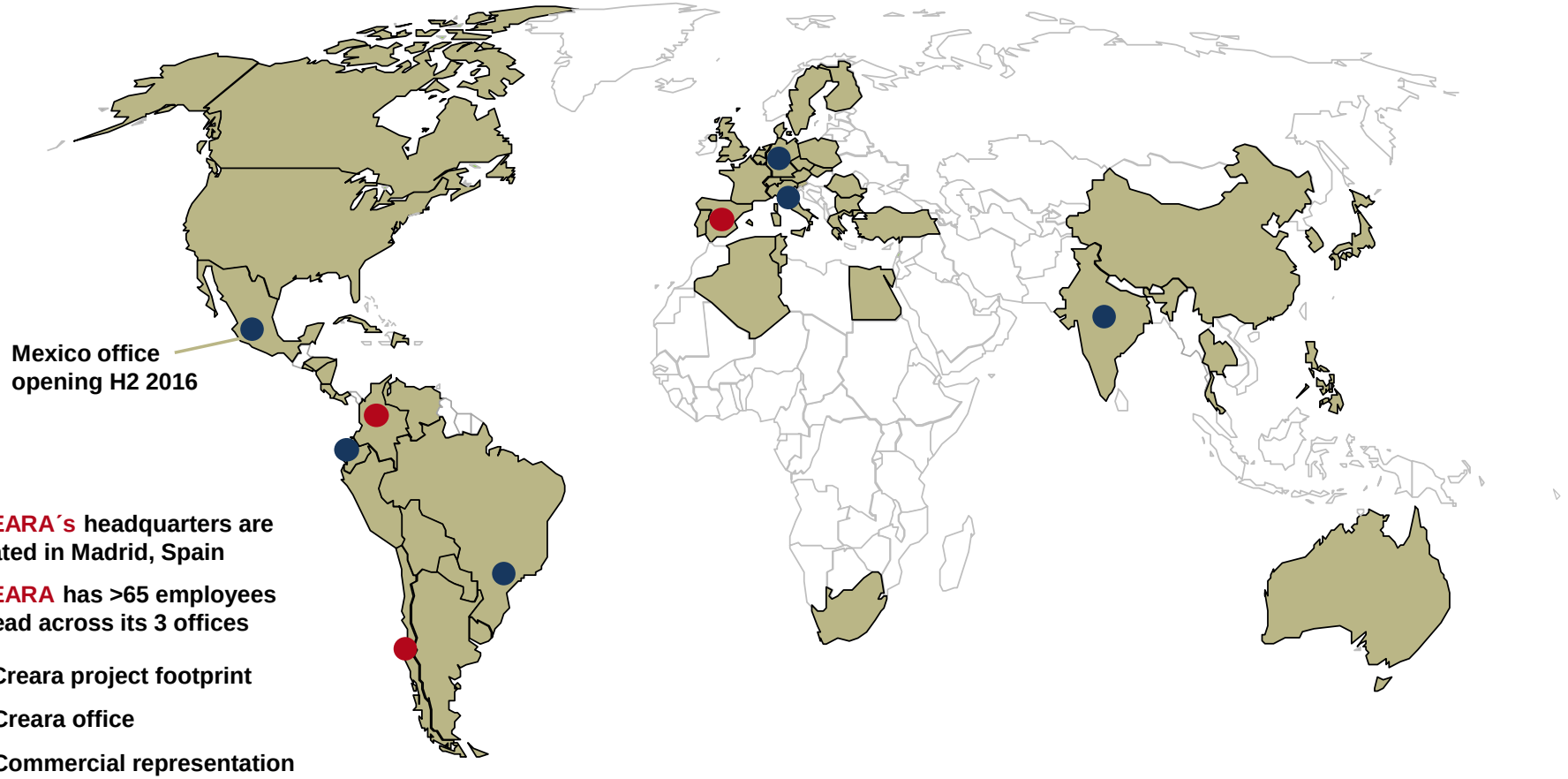
CREARA fundamentals

- Over 60 multidisciplinary professionals from around the globe, 90% of which have university degrees or above
- Clear and objective analysis geared towards producing results and facilitating decision-making



- Exclusive focus on developing know-how and innovations for the sustainable energy field
- A one-stop shop for sustainable energy services across the entire value chain

CREARA has completed projects across the world from its headquarters in Madrid and has developed a global office network to support its international growth



- CREARA´s headquarters are located in Madrid, Spain
- CREARA has >65 employees spread across its 3 offices

Creara project footprint

Creara office

Commercial representation

Markets we serve

- **Energy Efficiency**
  - ESCOs
  - Hotels & Hospitality
  - Hospitals
  - Industrial
  - Municipalities
  - Oil & Gas
  - Retail chains

- **Smart Grids**
  - Smart communities & cities
  - T&D
  - Power electronics (LV, MV, HV)
  - Automation and control
  - Electric Vehicle
  - Energy Storage
  - RES integration

- **Renewable Energy**
  - Biomass and biofuels
  - Cogeneration
  - Geothermal
  - Marine
  - Photovoltaic
  - Solar Thermal Electric
  - Wind

- **Climate Change & Adaptation**
  - Local
  - National
  - Regional

Clients we serve

- **Entire market value chain**
  - Equipment & component manufacturers
  - Wholesalers
  - Integrators
  - Project developers
  - ESCOs
  - Utilities (DSOs & TSOs)
  - Independent energy retailers
  - Industry associations

- **Public entities**
  - Regulators
  - Energy agencies
  - Multilateral agencies
  - Local, national and regional governments

- **Final consumer**
  - Private consumers
  - Communities (cities, etc.)
  - Public consumers

- **Financial & legal sector**
  - Law firms
  - Private equity
  - Venture capital
  - Banks
  - Investment funds
  - Family offices
  - Soft loans

ONE STOP-SHOP FOR SUSTAINABLE ENERGY SERVICES

1 Consulting

- Policy Consulting
- Strategy Consulting
- Financial Advisory (M&A, ESCO, origination)
- Market Intelligence
- Structuring of ESCOs
- Energy Efficiency Planning (corporate, local, national)
- Harmonization Committees (IEC, AENOR)

2 Engineering

- Energy Audits
- Monitoring &Telemetry
- Energy Certification (CALENER, LEED...)
- Software Design & Development
- Energy Management Systems (ISO 50001)
- Measurement & Verification (ESCOs)
- Climate Change (GHG inventory, carbon footprint, adaptation)

3 OEM[1)]

- Energy Procurement
- Energy Management
- PPA identification & negotiation

4 Training & Outreach

- Training (*face-to-face & on-line*)
- Manuals & Guides
- Communication & Outreach

- Multilateral Projects (H2020, IBD, EIB, etc.)

Note: [1)] Outsourced Energy Management (OEM)

Agenda

- **Introduction**
  - Methodology
  - Energy efficiency market
- **Country profiles**
  - Belgium
  - France
  - Germany
  - Portugal
  - Spain
  - UK
- **Case studies**
- **Conclusions**

CREARA was hired to support IEA DMS Task 25 ("Business models for effective market uptake of EE energy services") by analyzing the adaptation of previously selected BMs to the EE context in 6 countries

Country context analysis → **Adaptation to context**

Description of tasks

- **Analysis of the context for non-ESCO BM**
  - Industry structure
  - Political and legal context
  - Economic context
  - Social context
- **Included countries (presented in alphabetic order):**
  - Belgium
  - France
  - Germany
  - Portugal
  - Spain
  - UK
- **Description of how the short listed BMs have adapted to the situation in each country based on the prepared country context analysis**
  - Preparation of questionnaire for companies
  - Interviews with company representatives, stakeholders and experts
  - Description of adaptation of short listed BM to context

Timing

March — **May**

Source: CREARA Proposal

The analysis was structured into four areas which are presented in the following sections of this presentation

Structure of the analysis and the presentation

Context analysis

Country profiles

- **In order to provide an overview of the EE market context for each country five areas have been analyzed based on information recollected from publications, databases and interviews with market experts and stakeholders**
  - General context, industry structure, political and legal context, economic context, social context have been covered
- **Country profiles for the six countries (Belgium, France, Germany, Portugal, Spain, UK) were prepared**

Elements of success

- **Based on the context analysis, market characteristics have been defined (maturity, competitiveness, regulation, economic incentives/ financing options, energy price, social consciousness) on a general level or, where necessary, differentiating between customer segments (industrial, commercial, residential)**
- **Through interviews, elements of success for the EE business have been identified taking into account the impact that the status of the market characteristics have on each of the them**
  - The elements of success are presented as conclusions of the context analysis (they are presented in a summarized way (table format) in order to come as close as possible to a "tool" for the context analysis, further explanations are given in an additional slide)

Case studies

- **After completing the context analysis, the previously selected case studies were analyzed in further detail to identify any adaptation of the business to a changing context**
  - Interviews with three out of the four companies were completed (the analysis of Airis LED was based on publications)
- **As a conclusion of this section, the elements of success that have been used by each of the companies in the different markets they are active in have been compared**

Conclusions

- **Summarizing the results from the analysis of each of the 6 markets, general conclusions on market characteristics and elements of success were drawn**

Source: **CREARA Analysis**

In order to provide an overview of the EE market context for each country the following five areas have been analyzed

Structure of the analysis of each country

General context	• For a quantitative overview of the energy efficiency (EE) situation in each country, we have analyzed the evolution of the country's energy intensity (primary and final) and EE gains compared to the European average; these have been considered the most accurate indicators of a country's EE performance • For a closer perspective of the country's EE market, the decomposition of the final energy consumption variation has also been presented (data for Belgium was not available)
Industry structure	• To indicate the maturity of the EE market, we have identified the EE market size (annual turnover and number of employees), the number of players, concentration of the market and principal EE and ESCO associations • The different types of players active in the EE market have been analyzed, in order to understand the main differences in industry structure between countries
Political and legal context	• The political and legal context of each country is described by the most important regulations, programs and incentives for EE • The main regulatory drivers in each country, according to the Odyssee-Mure Project, have also been depicted
Economic context	• It has been considered interesting to analyze the macro-economical situation of the country. For this, we have compared the evolution of the GDP, the private consumption and the value-added by industry of each country with Europe's parameters • The evolution of electricity prices in the residential and industrial sectors have also been presented as an indicator of the EE market context
Social context	• Finally, the social perception of the environment, and particularly their concern and commitment to EE issues, has been investigated • A selection of the results from a European survey carried out by the Eurobarometer in 2007, 2011 and 2014 has been used as indicators of each country's social perception on the importance of the EE in society • Campaigns which provide information and education on EE matters have been identified in order to asses how active a country is in the field of citizen involvement and education

Source: CREARA Analysis

For the general context, energy efficiency (EE) indicators were used to evaluate the overall EE achievement of each country

Description of energy efficiency indicators used in this study

Energy intensity

- **Energy intensities are often used as indicators to characterize the overall EE achievement of an economy**
  - Primary energy intensity represents the ratio between the total energy consumption and the Gross Domestic Product (GDP), i.e. it measures the total amount of energy needed to generate one unit of GDP
  - Final energy intensity is the ratio of final energy consumption, which covers all the energy supplied to the final consumer for all energy uses, over GDP
- **The focus of energy intensities lies upon short-term variations, so the indicators are prone to be distorted by climatic variations from year to year**

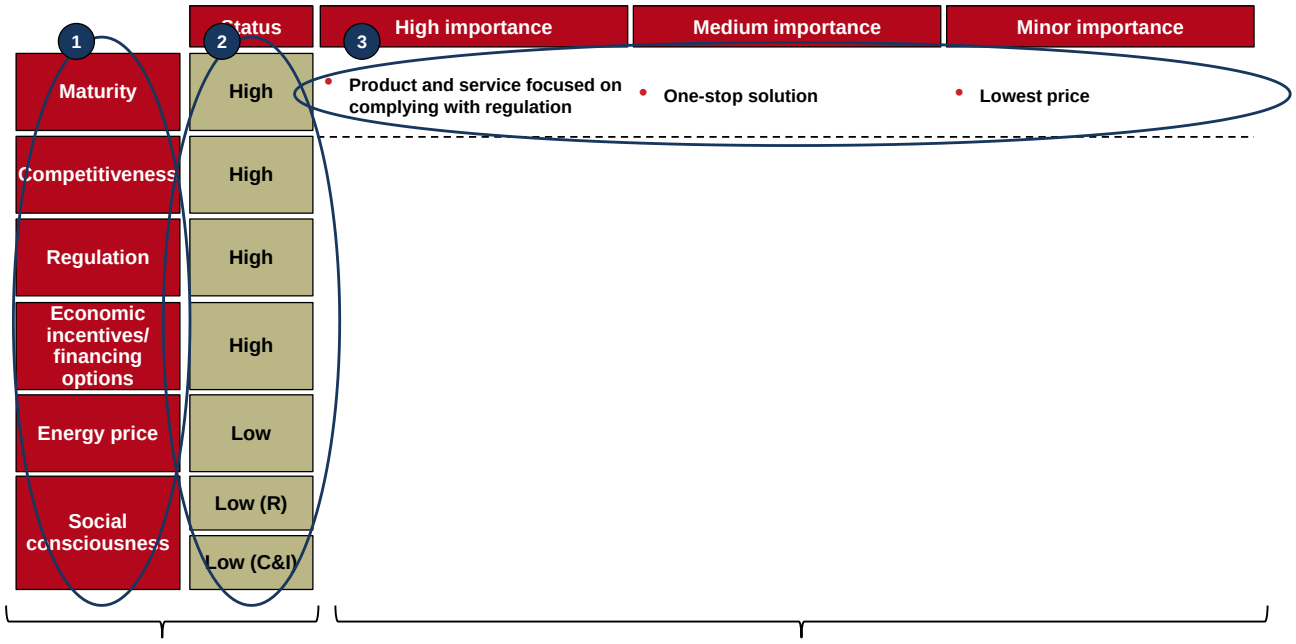
ODEX and EE gains

- **In order to take into account short-term fluctuations as well as some structural and economic rebound effects, an alternative aggregated EE indicator is used, the Odyssee energy efficiency index (ODEX)**
- **ODEX is the index used in the ODYSSEE-MURE project to measure EE progress for the economy of a country**
  - The index is calculated as a weighted average of sub-sectorial indices of EE progress
    - The sub-sectorial (residential, commercial and industrial) indices are calculated from variations of unit energy consumption indicators in order to provide a better indicator of EE progress from a policy evaluation point of view
    - The weight used for the weighted aggregate is the share of each subsector in the total energy consumption of all subsectors considered in the calculation
- **ODEX indicators represent a better proxy for assessing EE trends at an aggregate level than the traditional energy intensities as they are corrected for structural changes and from other factors not related to EE**
- **EE gains are calculated based on the ODEX and reflect efficiency gains of a country**

Source: ODYSSEE-MURE; CREARA Analysis

We then identified elements of success for the EE business which are influenced by market characteristics; the elements are summarized in tables and presented as conclusions at the end of each country section

Example of table with elements of success according to importance segmented by market characteristics



- **The table should be read from the left by line for each market characteristic**

1. **Establishes the main characteristics of the EE market under study**
   - The impact of each characteristic on the EE market is defined on slide 8
2. **This column establishes the status of each of the characteristics in the specific country**
   - In some cases there is a differentiation based on the status of each application segment (residential, commercial and industrial)
   - The status is evaluated from low to high, based on the differences between the analyzed countries (not compared to the global situation of EE markets)
3. **The last part of the analysis refers to the elements of success ranked by importance**
   - These elements were identified based on interviews with market experts and participants from each of the countries

Source: CREARA Analysis

The market characteristic have a direct impact on the elements of success

Description of impact of the main market characteristics on the EE status of the country

Maturity	• The maturity of an EE market reflects the status of development of the country in terms of potential EE services and products to be offered, i.e. a highly mature EE market will have already covered basic EE products and measures (e.g. efficient lighting and substitution of home appliances) and is offering more complex solutions • A more mature market could show higher potential for service offering companies as clients are interested in services and solutions rather than the products themselves and their "mere" implementation
Competitive-ness	• The competitiveness in an EE market reflects the difficulty for a company to enter the market and to succeed • In case the level of competition is high, a company must be more competitive by offering a differentiated product or service (e.g. lower price, innovative product or service, complete service package). On the other hand, if the level of competition is low, it is easier for a company to enter and succeed in the market by offering a simple and standardized product or service
Regulation	• Nowadays, the regulatory situation of the countries covered in the analysis is mainly driven by European EE regulation which sets obligations to the different European countries, e.g., for energy consumption reductions. Up to a certain extent the differentiation of the regulation status in the analyzed countries therefore "cancels out" • If a country is highly regulated consumers will probably look for the implementation of services which comply with the regulation and will not be willing to pay any extra for additions (although this depends on other market characteristics as well, e.g. social consciousness)
Economic incentives/ financing options	• The existence of economic incentives and financing options make it easier for consumers to implement EE measures, their absence on the other hand requires the consumer to cover the initial investment as well as any further costs by themselves (even if the product or solution achieves attractive savings, the initial investment can present a barrier for its implementation)
Energy price	• Electricity price levels present a significant market characteristics as they have a direct impact on the financial savings that can be achieved by EE products and services • High electricity prices are incentives for consumers to demand EE product and services, low electricity prices present a barrier for the EE market
Social consciousness	• Social consciousness is an important factor for the development of an EE market, as higher consciousness of consumers will lead to more interest in EE issues and therefore higher demand for (more complex) EE services/ products

Source: CREARA Analysis

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Currently, no harmonized definition of EE markets exists[1]; the market is described differently from country to country and study to study making any comparison difficult (1/2)

France

- **The French EE Market refers to all sectors related to improving energy efficiency:**
  - Transport: rail infrastructure and equipment, collective urban transport, private vehicles of Class A or B, electric and hybrid vehicles and urban bikes
  - Buildings: insulation and replacement works, condensing boilers, heating control and ventilation, large electrical appliances of classes ≥ A +, compact fluorescent lamps and LED

UK

- **UK's EE include the following services and products:**
  - Low carbon electricity: Onshore and offshore wind, Nuclear energy, Solar photovoltaic (solar PV), etc.
  - Low carbon heat:
    - Geothermal heat – primarily deep geothermal but includes some ground source heat
    - Heat pumps – including: ground, air and water source heat
    - Solar thermal
    - Heat networks - incorporates the distribution of heat, but not its generation. This will either be covered by energy generation from waste, biomass and deep geothermal or excluded if it is generated from fossil fuels
  - Energy efficiency products
    - Energy efficient lighting
    - Insulation and energy-efficient windows and doors
    - Heat recovery and ventilation systems
    - Energy controls and control systems; Sustainable architecture and buildings
  - Low carbon services: Low carbon advisory services and finance
  - Waste processing, energy from waste and biomass: Recycling and generation of energy from waste and biomass and the use od alternative fuels – primarily from landfill gas, processing forestry, agricultural and food waste, though it does include growing of crops especially for conversion into fuel
  - Low emission vehicles

Note: **[1]The different EE market definitions are taken from studies which provided data about EE markets in the analyzed countries. Not for all the countries we were able to find definitions nor market data**

Source: **ADEME; UK's Department for Business and Innovation Skills; CREARA Research**

Currently, no harmonized definition of EE markets exists[1]; the market is described differently from country to country and study to study making any comparison difficult (2/2)

Germany

- **The German EE market includes all services and products that allow the final client to obtain the same desired output with less energy input (compared to status quo). Structure of the EE market:**
  - Households/ buildings/ commercial:
    - Products: windows, doors, shutters, etc., isolation material, heating systems, air conditioning, heat pumps, building control and automation technology, etc.
    - Services: building energy consulting and building energy certificate, building planning and construction management, building energy management, saving and supply contracting, etc.
  - Industrial production :
    - Products: controlling technology, efficient autonomous drive systems and pumps, etc.
    - Services: industrial energy consulting, energy management systems, etc.
  - Transport
    - Products: efficient transport means, parts for efficient transport means, etc.
    - Services: car-sharing, training for efficient driving, etc.
  - Energy generation
    - Products: efficient generation plants, control systems for optimizing generation system, efficient energy distribution/ networks, etc.
    - Services: consulting and commercialization of generation system, etc.

Spain

- **The socioeconomic impact of the Spanish EE market has been quantified according to the following criteria:**
  - The products are linked to the ones covered by the Spanish EE Plan (PAE) or other EE support policies
  - The products are considered completely, not only by the product elements or components that save energy (e.g. in the electric vehicle market, the product is the complete vehicle, not only the engine)
  - They have not an specific morphology, being both tangible (LED) and intangibles (training courses)

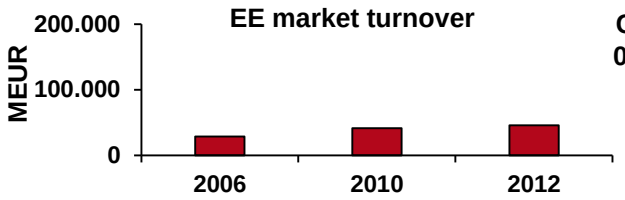
Note: **[1]The different EE market definitions are taken from studies which provided data about EE markets in the analyzed countries. Not for all the countries we were able to find definitions nor market data**

Source: **DENEFF; IDAE; CREARA Research**

Due to different definitions it is not possible to compare the size of the markets, although the numbers are useful to give an indication of the evolution of these

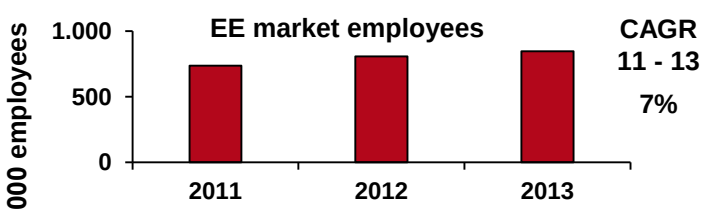
France

CAGR 06 - 12: 7%



CAGR 06 - 12: 8%

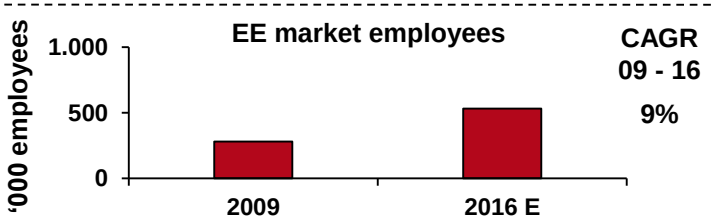
Germany



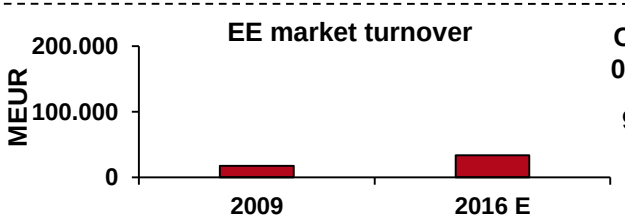
CAGR 11 - 13: 7%

CAGR 11 - 13: 13%

Spain



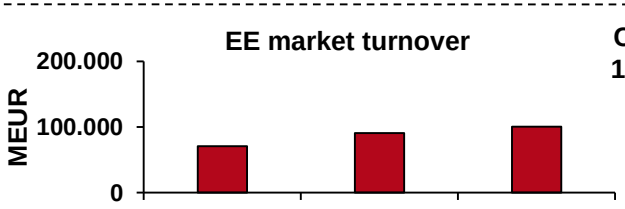
CAGR 09 - 16: 9%



CAGR 09 - 16: 9,5%

UK[1]

CAGR 11 - 13: 2%



CAGR 11 - 13: 19%

Note: [1]Low carbon electricity was not taken into account as it included only renewable energies
Source: CREARA Analysis

Even though the EE market scope is not harmonized, a global trend from a product-based to a service-based market can be detected; the trend is influenced by macro-environmental factors

Selection of macro-environmental factors moving EE towards a service-based market (PEST Analysis)

P – Political

- **The political agenda is designing a favorable environment for EE which demands the involvement of all stakeholders and creates markets that are looking for solutions rather than products, e.g.:**
  - COP21 for Climate change
  - European Energy Efficiency Directive, European Renewable Energy Directive
  - Corporate Social Responsibility (CSR)

E – Economic

- **The economic crisis has increased pressure on the companies of all sectors, including EE:**
  - Companies need to reduce prices which they compensate through the expansion along the value chain
  - Services give access to new sources of margins, allow companies to be closer to the client and through this obtain information from the end user as well as increase customer retention
  - Income through services is more recurrent, reducing sales pressure and increasing visibility
- **On the demand side, companies are looking for outsourcing options (focus on core competences), services are therefore gaining importance**
- **Energy prices are generally increasing, but their composition (e.g. variable vs fixed part of electricity prices) is asking for more complex solutions**

S – Socio-cultural

- **Users search for comfort and complying with regulation, they are not interested in the products themselves but rather in the results and are therefore looking for packaged solutions (e.g. including implementation, maintenance, financing)**
- **Awareness for EE is still low in many markets, customers have to be educated by the companies**

T – Techno-logical

- **There is a general interest in green technologies, among others pushed by the political agenda**
- **Technological advances in EE have brought more complex solutions which require know-how for implementation as well as for effective operation**
  - There is a clear trend of automatization of products and services (e.g. building automation)
  - Smart applications are increasing

- **The PEST analysis shows how macro-environmental factors are driving the market towards a service-based market**
  - In EE, there are hardly any companies focusing merely on supplying products
- **The analysis has been carried out based on this trend**
  - Even though products and services are mentioned throughout the presentation, the focus lies on EE services

Source: CREARA Analysis

Apart from the trend towards services, there are some general trends that affect all EE markets under study

General trends

- **The European directives have encouraged the development of EE in the analyzed countries**
- **Because of the economic and financial crisis in Europe, many banks have stopped offering credits for EE which has discouraged the implementation of EE projects mainly for the industrial sector**
  - Although the development of ESCO projects has helped to alleviate this problem
- **EE products are usually low interest due to the following factors:**
  - They tend to be more expensive than less efficient products/ services
  - Many appliances/ systems are only renewed when they stop working, such as refrigerators, washing machines, etc., switching to efficient products is usually a secondary decision due to necessity
  - Residential customers primarily seek comfort and do not worry about other aspects, also some people are reluctant to changes making it quite difficult to implement innovative solutions
- **EE in not a priority for the public sector mainly due to the following factors:**
  - EE solutions have a lack of visibility for citizens and for public authorities it is more important to give a “green image” than to do something for the environment. In this sense they would rather install a PV system which can be seen by citizens than upgrade lighting systems
  - Some EE solutions require great investments and sometimes payback periods are higher than the government period

Source: **CREARA Analysis**

The six analyzed countries have a favorable context created by regulation and economic context, Germany being the most developed market (1/2)

	Belgium	France	Germany
General context	• Compared to the average European EE gains Belgium has obtained higher rates since 2001 • Belgium has achieved the highest EE gains, among the 6 analyzed countries	• France is in 3rd position behind the UK, within the 6 analyzed countries, in terms of highest EE gains • France presents overall EE gains slightly higher than the European ones	• In general terms, Germany's EE gains have been evolving in line with the evolution of the European gains, positioning itself in 4th position within the 6 analyzed countries, behind France
Industry structure	• According to interviews, the Belgian EE market is a growing market. It has been evolving positively in general terms, although at a lower rate than other European countries due to the existing regional differences	• The French EE market presents a positive evolution in terms of turnover (CAGR 2006-12: 8%) and number of employees (CAGR 2006-12: 7%)	• Germany is the largest market between the 6 analyzed countries, presenting an increasing trend for both EE market turnover and number of employees – Turnover: 13% CAGR (2011 - 13) – Employees: 7% CAGR (2011 - 13)
Political and legal	• There are 2 principal EE laws – An energy consumption savings target of 18% by 2020 – Voluntary Agreement Programs on EE for the industrial sector, in Flanders and Wallonia	• The principal law Grenelle 1 of 2009, which sets a target of 28% reduction in energy consumption of buildings by 2020, measures to achieve the target were published in 2010 (Grenelle 2)	• There are 4 main EE laws • The "Energy Concept" of 2010 sets policy objectives that promote EE (e.g. GHG emission reduction of about 40% by 2020)
Economic context	• Residential electricity prices in Belgium have slightly increased standing above the European average, while industrial prices have fallen	• French electricity prices have increased significantly in recent years although they are still lower than the European average prices	• Residential electricity prices in Germany have slightly increased while industrial ones have fallen by nearly 2% due to its competition with spot prices
Social context	• Despite the willingness to contribute to the wellbeing of the environment, in order to enhance EE measures an effort in Belgian social commitment should be made	• Although the population agrees that caring about the environment may contribute to economic growth, an effort should be done to increase consciousness	• Germany is the only country analyzed where the economic recession has not affected people's willingness to pay for environmentally friendly products
Relative evaluation	✓✓ • Highest EE gains among the 6 analyzed countries, lowest number of EE drivers	✓✓ • High EE gains, high number of ongoing EE regulatory drivers	✓✓✓ • According to interviews, most mature market in Europe and high number of ongoing regulatory drivers and

Source: IEA; ODYSSEE-MURE; RESLegal; European Commission; CREARA Analysis

The six analyzed countries have a favorable context created by regulation and economic context, Germany being the most developed market (2/2)

	Portugal	Spain	UK
General context	• Portugal presented higher EE gains than the European average for the first years, however after 2005 Europe had a remarkable gain and Portugal was left in 5th position among the 6 studied countries	• Spain has achieved continuous EE progress in the period 2000 - 2013, although Spain stands in last position in terms of EE gains among the 6 analyzed countries	• Compared to average European EE gains UK has been obtaining better rates since 2001, positioning itself among the top 5 European countries in this matter (Slovakia, Belgium, Latvia, Poland and the UK)
Industry structure	• According to interviews, the Portuguese EE market is evolving positively in general terms, although at a lower rate than other European countries	• Both EE market turnover and number of employees present an increasing estimated trend for 2016 – Turnover: 9,5% CAGR (2009 - 16) – Employees: 9% CAGR (2009 - 16)	• Both EE market turnover and employees have presented an increasing trend in the last years – Turnover: 15% CAGR (2011 - 13) – Employees: 3% CAGR (2011 - 13)
Political and legal context	• There are 3 main EE laws • The National Energy Efficiency Action Plan (NEEAP) sets several primary energy savings targets, one of 8,2% by 2016 and one of 25% by 2020	• There are 2 principal EE laws – An energy consumption savings target of 26,4% by 2020 – Obligations scheme for energy suppliers for implementing EE measures	• There are 2 principal EE laws – An energy consumption savings target of 18% by 2020 – Obligations scheme for energy suppliers
Economic context	• Compared to Europe, Portugal's electricity prices have been higher since 2011 for both the residential and industrial segments	• Spanish electricity prices have risen significantly in recent years and are higher than average European prices	• Electricity prices for both residential and industrial consumers in the UK have risen strongly since 2010, standing above the European average
Social context	• The Portuguese population appears to be concerned about the environment as a result of the effective dissemination campaign of the last years	• Important improvements have been made in the Spanish social concern about the environment since 2007 • A good attitude towards the environment seems to be less extended than in other countries	• The UK population shows a good level of environmental awareness and general commitment with the environment, although there is room for improvement
Relative evaluation	• Second last position in terms of EE gains among the 6 countries ✓	• Lowest EE gains among the 6 analyzed countries ✓	• Second position in terms of EE gains and high number of ongoing EE regulatory drivers ✓✓✓

Source: IEA; ODYSSEE-MURE; RESLegal; European Commission; CREARA Analysis

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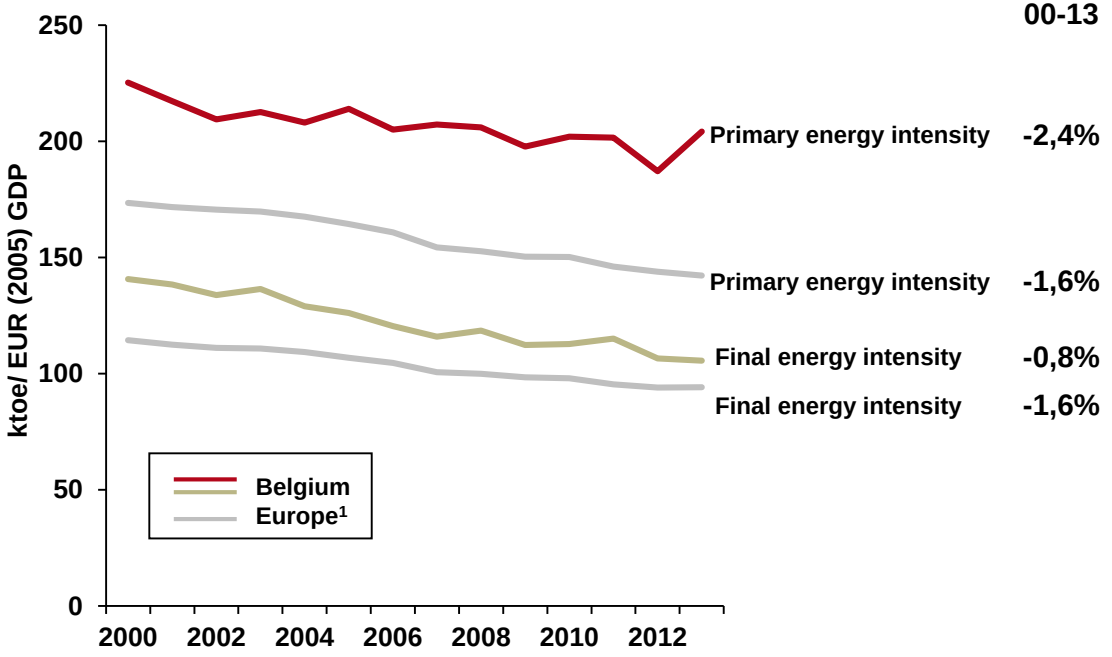
In Belgium, both primary and final energy intensity have been decreasing, representing a positive trend in terms of EE; compared to the European average, Belgium presents higher intensities for the studied period

