



Asociación de Empresas  
de Servicios Energéticos



# Energy efficiency indicators for accelerating building renovation investments

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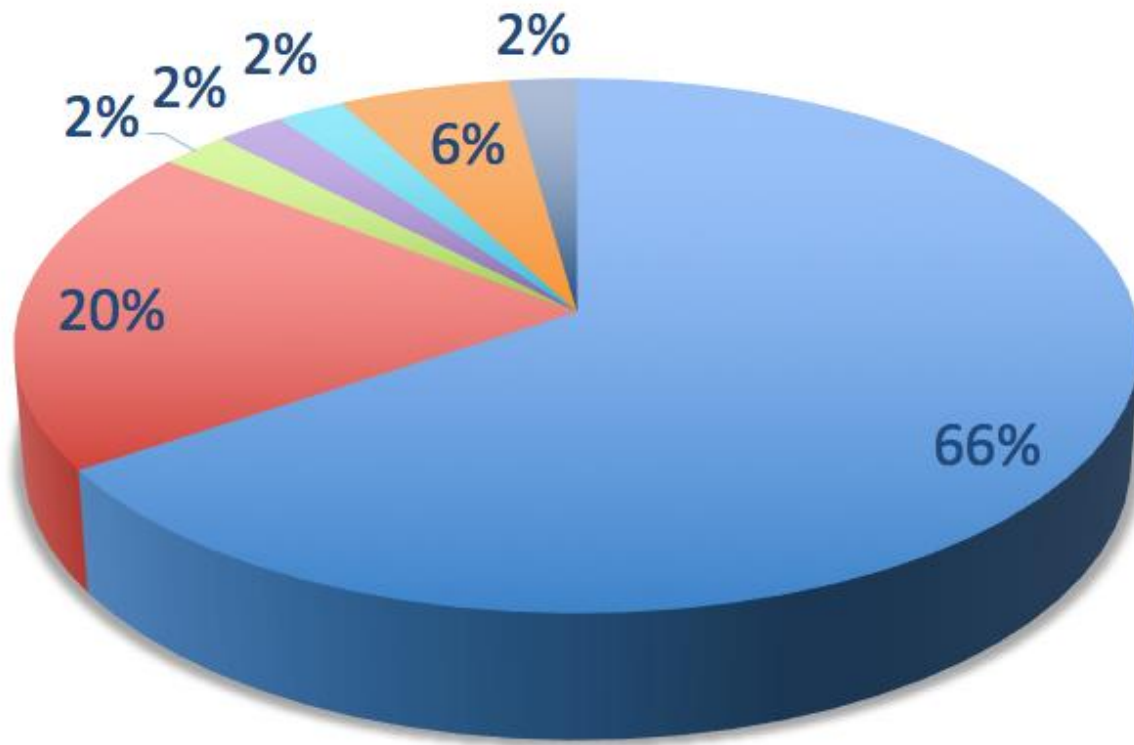
Managing Director of Spanish National ESCO Association



**E.V.V.E. – 25TH ANNIVERSARY CONGRESS**  
**Shaping the Future of Energy Efficiency in**  
**Buildings – Cost Effective and Sustainable**

Brussels, November 6th, 2018

- Who is ANESE?
- Why is essential to work on improving the energy efficiency of the buildings?  
*Some figures of the Spanish market*
- What can we do?
  - KPIs: the Smart Indicator
  - Regulation and technology
  - Energy Performance Contracts



## 94 members

- ESCOs
- Technology Companies
- Investment Fund
- Insurance and Legal
- Utility
- Energy Consulting
- Certification Authority

# Network leader and business hub in energy efficiency and sustainability in Spain

Gold



Silver



Bronze



# ANESE, the Spanish driving force of the market for efficient and sustainable energy services



## CO2

Programme CLIMA for members of ANESE

GOAL:

reduce 210,000 tnCO2

Payment :

9,7 €/tnCO2 reduced



Regulation  
EEED



# Why is essential to work on improving the energy efficiency of the buildings?

- **55%** of people on our planet live in cities and this percentage is increasing, **68%** in 2050
- One in every 8 inhabitants lives in one of the **33** megacities with more than 10 million inhabitants. In 2030 there will be 43 megacities
- This **55%** of urban inhabitants generate **80%** of world GDP
- In some parts of the world such as the American continent, Europe and Oceania have already reached levels above 70%
- Cities consume **75%** of the world's resources and energy and generate **80%** of greenhouse gases, occupying only **3%** of the territory of our planet

Where do we live in Spain?