Development of primary and final energy intensity in Belgium and Europe, 2000 - 2013

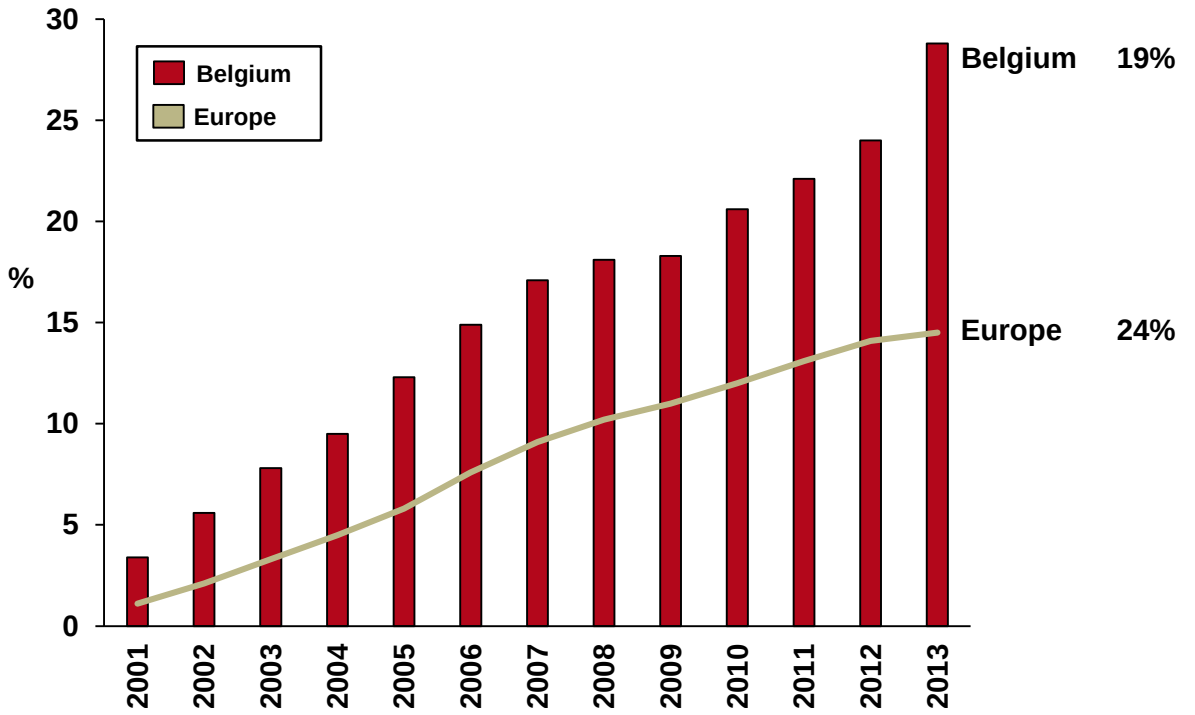


- **The graph shows a downward trend in both primary and final energy intensities over the period 2000 - 2013**
  - The general decreasing trend confirms the decoupling of energy consumption from the economic activity over the whole period
- **The final energy intensity decreases at a rate much lower than the primary intensity, also the primary energy intensity presents higher volatility than final energy**
- **Primary energy intensity decreases faster than the European average, while final energy intensity decreases at a lower rate. However, for both cases Belgium's intensities are higher than the European average**
- **Energy intensities are influenced not only by EE, but also by structural effects taking place within each sector (climate, economics, etc.)**

Note: [1]Europe refers to the European Union (28 countries); [2]CAGR, Compound Annual Growth Rate
Source: ODYSSEE-MURE; CREARA Analysis

Belgium presents the best rates in terms of EE gains since 2000 among the 6 analyzed countries with an annual average increase of 19%

Overall energy efficiency gains in Belgium and Europe according to ODEX, 2001 - 2013



- **Total EE gains have been increasing with an annual average growth of 19% for the period of 2000 to 2013**
- **Compared to the average European EE gains Belgium has obtained better rates since 2001, standing among the top 5 European countries in this matter[1]**
  - Belgium also has the highest EE gains, within the 6 analyzed countries
- **All three application segments have helped with the growth of energy efficiency gains in Belgium**
  - The transport sector shows an average annual growth rate of 31%, representing the sector with the highest increase for the studied period
  - The residential and industrial sectors represent both an average annual growth rate of 18% (between 2000 - 2013)

Note: [1]Slovakia, Belgium, Latvia, Poland and the UK
Source: ODYSSEE-MURE; CREARA Analysis

The Belgian EE market is highly competitive although it grows at a lower rate than other European countries due to the problems resulting from the differences between the three Belgian regions

EE market maturity in Belgium

Association ESCO/ EE	• **Two main EE/ ESCO associations: BELESCO (founded in 2008) and AGORIA Green Building Platform (founded in 2010)**
Number of active players	• **There are between 70 to 80 companies in the energy efficiency sector in Belgium** - Nearly 40% of the total are ESCO companies - 40% approximately are installers and facility managers - 10% are utilities, of which 3 have ESCO services - 10% are other kinds of companies such as energy consultants, manufacturers, etc.
Market concentration	• **Competitive market, dominated by large international companies on the national level but with a large variety of SMEs players which only act regionally as there are differences in regulation and certification compliance between the different regions**
Market size	**EE market employees** • **There is no official data about the number of employees in the EE market in Belgium, although the following aspects could be used as an indication** - Approximately 30 to 40 companies in the EE sector are large international groups - The remaining companies are national SMEs with 5 to 30 employees **EE market turnover** • **There is no official data about the turnover of the EE market in Belgium, although according to interviews it is growing at a lower rate than other European countries due to regional differences**
Year of first national EE regulation	• **1985 for the residential sector:** - K-level thermal regulations of residential buildings
Year of first ESCO	• **2005**

Source: Deloitte; Canadian Trade Commissioner Service; ESCO Market Report (JRC, 2014); CREARA Interviews; CREARA Analysis

Large international EE service groups dominate the market making it difficult for new companies to enter the market, smaller companies rather focus on the regional markets

Type of EE market players in Belgium

	Utilities	Facility managers	Manufacturers	Construction companies and installers	Engineering companies	Energy efficiency services	Other
Relative number	✓✓✓	✓✓	✓	✓✓✓	✓✓	✓✓	
Description	• They sell energy flows (such as gas or electricity) to the end customer • Generation dominated by two main players: GDF Suez and EDF • There is a competitive energy supply landscape, different in each region	• Companies dedicated to the management and maintenance of buildings and their services • Highly diversified sector, with an increasing activity after the application of the EPBD[1]	• They manufacture equipment, tools and platforms, often complemented with other services • Growing interest of international companies in building automation and control	• They install the equipment (one-off service at the end of the value chain) • Very diverse sector, with several players and activities • Large number of small national companies, as well as some international groups	• Companies dedicated to the design and planning of installations and solutions (based on projects) • Large national groups and SMEs	• They provide energy efficiency measures: EPCs, metering, supervision, etc. • Large international companies, traditionally offering FM solutions with new interest in EPCs	• Customer financing, ESCO-based funding and third party financing are available in Belgium • Third party financing institutions offer leasing principally
Examples	• Electrabel (GDF Suez), SPE-Luminus (EDF), Enel, EON, Lampiris, Octa+ Energy	• AEJ, Cofely, Vinci Facilities, SPIE, Bilfinger, Cegelec, BESIX	• Schneider, Siemens, Johnson Controls, Honeywell, Bosch Rexroth	• Bouygues, Vinci, BAM, Hochtief, BESIX, Thomas & Piron, Willemen	• Tractebe (Engie), TPF, Deme, Jan de Nul, Denys	• Dalkia, Axima Services-Cofely, Fedesco (public ESCO)	• Dexia (bank), The Regional-Federal Consultation Cell

Assessment: ✓ Small ✓✓ Medium ✓✓✓ Large

Note: [1] EPBD: Energy Performance of Buildings Directive

Source: Deloitte; Enerdata; Canadian Trade Commissioner Service; CREARA Research; CREARA Analysis

Belgium has developed national EE plans mainly driven by the EU regulation as well as regional regulations which positively promote EE in the country

Key regulatory drivers of EE in Belgium

Energy Efficiency

Regulation

- **National Energy Efficiency Action Plan (NEEAP, last version of 2014), required by the European Energy Efficiency Directive (EED 2012/27/EU), which has been enacted by each of the three regions' Energy Efficiency Action Plans (Brussels, Wallonia and Flemish):**
  - A reduction of 18% on primary energy consumption by 2020 (2007 baseline, country wide target)
  - It should be noted that the targets and expectations differ in each region; e.g. in 2016 the expected energy savings for the Flemish region are 13,9%, while for Brussels the target was set at 10% and in Wallonia at 7,9% (compared to the 2007 reference scenario)
- **Public Procurement Rules for Federal Administrations and Public Services (2014)**
  - It sets a general policy framework for public contracts (among other, EE requirements on acquisition of products, services, buildings, public transport, etc.)
- **Energy Audit Obligation for Brussels region (2012), which obligates buildings with more than 3.500m² to undergo an energy audit for the renewal of its environmental permit**
- **The implementation of the Energy Performance of Buildings Directive (2002/91/EC) in Belgium is a regional responsibility, so there are three different situations:**
  - Brussels transposed the Directive in 2007, in 2008 they set the requirements for building certification on new buildings, and in 2011 for public building certification
  - Flanders transposed it in 2006, and building certification has been implemented in different phases, starting in 2008
  - Wallonia transposed it in 2006 and the first regulation on building certification was passed in 2009
- **Act on Coordination of Federal Policy on Sustainable Development (1997; latest amendment 2014)**
  - It sets the main coordination frame between regions on Sustainable Development, establishing measures and goals for the long term (in the last version, goals have been included for 2050)

Programs

- **Voluntary Agreement Programs on EE (2003) for the industry sector, in Flanders and Wallonia**
  - The three regions have agreed to use these type of programs in the industrial sector instead of imposing a quantitative EE obligation for energy suppliers
  - The main objective is to reduce their energy consumption and their green house gases emissions

- **Considering the peculiar Belgian regulatory landscape, a special effort is made to launch national policies under efficient coordination programs between regions**
- **Although sometimes Belgium has failed to transpose EU Directives on time (like the EPBD), its regulation seems to be in line with EE measures in the EU**

Source: IEA; ODYSSEE-MURE; European Commission; CREARA Analysis

There are several EE incentives which address the entire national territory, as well as regional programs for several segments making it easier to implement EE solutions

Key incentives for EE in Belgium

Energy Efficiency

Financial incentives

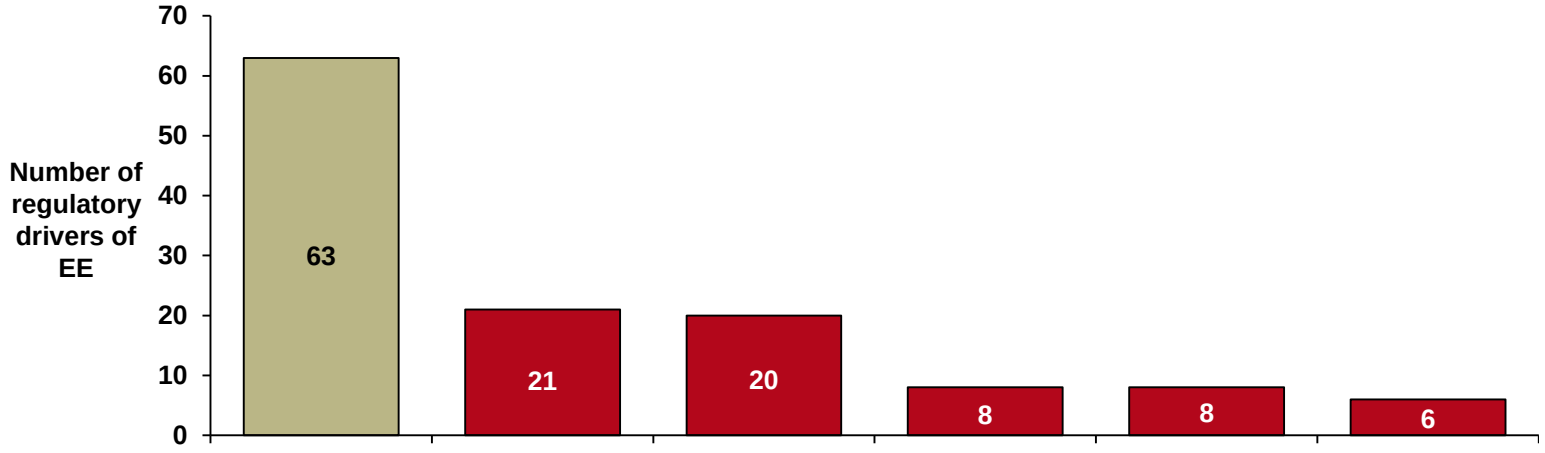
- **The particular configuration of the Belgian territory must be taken into account when analyzing the different EE financial incentives, in the list nation-wide programs have been included**
- **The most important initiatives (according to ODYSEE-database) are listed below according to the application segment[1]:**
  - Residential sector:
    - Reduced VAT for renovation of old buildings (2000)
    - Tax deduction for energy saving measures in residential buildings (2003)
    - Fund for the Reduction of the overall Energy Costs (FRCE) in residential buildings (2007)
    - Alternative financing of sustainable building renovation (social green loan, third party investor, FRCE), also affects the tertiary sector (Brussels, 2007)
    - Energy grant for households (Brussels, 2003)
    - Financial incentives for RUE investments in buildings, also affects the tertiary sector (Wallonia, 2005)
    - Develop and promote exemplary buildings - BATEX (with virtually zero consumption and high environmental quality), also applicable in the tertiary sector (Brussels, 2007)
  - Tertiary sector:
    - Subsidies for energy saving measures in horticulture (cultivation under glass) (Flanders, 2001)
    - Public lighting (including EPURE) and traffic lights (Wallonia, 2005)
  - Transport sector:
    - Measures in the transport sector (IRIS II Mobility Plan, COBRACE code) (Brussels, 2004)
    - Financial support for alternative transport between home and work (2001)
    - Modulation of the road and circulation taxes (2001)

- **Belgium has launched several fiscal and financial incentives for EE, specially related to EE measures in buildings in the residential and tertiary sector**
- **No clear profile of the incentives for EE in Belgium has been identified, due to the complex Belgian territorial and administrative configuration**

Note: [1]**Where an incentive just affects one of the three regions it has been indicated in brackets**
Source: **IEA; European Commission; ODYSSEE-MURE; CREARA Analysis**

Most of the Belgian EE regulatory drivers have a high quantitative impact[1], and nearly all of them are currently in force

Summary of total regulatory drivers of EE in Belgium according to ODYSSEE



Odyssee database[2]	Total	Tertiary	Household	Transport	General cross-cutting	Industry
Year of 1st regulation	1985	1986	1985	2001	1997	1993
# high impact	26	10	8	2	4	2
# medium impact	5	0	1	2	2	0
# low impact	8	3	2	0	0	3
# of laws in force	60	20	19	7	8	6

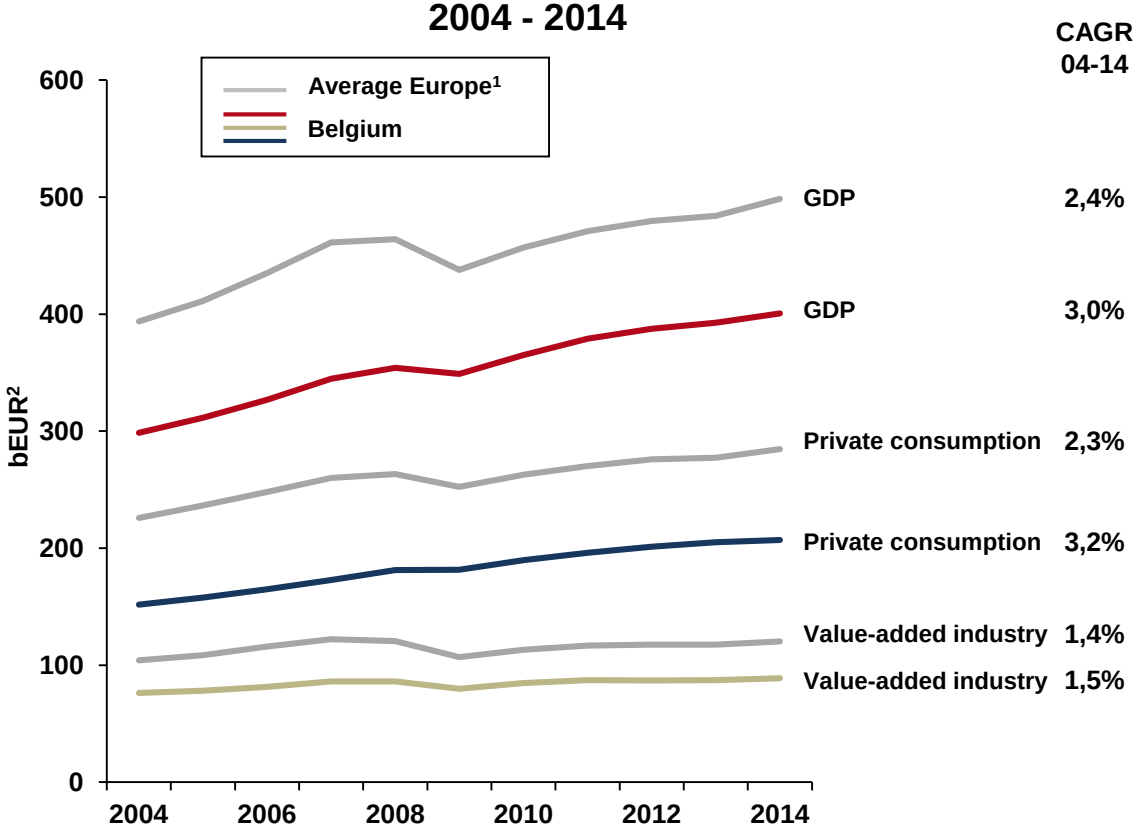
- Most Belgian regulatory drivers on EE show high quantitative impact (without considering the ones with unknown quantitative impact)
- Nearly all the EE regulatory drivers are currently in force (60 out of 63), even though some of these drivers were created a long time ago

Note: [1]The impact of a regulatory driver has been quantified in relation with energy consumption and CO2 emissions; [2]The missing regulations to reach the total number were allocated to "unknown impact"

Source: ODYSSEE-MURE; CREARA Analysis

Belgium macro-economic values are lower than European average, although the evolution is quite similar

Macro-economic evolution in Belgium and Europe 2004 - 2014

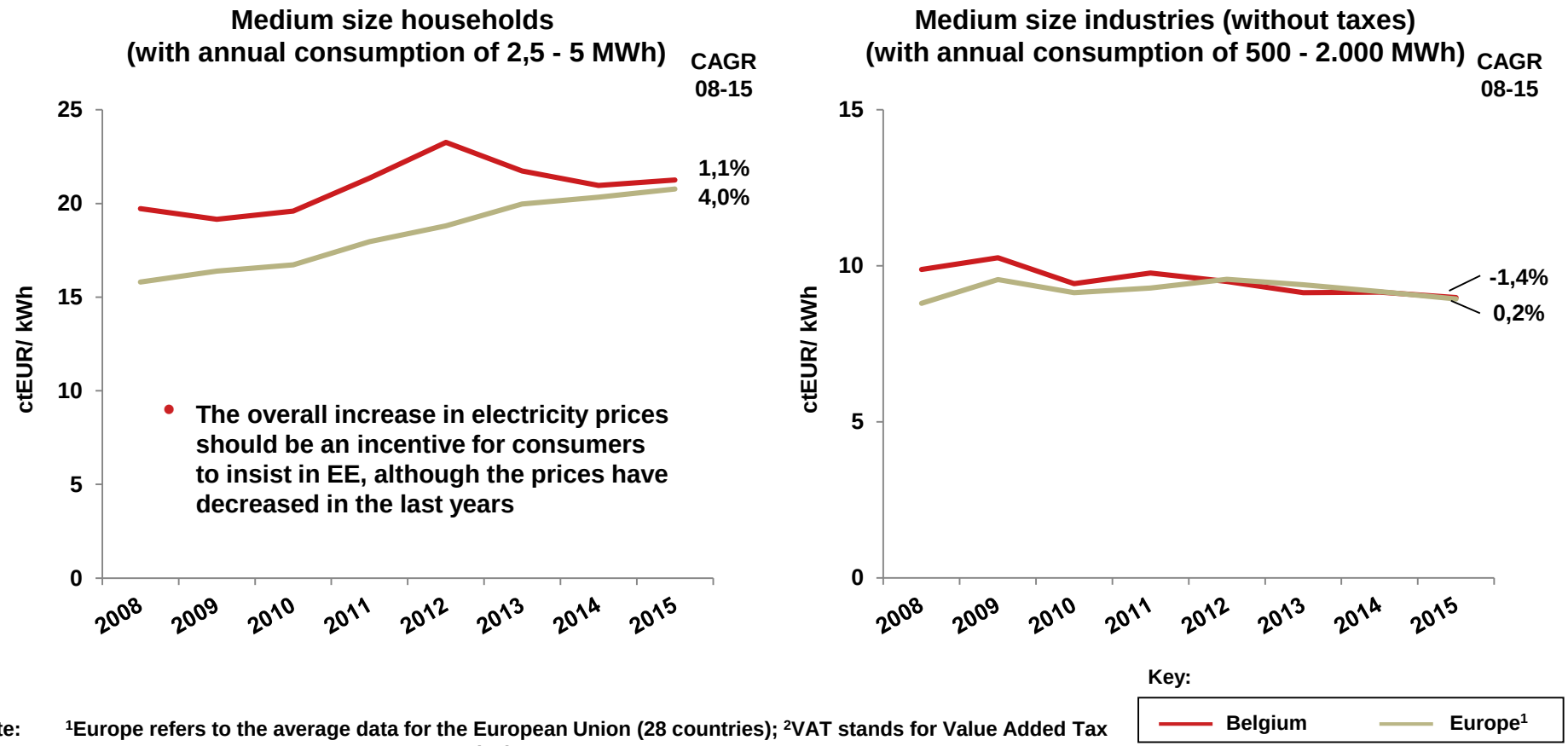


- **In 2014, total real GDP in Belgium amounted to 400.643 MEUR, generally showing an increase in the last years (CAGR 2004 - 2014 3,0%)**
  - In 2009, GDP suffered a relative decrease (2,8%) due to the economic crisis
  - The rebound of this decrease took place in 2010 and 2011, although it has not allowed to recover the previous growth trajectory
- **Private consumption has been impacted the least (among the three analyzed parameters) by the crisis in Belgium**
- **Belgium shows lower rates than European average for the three parameters, although the growth trends of the parameters have followed a similar pattern**

Note: [1]Europe refers to the average data for the European Union (28 countries); [2]bEUR stands for billion i.e. one thousand million
Source: ODYSSEE-MURE; Eurostat; IEA; CREARA Analysis

Residential electricity prices in Belgium have slightly increased standing above the European average prices while industrial ones have fallen since 2008 and are now in line with the European average

Evolution of average electricity prices in Belgium and Europe, 2008 - 2015



Note: [1]Europe refers to the average data for the European Union (28 countries); [2]VAT stands for Value Added Tax
Source: ODYSSEE-MURE; Eurostat; CREARA Analysis

Despite the willingness to contribute to the environment, in order to enhance EE measures an effort in Belgian social commitment should be made

Attitudes of Belgian citizens towards the environment[1]

			2007	2011	2014	
					Belgium	EU6[2]
Resource efficiency and protection of the environment can lead to economic growth	Better use of resources (A.9.2.)	Totally/Tend to Agree	-	88%	84%	80%
		Totally/Tend to Disagree	-	10%	10%	10%
	Protection of the environment (A.9.1.)	Totally/Tend to Agree	68%	80%	78%	76%
		Totally/Tend to Disagree	27%	18%	17%	15%
Citizens behavior towards environment	Willingness to pay for eco-products (A.10.)	Totally/Tend to Agree	79%	73%	80%	76%
		Totally/Tend to Disagree	19%	27%	20%	23%
	Level of commitment personally (A.16.2.)	Doing too much	-	3%	2%	2%
		Doing the right amount	-	29%	26%	29%
		Not doing enough	-	67%	68%	65%
Information about environmental issues	Well/Badly Informed (A.3.)	Very/Fairly Well	68%	59%	59%	62%
		Very/Fairly Badly	31%	41%	41%	38%

- There is a general consensus about the important role of better allocation of resources and protection of the environment in the path to economic growth, although both have decreased since 2011
- In spite of a widespread willingness to pay for eco-friendly products, the numbers show a general reluctance when it comes to acting in consequence
- The general perception about the level of information has decreased 9 points from 2007, becoming an important aspect to be improved
- Belgium presents higher overall values than the average value for the six analysed countries in 2014

Note: [1]The missing % to 100% was allocated to "don't know"; [2]It refers to the average value of the six analyzed countries; [2]Eurobarometer questions' reference number differs from one year to another, 2014 reference numbers are indicated

Source: EUROBAROMETER; CREARA Analysis

Most informative and educational campaigns in Belgium have been developed in Wallonia

Principal[1] informative and educational campaigns developed in Belgium

	Description	Sector	Organizing party	Starting year	Status	Quantitative impact
EE information actions for industry (Wallonia)	• **Provision of information, and promotion of rational use of energy (RUE) in the industrial sector** • **It covers both the promotion of RUE in building and the support for the introduction of sustainable resource management**	• **Industry**	• **Government**	• **N/A**	• **Ongoing**	• **Unknown**
Information on rational use of energy in public buildings (Wallonia)	• **Implementation of several initiatives to promote rational use of energy in the public sector:** - Environmental clauses in the specifications for public procurement - Good practice guide for staff in regional and local administrations - Operation "Communes Energ-Ethiques" (energy for councils) - Energy audit available to each municipality	• **Tertiary**	• **Government**	• **2007**	• **Ongoing**	• **Unknown**
Training and information on rational use of energy (Wallonia)	• **Implementation of various initiatives for promoting RUE, training and informing professionals and EE awareness-raising; e.g.:** - Promotion of information on RUE through seminars, one-off promotional events, etc. - Training professionals	• **Residential and tertiary**	• **Government**	• **2000**	• **Ongoing**	• **Unknown**

Note: [1]**In total there are 11 different informative campaigns in Belgium according to the Odyssee-Mure database**
Source: **ODYSSEE-MURE; CREARA Analysis**

The main element to succeed in the Belgian EE market seems to be offering the simplest one-stop solution (products and services) at the lowest price (1/2)

Elements of success according to importance segmented by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	High	• Product and service focused on complying with regulation	• One-stop solution	• Lowest price
Competitiveness	High	• Lowest price	• Simplicity of the service/ product	• Close relationship with client
Regulation	High	• Lowest price	• Simplicity of the service/ product	• One-stop solution (R) • Corporate brand (C&I)
Economic incentives/ financing options	High	• Financing options (can be external)	• Short payback period of product/ service	• One-stop solution (R) • ESCO Services (C&I)
Energy price	Low	• Lowest price	• One-stop solution	• Innovation of service/ product
Social consciousness	Low (R)	• Innovation of service/ product	• Client education	• Lowest price
	Low (C&I)	• Product and service focused on complying with regulation	• Short payback period of product/ service	• Corporate brand

Note: R: residential; C: commercial; I: industrial
Source: CREARA Interviews; CREARA Analysis

The main element to succeed in the Belgian EE market seems to be offering the simplest one-stop solution (products and services) at the lowest price (2/2)

Explanation of the elements of success segmented by market characteristics

	Status	Elements of success
Maturity	High	• The market in Belgium is considered mature, favoring companies that focus on services that comply with regulation as well as those that offer a one-stop solutions as clients are not interested in investing in any non-required measures nor do they want to increase the effort and time spent on them beyond the minimum • Price is an important factor but to a lesser extent than the first two, it is directly related to the first element
Competitiveness	High	• Given the high competitiveness in the Belgian market, companies need to offer competitive prices to be successful, as this is the most important differentiation element. Furthermore, a simple service as well as a close relationship with the client contribute to gaining competitiveness over other market players
Regulation	High	• As well in the highly regulated environment, companies which offer the lowest prices and a simple service succeed more than other companies. The clients are rather interested in complying with regulation at a low price than in a complex service • Other important elements, although with less weight, are the one-stop solution for residential consumers (who want to reduce the effort and time spent on the EE service) and the corporate brand for the commercial and industrial segment which provides confidence
Eco. incentives/ finan. options	High	• In Belgium, there are numerous economic incentives although people are not aware of them, so users of EE services demand financing options with a product/ service which ideally also has a short payback period
Energy price	Low	• The energy price in Belgium is lower than in other EU countries, which makes savings harder to achieve and consumers less willing to invest in EE. Companies offering low prices are therefore more successful • Furthermore, clients are looking for one-stop solutions to reduce the effort and time spent on the EE service
Social consciousness	Low (R)	• Companies offering innovative services to residential consumers should succeed before others, because the consumers interest in EE is rather low. Those players that manage to educate the consumers (e.g. through clear information) have an advantage over others
	Low (C&I)	• For C and I consumers it is more important to comply with regulation and regain the investment in a short period mainly due to the low social commitment with the environment

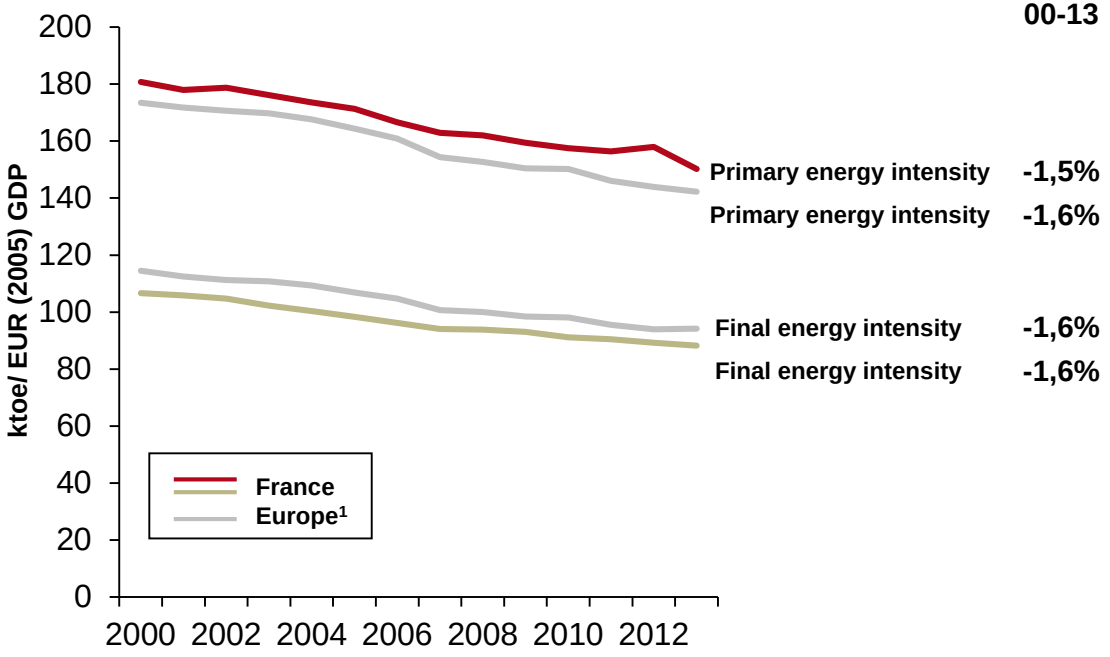
Note: R: residential; C: commercial; I: industrial
Source: CREARA Interviews; CREARA Analysis

Agenda

- **Introduction**
- **Country profiles**
  - Belgium
  - France
  - Germany
  - Portugal
  - Spain
  - UK
- **Case studies**
- **Conclusions**

Both primary and final energy intensity have been decreasing over the period 2000 - 2013 with only short periods of stagnation, presenting an evolution in line with the European one

Development of primary and final energy intensity in France and Europe, 2000 - 2013

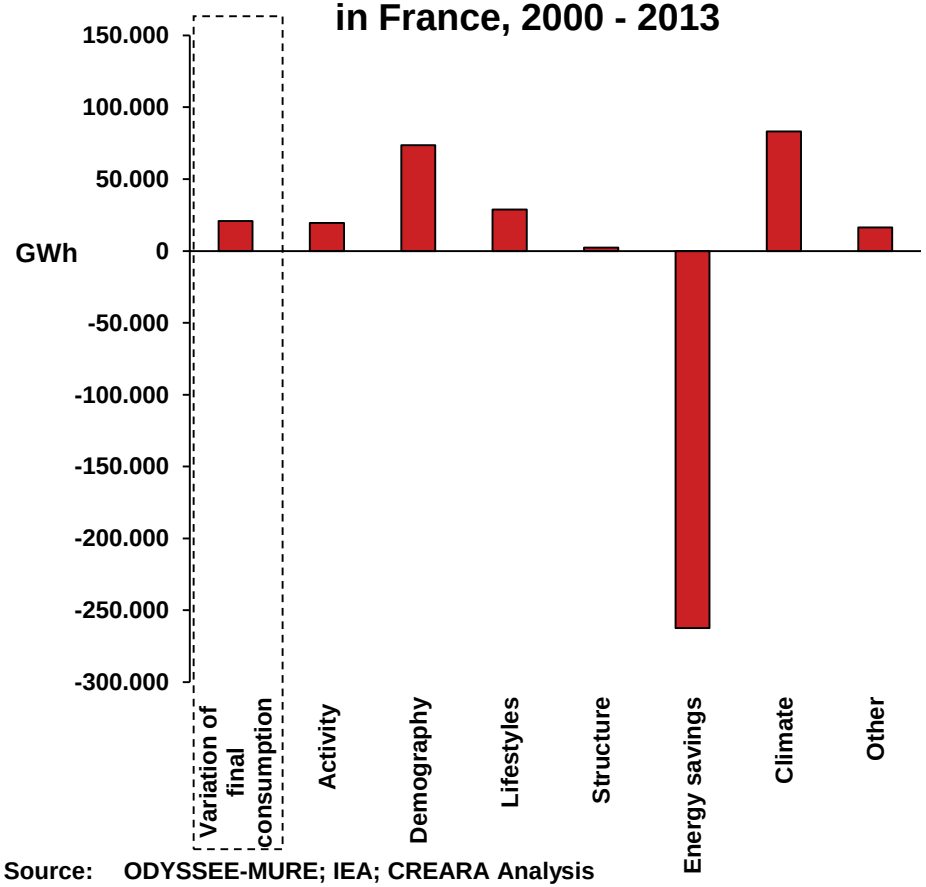


- **Over the period of 2000 to 2013, both primary and final energy intensities have decreased continuously**
- **The overall development of final energy intensity is very similar to that of primary intensity**
  - Final energy intensity presents an average annual decrease of 1,6%, which still remains below the policy objective of a 2% average annual decline in final energy intensity (Grenelle 1 Law)
- **The French final energy intensity is lower than the European average, while the primary intensity is slightly higher and presents a lower rate for the period studied (2000 - 2013)**
- **As stated before, energy intensities are limited by different effects, such as climate, economics, structural effects, etc.**

Note: [1]Europe refers to the European Union (28 countries); [2]CAGR, Compound Annual Growth Rate
Source: ODYSSEE-MURE; ADEME; CREARA Analysis

For the period 2000 - 2013 final energy consumption variation has increased 1,1% despite the great consumption reduction of energy savings due to EE

Decomposition of the final energy consumption variation in France, 2000 - 2013

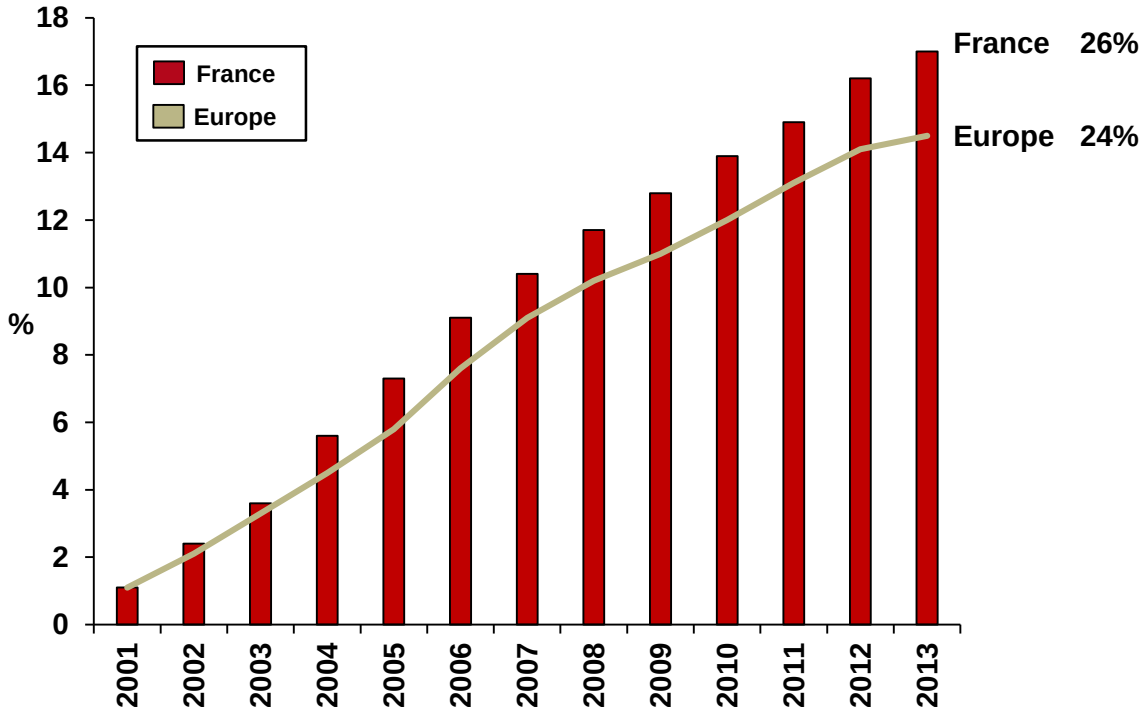


Source: ODYSSEE-MURE; IEA; CREARA Analysis

- **Since 2000, overall energy consumption has increased in France by around 1,1%, despite consumption decreases occurred in several areas over the period due to the EE energy savings**
  - The most significant increases have occurred in demography (4%) and climate (4,6%)
  - Other consumption increases could be seen mainly in the following subsectors:
    - Activity (1,1%), which represents all changes in value added in industry, services, transport, etc.
    - Lifestyle (1,6%), resulting from a greater use of appliances in all sectors
- **The significant volumes of energy savings achieved through EE policies have offset part of the effects of energy consumption increases**
  - Energy savings have increased by 14,4% since 2000, mainly due to EE measures
  - These energy savings represent the technical savings derived from the ODEX
- **France's positive variation of final consumption represents a negative impact for European total consumption**

France presents overall energy efficiency gains since 2000 of 17,0%, slightly higher than the European ones of 14,5%

Overall energy efficiency gains in France and Europe according to ODEX, 2001 - 2013

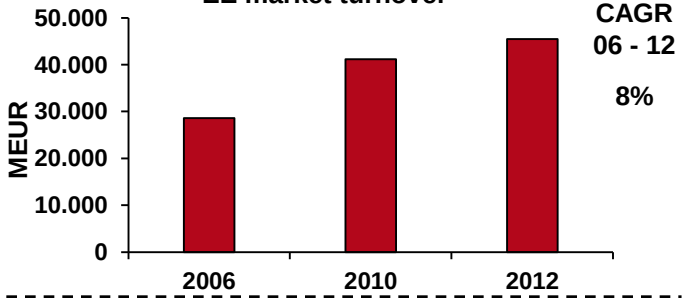


- **EE plays an important role in the energy consumption decrease**
  - Total EE gains have been increasing on average with an annual rate of 26% for the period of 2000 to 2013
  - Overall ODEX shows a continuous decline over the last years, which is equivalent to an EE improvement of 1,05% per year, slightly lower than the decrease in the final energy intensity within that period
- **All three application segments have helped to increase energy efficiency gains in France**
  - The residential sector represents a CAGR of 29%, representing the sector with the largest increase for the studied period
  - The transport sector represents a CAGR of 26% (between 2000 - 2013)
  - The industrial sector represents a CAGR of 21% since 2000
- **France is in third position with highest EE gains, within the 6 analyzed countries, in terms of EE gains**

Source: ODYSSEE-MURE; CREARA Analysis

France represents a highly developed EE market with a positive evolution in terms of turnover and number of employees

EE market maturity in France

Association ESCO/ EE	• **Various EE/ ESCO associations (e.g.: ADEME (founded in 1987), GIMELEC (founded in 1971), SERCE (founded in 1922))**
Number of active players	• **The main active players in the EE market are:** - The leading actors (energy suppliers, electrical installation companies, electrical and thermal equipment manufacturers, large engineering companies, control offices and thermal operators) perceive energy services as an opportunity to diversify their traditional (energy) activity - The new companies offer innovative services in the field of metering, monitoring, audit and certificates
Market concentration	• **Highly competitive, large companies dominate the market**
Market size (indicative for evolution, not directly comparable with other countries)	**EE market employees**  **EE market turnover[1]** 
Year of first national EE regulation	• **1974 for the household, transport and tertiary sectors:** - Building codes "RT 1974" - Internal temperature limit for houses, classrooms, offices and public access buildings - Speed limit control
Year of first ESCO	• **1970**

Note: [1]To be confirmed with interviews
Source: ADEME; ESCO Market Report (JRC, 2014); CREARA Analysis; CREARA Interviews

Facility managers and national EE services SMEs are dominating the EE sector in France

Type of EE market players in France

	Utilities	Facility managers	Manufacturers	Construction companies and installers	Engineering companies	Energy efficiency services	Certification
Relative number	✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓	✓
Description	• They sell energy flows (such as gas or electricity) to the end customer • Dominated by the historical national utilities • Two main national players, some international groups and a few small utilities	• Companies dedicated to the management and maintenance of buildings and related services • Mainly originated from large groups of the BTP[1] sector • Large number of subsidiaries of large groups	• They manufacture equipment, tools and platforms, often complemented with other services • Large global companies with a diversified activity • Large number of national and international companies	• They install the equipment (one-off service at the end of the value chain) • Big national companies with historical tradition in France (BTP[1] companies) • Large number of national companies and some international groups	• Companies dedicated to the design and planning of installations and solutions (based on projects) • Different players: large national / international groups, specialized companies or SMEs	• They provide energy efficiency measures: EPCs, metering, supervision, etc. • Difficulty identifying a clear profile: many large groups include this service, but also SEMs	• The "Bureaux de contrôle" (*Control offices*) plays an important role in EE, due to its regulatory landscape (White Certificates, energy audits, etc.) • Large companies, specialized in certification
Examples	• EDF, GDF Suez, Enel, Enie, Alpiq, Direct Energie	• Energilec (Vinci), Exprimm (Bouygues), Omnitec (Eiffage)	• Schneider, Legrand, Johnson Controls, Honeywell, Sauter	• VINCI, INEO, Bouygues, Eiffage, SPIE	• Technip, Altran, Egis, SNC Lavalin, Barbanel, Cardonnel	• Dalkia, Cofely, IDEX	• Socotec, Veritas, Dekra

Note: [1] BTP: "Bâtiment et Travaux Publiques" (*Buildings and Public Works*)
Source: ADEME; CREARA Research; CREARA Analysis

Assessment: ✓ Small ✓✓ Medium ✓✓✓ Large

The Grenelle laws in France set ambitious energy savings targets although some experts believe that higher targets are needed in order to encourage the implementation of EE solutions

Key regulatory drivers of EE in France

Energy Efficiency

Regulation

- **Grenelle 1 (2009), sets targets for energy reduction and the integration of renewable energies (base year 2009):**
  - CO2 emissions reduction up to 4 times by 2050, by reducing 3% per year on average of CO2 emissions
  - Final energy intensity reduction of at least 2% per year by 2015 and 2,5% from 2015-2030
  - Building energy consumption reduction of 28% by 2020
  - Coverage of 10% of energy needs from renewable energy sources by 2010
- **Grenelle 2 (2010), establishes the necessary measures to achieve the objectives set by Grenelle 1:**
  - Improving buildings' energy footprint and the standardization of measures
  - Making fundamental changes in the area of transport
  - Reduction in energy consumption and carbon footprint in the manufacturing sector
  - Biodiversity conservation
  - Implementation of the new ecological governance which sets the basis for a more sustainable production and consumption
- **Third National Energy Efficiency Action Plan (2014), sets a final consumption target of 131 Mtoe in 2020, compared to the previous objective reducing final consumption to 155 Mtoe**
  - The Third National Energy Efficiency Action Plan has been drawn up in accordance with the template laid out by the European Commission, with which all EU Member States must comply

Programs

- **White certificates scheme (Energy savings obligation) (2006)**
  - This Energy Saving Obligation scheme obliges energy retailers and fuel suppliers (called "obligated parties") to save energy by encouraging their customers (households, local authorities or companies) to reduce their energy consumption, if they don not comply with the obligations they must pay a fee. It also supports voluntary actions implementing energy saving projects from "eligible parties"
  - It defines a three-year savings target, for example 700 TWh for the period 2015-2017, which is distributed between operators according to their turnovers, which must be justified by the delivery of an equivalent number of certificates
  - From the beginning of the program savings targets have been exceeded in each period

- **The French EE Watch Report affirms that with regard to the overall ambition of EE policy, the experts are divided with about half of the respondents considering the ambition to be rather low and the other half considering it relatively high**
- **The interviewed domestic experts are concerned that the ambitious targets set for building renovation will not be reached**

Source: **Ministry of Ecology, Sustainable Development and Energy France; Legifrance; CREARA Analysis**

France presents a wide range of financial initiatives that promote a positive evolution for EE in the country

Key incentives for EE in France

Energy Efficiency

Financial incentives

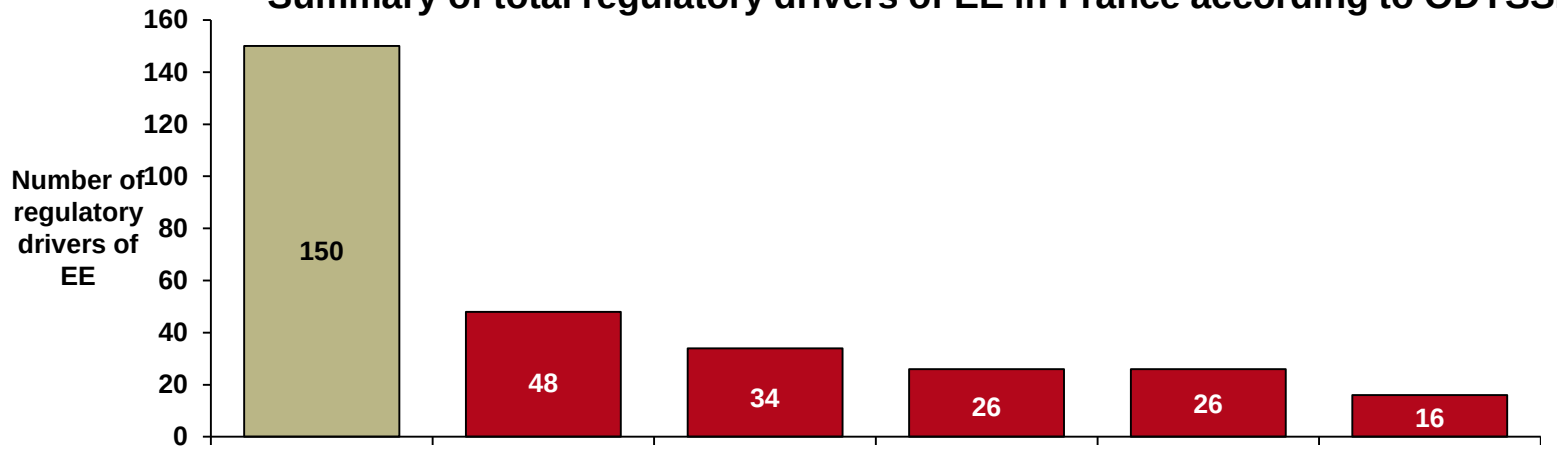
- **There are several programs that have economic instruments to promote EE in France, one of the most important ones is the previously mentioned Energy Savings Obligations (white certificates) of 2006**
- **There are other initiatives that seek to obtain EE improvements in France. Examples of them are listed below according to the application segment:**
  - Residential sector:
    - Refurbishment plan for housing, PREH (2013)
    - Zero-rated eco-loan "prêt à taux zéro“ (2009)
    - Social housing eco-loan (2009)
    - Relief from property tax on existing buildings for households when implementing EE measures(2008)
  - Tertiary sector:
    - "Modernizing building and cities" programme (2008)
  - Industrial sector:
    - Loans for small and medium sized enterprises (2010)
  - Transport sector:
    - The national plan: clean vehicle (2009)
    - Automobile bonus malus écologique (2007)
    - Registration surcharge for cars (2006)
    - Tax on company vehicles - CO2 basis (2006)

- **French fiscal and financial incentives for EE cover a wide spectrum of the application segments**

Source: IEA; European Commission; ODYSSEE-MURE; CREARA Analysis

From an overall perspective, France has a large number of regulations with low quantitative impact

Summary of total regulatory drivers of EE in France according to ODYSSEE



Odyssee database[2]	Total	Household	Transport	Tertiary	General cross-cutting	Industry
Year of 1st regulation	1974	1974	1974	1974	1974	1975
# high impact	39	12	6	7	10	4
# medium impact	28	12	5	7	3	1
# low impact	57	20	16	8	6	7
# of laws in force	120	34	29	22	23	12

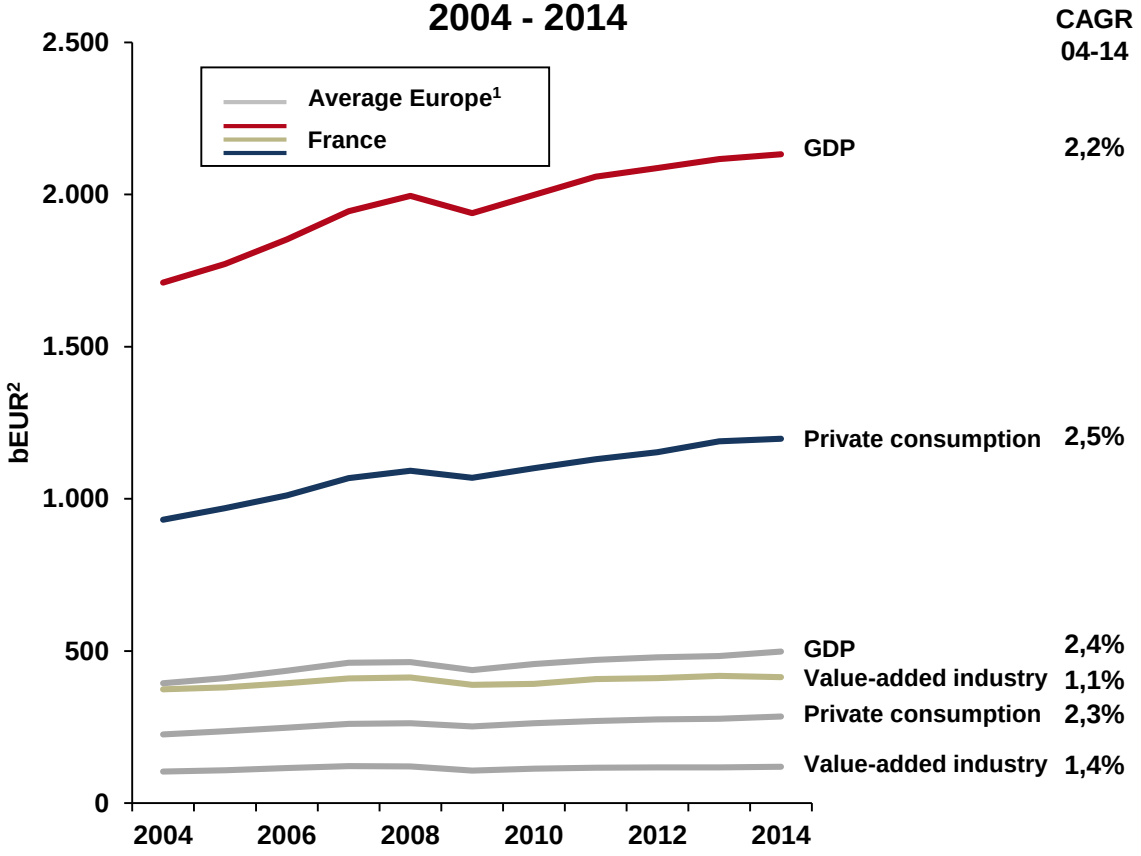
- French regulatory drivers of EE began, for all sectors of application, during the years 1974/ 1975
- From an overall perspective, France has a large number of regulations, although with a large share of low quantitative impact

Note: [1]The impact of a regulatory driver has been quantified in relation with energy consumption and CO2 emissions; [2]The missing regulations to reach the total number were allocated to "unknown impact"

Source: ODYSSEE-MURE; CREARA Analysis

France's economy has recovered from the financial crisis in 2008 and shown a growth rate of 2,2% yearly in the last 10 years

Macro-economic evolution in France and Europe 2004 - 2014



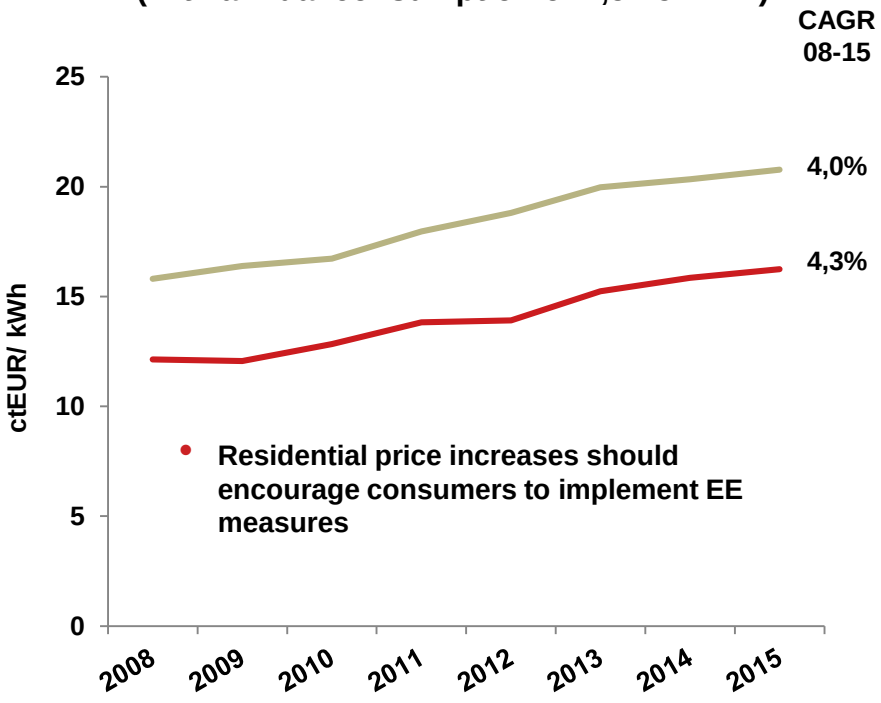
- **In 2014, total real GDP in France amounted to 2.132.449 MEUR, showing an increase (CAGR 2004 - 2014, 2,2%)**
  - GDP presented a relevant decline in 2009 of about 2,8% (with respect to the previous year)
  - Although in 2010, the economic growth measured by the GDP increased 3% showing a fast recovery
- **Private consumption has been increasing constantly during the last decade**
  - Private consumption presents the highest growth rate per year of the three valued parameters, 2,5%
  - The growth was stagnant in 2008 - 2009 due to the economic and financial crisis
- **Value added of industry presents a positive growth since 2004 although it has remained fairly constant for the past decade**
- **The European growth rate for the GDP is slightly higher than the French one, although the French GDP is much higher than European average**

Note: [1]Europe refers to the average data for the European Union (28 countries); [2]bEUR stands for billion i.e. one thousand million
Source: ODYSSEE-MURE; Eurostat; IEA; CREARA Analysis

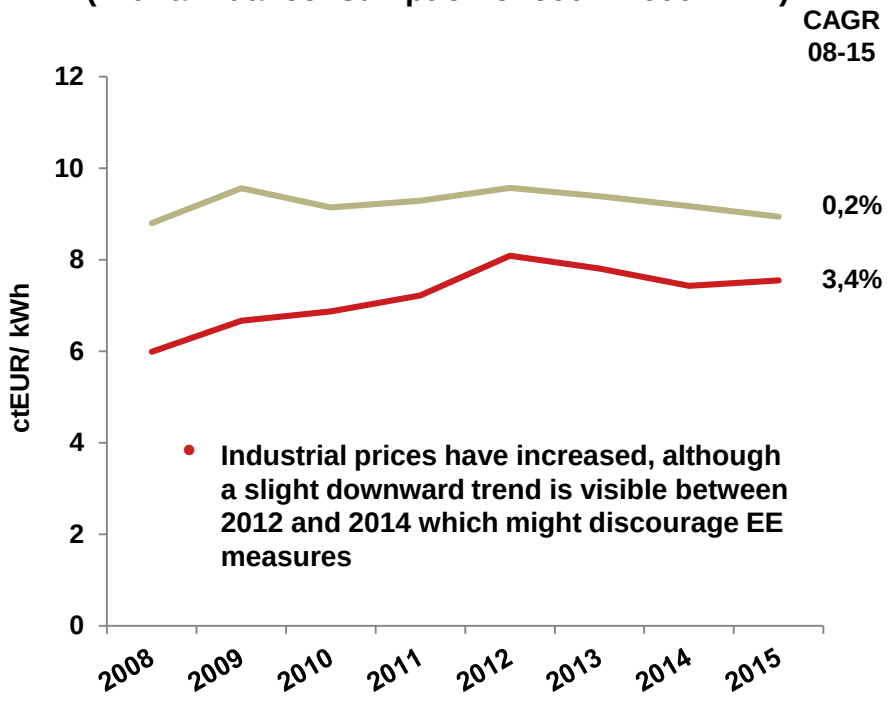
The French electricity prices have increased significantly in recent years although they are still lower than the European average prices

Evolution of average electricity prices in France and Europe, 2008 - 2015

Medium size households (with annual consumption of 2,5 - 5 MWh)



Medium size industries (without taxes) (with annual consumption of 500 - 2.000 MWh)



Key: France — Europe[1]

Note: [1]Europe refers to the average data for the European Union (28 countries)
Source: ODYSSEE-MURE; Eurostat; CREARA Analysis

Although a large share of the population agrees that caring about the environment may contribute to economic growth, general consciousness could be improved

Attitudes of French citizens towards the environment[1]

			2007	2011	2014	
					France	EU6[2]
Resource efficiency and protection of the environment can lead to economic growth	Better use of resources (A.9.2.)	Totally/Tend to Agree	-	82%	81%	80%
		Totally/Tend to Disagree	-	9%	10%	10%
	Protection of the environment (A.9.1.)	Totally/Tend to Agree	75%	78%	79%	76%
		Totally/Tend to Disagree	14%	15%	13%	15%
Citizens behavior towards environment	Willingness to pay for eco-products (A.10.)	Totally/Tend to Agree	77%	72%	78%	76%
		Totally/Tend to Disagree	21%	26%	21%	23%
	Level of commitment personally (A.16.2.)	Doing too much	-	2%	1%	2%
		Doing the right amount	-	18%	18%	29%
		Not doing enough	-	74%	73%	65%
Information about environmental issues	Well/Badly Informed (A.3.)	Very/Fairly Well	61%	55%	57%	62%
		Very/Fairly Badly	38%	44%	42%	38%

- The French population affirms that a better use of resources and protection of the environment can contribute to economic growth, in line with EU6 average
- In spite of the decrease in the willingness to pay for eco-friendly products in 2011 (which seems to be a result of the economic crisis), the results of 2014 show levels similar to those of 2007
- Nevertheless, a very high percentage of the people surveyed (85% in 2014) affirm they are not doing enough to protect the environment
- There is a slight downward trend from 2007 in how well-informed the French population feels about environmental matters, presenting lower rates than the average EU6

Note: [1]The missing % to 100% was allocated to "don't know"; [2]It refers to the average value of the six analyzed countries; [2]Eurobarometer questions' reference number differs from one year to another, 2014 reference numbers are indicated

Source: EUROBAROMETER; CREARA Analysis

ADEME[1] has undertaken several awareness raising campaigns in France, resulting in a positive impact for EE in the country

Principal[2] informative and educational campaigns developed in France

	Description	Sector	Organizing party	Starting year	Status	Quantitative impact
Information and advertising campaign: why wait?	• The main objective is to initiate the French (both private and professional individuals) to act by systematic behaviors aiming at saving energy • The objective is then to encourage the public to obtain more information to decide with all full knowledge of all the available possibilities	• All	• Ministry of Sustainable Development and ADEME	• 2004	• Completed (2008)	• High
ADEME energy-saving awareness campaign	• The objective of this operation is to sensitize the public audience about energy management and climate change in order to incite them to act daily to achieve energy savings	• Residential	• ADEME	• 2004	• Ongoing	• High
Local energy information centres (EIE)	• To increase the awareness of households and assist them in their investment decisions in EE, local energy information centres were created whose role is to provide information and practical advice about EE	• Residential	• ADEME	• 2001	• Ongoing	• Medium
Information and awareness-raising measures	• Implementation of several measures in favor of eco-driving: - Professional drivers are trained in eco-driving during their initial training - Eco-driving is taken into account in the driving license test and in road safety programs in secondary school	• Transport	• Ministry of Sustainable Development	• 2010	• Ongoing	• Unknown

Note: [1]ADEME: French Environment and Energy Management Agency; [2]In total there are 12 different informative campaigns in France according to the Odyssee-Mure database

Source: ODYSSEE-MURE; CREARA Analysis

In France, EE companies seem to be most successful in the C and I sector if they offer one-stop solutions with short payback periods which are focused on complying with regulation (1/2)

Elements of success according to importance segmented by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	High	• One-stop solution	• Innovation of service/ product	• Lowest price
Competitiveness	High	• Lowest price	• Innovation of service/ product	• Close relationship with client
Regulation	High (R&C)	• One-stop solution	• Lowest price	• Corporate brand
	Low (I)	• Service focused on energy performance	• Short payback period of product/ service	• Financing options (can be external)
Economic incentives/ financing options	High (R)	• One-stop solution (including information/ management of incentives)	• Short payback period of product/ service	• Corporate brand
	Low (C&I)	• Financing options (can be external)	• ESCO based services	• Short payback period of product/ service
Energy price	Low	• Product and services focused on complying with regulation	• One-stop solution	• Innovation of service/ product
Social consciousness	Low (R)	• Client education	• Dedicated and extensive sales team	• Innovation of service/ product
	High (C&I)	• Product and services focused on complying with regulation	• Short payback period of product/ service	• One-stop solution

Note: R: residential; C: commercial; I: industrial
Source: CREARA Interviews; CREARA Analysis

In France, EE companies seem to be most successful in the C and I sector if they offer one-stop solutions with short payback periods which are focused on complying with regulation (2/2)

Explanation of the elements of success segmented by market characteristics

	Status	Elements of success
Maturity	High	• In the mature market in France companies that offer one-stop solutions are more successful as clients value being able to outsource the EE measure implementation to one provider • Furthermore, the market favors innovative solutions on the one hand and low price offers on the other
Competitiveness	High	• In order to compete in the mature market, companies need to offer low prices, this is what clients are looking for. They can further differentiate their offer through innovation. A close client relationship is another element of success
Regulation	High (R&C)	• The R and C sectors are highly regulated in the French EE market and consumers are mainly interested in complying with the regulation, which is why they are demanding one-stop solutions at the lowest price • To a lesser extent, a corporate brand can contribute to success by providing consumer confidence
	Low (I)	• The I sector on the other hand presents a low level of regulation and for clients the most important element of an offer would be the improvement of their energy performance, short payback periods and financing options
Economic incentives/ financing options	High (R)	• The availability of incentives for the R segments makes consumers favor one-stop solutions that include information or even the management of incentives. There is still a lot of misinformation and mistrust by consumers which brings them to ask for short payback period of product/ service even though incentives exist
	Low (C&I)	• For C and I consumers given the low availability of incentives the most important element is to offer financing options (even if these are provided by a third party) or ESCO based services, furthermore a service with a short payback period gives an advantage
Energy price	Low	• French energy prices are low, consumers are therefore not encouraged to invest in EE and look for services that assure compliance with regulation as well as a one-stop solution that takes the EE issue off their hands
Social consciousness	Low (R)	• As R social consciousness is low in France, companies are more successful if they educate the client and if they have an extensive sales team. An innovative product/ service can gain more attention by the consumers
	High (C&I)	• Although C and I social consciousness is high, users search for services which comply with regulation with low payback periods

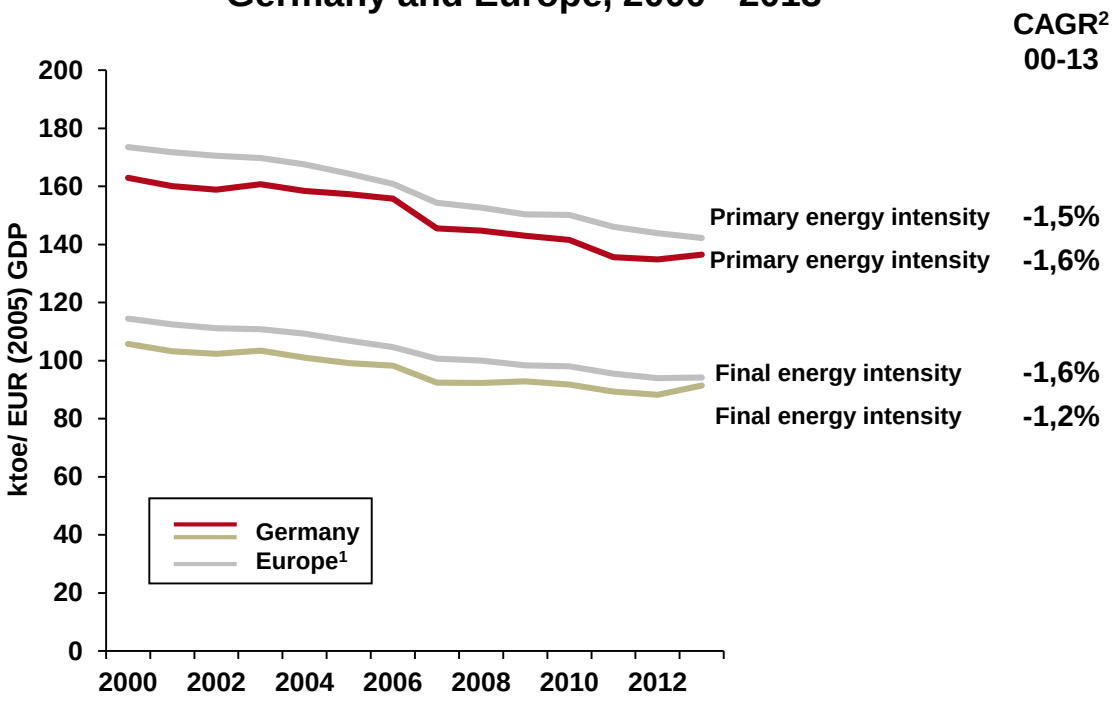
Note: R: residential; C: commercial; I: industrial
Source: CREARA Interviews; CREARA Analysis

Agenda

- **Introduction**
- **Country profiles**
  - Belgium
  - France
  - Germany
  - Portugal
  - Spain
  - UK
- **Case studies**
- **Conclusions**

Both primary and final energy intensity have been decreasing in Germany, representing a positive trend in terms of EE; compared to Europe, the country presents lower intensities for the studied period

Development of primary and final energy intensity in Germany and Europe, 2000 - 2013

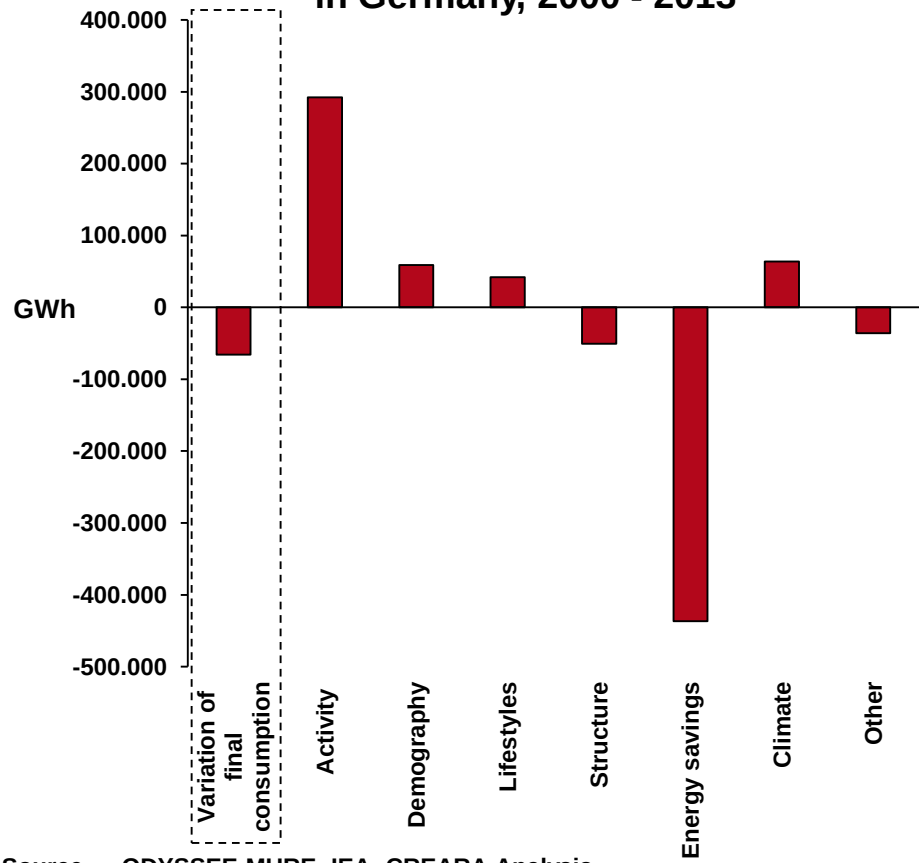


- **Over the period of 2000 to 2013, both primary and final energy intensities have decreased continuously in Germany, with only short periods of stagnation**
- **The development of the final energy intensity for the analyzed period was very similar to the primary intensity, with a slightly slower decrease**
- **The years 2009 and 2013 show an increasing trend in energy intensities**
  - The main reasons for the increase were the downward trend suffered by the industrial value added and the stagnation or decrease of GDP
- **Both primary and final energy intensities are lower than the European average, meaning that Germany requires less energy to generate a EUR of GDP than the average**
- **As stated before, energy intensities are limited by different effects, such as climate, economics, structural effects, etc.**

Note: [1]Europe refers to the European Union (28 countries); [2]CAGR, Compound Annual Growth Rate
Source: ODYSSEE-MURE; CREARA Analysis

Despite the increase in consumption in several areas in Germany, energy savings due to EE resulted in an overall decrease of 4% over the period of 2000 to 2013

Decomposition of the final energy consumption variation in Germany, 2000 - 2013

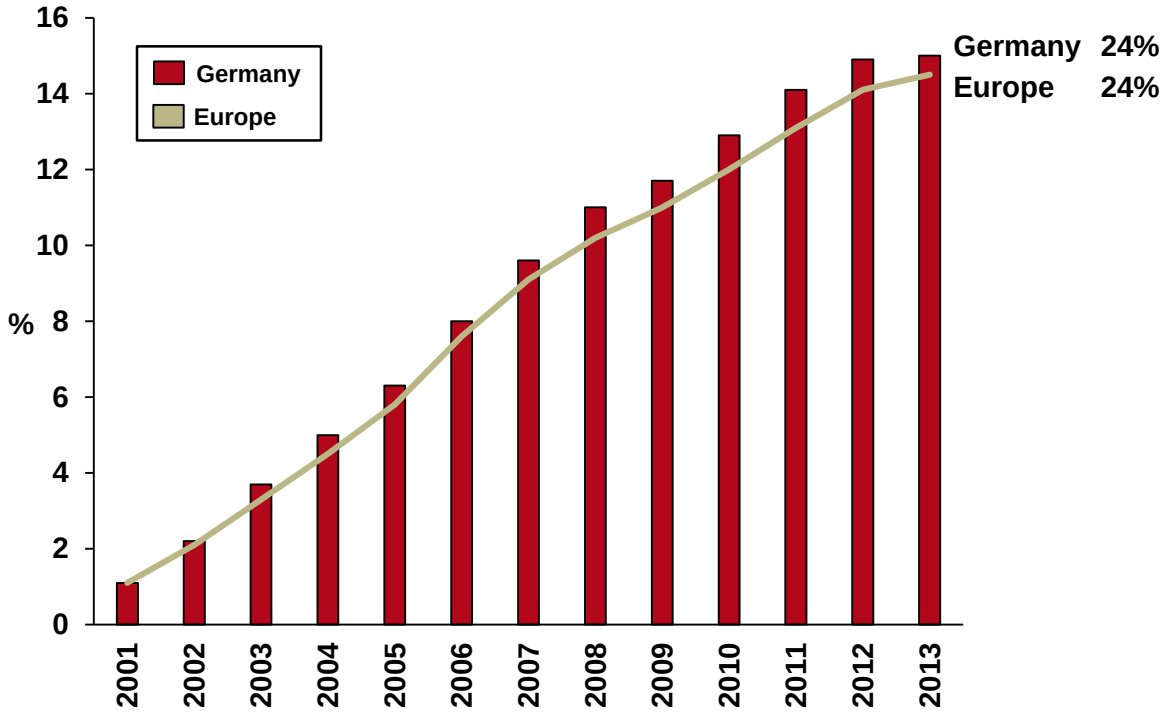


Source: ODYSSEE-MURE; IEA; CREARA Analysis

- **Since 2000, overall energy consumption has decreased by around 4% in Germany, despite increased consumption in several areas in this period**
  - There has been an increase of 15% in activity, which represents all changes in value added in industry, services, transport, etc., in this case, principally in the manufacturing and the services sector
  - The other consumption increases have been mainly due to:
    - Demography (3%), due to the construction of new households
    - Lifestyle (2%), resulting from a greater use of appliances in all sectors
    - Climate (3%), caused by a change in temperatures
- **Energy savings have increased by 23% since 2000, mainly due to EE measures**
  - These energy savings represent the technical savings derived from the ODEX
- **Germany has contributed to a positive variation in energy consumption in the European Union**

Germany presents overall energy efficiency gains of 15,0% since 2000, slightly higher than the European average ones of 14,5%

Overall energy efficiency gains in Germany and Europe according to ODEX, 2001 - 2013

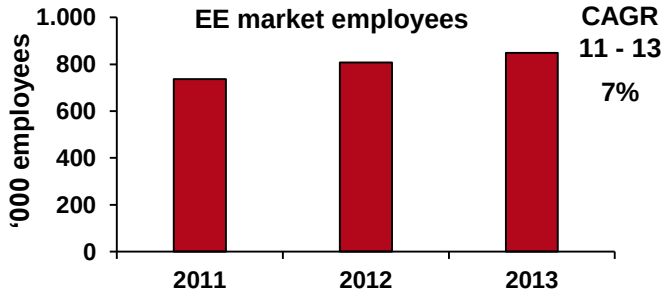
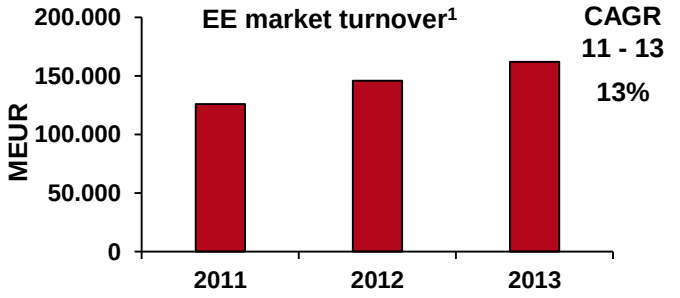


- **As stated before, EE played an important role in the energy consumption decrease**
  - Over the period 2000 to 2013, the ODEX decreased continuously, which is equivalent to an EE improvement of 1,2% per year
  - Total EE gains have been increasing with an annual rate of 24% for the period of 2000 to 2013
- **During the 1990s, the industrial sector contributed the most to the EE development, while since 2000 this trend has reversed being the residential sector the one which most contributed to the EE development**
  - The residential sector represents a CAGR of 32%, representing the sector with the largest increase for the studied period
  - The transport sector represents a CAGR of 22% (2000 - 2013)
  - The industrial sector represents a CAGR of 18% since 2000
- **Germany's total EE gains have been increasing in line with the evolution of the European gains**

Source: ODYSSEE-MURE; CREARA Analysis

The German EE market is composed of a large number of active players and its turnover has grown by 13% annually in recent years; it is the largest market among the analyzed ones

EE market maturity in Germany

Association ESCO/ EE	• **There are several EE/ ESCO associations (e.g.: VfW (founded in 1990), AGFW (founded in 1980), DENEFF (founded in 2011), etc.)**
Number of active players	• **There are between 12.500 and 14.000 companies in the energy efficiency services sector in Germany** - Nearly 75% of the total are engineering and architecture companies - 7% are installers - 6% are utilities - 3% are principally energy agencies - And 14% are other kinds of companies such as energy consultants
Market concentration	• **Low concentration but highly competitive, ESCOs and local energy services companies with experience have significant advantages over new players**
Market size (indicative for evolution, not directly comparable with other countries)	 
Year of first national EE regulation	• **1977 for both, residential and tertiary sector:** - Thermal Insulation Ordinance (Wärmeschutzverordnung) - Environmental Label "Blue Angel" (Umweltzeichen "Blauer Engel")
Year of first ESCO	• **Early 1990s**

Note: [1]To be confirmed with interviews

Source: PWC; BfEE; ESCO Market Report (JRC, 2014); CREARA Analysis; CREARA Interviews

The German EE market is driven by local players as well as large international groups with several years of experience in EE which have significant advantages over new players

Type of EE market players in Germany

	Utilities	Facility managers	Manufacturers	Construction companies and installers	Engineering companies	Energy efficiency services	Other
Relative number	✓✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓	✓
Description	• They sell energy flows (such as gas or electricity) to the end customer • Dominated by 4 large international groups (3 German, 1 Swedish) • Large number of local players • Growing number of new players in the energy supply sector	• Companies dedicated to the manage-ment and maintenance of buildings and related services • Market very fragmented with different type of players • Large international groups and smaller companies	• They manufacture equipment, tools and platforms, often complemented with other services • Important international companies with diversified activities	• They install the equipment (one-off service at the end of the value chain) • Construction companies offer their services for building sustainable buildings and for energy infrastructure • Principally large groups and large number of local players	• Companies dedicated to the design and planning of installations and solutions (based on projects) • Very fragmented with large number of small companies (usually architects' and civil engineers' offices)	• They provide energy efficiency measures: EPCs, metering, supervision, etc. • Competitive landscape, very developed compared to other markets • Mainly dominated by large international companies	• Energy financing institutions play an important role by providing the funds needed to undertake the projects • KfW plays an important role due to its several EE programs
Examples	• EON, RWE, EnBW, Vattenfall, Stadtwerke	• Bilfinger, VINCI, Imtech	• Sauter, Siemens, Bauer	• Hochtief, ABACUS, Bilfinger	• INGA mbH, VIKA Ingenieur GmbH, ZENT-FRENGER	• Berliner Energieagentur, MVV Enamic, Dalkia, Cofely	• KfW, rds energies GmbH, NBank

Source: CREARA Research; CREARA Analysis

Assessment: ✓ Small ✓✓ Medium ✓✓✓ Large

The "Energy Concept" and the NEEAP[1] are the main drivers of EE in Germany; the country has an overall reduction target of 20% in energy consumption by 2020

Key regulatory drivers of EE in Germany

Energy Efficiency

Regulation

- **National Energy Efficiency Action Plan (NEEAP), required by the European Energy Efficiency Directive (EED 2012/27/EU) sets several objectives:**
  - Increase macroeconomic energy productivity by 2,1% annually during the period 2008-2020
  - Decrease primary energy consumption from 2008 levels by 20% by 2020 and by 50% in 2050
- **The German "Energy Concept" (*Energiewende*) consists of several political objectives to ensure energy supply and climate protection and promote growth in the German industry (2010)**
  - Phase-out of Germany's nuclear fleet by 2022
  - Decrease greenhouse gas emissions: 40% in 2020, 55% in 2030; 70% by 2040 and 80 - 95% by 2050 (2010 base year)
  - Increase the share of renewable energy in final energy consumption, move from approximately 10% in 2010 to 60% in 2050
  - Decrease primary energy consumption to the same levels as the target fixed in the NEEAP
  - Double the annual rate of building renovation in order to improve energy performance from current levels of 1% to 2% per year
- **Renewable Energies Heat Act (EEWärmeG) which was last amended in 2012**
  - Increase the share of renewable energies in heat supply to 14% by 2020, by setting an obligation for new buildings to be built with renewable energy for heating and water heating
- **Renewable Energy Act (Erneuerbare-Energien-Gesetz, EEG), from 2014**
  - Promote cost reductions based on improving EE through time and setting a renewable energies penetration target like the "Energy Concept"

Programs

- **There are several EE support programs, including:**
  - Electricity Saving Initiative (2012)
  - Urban Lighting (2011)

- **The German EE Watch report states that the German NEEAP can be considered of rather high quality**
- **Regarding the overarching EE governance framework, the NEEAP entails an ambitious long term strategy, which includes EE targets for both 2020 and 2050**

Note: [1]NEEAP stands for National Energy Efficiency Action Plan
Source: IEA; Bundesministerium der Justiz und für Verbraucherschutz; European Commission; CREARA Analysis

The German administration offers a wide range of incentives that encourage the implementation of EE measures in different sectors

Key incentives for EE in Germany

Energy Efficiency

Financial incentives

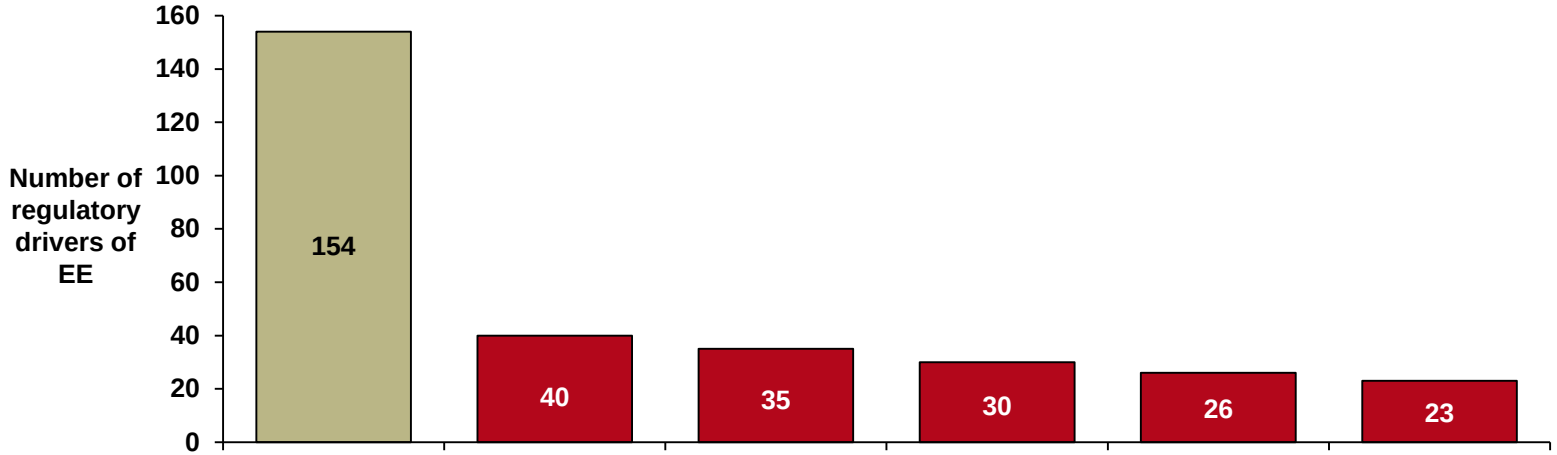
- **There are several programs, laws and funds that have economic instruments to promote EE in Germany, the most important are the KfW promotional bank refurbishment and construction programs for the residential sector (2009)**
  - These programs offer either a loan or an investment grant programme to promote energy efficient refurbishment or construction (i.e. favourable conditions of financing)
    - The maximum loan amount is 75.000 EUR for comprehensive refurbishment projects, and 50.000 EUR for single measures
    - Grant levels are calculated based on the maximum loan amount applicable
  - An upgrade of the programs was made in 2015 in order to include the industrial and the commercial sectors
- **Recently published initiatives that aim at EE improvements in Germany are listed below:**
  - Heating Check (2016), which aims to initiate additional heating modernization by a new method for heat inspections; government authorities will provide funding for each heat check (residential sector)
  - Granting tax incentives for energy efficiency renovations (2015), tax discounts for measures for the energy renovation of residential buildings
    - The requirements and incentives are closely oriented towards the KfW programs, although this measure offers further promotional options, like supporting the deployment of renewable heating in the residential buildings
  - Energy consultations for SMEs (updated in 2015), exploitation of EE potential in SMEs, including advisory support and investment support
  - Waste Heat Usage Initiative (Offensive Abwärmenutzung, from 2015), measures to strengthen the prevention of industrial waste heat, through the support for waste heat utilization from the framework of “Energy consultations for SMEs” as well as grant-schemes
  - Promotion of energy management systems (EMS) under the Energy Efficiency Fund (industry)

- **The financial incentives for EE in Germany cover a wide spectrum of application segments**
- **Almost every year a new incentive program is published or upgraded in order to reach the ambitious energy saving targets**

Source: IEA; European Commission; ODYSSEE-MURE; CREARA Analysis

Germany has a large number of EE regulations for the different consumer segments, although not all have a significant impact

Summary of total regulatory drivers of EE in Germany according to ODYSSEE



Odyssee database[2]	Total	Household	Tertiary	General cross-cutting	Industry	Transport
Year of 1st regulation	1977	1977	1977	1990	1978	1985
# high impact	53	15	9	14	6	9
# medium impact	51	13	13	6	10	9
# low impact	50	12	13	10	10	5
# of laws in force	119	25	25	28	22	19

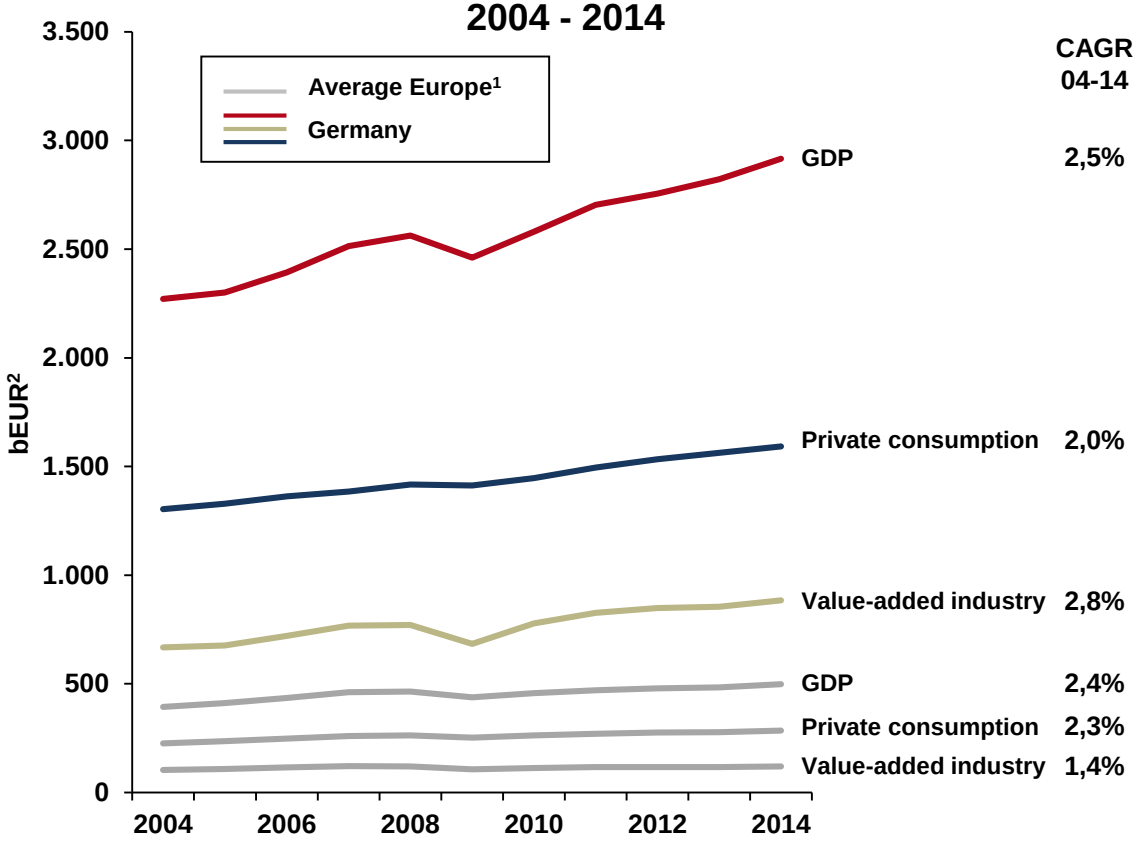
- **Regulatory drivers in Germany have different quantitative impacts according to ODYSSEE; there is about the same proportion of the three impacts rated (high, medium and low)**

Note: [1]The impact of a regulatory driver has been quantified in relation with energy consumption and CO2 emissions; [2]The missing regulations to reach the total number were allocated to "unknown impact"

Source: ODYSSEE-MURE; CREARA Analysis

The GDP in Germany has increased on average by 2,5% annually in the last decade, showing a significant decline in 2009 due to the financial crisis

Macro-economic evolution in Germany and Europe 2004 - 2014



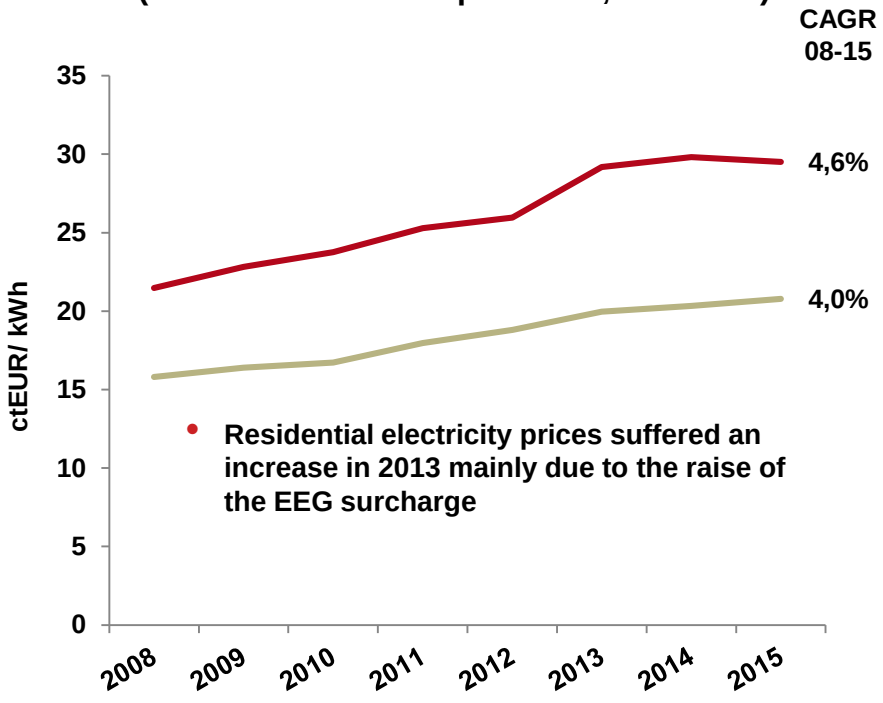
- **In 2014, total real GDP in Germany amounted to 2.915.650 MEUR, showing a positive evolution for the last years (CAGR 2004 - 2014, 2,5%)**
  - Between 2004 and 2008, GDP increased continuously
  - While in 2009, due to the financial and economic crisis, it suffered a significant decline
  - Since 2010, however, an above-average growth could be observed again in Germany compared with the evolution from 2004 to 2008
- **Private consumption has been increasing constantly during the last decade**
  - The growth was stagnant for 2008 - 2009, however rebounded thereafter
- **Value added of industry also showed a positive increase from 2004, however it was clearly affected by the financial crisis in 2009**
  - The increasing trend returned from 2010 when the economy rebounded after the peak of the financial crisis
- **Germany presents higher values than the European average for the analyzed parameters as well as higher growth rates, with the exemption of private consumption which is slightly lower**

Note: [1]Europe refers to the average data for the European Union (28 countries); [2]bEUR stands for billion i.e. one thousand million
Source: ODYSSEE-MURE; Eurostat; IEA; CREARA Analysis

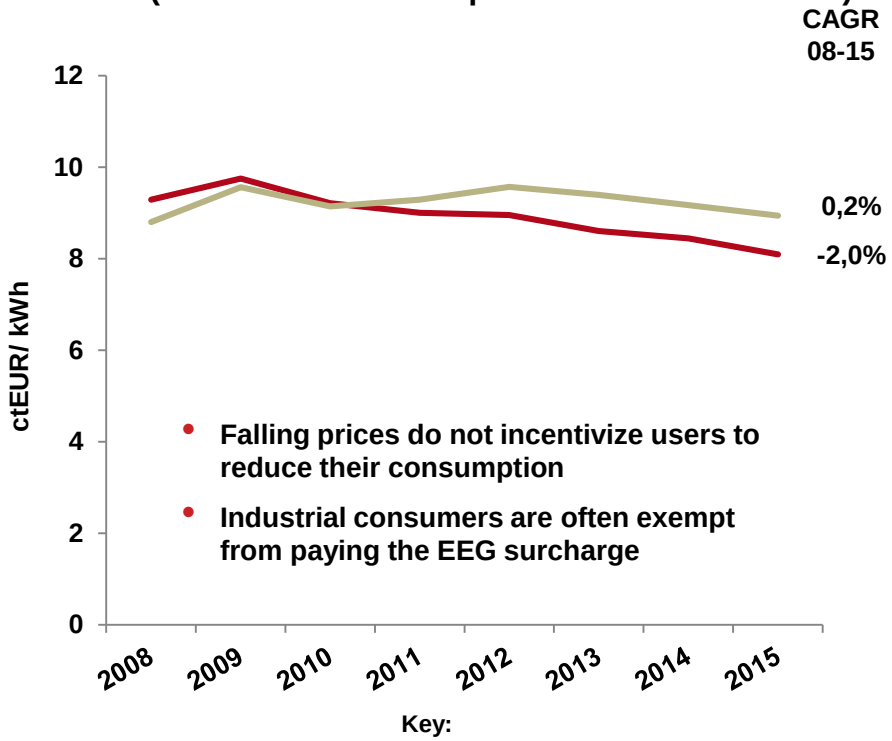
Residential electricity prices in Germany have slightly increased standing above the European average prices while industrial ones have fallen since 2008 due to the competition with spot electricity prices

Evolution of average electricity prices in Germany and Europe, 2008 - 2015

Medium size households (with annual consumption of 2,5 - 5 MWh)



Medium size industries (without taxes) (with annual consumption of 500 - 2.000 MWh)



Note: [1] Europe refers to the average data for the European Union (28 countries)
Source: ODYSSEE-MURE; Eurostat; Fraunhofer ISI; CREARA Analysis

There is a general concern about the environment among the German citizens, but there is room for improvements in their level of commitment

Attitudes of German citizens towards the environment[1]

			2007	2011	2014 Germany	2014 EU6[2]
Resource efficiency and protection of the environment can lead to economic growth	Better use of resources (A.9.2.)	Totally/Tend to Agree	-	77%	71%	80%
		Totally/Tend to Disagree	-	15%	20%	10%
	Protection of the environment (A.9.1.)	Totally/Tend to Agree	68%	70%	61%	76%
		Totally/Tend to Disagree	18%	23%	29%	15%
Citizens behavior towards environment	Willingness to pay for eco-products (A.10.)	Totally/Tend to Agree	74%	76%	80%	76%
		Totally/Tend to Disagree	22%	23%	20%	23%
	Level of commitment personally (A.16.2.)	Doing too much	-	1%	3%	2%
		Doing the right amount	-	38%	41%	29%
		Not doing enough	-	59%	53%	65%
Information about environmental issues	Well/Badly Informed (A.3.)	Very/Fairly Well	66%	65%	65%	62%
		Very/Fairly Badly	32%	33%	34%	38%

- The majority of the German population shares the opinion that a better use of resources and the protection of the environment can lead to economic growth
- Germany is the only country analyzed where the economic recession has not had an impact on people's willingness to pay for environmentally friendly products
- However, 53% of the survey respondents in 2014 affirm they are not doing enough to protect the environment
- The general perception of information levels about the environment is stagnant
- Germany presents lower overall rates than the EU6 average, except for the level of commitment and how well informed citizens feel

Note: [1]The missing % to 100% was allocated to "don't know"; [2]It refers to the average value of the six analyzed countries; [2]Eurobarometer questions' reference number differs from one year to another, 2014 reference numbers are indicated

Source: EUROBAROMETER; CREARA Analysis

Germany has launched several informative campaigns although the quantitative impact of all of them is low

Principal[1] informative and educational campaigns developed in Germany

	Description	Sector	Organizing party	Starting year	Status	Quantitative impact
Information Campaign on Climate Protection	• The main parts of the campaign are: - A "Climate Hotline" by phone - A brochure which informs on financial incentive programs for climate protection, energy saving tips, and advice on climate protection and energy savings - Advertisements in daily and weekly journals	• Residential and tertiary	• Ministry for the Environment, Nature Conservation and Nuclear Safety	• 2008	• Completed	• Low
Energy Efficiency Campaign	• The campaign provides information on efficient electricity use in public buildings, households and offices • For industry and trade, information on "best available technologies"	• Residential, tertiary and industry	• German Energy Agency (DENA)	• 2002	• Ongoing	• Low
ECO Management and Audit Scheme	• The transposition of the European Directive on voluntary participation of commercial companies in a system of environmental management and company inspection	• Tertiary	• Government under the EMAS[2] laws	• 1996	• Ongoing	• Low
Energy Consultancy and Energy Checks	• Energy consultations provided by consumer organizations generally consist of a 30-minute specialist consultation on energy-related topics, which is offered at the advisory centres of the consumer organizations	• Residential	• Federal Ministry of Economic Affairs	• 1978	• Ongoing	• Low

Note: [1]In total there are 14 different informative campaigns in Germany according to the Odyssee-Mure database; [2]EU's Eco-management and Audit Scheme
Source: ODYSSEE-MURE; CREARA Analysis

The most important elements for being successful in the German EE market are the focus on clients and the capacity to adapt rapidly to their requirements (1/2)

Elements of success according to importance segmented by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	High	• Service/ product based on customer requirements	• High quality of service/product	• One-stop solution
Competitiveness	High	• Service/ product based on customer requirements	• Track record (corporate brand)	• Close relationship with client
Regulation	High	• Innovation of service/ product	• One-stop solution	• Lowest price
Economic incentives/ financing options	High (P)	• Service/ product based on customer requirements	• Innovation of service/ product	• Short payback period of product/ service
	Low (R)	• One-stop solution (including information/ management of incentives, financing options)	• Short payback period of product/ service	• Service/ product based on customer requirements
Energy price	High	• Product and services focused on complying with regulation	• Lowest price	• Innovation of service/ product
Social consciousness	High	• Lowest price • Partnership with a local company or having local sales staff[2]	• Service/ product based on customer requirements	• One-stop solution

Note: P: private sector; R: rest of sectors; [2]This key element is focused on foreign companies which enter the German market
Source: CREARA Interviews; CREARA Analysis

The most important elements for being successful in the German EE market are the focus on clients and the capacity to adapt rapidly to their requirements (2/2)

Explanation of the elements of success segmented by market characteristics

	Status	Elements of success
Maturity	High	• Companies active in the German EE market are expected to be more successful if they offer services/ products based on each customers requirements, high quality and/ or one-stop solutions. This might be because of the high maturity of the market which requires companies to focus more on the client than on the product or service
Competitiveness	High	• The highly competitive German market demands companies to adapt their services as much as possible to customers' requirements. This is different to the other markets, possibly because of the social consciousness • A good track record and the affiliation to a well-known German company as well as a close relationship with the client are further advantages
Regulation	High	• In order to compete in the highly regulated environment of the German EE market, companies must offer innovative service/ product, one-stop solutions and/ or the lowest price (even though to a lesser extent)
Economic incentives/ financing options	High (P)	• The German EE market provides a high level of incentives as well as financing options, so private clients can focus on non-financial aspects and value companies that offer services based on their requirements. The innovativeness of the services plays an important role as well, a short payback period is important nevertheless
	Low (R)	• For the rest of consumers, given the low availability of incentives, the most important element would be to offer one-stop solutions which provide information about possible financing options as well as a short payback period. The focus on customer requirements looses importance
Energy price	High	• German energy prices are high and therefore encourage the implementation of EE products and services. For the clients it is most important that they comply with the EE requirements set by the regulation, then that they are offered at a low price and that the service has an innovative element which differentiates it from other solutions
Social consciousness	High	• The consciousness regarding EE in Germany is high, nevertheless clients look for low priced services and services that are offered by local companies or through local sales staff (giving an advantage to national companies) • Furthermore, services should be adapted to clients' requirements and be one-stop solutions

Note: P: private sector; R: rest of sectors; [2]This key element is focused on foreign companies which enter the German market
Source: CREARA Interviews; CREARA Analysis

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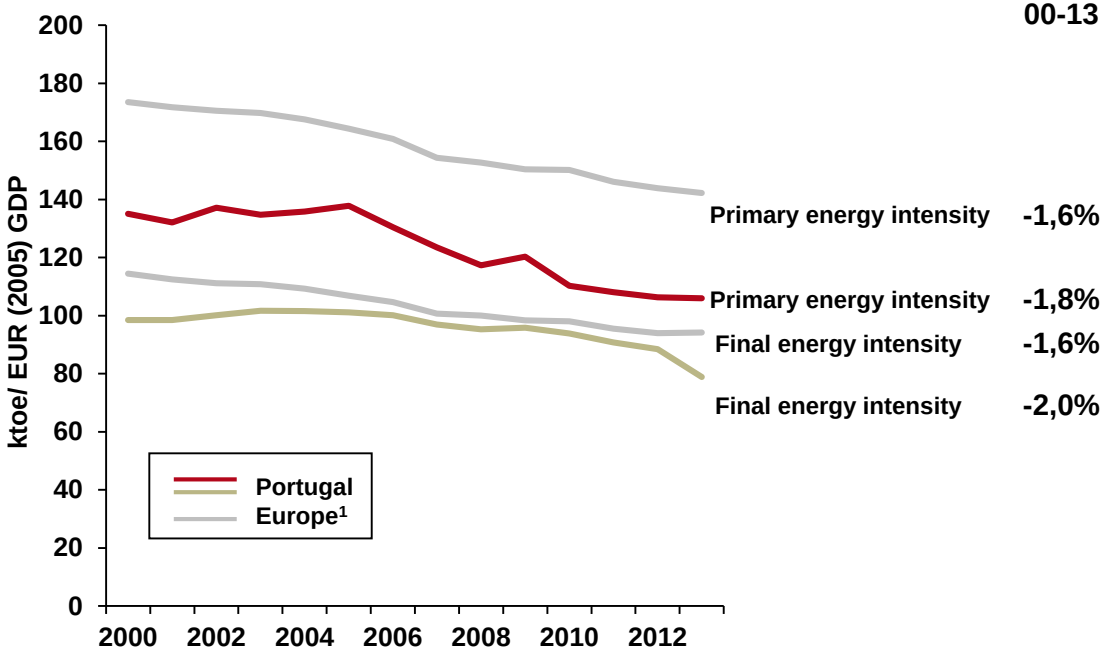
Both Portugal's primary and final energy intensity have been decreasing over the period 2000 - 2013, presenting lower rates than the average European ones

Development of primary and final energy intensity in Portugal and Europe, 2000 - 2013



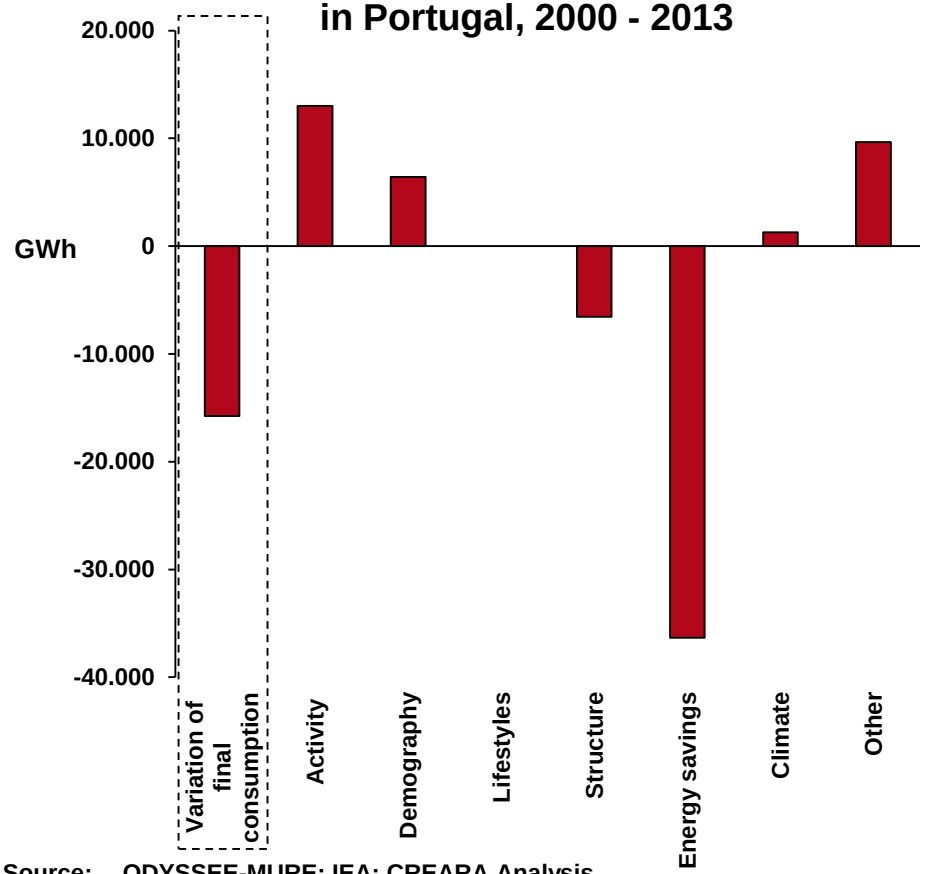
	CAGR2 00-13
Primary energy intensity	-1,6%
Primary energy intensity	-1,8%
Final energy intensity	-1,6%
Final energy intensity	-2,0%

- **The graph shows a downward trend in both primary and final energy intensities over the period 2000 - 2013**
  - From 2005 until the beginning of the crisis in 2008 the downward trend becomes more visible, especially in primary energy intensity
  - From 2008 the evolution of energy intensities has been less clear, presenting increases in 2009 and then a period of decrease until 2013
- **The overall development of final energy intensity decreases with an annual rate similar to the primary intensity one, although primary energy intensity presents a higher volatility than the final intensity**
- **Both primary and final energy intensities are decreasing faster than the European average and present lower values in both cases, meaning that Portugal requires less energy to generate its GDP**
- **As stated before, energy intensities are limited by different effects, such as climate, economics, structural effects, etc.**

Note: [1]Europe refers to the European Union (28 countries); [2]CAGR, Compound Annual Growth Rate
Source: ODYSSEE-MURE; CREARA Analysis

Despite consumption increases in the period 2000 - 2013, the final energy consumption variation has been negative (-7,5%), meaning that overall less energy has been consumed

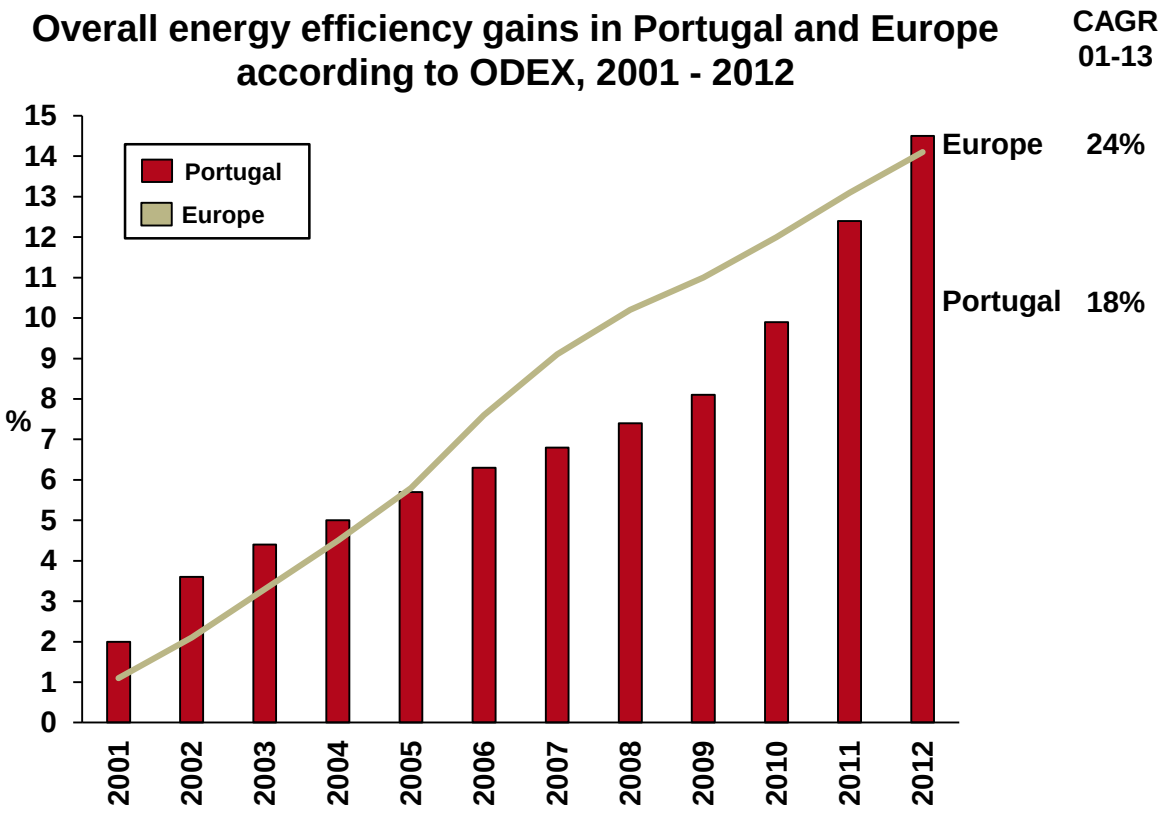
Decomposition of the final energy consumption variation in Portugal, 2000 - 2013



Source: ODYSSEE-MURE; IEA; CREARA Analysis

- **Since 2000, overall energy consumption has decreased by around 7,5% in Portugal despite consumption increases occurred in several areas over the period**
  - The major increase can be found in activity, 6,2%, which represents all changes in value added in industry, services, transport, etc.
  - The other consumption increases have been mainly due to:
    - Other (4,6%), influenced by the behavior of households, value of product in industry, labor productivity in services, etc.
    - Demography (3,0%), due to the construction of new households
    - Climate (0,6%), caused by a change in temperatures
- **Energy savings have increased by 17,2% since 2000**
- **Portugal has helped to achieve a positive variation in energy consumption for the European Union**

EE gains in Portugal show an increasing trend for the analyzed period, although for the period of 2005 - 2012 Portuguese EE gains were lower than the European average



- **Portugal achieves an EE improvement of about 1,2% per year, which is lower than the final energy intensity decrease of 2%**
  - Total EE gains have been increasing with an annual average growth rate of 18% for the period of 2000 to 2012, especially the last three years contributed to this growth
- **Observing Portuguese and European EE progress for the analyzed period, in the first years Portugal presented higher EE gains, however after 2005 Europe had a significantly higher gain in EE**
- **All three application segments have helped with the improvement of energy efficiency gains in Portugal**
  - The transport sector represents an annual growth rate of 25%, representing the sector with the highest increase for the studied period
  - The residential sector represents a rate of 22% (between 2000 - 2012)
  - The industrial sector represents a growth of 16% annually since 2000

Source: ODYSSEE-MURE; CREARA Analysis

The Portuguese EE market is a growing market which has led to a increased interest of international companies to enter the market

EE market maturity in Portugal

Association ESCO/ EE	• **The most important associations are the Energy Agency (ADENE (founded in 2000) and the ESCO association (APESEnergía (founded in 2011))** • **There are other regional and municipal energy agencies (AGENEAL (founded in 1999), ENERGAIA (founded in 1999), etc.), grouped in the RNAE (National Association of Energy Agencies founded in 2010)**
Number of active players	• **There is no official data about the number of active players in Portugal, although one interviewee was able to give us the following information about the type of companies currently active in the Portuguese EE market:** - 20 energy efficiency services companies for public auctions - 100 certifications and audit companies - 1.000 freelance auditors and certificators - 10 ESCOs
Market concentration	• **Competitive, dominated by large national companies and some Spanish companies. There is also a large number of small local companies, and lately several international companies entered the market**
Market size	**EE market employees** • **There is no official data about the number of employees in the EE market in Portugal, although the number of employees with a special certification from ADENE needed to undertake EE solutions are as follows** - 1.000 qualified experts for large buildings - 400 qualified experts for small buildings - 400 installation and maintenance technicians (EIM) - 500 industry auditors for energy consumption management systems - 3.000 EE technicians (normal auditors) **EE market turnover** • **There is no official data about the turnover of the EE market in Portugal**
Year of first national EE regulation	• **1986 for the tertiary and industry sectors:** - Management Regulation of Energy Consumption
Year of first ESCO	• **1990**

Source: **World Esco Outlook; ESCO Market Report (JRC, 2014); CREARA Analysis; CREARA Interviews**

The Portuguese EE market is driven by large national and Spanish companies which dominate the market although lately several international companies entered the market

Type of EE market players in Portugal

	Utilities	Facility managers	Manufacturers	Construction companies and installers	Engineering companies	Energy efficiency services
Relative number	✓	✓✓	✓✓	✓✓✓	✓	✓✓✓
Description	• They sell energy flows (such as gas or electricity) to the end customer • Generation and supply dominated by EDP (originally public) • There is a growing interest of international utilities and energy suppliers to enter the market especially from Spain	• Companies dedicated to the management and maintenance of buildings and their services • These services have traditionally been executed by non-specialized domestic companies, although nowadays there are companies specialized in FM	• They manufacture equipment, tools and platforms, often complemented with other services • Mainly dominated by large international groups	• They install the equipment (one-off service at the end of the value chain) • Large traditional national construction groups and some SMEs	• Companies dedicated to the design and planning of installations and solutions (based on projects) • Large national companies, with diversified activities	• They provide energy efficiency measures: EPCs, metering, supervision, etc. • Local and national companies, usually SMEs
Examples	• EDP, Galp, REN (Redes Energéticas Nacionais, SGPS, S.A), Endesa, Iberdrola, Gas Natural	• ISS, Cofely, Ferrovial, TDGI (Teixeira Duarte), Eulen	• Siemens, Samsung, Bosch, Enercon, Coficab	• Mota Engil, Teixeira Duarte, Lena, Conduril, Sotecnica	• Efacec, Visabeira, Elevo	• Ewen, ISQ, Viva Power, Smartwatt

Source: IGNIOS; CREARA Research; CREARA Analysis

Assessment: ✓ Small ✓✓ Medium ✓✓✓ Large

The last Portuguese NEEAP shows very ambitious targets, and has become the main regulatory driver for EE measures

Key regulatory drivers of EE in Portugal

Energy Efficiency

Regulation

- **National Energy Efficiency Action Plan (NEEAP) for 2013-2016, required by the European Energy Efficiency Directive (EED 2012/27/EU), sets the following targets:**
  - Savings target on energy consumption of 8,2% in 2016, relative to the average consumption in the period 2001-2005
  - Decrease primary energy consumption to 25% by 2020 (previously established at 20%)
- **Energy Efficiency Program in Public Administration (Eco.AP, 2011)**
  - Establishes several EE measures for implementation in services, agencies and public equipment
  - Aims to achieve a 20% improvement in EE in public services and bodies of the public administration by 2020
- **Energy Efficiency Fund (2011), which has three main objectives:**
  - Encourage citizens and businesses to implement EE projects
  - Support EE projects in areas where until now these projects had not yet been developed
  - Promote behavior change in EE
- **Portugal's National Energy Strategy 2020 (2010), which hinges around 5 axes:**
  - Agenda for competitiveness, growth and energy and financial independence
  - Promoting on Renewable Energy
  - Promoting energy efficiency, by targeting a 20% reduction in overall energy consumption by 2020
  - Guaranteeing security of energy supply
  - Sustaining the energy strategy
- **Management System of Intensive Energy Consumption (SGCIE, 2008)**
  - Sets a new RGCE (Management Regulation of Energy Consumption) in industry and establishes a modification of excise duties (special taxes) on oil and energy products applied to industrial fuels
  - Obliges intensive energy facilities (consumption of more than 1000 toe/year) to undergo an energy audit every 6 years (8 years for facilities with energy consumption between 500 and 1000 toe/year)

- **Although the Portuguese EE Watch report states that the assessment of the NEEAP measures is unclear, the regulatory frame seems to indicate that they are doing an effort to implement EE measures**
- **According to domestic experts[1], the Portuguese EE policies have presented a very good progression since the first NEEAP of 2008**

Note: [1] **Interviews of the Energy Efficiency Watch (European Commission)**
Source: **IEA; European Commission; CREARA Analysis**

Despite the limited number of Portuguese fiscal and financial incentives for EE compared to the other analyzed countries, Portugal presents a positive evolution mainly driven by the last NEEAP

Key incentives for EE in Portugal

Energy Efficiency

Financial incentives

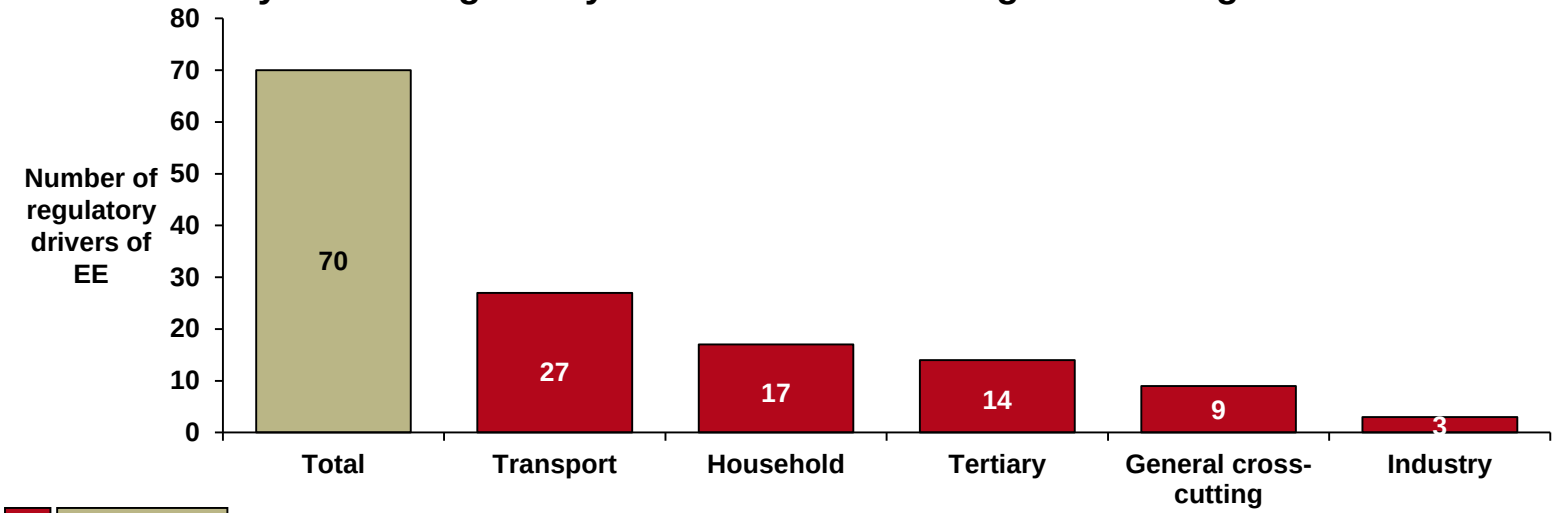
- **Among the different programs launched by the Portuguese Government on EE, the previously mentioned Energy Efficiency Fund (2010) should be highlighted, which sets three main objectives:**
  - Encourage citizens and businesses to implement EE projects
  - Support projects of EE
  - Promote behavioral changes on EE issues
- **In addition, the following initiatives listed according to the application segment, seek to obtain EE improvements in Portugal:**
  - Residential sector:
    - Renewable at the Time: Micro generation (2008)
    - Equipment replacement (2008)
  - Industrial/ Tertiary sector:
    - MAPE/PRIME - Measure for Supporting the Use of Energy Potential and Rational Use of Energy (2001), also affecting the tertiary and transport sectors
    - Intensive Energy Consumption Management System (SGCIE) (2008)
  - Transport sector:
    - Fiscal incentives for old cars scrapping (2000)
    - Taxation on the purchase of passengers vehicles (2006)
    - Special tax relief for biofuels (2006)
    - Reviving the decommissioning program for end of life vehicles (2008)
    - Green Taxes Review of the private vehicle tax regime (PNAC 2006 Measure) (2008)
    - Program for Electric Mobility in Portugal (2009)

- **The number of Portuguese fiscal and financial initiatives is relatively low, compared to other countries**
- **However, the last NEEAP aims to promote different incentives and programs on EE, in order to achieve 2020 objectives**

Source: **European Commission; ODYSSEE-MURE; CREARA Analysis**

Although Portugal incorporated regulatory drivers on EE relatively late, most of the drivers have proven to represent a high quantitative impact[1]

Summary of total regulatory drivers of EE in Portugal according to ODYSSEE



Odyssee database[2]	Total	Transport	Household	Tertiary	General cross-cutting	Industry
Year of 1st regulation	1986	1991	1991	1986	1988	1986
# high impact	33	7	12	10	4	0
# medium impact	15	5	0	3	4	3
# low impact	11	9	1	1	0	0
# of laws in force	35	12	10	6	6	1

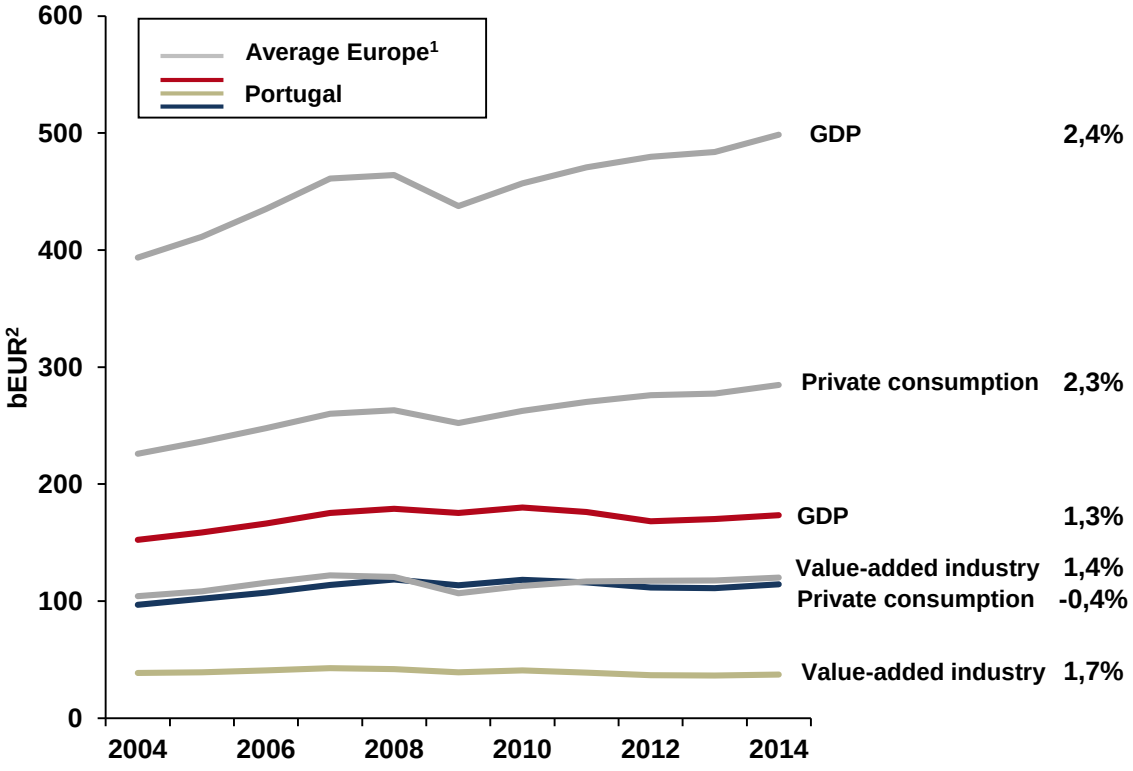
- The first regulation on EE in Portugal is from 1986, placing Portugal as the last country among the analyzed ones to incorporate regulatory drivers for EE
- However, among the 70 regulatory drivers, nearly half of them have a high quantitative impact

Note: [1]The impact of a regulatory driver has been quantified in relation with energy consumption and CO2 emissions; [2]The missing regulations to reach the total number were allocated to "unknown impact"

Source: ODYSSEE-MURE; CREARA Analysis

In terms of GDP development, the period 2004 - 2014 shows an economic increase, although with a short period of stagnation in 2009 and 2011

Macro-economic evolution in Portugal and Europe 2004 - 2014



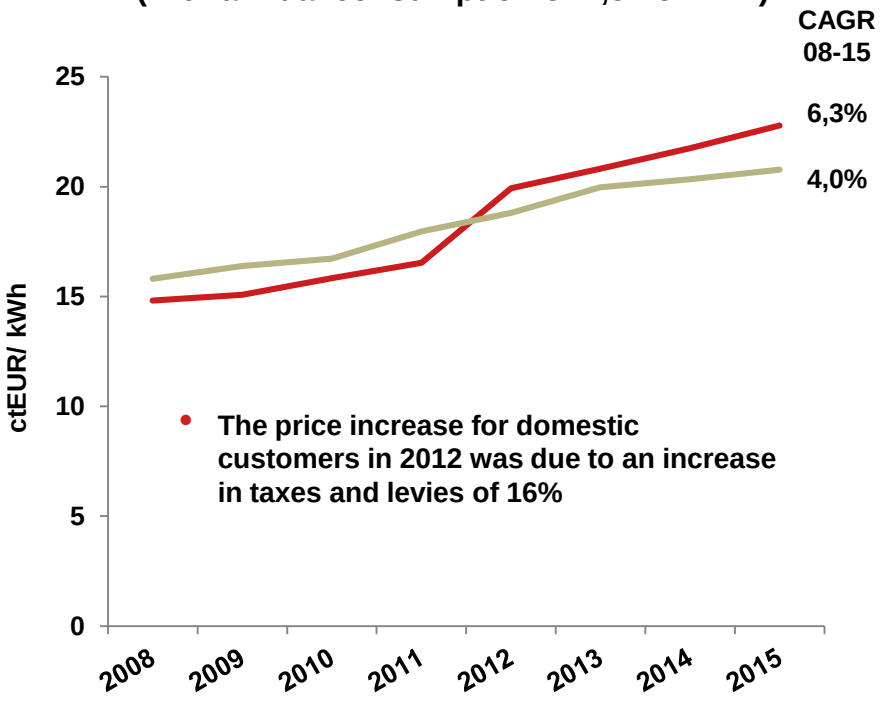
- **In 2014, total real GDP in Portugal amounted to 173.446 MEUR, showing a generally an increase in the last years**
- **The three analyzed parameters for Portugal have been evolving following a similar pattern**
  - Private consumption is the only one showing an overall decreasing trend for the studied period (CAGR 2004 - 2014, -0,4%)
- **Portugal shows the lowest rates of GDP among the 6 analyzed countries, being all three studied parameters lower than the European averages**
  - All three parameters are growing with lower rates than the European ones

Note: [1]Europe refers to the average data for the European Union (28 countries); [2]bEUR stands for billion i.e. one thousand million
Source: ODYSSEE-MURE; Eurostat; IEA; CREARA Analysis

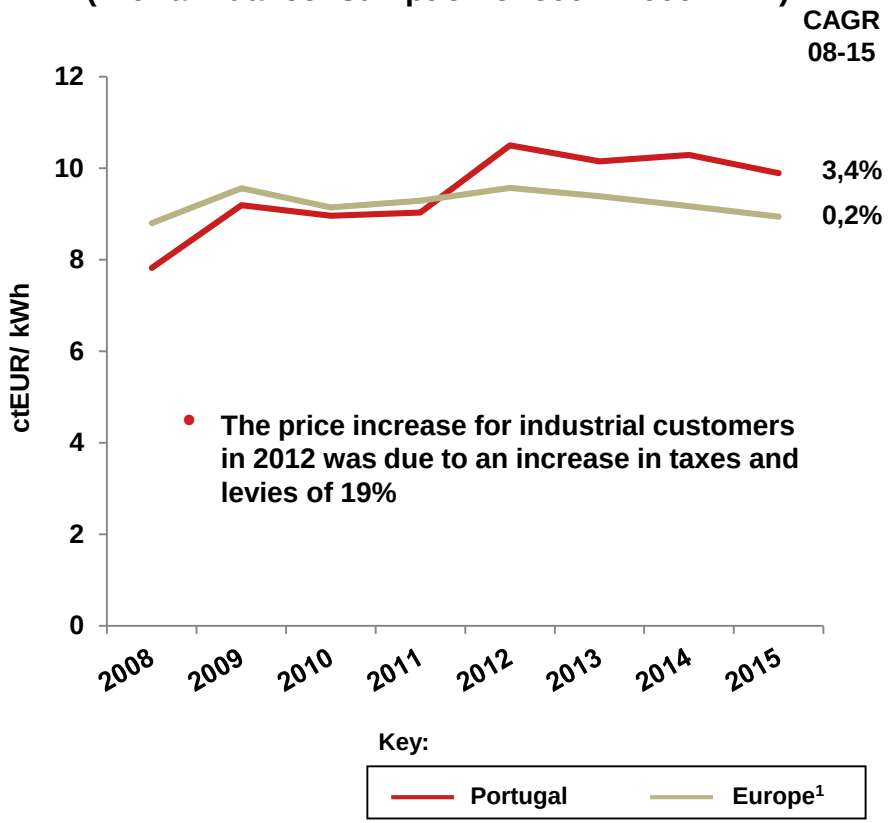
Compared to Europe, Portugal's electricity prices have been higher since 2011 for both the residential and industrial segments

Evolution of average electricity prices in Portugal and Europe, 2008 - 2015

Medium size households (with annual consumption of 2,5 - 5 MWh)



Medium size industries (without taxes) (with annual consumption of 500 - 2.000 MWh)



Note: [1]Europe refers to the average data for the European Union (28 countries)
Source: ODYSSEE-MURE; Eurostat; CREARA Analysis

The Portuguese population appears to be concerned about the environment as a result of an effective dissemination campaign over the last years

Attitudes of Portuguese citizens towards the environment[1]

			2007	2011	2014	
					Portugal	EU6[2]
Resource efficiency and protection of the environment can lead to economic growth	Better use of resources (A.9.2.)	Totally/Tend to Agree	-	80%	91%	80%
		Totally/Tend to Disagree	-	9%	4%	10%
	Protection of the environment (A.9.1.)	Totally/Tend to Agree	69%	77%	89%	76%
		Totally/Tend to Disagree	12%	11%	6%	15%
Citizens behavior towards environment	Willingness to pay for eco-products (A.10.)	Totally/Tend to Agree	75%	59%	62%	76%
		Totally/Tend to Disagree	17%	36%	36%	23%
	Level of commitment personally (A.16.2.)	Doing too much	-	6%	3%	2%
		Doing the right amount	-	29%	36%	29%
		Not doing enough	-	58%	56%	65%
Information about environmental issues	Well/Badly Informed (A.3.)	Very/Fairly Well	39%	46%	65%	62%
		Very/Fairly Badly	59%	53%	35%	38%

- Portuguese people share the opinion that a better use of resources and the protection of the environment can lead to economic growth
- The percentage of people saying that they are not doing enough for the environment is relatively low, compared to other countries
- The Portuguese population appears to be willing to pay for eco-friendly products, although this behaviour has experienced a downward trend since 2007
- The indicator on how well consumers feel informed about the environment presents a positive evolution since 2007
- Portugal presents higher overall values than the EU6 average values in 2014

Note: [1]The missing % to 100% was allocated to "don't know"; [2]It refers to the average value of the six analyzed countries; [2]Eurobarometer questions' reference number differs from one year to another, 2014 reference numbers are indicated

Source: EUROBAROMETER; CREARA Analysis

The principal Portuguese awareness-raising programs were launched by the Government in the PNAEE of 2008; they have already been concluded

Principal[1] informative and educational campaigns developed in Portugal

	Description	Sector	Organizing party	Starting year	Status	Quantitative impact

Operation E	• **The program is designed to increase awareness on energy efficiency, by encouraging behavioral changes in different areas:**
	- Schools:
	  - Monitoring of energy consumption and dissemination of results
	  - Conducting information and awareness campaigns for students and teachers
	  - Energy "Open week", etc.
	- Transport:
	  - Eco-driving
	  - Campaign tips for more efficient driving
	- Residential:
	  - Information and awareness campaigns of energy issues
	  - Energy efficiency portal
	  - Network of EE information points
	- Offices:
	  - Information and awareness campaigns of energy issues: lighting, space heating, etc.
		• **All except industry**	• **Government through the PNAEE 2008**	• **2008**	• **Completed (2013)**	• **Unknown**

Plus Program	• **The program aims to raise awareness of efficient behavior.** • **It defines five actuation areas: household, school, tertiary, offices and equipment.**	• **All except industry**	• **Government through the PNAEE 2008**	• **2008**	• **Completed (2013)**	• **Unknown**

Note: [1]**In total there are 8 different informative campaigns in Portugal according to the Odyssee-Mure database**
Source: **ODYSSEE-MURE; CREARA Analysis**

The main element to succeed in the Portuguese EE market seems to be offering one-stop solutions (products and services) at the lowest price (1/2)

Elements of company according to importance by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	Medium	• Lowest price	• Close relationship with client	• Corporate brand
Competitiveness	Medium	• One-stop solution	• ESCO based services	• Short payback period of product/service
Regulation	High	• Lowest price	• Close relationship with client	• Innovation of service / product
Economic incentives/ financing options	Low	• Product and services focused on complying with regulation	• Short payback period of product/service	• One-stop solution
Energy price	High	• Financing options (can be external)	• Short payback period of product/service	• ESCO based services
Social consciousness	Medium	• Innovation of service / product	• One-stop solution	• Lowest price

Source: CREARA Interviews; CREARA Analysis

The main element to succeed in the Portuguese EE market seems to be offering one-stop solutions (products and services) at the lowest price (2/2)

Explanation of the elements of success segmented by market characteristics

	Status	Elements of success
Maturity	Medium	• The Portuguese market is less mature than the other countries analyzed. Clients are focusing generally on the price when selecting a EE product/ service • A close customer relationship and a corporate brand can help companies succeed in the EE market which is still developing, allowing customers to gain confidence and gain knowledge about EE
Competitiveness	Medium	• The medium level competitiveness in the Portuguese EE market represents an opportunity for companies offering one-stop solutions and ESCO based services, as well as short payback period of product/service, these being the elements valued most by the clients
Regulation	High	• In order to compete in the highly regulated EE market in Portugal, companies must offer services with low prices as well as build up a close relationship with the client and, to a lesser extent, offer innovative products/ services
Economic incentives/ financing options	Low	• As there is low availability of incentives for EE solutions clients are not encouraged to implement EE measure and therefore focus on investing in EE as little as possible • They favor companies that offer services which comply with regulation and which have short payback periods. If the service is a one-stop solution this is an advantage as well
Energy price	High	• The energy price in Portugal is high giving consumers incentives to invest in EE. When EE measures are implemented, clients prefer services with financing options or EE services with short payback periods. ESCO projects are considered interesting as well as they allow customers not to spend large quantities at once
Social consciousness	Medium	• The social consciousness in Portugal has started to grow in the last years although it is still on a medium level, for this reason companies must offer innovative solutions that attract consumers attention • Companies that simplify the implementation of EE by providing one-stop solution and that offer low prices have an advantage as well

Source: CREARA Interviews; CREARA Analysis

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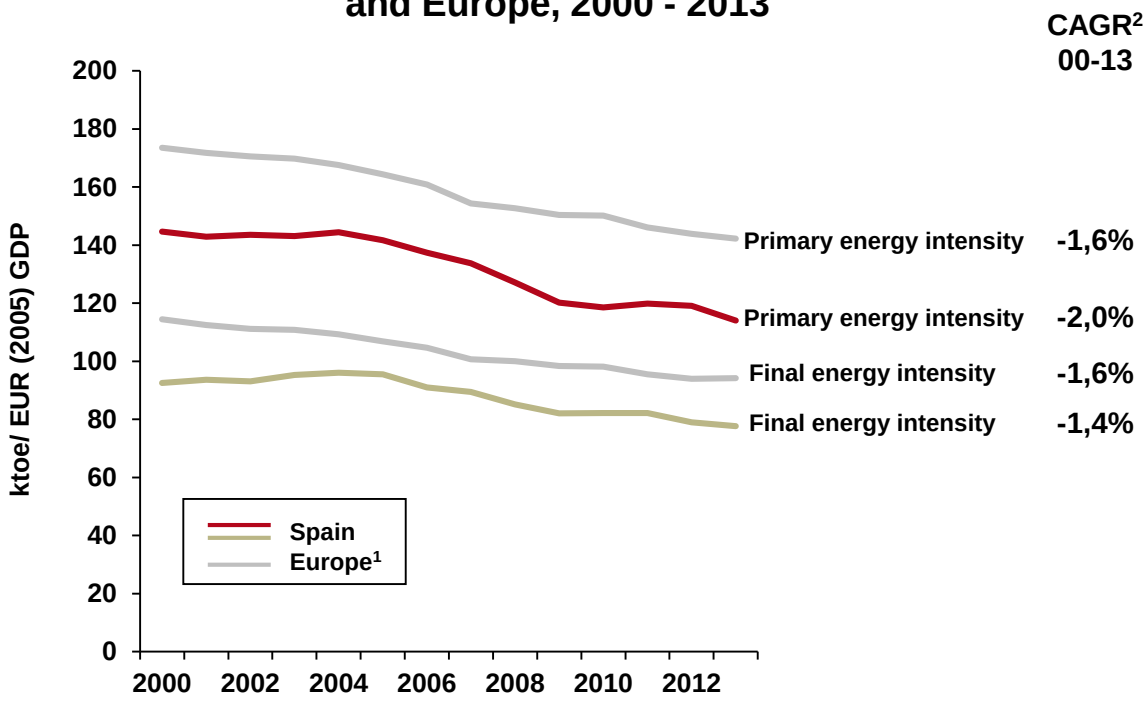
The most dramatic primary intensity fall as compared to the final one is due to the greater contribution of renewable energies in the electric generation system

Development of primary and final energy intensity in Spain and Europe, 2000 - 2013

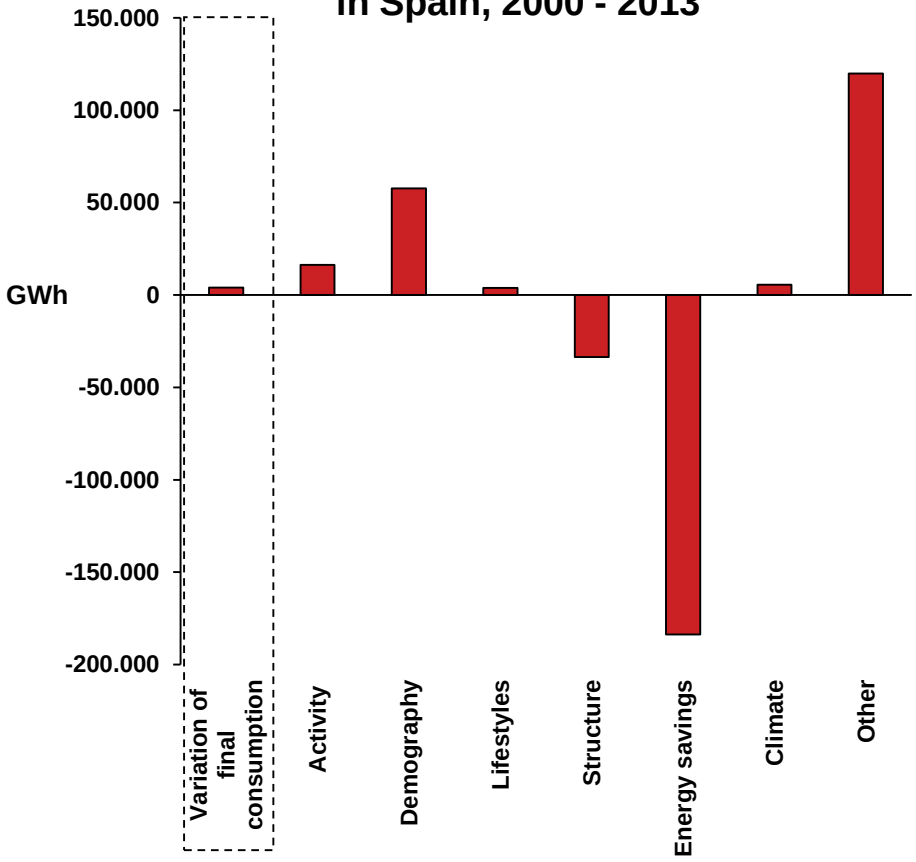


- **The graph shows a downward trend in both primary and final energy intensities over the period 2000-2013**
  - From 2004 until the beginning of the crisis in 2008 the downward trend becomes most visible
  - From 2008 the evolution of energy intensities accounts for some kind of fluctuation, presenting increases in 2011
- **Primary intensity presents a more dramatic fall compared to final intensity for the period 2007 to 2009**
  - The main reason for this fall is the greater contribution of renewable energies in the electric generation system, while the drop in final intensity is in line with the structural and activity effects of the crisis in the economic activity

Note: [1]Europe refers to the European Union (28 countries); [2]CAGR, Compound Annual Growth Rate
Source: ODYSSEE-MURE; CREARA Analysis

Despite the increase in energy savings in Spain, overall variation of final energy consumption for the studied period was of 4.097 GWh

Decomposition of the final energy consumption variation in Spain, 2000 - 2013

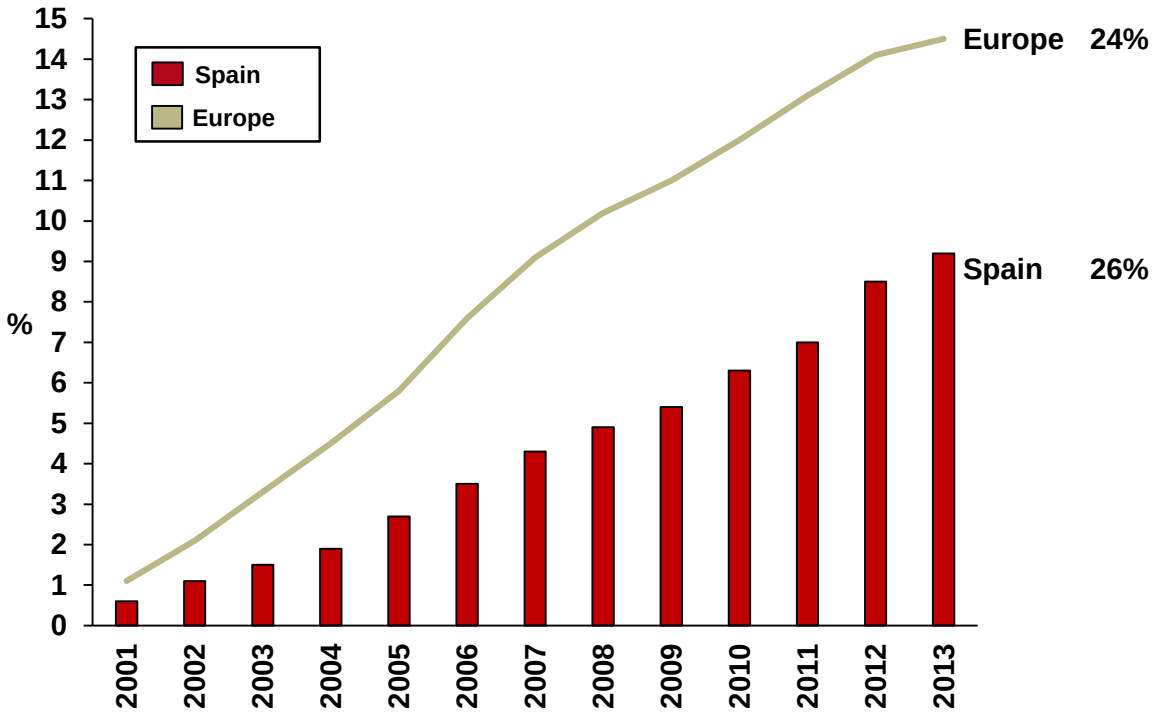


Source: ODYSSEE-MURE; IEA; CREARA Analysis

- **Since 2000, overall energy consumption has increased in Spain by around 0,4%, despite consumption decreases in several areas due to the EE energy savings**
  - The most significant increases have occurred in demography (5,9%) and other (12,3%)
  - Other consumption increases have been mainly in the following subsectors:
    - Activity (1,7%), which represents all changes in value added in industry, services, transport, etc.
    - Lifestyle (5,9%), resulting from change in use of appliances principally in households
    - Climate (0,6%), caused by the change in temperatures
- **The significant volumes of energy savings achieved through EE policies have offset part of the effects of energy consumption increases, although the final variation of consumption is still positive**
  - Energy savings have increased by 18,8% since 2000, mainly due to EE measures
- **The Spanish increase of final consumption represents a negative impact for the European total consumption**

Spain accounts for a continuous EE progress in the analyzed period 2000-2013, although the gains are still lower than the European average

Overall energy efficiency gains in the Spain and Europe according to ODEX, 2001 - 2013



- **As stated before, EE played an important role in the energy consumption decrease in Spain in the last years**
  - Over the period 2000 to 2013, the ODEX decreased continuously, which is equivalent to an EE improvement of 0,7% per year, significantly lower than the other analyzed countries
  - Total EE gains have been increasing with an annual rate of 26% for the period of 2000 to 2013
- **EE development in the different application segments shows that Spain is still an incipient country with regard to EE**
  - The industrial sector represents an average rate of 33%, representing the sector with major increase for the studied period
  - The transport sector represents an annual increase of 25% between 2000 and 2013
  - The residential sector represents an annual average rate of 14% since 2000
- **Within the 6 analyzed countries Spain is in the last position in terms of overall EE gains**

Source: ODYSSEE-MURE; CREARA Analysis

The Spanish EE market is starting to grow rapidly mainly due to the new approval of EE regulations, although it is still far behind other European EE markets such as Germany

EE market maturity in Spain

Association ESCO/ EE

- There are two principal EE/ ESCO associations (e.g.: A3E (founded in 2009) and ANESE (founded in 2010))

Number of active players

- According to *energetica,* which publishes an energy companies guide annually, in 2015, there were 689 companies directly engaged in the energy efficiency economy across the Spain:
  - 59% of the total are engineering, installers and consulting companies
  - 28% are manufacturers
  - 1% are utilities
  - 2% are principally energy agencies
  - And 10% are other kinds of companies such as operation and maintenance companies

Market concentration

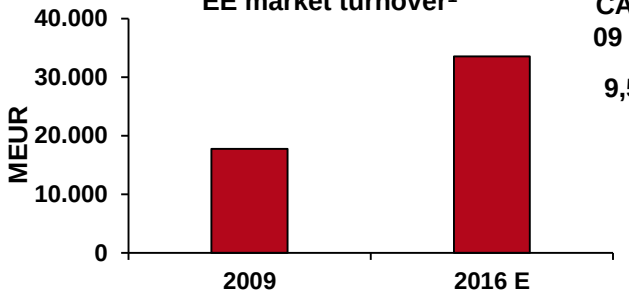
- Competitive, EE market in Spain is starting to grow so new companies are continuously entering the market

Market size[1] (indicative for evolution, not directly comparable with other countries)

EE market employees[1]

CAGR 09 - 16: 9%

EE market turnover[1]



CAGR 09 - 16: 9,5%

Year of first national EE regulation

- 1979 for both the residential and tertiary sectors:
  - Basic Building Standards for Thermal Insulation

Year of first ESCO

- 2000

Note: [1]Based on estimations of 2011 calculated by the IDAE
Source: ESCO Market Report (JRC, 2014); *Energetica* energy companies guide; CREARA Analysis; CREARA Interviews

Certification, civil engineering and renewable energies Spanish companies are diversifying their businesses towards EE increasing market competition

Type of EE market players in Spain

	Utilities	Facility managers	Manufacturers	Construction companies and installers	Engineering companies	Energy efficiency companies
Relative number	✓	✓	✓✓	✓✓✓	✓✓	✓
Description	• They sell energy flows (such as gas or electricity) to the end customer • Large mainly national companies with identified geographical zones • Large number of new players (energy suppliers)	• Companies dedicated to the management and maintenance of buildings and their services • Companies tied to large construction groups • Mainly national companies	• They manufacture equipment, tools and platforms, often complemented with other services • Large global companies, very diversified • National SMEs	• They install the equipment (one-off service at the end of the value chain) • National diversified companies (e.g. FM) • Large number of national SMEs	• Companies dedicated to the design and planning of installations and solutions (based on projects) • National SMEs, many of them *startups*	• They provide energy services and energy efficiency measures • Large international specialized companies • Different sizes of local companies
Examples	• GNF, Endesa, Iberdrola, EDP, E.ON	• Ferroser, Elecnor	• Schneider, ABB, Philips, Johnson Controls, Honeywell	• Cobra, Grupo Etra	• Sampol, Enertika, Geype, Marwen Ingenieria,	• CREARA, Anesca

Assessment: ✓ Small ✓✓ Medium ✓✓✓ Large

Source: CREARA Research; CREARA Analysis

The EU Directives are the main actors behind the power system's change in Spain; after the last stagnant years, a change in the government could affect this change

Key regulatory drivers of EE in Spain

Energy Efficiency

Regulation

- **National Energy Efficiency Action Plan (NEEAP)**
  - Sets the national target for EE on the basis of final energy consumption
  - The last NEEAP (2014-2020) shows a more ambitious target: 26,4% of energy saving vs. 20% by 2020
- **RD 314/2006, modified by RD 410/2010, which approves the Technical Building Code**
  - Regulates the quality requirements to be met by buildings, including the basic requirements of security and habitability on the Building code
- **RD 1027/2007, modified by RD 1826/ 2009 and RD 238/2013, which approves the Regulation of Thermal Installations in Buildings**
  - Sets the requirements on EE and security to be met by thermal installations in buildings, during the design and sizing, implementation, maintenance and use
  - Determines the procedures for accrediting compliance with the regulation
- **RD 235/2013, which approves the procedure for EE certification on buildings**
  - Sets the technical and administrative conditions to elaborate EE certifications on buildings, and the calculation methodology for EE qualification
  - Entails zero emissions for new constructions from 2021
- **RDL 18/2014, which approves urgent measures for growth, competitiveness and efficiency**
  - Sets the obligation for energy suppliers to implement EE measures or contribute to the Energy Fund (350 M EUR)
- **RD 56/2016, which transposes the 2012/27/UE Directive, relative to EE on energy audits and certification of energy auditors**
  - Establishes a regulatory frame that develops and encourages actions directed to the improvement of EE in an organization, to the promotion of energy savings and the reduction of greenhouse gases

- **Although the general perception in Europe is that Spain will not be able to reach the 2020 targets, the decrease in the energy demand since 2007 has permitted Spain to reach the target on EE**
- **However, the economic recovery can endanger this "achievement" of the EE target**

Note: RD – Royal Decree; RDL – Royal Decree-Law
Source: CREARA Analysis

In Spain a wide range of financial and fiscal initiatives exist that encourage the implementation of EE measures principally in the transport sector

Key incentives for EE in Spain

Energy Efficiency

Financial incentives

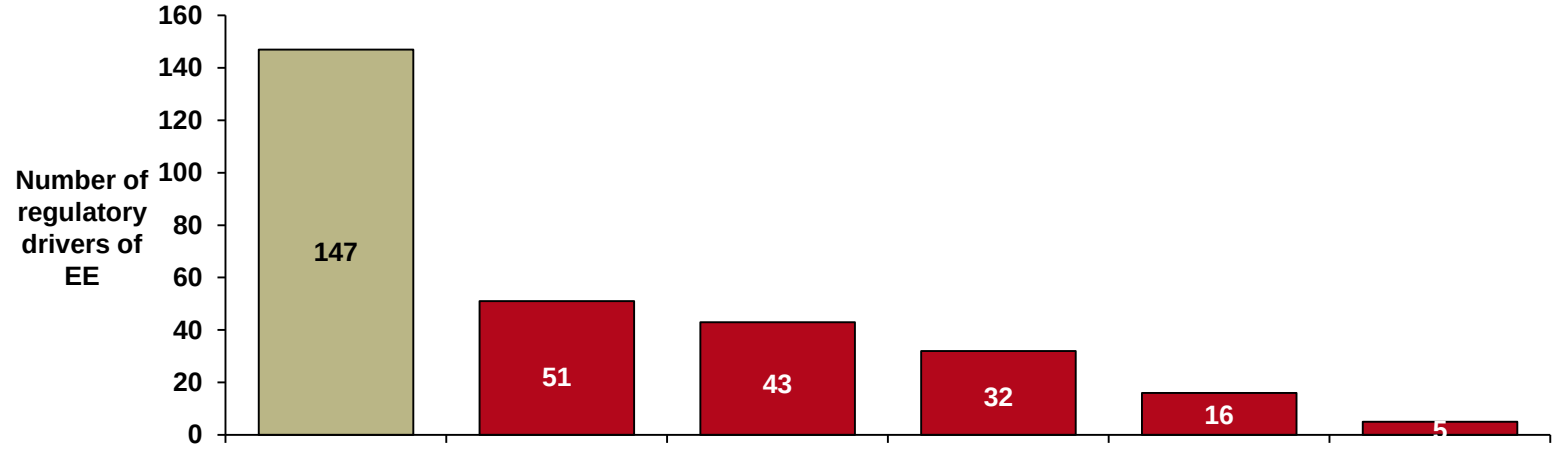
- **There are many financial initiatives in Spain that seek to obtain EE improvements, some of them (the ones with higher impact according to ODYSSEE - database) are listed bellow according to the application segment:**
  - Residential and tertiary sector:
    - PAREER-CRECE Program, Aids Program for Energy Rehabilitation in Buildings in Household and Hotel Sectors (2014)
    - State Plan 2013 - 2016 for Rental Housing, Housing Rehabilitation, and Urban Regeneration and Renewal (2013)
  - Industrial sector:
    - Aids to SMEs and large companies in the industrial sector (2015)
  - Tertiary sector:
    - Aid Program for the Renewal of Municipal Street Lighting Installations (2015)
    - PIMA SOL, Plan for Promoting Energy Rehabilitation of Hotel Sector (2013)
  - Transport sector:
    - MOVELE 2014 Program (2014)
    - Plan to promote Environment (2014)
    - PIVE Program, Efficient Vehicle Incentive Program (2012)
    - Integral Strategy to Impulse the EV/PHEV in Spain (2010)
    - Fiscal Measures to Promote Car Fuel Efficiency (2008)
  - General cross-cutting:
    - National Energy Efficiency Fund (2015)
    - Law on Tax Measures for Energy Sustainability (2013)
    - JESSICA - F.I.D.A.E Fund (2013)

- **Spanish fiscal and financial incentives for EE cover all application segments, many focused on the transport sector**
- **The industrial segment has only one financial initiative that focuses on the implementation of EE measures**

Source: IEA; European Commission; ODYSSEE-MURE; CREARA Analysis

Although the overall number of EE regulatory drivers in Spain is high, less than 1/3 of these are still in force

Summary of total regulatory drivers of EE in Spain according to ODYSSEE



Odyssee database[2]	Total	Transport	Tertiary	Household	Industry	General cross-cutting
Year of 1st regulation	1979	1991	1979	1979	1985	2011
# high impact	92	24	31	24	9	4
# medium impact	37	15	9	6	6	1
# low impact	18	12	3	2	1	0
# of laws in force	43	11	14	12	2	4

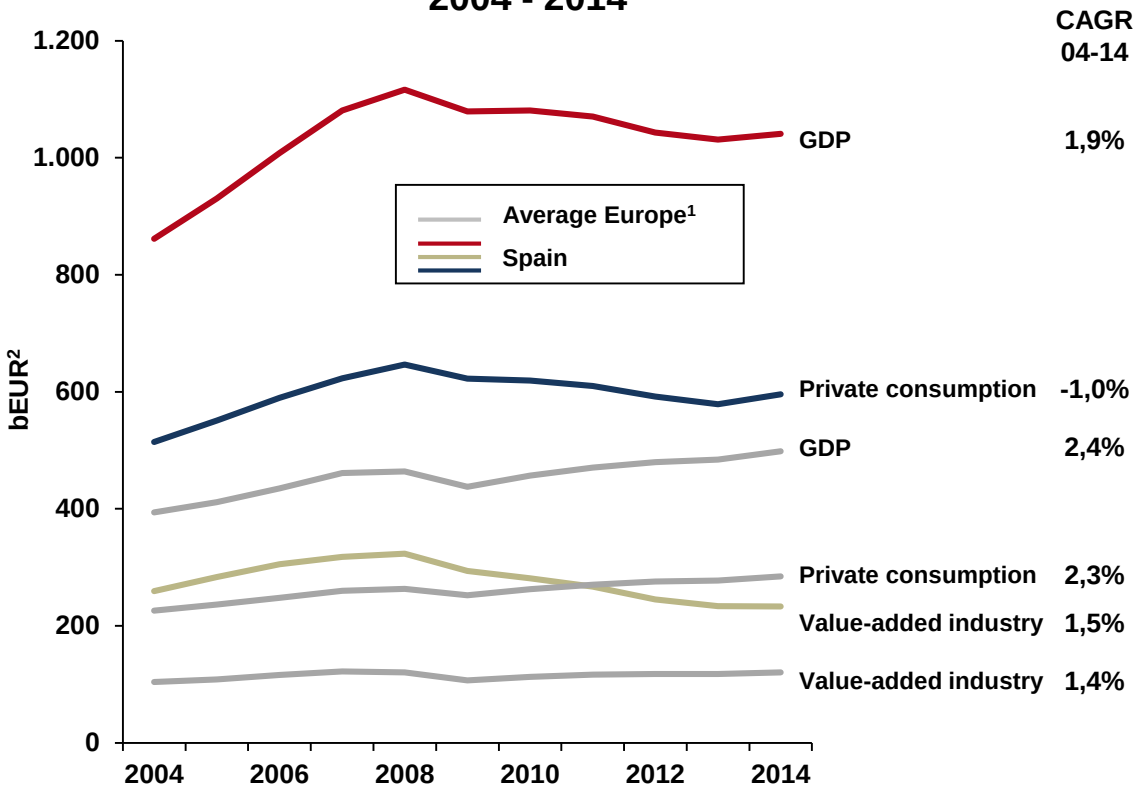
- Many regulatory drivers implemented in the past are not in force anymore
- The number of high impact[1] regulatory drivers is much higher than the low and medium ones for all application segments representing half of the ongoing measures

Note: [1]The impact of a regulatory driver has been quantified in relation with energy consumption and CO2 emissions; [2]The missing regulations to reach the total number were allocated to "unknown impact"

Source: ODYSSEE-MURE; CREARA Analysis

The GDP has shown overall positive growth rates in Spain since 2004, although with periods of stagnation and a significant decrease since the beginning of the financial crisis

Macro-economic evolution in Spain and Europe 2004 - 2014



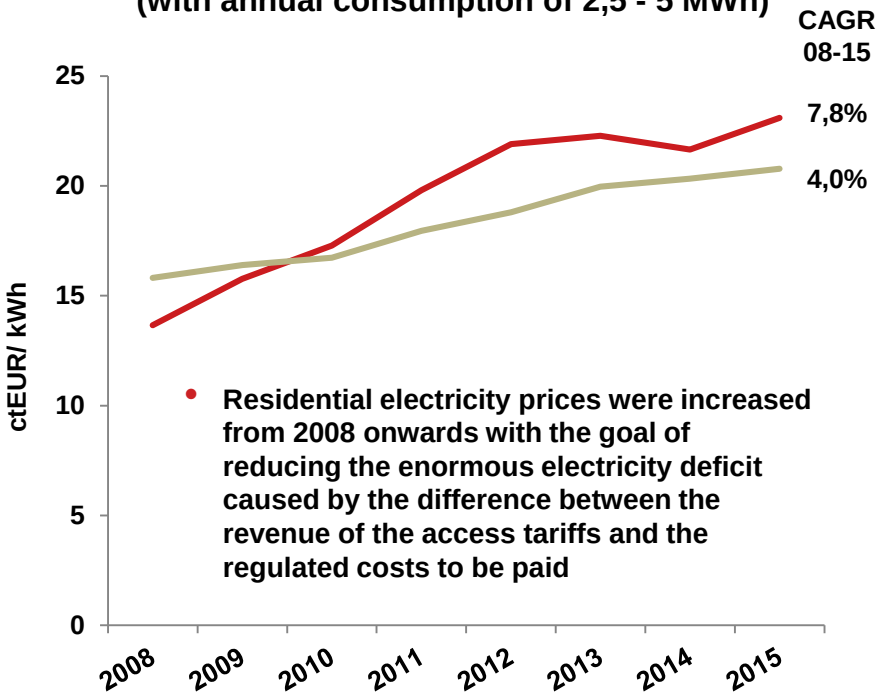
- **In 2014, total real GDP in Spain amounted to 1.041.160 MEUR, showing a generally positive increase over the years (CAGR 2004 - 2014 1,9%)**
  - The change in the economic situation in Spain started becoming evident from the third term of 2008 onwards
  - A new scenario with a recovery of the Spanish economy consolidated the situation from the second half of 2013
  - Nonetheless the GDP decreased by 1,2% in 2013, partly as a result of the effect from a dramatic decrease of activity in late 2012
  - GDP still has not returned to pre-crisis levels
- **Private consumption accounts for the partial recovery in the second half of 2013, after two years of decrease**
  - As overall GDP, private consumption suffered a strong decline since 2008 due to the economic and financial crisis
- **Spain presents higher values than the European average for the three analysed parameters**

Note: [1]Europe refers to the average data for the European Union (28 countries); [2]bEUR stands for billion i.e. one thousand million
Source: ODYSSEE-MURE; Eurostat; IEA; CREARA Analysis

Spanish electricity prices have grown significantly in recent years and are higher than the average European prices; industrial prices have seen a slight decrease in 2015

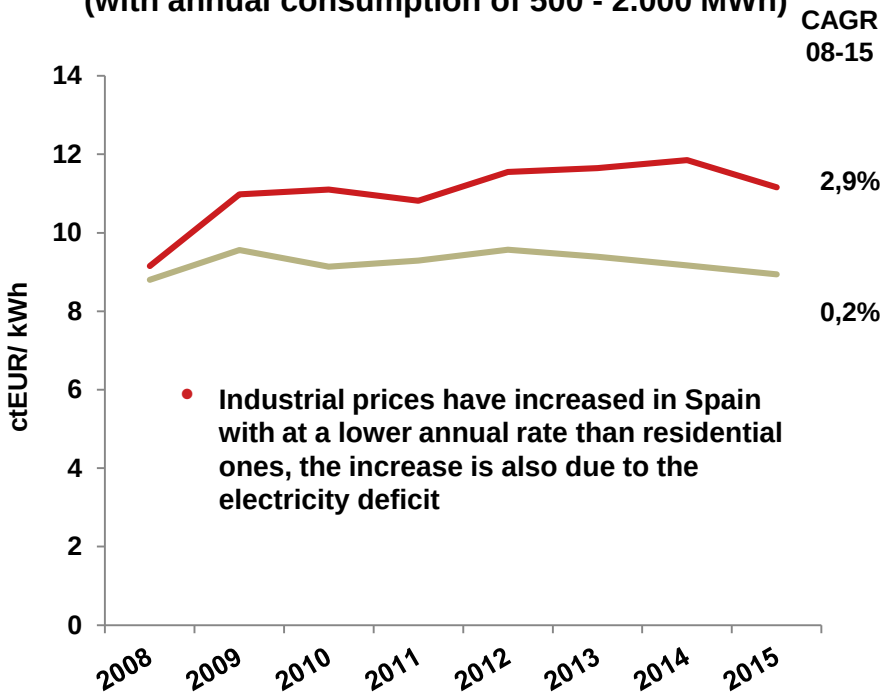
Evolution of average electricity prices in Spain and Europe, 2008 - 2015

Medium size households (with annual consumption of 2,5 - 5 MWh)



- Residential electricity prices were increased from 2008 onwards with the goal of reducing the enormous electricity deficit caused by the difference between the revenue of the access tariffs and the regulated costs to be paid

Medium size industries (without taxes) (with annual consumption of 500 - 2.000 MWh)



- Industrial prices have increased in Spain with at a lower annual rate than residential ones, the increase is also due to the electricity deficit

Key: Spain — Europe[1]

Note: [1]Europe refers to the average data for the European Union (28 countries)
Source: ODYSSEE-MURE; Eurostat; CREARA Analysis

Some improvements have been made in the Spanish social conception of the environment; however, the population's consciousness is still far from other countries

Attitudes of Spanish citizens towards the environment[1]

			2007	2011	2014	
					Spain	EU6[2]
Resource efficiency and protection of the environment can lead to economic growth	Better use of resources (A.9.2.)	Totally/Tend to Agree	-	83%	80%	80%
		Totally/Tend to Disagree	-	9%	9%	10%
	Protection of the environment (A.9.1.)	Totally/Tend to Agree	57%	78%	79%	76%
		Totally/Tend to Disagree	13%	15%	11%	15%
Citizens behavior towards environment	Willingness to pay for eco-products (A.10.)	Totally/Tend to Agree	64%	60%	73%	76%
		Totally/Tend to Disagree	22%	34%	24%	23%
	Level of commitment personally (A.16.2.)	Doing too much	-	1%	3%	2%
		Doing the right amount	-	21%	27%	29%
		Not doing enough	-	75%	68%	65%
Information about environmental issues	Well/Badly Informed (A.3.)	Very/Fairly Well	45%	46%	56%	62%
		Very/Fairly Badly	53%	53%	44%	38%

- The percentages of agreement in the proposed questions seem lower than in other countries, although following a similar trend to the average EU6 values
- The share of people affirming they are not doing enough to protect the environment seems quite alarming (68% of respondents)
- Concerning the perception of information, in spite of having passed the 50% barrier of "well-informed", 44% of the Spanish population feels very/fairly badly informed about environmental issues

Note: [1]The missing % to 100% was allocated to "don't know"; [2]It refers to the average value of the six analyzed countries; [2]Eurobarometer questions' reference number differs from one year to another, 2014 reference numbers are indicated

Source: EUROBAROMETER; CREARA Analysis

The principal informative and awareness raising programs in Spain have had a positive impact in the development of EE in the country

Principal[1] informative and educational campaigns developed in Spain

	Description	Sector	Organizing party	Starting year	Status	Quantitative impact
Training of the local council energy managers	• The object of this measure is to manage the organization of energy training courses for municipal technicians and authorities in charge of the maintenance of the municipal installations	• Tertiary	• Government under the NEEAP	• 2011	• Ongoing	• High
Awareness raising and training of consumers and salespeople	• The aim of this measure is to train the household appliance sellers and raise users awareness on the advantages of EE and labelling • Development of training courses both face-to-face and online	• Residential	• IDAE	• 2005	• Completed (2007)	• High
Aid programs for modal and means of transport shift	• This aid program seeks to promote the realization of sustainable transport plans to the workplace with a view to achieving significant changes in the modal split, with greater involvement of the most efficient modes	• Transport	• IDAE	• 2015	• Ongoing	• Medium
Training plan for road haulage personnel in the reduction of energy consumption	• The project consists in the elaboration of a comparative study containing European training plans and these available in Spain • Also, it develops a specific training program, seeking a significant reduction of operation costs through fuel reduction	• Transport	• IDAE and the Spanish Goods Transport Confederation	• 1994	• Completed (2007)	• Medium

Note: [1]In total there are 28 different informative campaigns in Spain according to the Odyssee-Mure database
Source: ODYSSEE-MURE; CREARA Analysis

The main element to succeed in the Spanish EE market seems to be offering one-stop solutions at the lowest price (1/2)

Elements of company according to importance by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	Medium	• Lowest price	• One-stop solution	• Innovation of service/ product
Competitiveness	High	• Lowest price	• Innovation of service/ product	• Close relationship with client
Regulation	High (R)	• Lowest price	• Comply with regulation	• One-stop solution
	Medium (C&I)	• One-stop solution (comfort)	• Lowest price	• Comply with regulation
Economic incentives/ financing options	Low (R)	• Short payback period of product/ service	• One-stop solution	• Corporate brand
	Medium (C&I)	• Short payback period of product/ service	• One-stop solution	• Corporate brand
Energy price	High	• Innovation of service/ product (savings)	• Lowest price	• One-stop solution
Social consciousness	Low (R)	• Lowest price	• One-stop solution	• Innovation of service/ product (savings)
	High (C&I)	• Lowest price	• Corporate brand	• Innovation/ One-stop solution

Note: R: residential; C: commercial; I: industrial
Source: CREARA Interviews; CREARA Analysis

The main element to succeed in the Spanish EE market seems to be offering one-stop solutions at the lowest price (2/2)

Explanation of the elements of success segmented by market characteristics

	Status	Elements of success
Maturity	Medium	• The most important element for Spanish consumers is the price of the offered solution as Spain, together with Portugal, is less mature than the other analyzed countries • Offering one-stop solutions could improve the successfulness of the players in the Spanish EE market as well as providing innovative services
Competitiveness	High	• In the highly competitive market, in order to gain advantage over other competing companies, a service provider should offer the lowest price, differentiate the offer through innovative solutions and build up a close relationship with the client
Regulation	High (R)	• The R segment is highly regulated in the Spanish EE market, to compete companies must offer low priced solutions which comply with regulation as consumers are not willing to pay extra for elements that are not legally required
	Medium (C&I)	• For C and I clients it is more important to receive one-stop solutions. The low price and the compliance with the regulation are important as well though, as clients are reluctant to pay for any extras
Economic incentives/ financing options	Low (R)	• Even though the level of economic incentives differs in the three segments (low and medium), all clients are looking for the same elements in a company and its services: a short payback periods, as the investment and other costs have to be covered mainly by the consumer • Furthermore, one-stop solutions which cover all phases of the EE project as well as a corporate brand are attractive. As the client has to pay for the EE measures, well-known companies contribute confidence
	Medium (C&I)	
Energy price	High	• Spain has relatively high energy prices which encourage the implementation of EE solutions, the clients are therefore interested in implementing innovative services, even though these should focus mainly on savings • A low price and a one-stop solution are attractive here as well
Social consciousness	Low (R)	• Even if the C and I sectors have a high consciousness of the importance of EE and the environment, the lowest price is the most important selling feature. A corporate brand and an innovative solution could be used for improving their green image • In the residential segment, the consciousness is lower leading to a situation where consumers are looking for low prices, one-stop solutions and innovative services that are focused on savings
	High (C&I)	

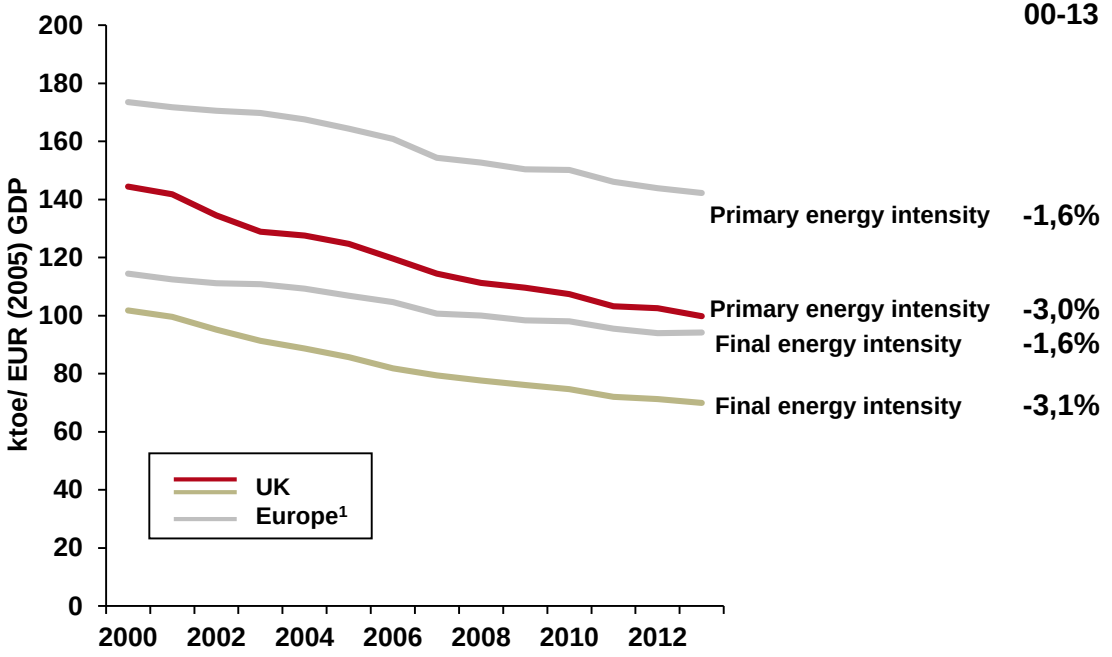
Note: R: residential; C: commercial; I: industrial
Source: CREARA Interviews; CREARA Analysis

Agenda

- **Introduction**
- **Country profiles**
  - Belgium
  - France
  - Germany
  - Portugal
  - Spain
  - UK
- **Case studies**
- **Conclusions**

The UK's primary and final energy intensity present a downward trend throughout the period 2000 - 2013 with average reduction rates higher than the European average

Development of primary and final energy intensity in the UK and Europe, 2000 - 2013

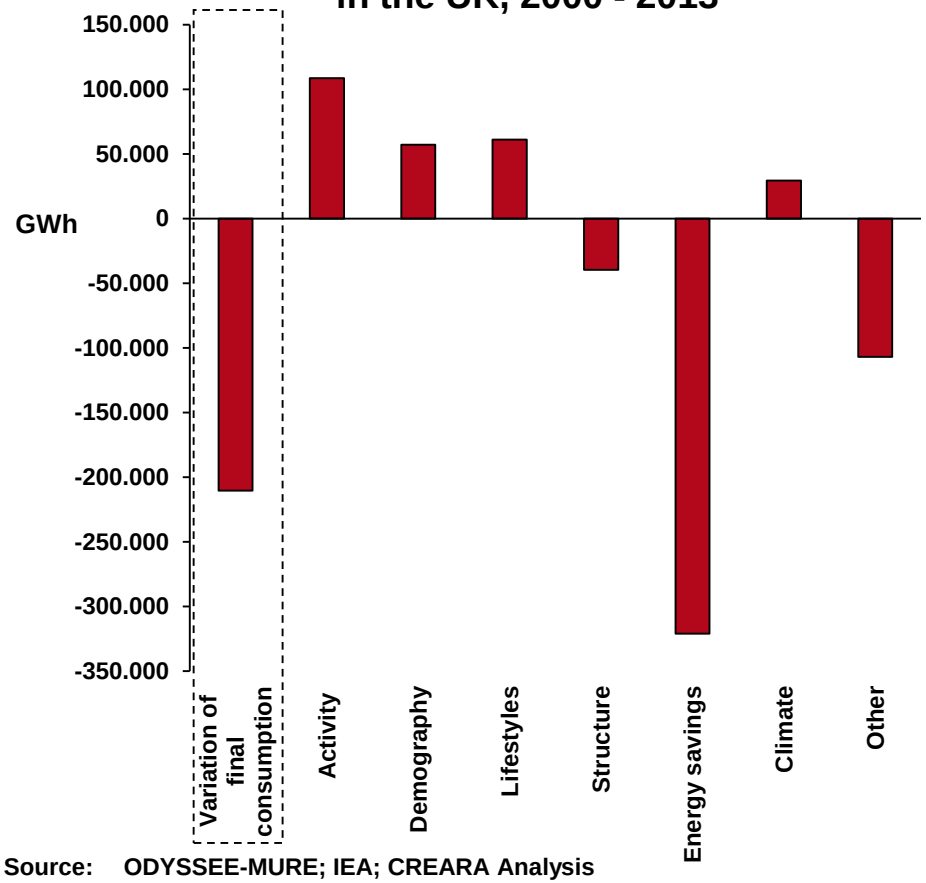


- **The graph shows a downward trend in both primary and final energy intensities over the period 2000 - 2013**
  - The downward trend in energy intensity suggests improvements in EE, but there may be other underlying effects contributing to the changes, such as:
    - Fuel switching
    - Uses that do not increase in line with economic output (such as space heating)
    - Changes in the structure of the economy
- **The overall development of final energy intensity is very similar to the primary intensity one, only the average reduction rate is slightly higher**
  - Final energy intensity presents an average annual decrease of 3,1% and primary energy intensity of 3,0%
- **Both primary and final energy intensities are decreasing faster than the European average increasing the difference between both over the years**

Note: [1]Europe refers to the European Union (28 countries); [2]CAGR, Compound Annual Growth Rate
Source: ODYSSEE-MURE; CREARA Analysis

The overall variation of final consumption for the period 2000 to 2013 in the UK was of -210.380 GWh; representing a reduction close to 12%

Decomposition of the final energy consumption variation in the UK, 2000 - 2013

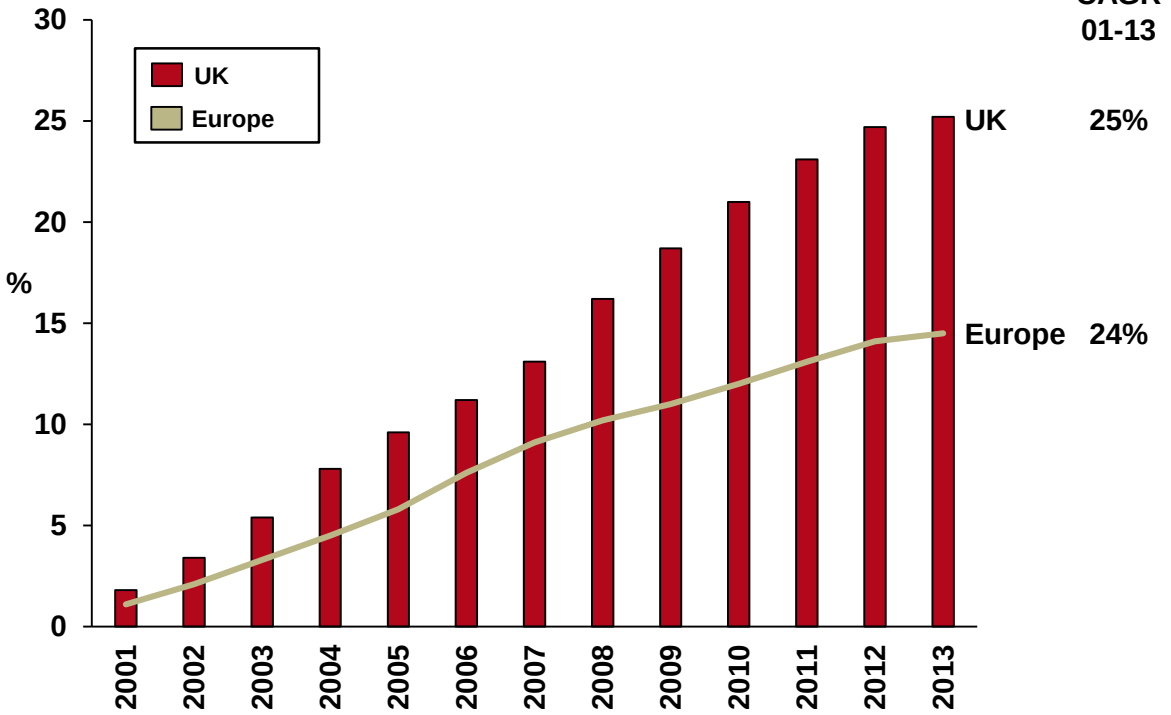


Source: ODYSSEE-MURE; IEA; CREARA Analysis

- **Since 2000, overall energy consumption has decreased by around 11,8% in the UK, mainly due to energy efficiency, despite consumption increases in several areas over the period**
  - The major increase can be found in activity, 6,1%, which represents all changes in value added in industry, services, transport, etc.
  - The other consumption increases have been mainly due to:
    - Demography (3,2%), due to the construction of new households
    - Lifestyle (3,4%), resulting from a change in the use of appliances and the evolution on innovation
    - Climate (1,6%), caused by a change in temperatures
- **Energy savings have increased by 18% since 2000, mainly due to EE measures in the building sector**
- **UK has helped to achieve a positive variation in energy consumption for the European Union**

UK is among the top five European countries in energy efficiency gains, which rated 25,2% (between 2000 - 2013), significantly above the European average

Overall energy efficiency gains in the UK and Europe according to ODEX, 2001 - 2013



- **The UK achieves an EE improvement of about 2% per year, to some extent lower than the final energy intensity decrease of 3%**
  - Total EE gains have been increasing with an annual average growth of 25,2% for the period of 2000 to 2013
- **Compared to the average European EE gains UK has obtained better rates since 2001, standing among the top 5 European countries in this matter[1]**
- **All three application segments have helped with the improvement of energy efficiency gains in the UK**
  - The residential sector represents an annual growth rate of 29%, representing the sector with the highest increase for the studied period
  - The transport and industrial sector represents an average annual growth of 25% (between 2000 - 2013)

Note: [1]Slovakia, Belgium, Latvia, Poland and the UK
Source: ODYSSEE-MURE; CREARA Analysis

The EE market in the UK is in second position in terms of market size behind Germany, representing a highly developed market

EE market maturity in the UK

Association ESCO/ EE

- Various EE/ ESCO associations (e.g.: ESTA (founded in 1986), EMA (founded in 2012), etc.)

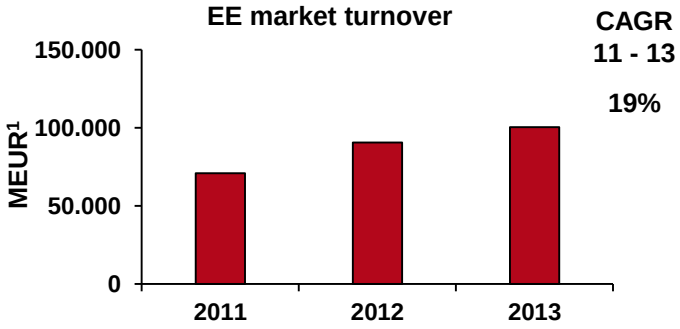
Number of active players

- In 2013 there were 11.550 businesses directly engaged in the energy efficiency economy across the UK:
  - Low carbon electricity, 3.360 companies (29% of total)
  - Low carbon heat, 1.070 companies (9% of total)
  - Energy efficiency products, 1.940 companies (17% of total)
  - Low carbon services, 790 companies (7% of total)
  - Waste processing, energy from waste and biomass, 4.230 companies (37% of total)
  - Low emission vehicles, 150 companies (1% of total)

Market concentration

- Highly competitive, large international companies dominate the market

Market size[2] (indicative for evolution, not directly comparable with other countries)



Year of first national EE regulation

- 1974 for the transport sector:
  - Freight Facilities Grant

Year of first ESCO

- 1980

Note: [1]Exchange rates – 2011: 1,1515 GBP/EUR; 2012: 1,2329 GBP/EUR; 2013: 1,1776 GBP/EUR; [2] Numbers do not include low carbon electricity
Source: OANDA; Department for Business, Innovation and Skills; ESCO Market Report (JRC, 2014); CREARA Analysis; CREARA Interviews

A large number of players are active in the UK, where large companies, principally engineering companies, are dominating the market making it difficult for new companies to succeed

Type of EE market players in the UK

	Utilities	Facility Managers	Manufacturers	Construction companies and installers	Engineering companies	Energy Efficiency services	Other
Relative number	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓
Description	• They sell energy flows (such as gas or electricity) to the end customer • Different international groups, very fragmented market • Large number of large international groups, and SMEs	• Companies dedicated to the management and maintenance of buildings and their services • The most mature FM market worldwide, with large and medium market players	• They manufacture equipment, tools and platforms, often complemented with other services • Large international manufacturers of building automation & control systems, with important presence in the market	• They install the equipment (one-off service at the end of the value chain) • The number of construction and property companies has been increasing in the last years	• Companies dedicated to the design and planning of installations and solutions (based on projects)	• They provide energy efficiency measures: EPCs, metering, supervision, etc. • Important international companies and a growing number of smaller consultancies	• Energy financing institutions, providing the financing to undertake the energy services projects • Important role of the UK Green Investment Bank (GIB) (Green Deal Finance Company supports the projects of GIB)
Examples	• British Gas (Centrica), EDF, EON, Scottish Power (Iberdrola)	• Compass, Carillion, MITIE, Rentokil Initial, EMCOR	• Schneider, Honeywell, Siemens	• Cogenco; TheGreenAge	• Max Fordham, Thames Energy Ltd	• Dalkia, Just energy solutions	• UK Green Investment Bank

Source: CREARA Research; CREARA Analysis

Assessment: ✓ Small ✓✓ Medium ✓✓✓ Large

The UK government has implemented various programs to promote EE in order to achieve the goal of reducing consumption by 18% in 2020

Key regulatory drivers of EE in the UK

Energy Efficiency

Regulation

- **Energy efficiency target set for the fulfillment of the European Energy Efficiency Directive (EED 2012/27/EU) (2013)**
  - Sets a national indicative target for EE on the basis of final energy consumption. This indicative target has been established taking into account the overall EU target of reducing energy consumption by 20% by 2020
  - Reduce primary energy consumption from 2007 levels by 18% by 2020
- **Energy Company Obligation (2013)**
  - Sets legal obligations for energy suppliers so that they offer EE measures to energy users
  - Energy suppliers have an obligation to help improve the EE of buildings of their domestic customers in three distinct areas:
    - Carbon emission reduction
    - Community obligation
    - Efficient heat measures cost reduction

Programs

- **Green Deal (2013)**
  - Provides grants for EE through which consumers pay for part of the costs of EE measures
  - The grant is a type of loan that is paid back with the savings customers make on their fuel bills
- **Carbon Reduction Commitment Energy Efficiency Scheme (CRC) (2010)**
  - Encourages EE and the reduction of emissions, by setting savings obligations for large energy users in both public and private sector, i.e. those responsible for around 10% of greenhouse gases emissions in the country
  - Offers a wide range of measures to develop energy management strategies that promote a better understanding of the use of energy

- **The UK EE Watch report affirms that the majority of domestic experts assess the progress made by the UK in the last 3 years as low to moderate: 60% believe that only a few additional policies have been set up**
- **With regard to the overall ambition of the UK, the experts are divided, about half of the respondents consider the ambition to be rather low and the other half consider it relatively high**

Source: IEA; UK Government; OFGEM; ODYSSEE-MURE; European Commission; CREARA Analysis

The UK presents a wide range of financial and fiscal initiatives that promote EE in the country by lowering initial investments for residential consumers

Key incentives for EE in the UK

Energy Efficiency

Financial incentives

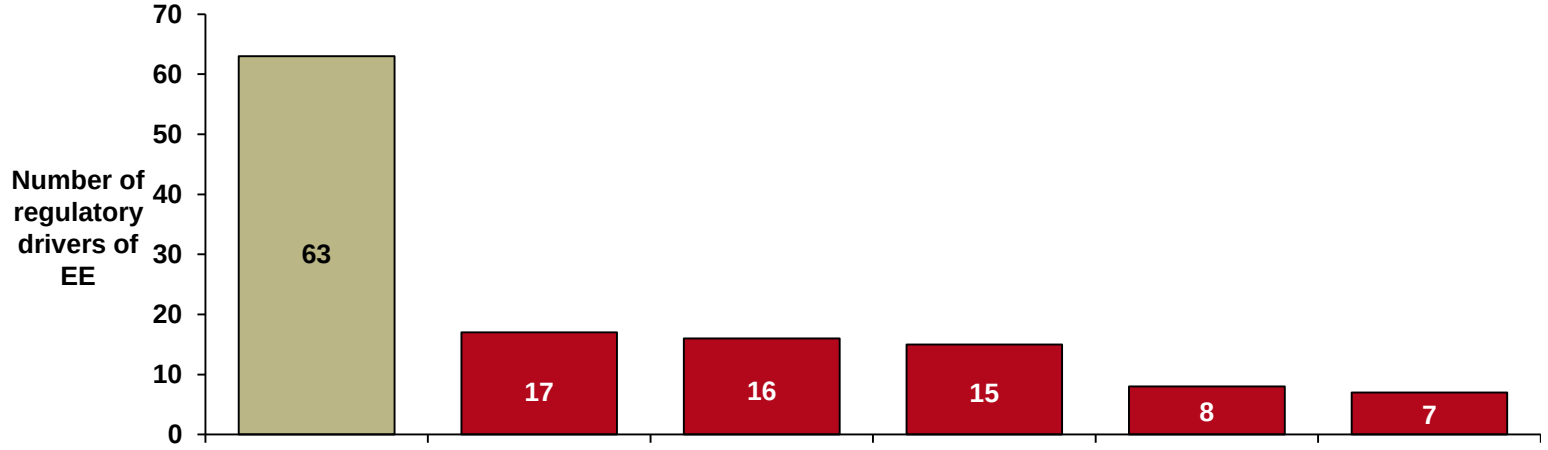
- **The most important program of incentives in the UK is the previously mentioned Green Deal, which provides grants to energy consumers to pay for the implementation of EE measures**
  - A requirement for larger energy suppliers (Energy Company Obligation (ECO)) works alongside the Green Deal to provide additional support for viable packages of EE measures that are unlikely to be fully financed by the Green Deal
  - These packages could include insulation of hard-to-treat cavities or solid walls
  - The ECO also provides insulation and heating measures to low-income and vulnerable households and insulation measures to low income communities
- **There are other initiatives that seek to obtain EE improvements in UK, examples are:**
  - Residential sector:
    - Home Energy Efficient Programmes (Scotland) (2013)
    - Descent Homes Standard (2001), a minimum standard that triggers action to improve social housing
  - Industrial sector:
    - Climate Change Agreements (2001)
    - Carbon Trust programmes (2001)
  - Tertiary sector:
    - Public Sector financing through Salix (2006)
    - Enhanced Capital Allowance Scheme (2001)
  - Transport sector:
    - Plug-In Car Grant (2011)

- **The Green Deal is an ambitious and long term initiative designed to upgrade the EE of Britain's buildings, extra help may be available through the Energy Company Obligation (ECO) and the other programs established to provide financing aid for EE**

Source: IEA; European Commission; ODYSSEE-MURE; CREARA Analysis

The number of low impact[1] regulatory drivers is higher than the high and medium ones

Summary of total regulatory drivers of EE in the UK according to ODYSSEE



Odyssee database[2]	Total	Household	Transport	Tertiary	General cross-cutting	Industry
Year of 1st regulation	1974	1992	1974	1992	2008	2000
# high impact	19	4	1	7	3	4
# medium impact	14	4	2	2	4	2
# low impact	26	8	10	6	1	1
# of laws in force	50	13	11	13	6	7

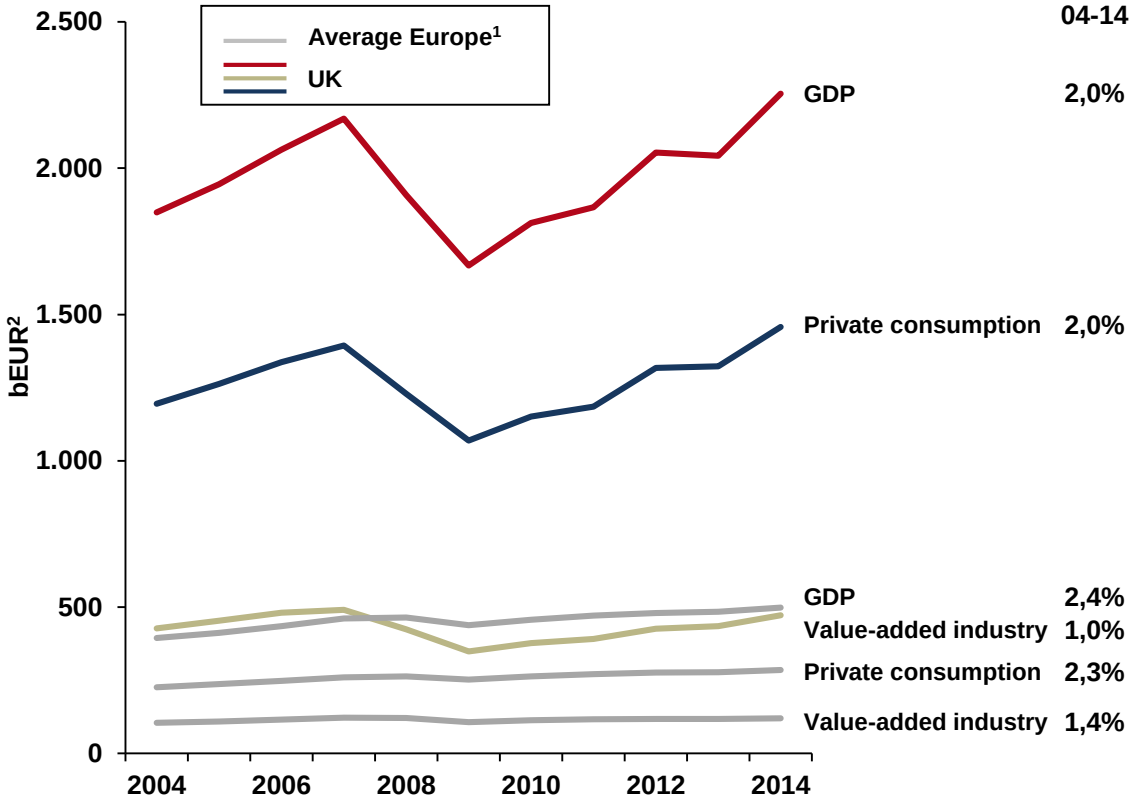
- **UK regulatory drivers have started in different years depending on the application segment, i.e. while residential and tertiary started in 1992 it was not until 2000 that the industrial one had a regulatory driver**

Note: [1]The impact of a regulatory driver has been quantified in relation with energy consumption and CO2 emissions; [2]The missing regulations to reach the total number were allocated to "unknown impact"

Source: ODYSSEE-MURE; CREARA Analysis

The UK's GDP suffered an economic downturn from the second half of 2008 until the end of 2009 mainly due to the financial crisis, since then it has recovered to pre-crisis levels

Macro-economic evolution in the UK and Europe 2004 - 2014



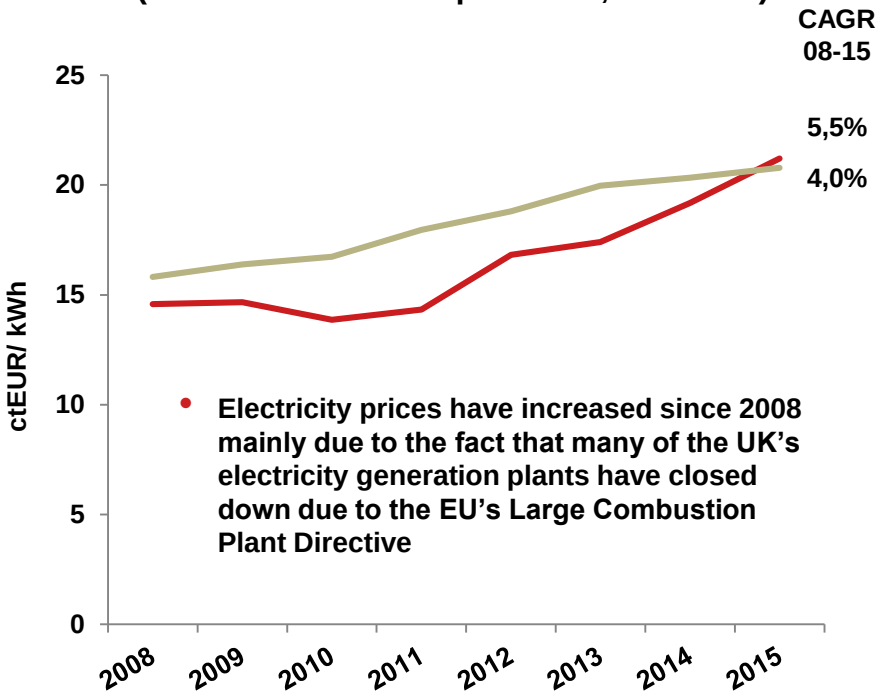
- **In 2014, total real GDP in the UK amounted to 2.254.297 MEUR, showing a general positive increase (CAGR 2004 - 2014, 2,0%)**
  - Due to the economic crisis GDP suffered an economic downturn which commenced in the second half of 2008 and was maintained until the end of 2009
  - Since 2010, the economic growth measured by the GDP increased on average 6% per year
- **Private consumption growth followed a similar trend to overall GDP**
- **Value added of industry presents a positive growth since 2004 although it presents lower rates that the other parameters**
  - In the UK there has been a shift towards a service economy as manufacturing and heavy industry tend to move to countries with lower labour costs
- **Although the displayed parameters have undergone major changes since 2004, UK values have always been well above the European average**

Note: [1]Europe refers to the average data for the European Union (28 countries); [2]bEUR stands for billion i.e. one thousand million
Source: ODYSSEE-MURE; Eurostat; IEA; CREARA Analysis

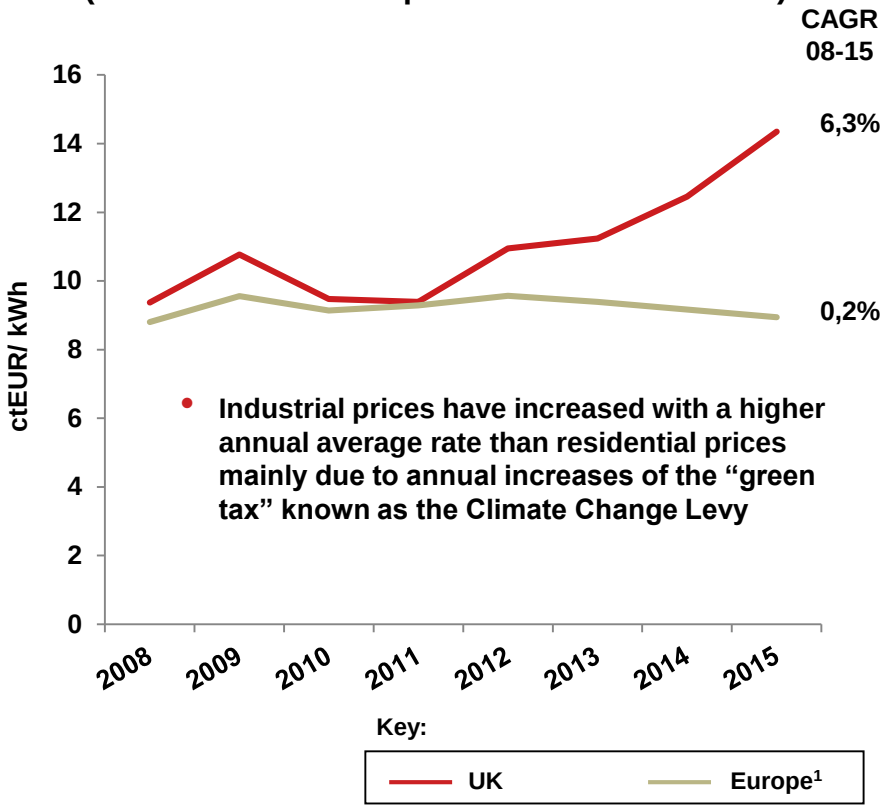
Electricity prices for both residential and industrial consumers in the UK have increased significantly since 2010; for industries they are now 60% higher than the European average

Evolution of average electricity prices in the UK and Europe, 2008 - 2015

Medium size households (with annual consumption of 2,5 - 5 MWh)



Medium size industries (without taxes) (with annual consumption of 500 - 2.000 MWh)



Note: [1]Europe refers to the average data for the European Union (28 countries)
Source: ODYSSEE-MURE; Eurostat; CREARA Analysis

The UK population shows a good level of environmental awareness and general commitment with the environment, although further progress could be made, especially in the commitment of citizens

Attitudes of UK citizens towards the environment[1]

			2007	2011	2014	
					UK	EU6[2]
Resource efficiency and protection of the environment can lead to economic growth	Better use of resources (A.9.2.)	Totally/Tend to Agree	-	84%	75%	80%
		Totally/Tend to Disagree	-	9%	8%	10%
	Protection of the environment (A.9.1.)	Totally/Tend to Agree	60%	73%	68%	76%
		Totally/Tend to Disagree	19%	19%	14%	15%
Citizens behavior towards environment	Willingness to pay for eco-products (A.10.)	Totally/Tend to Agree	79%	74%	82%	76%
		Totally/Tend to Disagree	17%	24%	17%	23%
	Level of commitment personally (A.16.2.)	Doing too much	-	2%	1%	2%
		Doing the right amount	-	27%	31%	29%
		Not doing enough	-	67%	61%	65%
Information about environmental issues	Well/Badly Informed (A.3.)	Very/Fairly Well	70%	76%	70%	62%
		Very/Fairly Badly	27%	23%	29%	38%

- The UK population seems to be very willing to contribute to the protection of the environment when it comes to paying for eco-friendly products
- The economic crisis seems to be reflected in the willingness to pay for eco-friendly products in 2011, but in 2014 UK showed the highest results among the 6 analyzed countries
- Like in the case of the other analyzed countries, despite the fact that most results indicate a "green conscience" of the country, 61% of the respondents admit that they are not doing enough to protect the environment, which represents a lower rate than the EU6 average one

Note: [1]The missing % to 100% was allocated to "don't know"; [2]It refers to the average value of the six analyzed countries; [2]Eurobarometer questions' reference number differs from one year to another, 2014 reference numbers are indicated

Source: EUROBAROMETER; CREARA Analysis

All informative campaigns in the UK have been launched by the Government, presenting a low quantitative impact

Principal[1] informative and educational campaigns developed in the UK

	Description	Sector	Organizing party	Starting year	Status	Quantitative impact
Combined Heat and Power (CHP)	• The program aims to reduce energy demand as a means to achieve security of energy supply • The overall objective is to create a framework to facilitate and support the installation and proper operation of cogeneration	• Industry	• Government	• 2008	• Ongoing	• Low
Act CO2 Campaign	• The campaign aimed to create awareness of the link between people's own everyday behavior and climate change • The campaign included the launch of a web-based CO2 calculator, a short film, TV advertising and an educational brochure	• Household and transport	• Government departments such as the Department of transport	• 2007	• Completed (2011)	• Low
Smarter choices	• The objective of the program was to promote changes towards more sustainable patterns of travel behavior using a range policy measures: – These include: travel awareness campaigns, marketing and public transport information; car sharing scheme; etc.	• Transport	• Department of Transport	• 2005	• Completed (2009)	• Low
Energy Saving Trust	• The program provides support for household EE activities though advertising programs, advice centres and the endorsement of energy efficient products • It also provides energy saving advice	• Household	• Government	• 1992	• Ongoing	• Medium

Note: [1]In total there are 9 different informative campaigns in the UK according to the Odyssee-Mure database
Source: ODYSSEE-MURE; CREARA Analysis

The most important element for being successful in UK's EE market is to offer innovative services at the lowest possible price (1/2)

Elements of company according to importance by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	High	• Lowest price	• Innovation of service/ product (savings)	• One-stop solution
Competitiveness	High	• One-stop solution	• Track record (corporate brand)	• Lowest price
Regulation	High	• Innovation of service/ product (savings)	• One-stop solution	• Comply with regulation
Economic incentives/ financing options	Low	• Short payback period of product/ service	• Financing options (can be external)	• Track record (corporate brand)
Energy price	High	• Innovation of service/ product (savings)	• Short payback period of product/ service	• One-stop solutions
Social consciousness	Medium	• Comply with regulation	• Innovation of service/ product (savings)	• Lowest price

Source: CREARA Interviews; CREARA Analysis

The most important element for being successful in UK's EE market is to offer innovative services at the lowest possible price (2/2)

Explanation of the elements of success segmented by market characteristics

	Status	Elements of success
Maturity	High	• The mature UK EE market is favoring companies that offer low priced EE services • Innovative products and services are considered attractive, if they are focused on achieving savings for the client. Companies that offer one-stop solutions that allow the client to hand over the complete project to the service provider might be more successful than companies offering partial projects
Competitiveness	High	• UK's EE market is highly competitive, companies that offer one-stop solutions and a good track-record could have more success. In this aspect, the UK seems to be more similar to the German market than to the others 4 which focus more on low prices • A low price is considered important, though less than the other elements
Regulation	High	• Like the other countries the UK is considered highly regulated with respect to EE • To be competitive companies should offer innovative service/ product that are focused on obtaining savings for the client • One-stop solutions and the compliance of the service with the regulation are considered other aspects that can give a company an advantage
Economic incentives/ financing options	Low	• In the UK given the low availability of economic incentives companies that offer solutions with short payback periods seem to be more successful • For the client it is important to have access to financing options as well (even if these are provided by a third party) and that the company has a well-known corporate brand in case the investment is undertaken by the client himself
Energy price	High	• The UK has relatively high energy prices which encourage the implementation of EE solutions, clients are therefore looking for services that are innovative by providing attractive savings • Companies offering solutions with short payback periods as well as one-stop solutions will succeed rather than companies offering projects that pay-off in the long-run and that the client has to manage
Social consciousness	Medium	• The medium level consciousness in the UK asks for services that focus on complying with the regulation • Innovative services that focus on obtaining attractive savings might achieve more attention by the consumers

Source: CREARA Interviews; CREARA Analysis

Agenda

- **Introduction**
- **Country profiles**
  - Belgium
  - France
  - Germany
  - Portugal
  - Spain
  - UK
- **Case studies**
- **Conclusions**

CMI Energy Efficiency

Basic information		• Part of CMI Group, which was founded in 1817 • Headquarters are located in Seraing, Belgium • Offices: Brazil, China, Germany, France, Luxembourg, India, New Caledonia, Russia UK and the US • Core business: Design and installation of equipment for upgrading services in energy, defense, steel-making, and other industries in general and assistance throughout the whole life-cycle of the client's equipment • Clients: CMI addresses clients from diverse industries and business fields, e.g. cement industry, armed forces, RES electricity producers, infrastructures and public works, chemistry, waste processing, petrochemical, etc.
CMI Energy Efficiency	Service provided	• Furnace efficiency improvement solutions and financing when necessary
	Objective	• Improvement of the global performances of industrial furnaces
	Area of application	• Heating processes, cooling processes and heat treatment processes
	Type of client	• Industrial
Context		• Geographical presence of BM: France (headquarters), UK, Germany, China and India (last two have just started) • The EE part of the CMI started in France in 2010 as an internal development of the company, afterwards they started developing the EE department in different countries • Before implementing the EE service CMI EE carried out different context and profitability analysis based on CMI group knowledge of the countries where the group is present. They finally decided to implement the BM in Europe due to CMI's presence and in China and India due to demand driven by the profitability of the projects for clients • The BM applied has been adapted to the context in the different markets: - For Europe, they use a BM focused on performance improvement services mainly due to antiquity of equipment: some examples of the offered services are: improving performance of furnaces, monitoring, quick-wins in energy savings by efficiency improvement solutions - On the other hand, for India, China and Brazil the BM is focused on implementing efficiency solutions and products rather than services, the objective is not so much optimizing existing infrastructure but rather implementing new equipment • Investments in industrial projects are driven by the energy costs, where there is low visibility and solutions like waste heat recovery/ conversion to electricity are not promoted enough by incentives to make projects viable. In this sense CMI's BM is quite dependent on the EE context of the country

Source: Corporate webpage; Interview with CMI; CREARA Analysis

CMI's BM has not undergone major changes since the service started operating, although the BM is being adapted to local conditions of new markets

Evolution

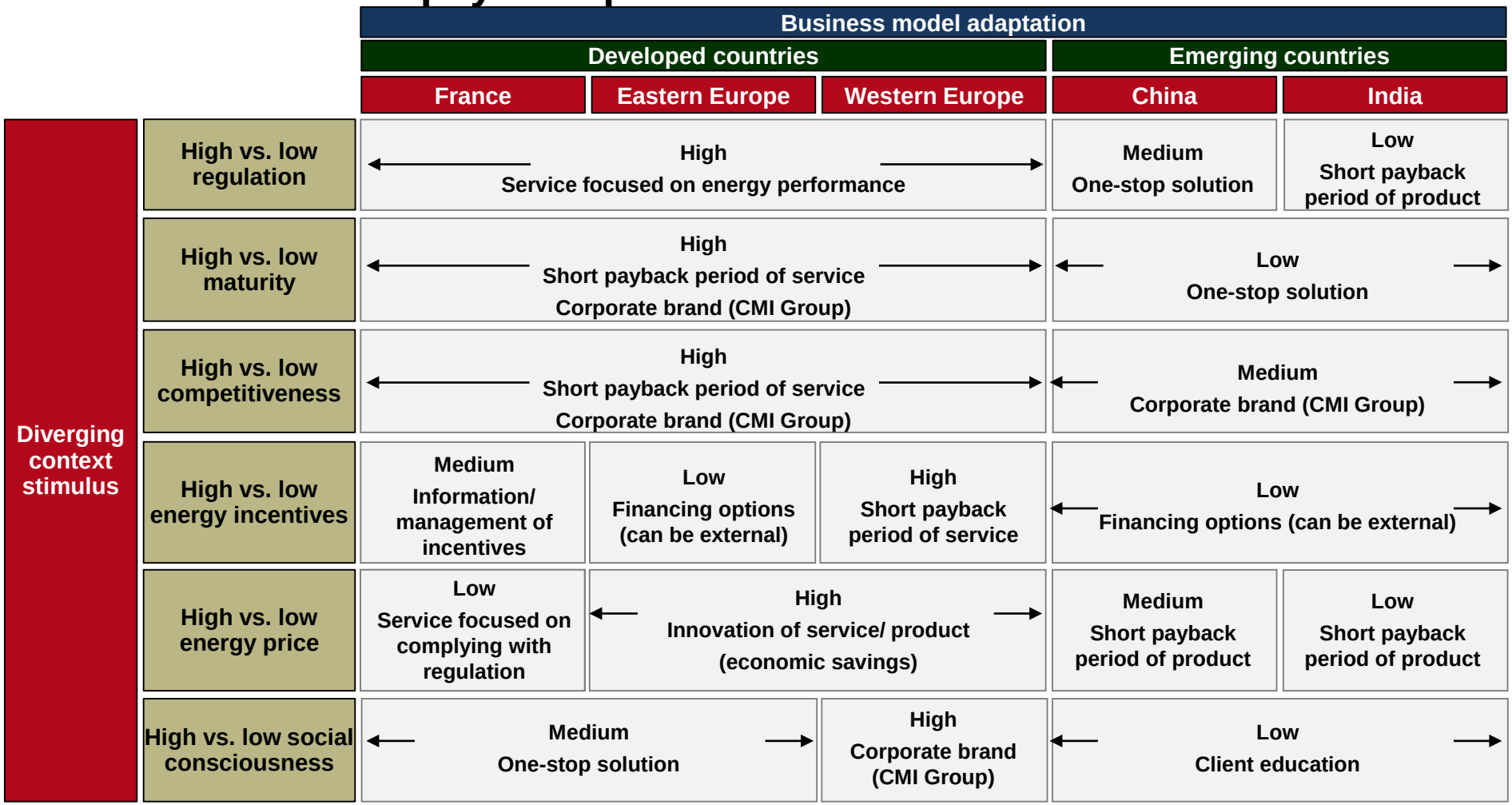
- **EE is still a new business for the CMI group so there is flexibility to adapt the BM rapidly to local conditions**
- **Since the beginning of operation (2010) no major changes have been made in the BM in Europe, but new regulations could lead to changes in the BM as well as new technological conditions could be required for industrial processes**
  - Obligatory energy audits in Europe (EN16247) which have already been implemented in some European countries, as well as the adoption of ISO50001 could increase demand for EE projects
- **For the last two years CMI has tried to promote projects with ESCOs (third party), as an option for reducing upfront investment costs for customers**
  - ESCO projects have not had any success yet due to differing positions of ESCOs and clients with respect to the conditions and contract details, although the concept seems to be a good solution for customers
- **In order to promote their BM they put efforts into innovation to develop solutions dedicated to particular processes, having in mind the viability of solutions**

Successful elements

- **Short payback period of product/ service: offering a competitive payback period as well as a lower price as responding to main objective of industries to lower their costs**
- **Service focused on energy performance: having their own portfolio of products which allows the company to respond quickly when detecting a problem by installing the necessary (own) equipment and thereby fixing the problem**
- **One-stop solution: possibility/ capacity to build a partnership with other companies in order to offer EE package solutions for industrial clients. For example, technical solutions + financing + monitoring and maintenance of products**
- **Corporate brand: being part of a group with international presence that allows the EE division to grow in those countries where the group is present**

Source: **Interview with CMI; CREARA Analysis**

CMI's principal element for succeeding in several markets is offering a service with a short payback period



Source: CREARA Interviews; CREARA Analysis

Fifthplay

Basic information

- Founded in 2007 as a wholly-owned subsidiary of the Niko Group
- Headquarters are located in Antwerp, Belgium
- Offices: Belgium, the Netherlands, Spain and France
- Core business: Remote energy management for households and businesses
- Clients include owners of residential buildings, ESCOs, utilities, telecommunications service providers (TSP), etc.

Fifthplay

Service provided	Re-lighting, Energy Smart and Smart Thermostat Management, more information on next slide
Goal	Energy management and control Reduction of energy costs through outsourcing of management of lighting installations
Area of application	Lighting, heating and cooling, and other EE solutions
Type of client	Energy conscious (cost conscious) businesses, ESCOs, utilities, telecommunication service provider

Context

- Geographical presence of BM: Belgium, Netherlands, France, Spain, Austria, UK, Germany and Switzerland
- Fifthplay was a strategic decision of the Niko Group to be able to respond to the IoT (Internet of things) needs of utilities, ESCOs, OEMs and other partners of the group, it started in 2007 in Belgium and afterwards grew throughout Europe in response to the introduction of various European laws on EE
  - The Netherlands and France were the succeeding destinations where Fifthplay opened new offices; in France they bought Dombox, which is a French company that offered a similar service. The acquisition helped them to be successful in the French market. Afterwards, they opened an office in Spain and started carrying out projects through Europe
- The BM applied is not the same in the different markets, it differs principally in terms of their main type of client:
  - Belgium, essentially product manufacturers
  - France and Germany, mainly distributors of electrical equipment and product manufacturers
  - Spain, principally ESCOs and real estate companies
  - UK, mainly utilities

Source: Corporate webpage; Interview with Fifthplay; CREARA Analysis

Fifthplay's BM is continuously changed in order to keep up with a fast evolving IoT market and client requirements

Evolution

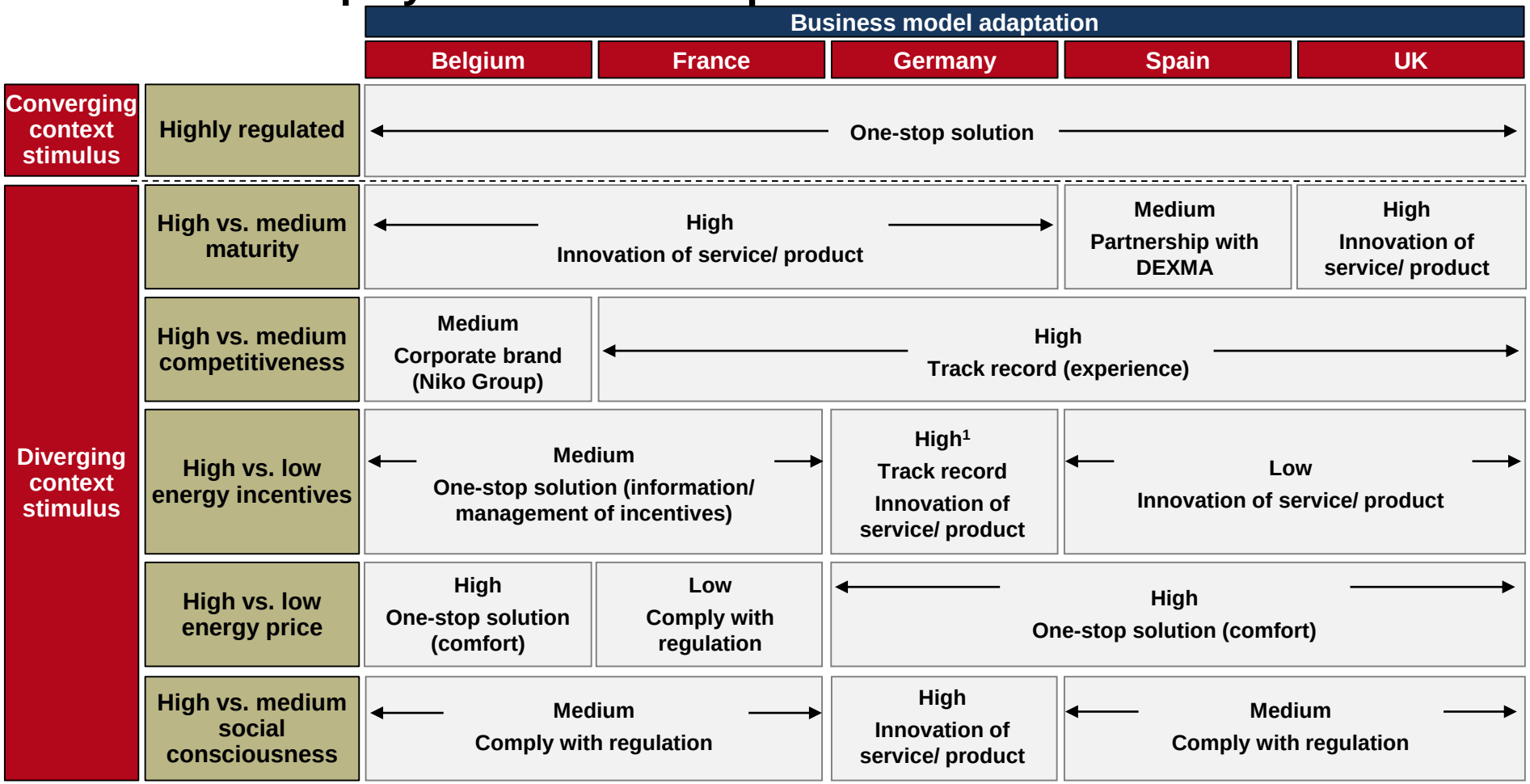
- **The adaptation of BM is an on-going exercise, based on the needs of their clients and the technological evolution**
- **The main structure of the energy management platform and EE equipment are completely developed, although they are continuously changing in order to keep up with a fast evolving IoT market and client requirements**
  - Fifthplay is currently looking into how to offer more connectivity to other products throughout the Niko Group
  - They have just started developing a service called "PV Assistant" which is a PV plug by which solar panels can be connected inexpensively to the Fifthplay gateway. Users can keep close track of the energy production of their solar panels and see exactly how much energy they are producing or also be notified if there is an abnormal deviation in the production. In addition, this information can be combined with the central consumer metering in order to obtain a real-time picture of the customer's energy status
    - Fifthplay started developing this idea as they believe that by 2020, 30% to 50% of European houses will be equipped with solar panels, so a new service market is presenting itself
- **Their biggest challenge is guiding their clients and partners in a fast evolving market with high demands and short development times**
- **Fifthplay wants to start growing in other European markets to the point of having offices in all of them**

Successful elements

- **One-stop solution: offering not only an open platform, not related to only one utility, but also, advice on energy optimization, EE equipment to reduce energy consumption, and continuous monitoring and control over performance**
- **Innovation: having the availability to read communication codes of different companies' appliances while other platforms can only read between 1 or 2 communication codes**
- **Experience: having an experience of nearly 10 years energy management solutions, while other companies which offer similar services have just started in the business**
- **Close relationship with clients: Fifthplay and the Niko Group have some ground rules about the relationship with their clients; their main rule is to have long-term relationships, cooperation where needed with clients**
- **Flexibility and adaptation capacity: mainly due to the size of the company (50 people) and the fact that they are not selling a commodity but rather a service/ product adjusted to each customer's needs**
- **Corporate brand: being part from the Niko Group has helped Fifthplay to have success in Belgium**

Source: **Interview with Fifthplay; CREARA Analysis**

Offering an innovative one-stop solution seems to be the element of success of Fifthplay in several European markets



Nota: [1]For this specific BM German incentives act as a barrier as the only way of obtaining them is by having a German entity as partner company
Source: CREARA Interviews; CREARA Analysis

Heating with the cloud

CLOUD&HEAT
THE CLOUD THAT HEATS HOMES WORLDWIDE

Basic information

- **Founded in 2011**
- **Headquarters are located in Dresden, Germany**
- **Offices: 1 office in Germany**
- **Core business: Cloud-based computing services together with heating and hot water through a fireproof safety cabinet that is equipped with servers which generate the heat**
- **Clients: Clients include any person/ company/ society which uses cloud based computing services and/ or heating applications (heating and hot water)**

Cloud&Heat

Service provided	**Installation, monitoring and maintenance of heating systems; free hot water and heating**
Goal	**Decreasing energy bills by providing heating, cooling and hot water through residual heat**
Area of application	**Heating and hot water**
Type of client	**Principally private households and small businesses**

Context

- **Geographical presence of BM:**
  - Cloud computing services are offered internationally
  - Heating system is only offered in Germany
- **In 2009 Dresden University and the CTO of Cloud&Heat developed an idea about heating homes with servers, and started a business based on the idea. C&H was founded in 2011 offering heating and cloud computing services**
  - Computing servers release a great quantity of heat and must be cooled with the use of additional energy, so they decided to place their servers in private households and offices and use the heat for heating the buildings as well as water, reducing energy costs and the impact on the environment
    - Customers interest in cloud computing services has been increasing in the last years
    - Reducing energy bills has gained importance in the last years given increasing energy prices
- **They are trying to expand their business to other countries basing the operations on partners for installation and maintenance**

Source: **Corporate webpage; Interview with Cloud&Heat; CREARA Analysis**

The BM has not seen any changes although in order to grow further, C&H focuses efforts on innovation and on outsourcing secondary services

Evolution

- **The main idea of the heating system is completely developed, although they are trying to expand through new ideas to gain more customers, so the business model is still evolving**
  - They had to focus on developing new cloud computing services in order to obtain more clients, as the heating systems are totally dependent on the implementation of cloud computing capacities, without the servers there is no heat generation
    - They built up a partnership with Deutsche Börse AG in order to expand their cloud computing services, but the results were not successful so they started developing new ideas of cloud services packages
  - They have also just started offering a whole service for residential and commercial private customers, i.e. offering customers the heating and cloud computing services in the same installation (“private installation for one customer”)
    - The private service was developed in order to comply with clients willingness to have both the heating system and cloud computing services but not willing to share cloud computing servers
- **Until now no changes have been made in the BM, but in order to improve the model and increase business, C&H focuses efforts on innovation to develop new cloud computing solutions, outsource installation and maintenance services they are also trying to expand their business to other customers and other countries**

Successful elements

- **Innovation: it is the first company which offers heating services through servers reducing environmental impact as the client is using the residual heat produced by a computing server**
- **Lower costs: H&C provides free heat and hot water after initial investment, as the pay for the electricity and the Internet service for server operation, there is also no maintenance costs as H&C keeps continued maintenance of the heating system to assure functioning of servers as the cloud service is part of their core business**
- **One-stop solution: offering not only a heating system but also the maintenance of the system throughout the contract**
- **Close relationship with clients: C&H builds a close relationship with customers during the development of the project and keeps the relationship during the maintenance of the heating system further new potential clients normally come from the word of mouth of current clients**
- **Flexibility and adaptation capacity: their competitive advantage is based on flexible distributed computing services based on an hourly basis, i.e. computing services based on clients consumption**

Source: **Interview with Cloud&Heat; CREARA Analysis**

Being the first company offering heating through servers has made C&H a successful company in Germany which is trying to expand to other countries

		Business model adaptation
		Germany
Context stimulus	Highly regulated	One-stop solution
	Highly mature	Innovation of service/ product
	Highly competitive[1]	Lowest costs
	High energy incentives[2]	Innovation of service/ product
	High energy price	Lowest price
	High social consciousness	Flexibility and adaptation capacity

- **Cloud&Heat has to be analysed as an isolated case due to the following factors:**
  - They are only present in Germany therefore it was not possible to carry out a country comparative analysis
    - The company is thinking of expanding their heating services through Europe, as stated before, although no projects outside Germany have been carried out for the moment
  - They have no competitors as they are the only company offering heating services through servers
    - They are trying to get more cloud computing services companies to sell heating systems as they think that their heating idea is sustainable and good for the environment
    - Their cabinet system could be compared to traditional heat pumps in terms of activity although no other technology is as innovative as C&H's one
  - Their technology is really new and innovative (immature) even if the German EE market is mature, which demonstrates that innovation is a key element for being successful in the German EE market

Nota: [1]For this specific BM there are no competitors; [2]Generally there is a large number of incentives, but they are not applicable to this business area in Germany and therefore present a barrier rather than a motor for the activity

Source: CREARA Interviews; CREARA Analysis

AIRIS LED

Basic information

- **Founded in 2009 as part of the Airis Group**
- **Headquarters are located in Guadalajara, Spain**
- **Offices in 14 countries and representation in 40 countries**
- **Core business: Manufacturing of lighting equipment**
- **Clients: Residential clients and commercial clients which include supermarkets, retailers, restaurants and hotels, hospitals and retirement homes, offices, shopping centres, gymnasiums and sport facilities, parking, logistics warehouses, production facilities, and street lighting**

AIRIS LED

Service provided	**Installation, monitoring and maintenance of lighting systems**
Goal	**Decreasing energy bills and investment costs**
Area of application	**Lighting**
Type of client	**Commercial clients**

Context

- **Geographical presence of BM: Brazil, Colombia, Dominican Republic, Ecuador, France, Guatemala, Mexico, Peru, Portugal, Spain (headquarters), Taiwan, UK, United Arab Emirates and US**
- **In 2009, Airis Group founded AIRIS Soluciones LED, dedicated to innovative lighting systems for the commercial sector. Lighting systems improvement is currently one of the main activities of Airis Group**
  - Lighting systems is a key concern for commercial customers. Therefore, the technology company AIRIS, looking for opportunities to diversify given the crisis, decided to enter into the LED market with the Taiwanese company as a technology partner
  - Given that technology is the key part for innovation in the LED lighting systems, for AIRIS, as a technological company, it was relatively simple to enter this market segment due to the great similarities associated with its other core activities
- **Lighting systems has become one of the main businesses for the AIRIS Group as they have been quite successful in the 7 years they have been opened**
  - In 2014 AirisLED won the Innovation and energy efficiency Matelec award

Source: **Corporate webpage; CREARA Analysis**

AIRIS LED is continuously innovating its products in order to keep up with technological advances although no changes have been made in its core BM since the beginning of operation

Evolution

- **Since the beginning of operation no changes have been made in its core business model (selling lighting equipment), although they are continuously innovating their products in order to keep up with technological advances in LED technology in the world**
- **In the last year they have started offering two new BM related to LED equipment**
  - 5% energy: Reducing 5% last year electricity bill through the following steps:
    - Installation of 7 EE measures, such as: Monitoring of consumption, LED lamps installation, climate home automation
    - Extra savings are offered by the replacement of light bulbs
    - In a period of 7 to 10 years AIRIS hands over to the customers all the equipment that has been installed
  - Digital signage: AIRIS offers a powerful, simple, easy to use, manage and implement and also very competitive integrated solution for digital signage. They offer a wide variety of services:
    - Display supports: they offer different products: totems, advertising panels, video walls, displays, etc.
    - Multimedia players: they offer players or mini PCs for playing different content through internet or internal network
    - Platform for content management: Cloud-based solutions that allow users to implement circuits without the need of large investments

Successful elements

- **Innovation: it is the first company in Spain which offers renting for lighting systems and in 2014 Airis LED won the innovation and energy efficiency Matelec award**
- **One-stop solution: offering not only the installation of lighting systems but also monitoring and maintenance of the lighting systems together with different financing options**
- **Adaptation capacity: AIRIS LED is solution oriented, with their business model the projects are designed on a tailor-made basis, including energy savings studies, lighting designs and implementation of samples as pilot tests**
- **Close relationship with clients: AIRIS LED builds a close relationship with customers during the development of projects and keeps the relationship during the financing/ renting period of the lighting systems**
- **Lower upfront costs for clients: providing long-term financing options, financing for 5 or 10 years, or renting for 5 years different lighting systems**

Source: **Corporate webpage; CREARA Analysis**

AIRIS LED key elements of success have been identified based on the context in the Spanish EE market

		Business model adaptation
		Spain
Context stimulus	Highly regulated	One-stop solution
	Medium maturity	Innovation of service/ product
	Highly competitive	Corporate brand (AIRIS Group)
	Low energy incentives	One-stop solution
	High energy price	Offering long-term financing options
	Medium social consciousness	Flexibility and adaptation capacity

- **It has not been possible to conduct the interview with AIRIS LED, so the reflected the conclusions are based on information available on its website and other public sources (advertising articles)**
- **As stated before the key elements of success of AIRIS LED are as follows:**
  - Innovation
  - One-stop solution
  - Adaptation capacity
  - Close relationship with clients
  - Lower upfront costs

Source: CREARA Analysis

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  - Spain
  - UK
- **Case studies**
- **Conclusions**

Summarizing the results of the analysis, for some market characteristics success elements could be identified: Lowest price, one-stop solution and innovation are the elements named the most

Key elements according to importance by market characteristics

	Status	High importance	Medium importance	Minor importance
Maturity	High	Lowest price	One-stop solution	Innovation of service/ product
	Medium	Lowest price	*Unclear*	*Unclear*
Competitive-ness	High	Lowest price	Innovation of service/ product Track record (corp. brand)	Close relationship with client
	Medium	One-stop solution	ESCO based services	Short payback period of product/ service
Regulation	High	Lowest price	Innovation of service/ product	One-stop solution
	Medium	One-stop solution	Lowest price	Comply with regulation
	Low	Service focused on energy performance	Short payback period of product/ service	Financing options (can be external)
E. incentives	All levels	Short payback period of product/ service	One-stop solution	*Unclear*
Energy price	High	Innovation of service/ product (savings)	Lowest price Short payback period of product/ service	One-stop solution
	Low	Lowest price	One-stop solution	Innovation of service/ product
Social conscious-ness	High	Lowest price	One-stop solution	*Unclear*
	Medium/ Low	Innovation of service/ product	Lowest Price	*Unclear*

- **Summarizing the results from the analysis of each of the 6 markets, some market characteristics seem to call for specific success elements**
  - Lowest price, one-stop solution and innovation are the elements named the most
- **In other cases the results were not that clear, either because only one market showed the characteristic (medium competitiveness and medium and low regulation) or because two elements were named with the same frequency (here we mentioned both)**
- **For two cases the order of the elements was not clear (high maturity and low social consciousness)**
- **Six of the medium and minor important elements received responses too diverse to be determined**

Source: CREARA Analysis

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