In the red dots live half of the Spanish population

# Spain

- 50% of the population
- 50% of the population



# Where do we live in Spain?

- In Spain there are **25 million homes** of which 71.7% are main residence, 14.6% are secondary residence and 13.7% are empty residences
- Of the total housing, **68.6% are multi-family** and 31.4% are single-family
- More than 40% are **over 40 years old**. More than 50% of buildings do not have thermal protection
- The number of buildings is 8.5 million
- Spain is the country of the European Union with the highest number of houses per inhabitant, **538 per 1,000 citizens**, compared to 432 on average in European countries



# Where do we live in Spain?

- The **size of the city** does matter.
  - The large cities (> 1 Mill. Hab.) have thermal (8.1 MWh) and electrical (3.5 MWh) consumption almost **10% higher** than the national average
- Although cities with a higher **density of population** (> 100 inhabitants per hectare) are the most efficient in the use of energy, (18% in thermal and 9% in electrical energy lower than the average values),
- **Household income** has a clear influence on energy consumption.
  - Cities with incomes above 40,000€ have a thermal consumption **20% higher** than average
  - and **82% higher** than cities with an income lower than 20,000€
  - In electricity consumption is **28% higher** than the average of Spanish cities

# Where do we live in Spain?

- An average home in Spain consumes directly 0.85 toe/year. Single-family homes consume an average of **2 times more** than apartments
- More than **90% of the homes** that will be in 2030 in Spain are already built.
  - Rehabilitation of buildings** with more than 20 years (or insufficiently isolated), can produce **a saving of 50%** of the energy consumed in heating and / or cooling
- The use of modern technologies for heating and hot sanitary water compared to more traditional technologies can produce **savings of between 10% and 60%** of the energy consumed

# Where do we live in Spain?

- ▶ 2,142 buildings of the GENERAL STATE ADMINISTRATION with a consumption of 1,038 GWh/year

- ✓ Estimate Investment for energy rehabilitation: **1,103 Mill€**

- ✓ Potential of savings through ESCO Projects:

**372,71 GWh/año** (35,9%)

**46,59 M€/año** (0,125 Euro(kWh))

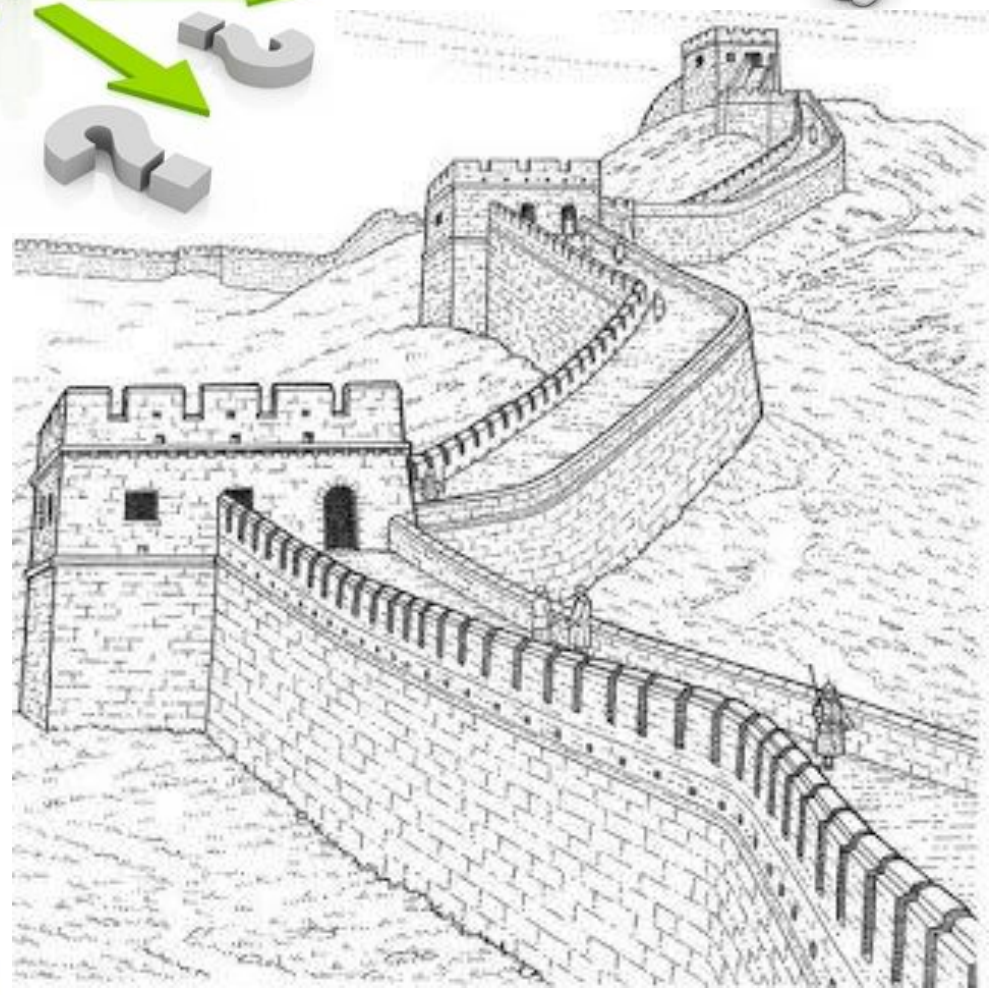
**0,15 Mton CO2/año**

(Fuente: Observatorio de Eficiencia 2016-ANESE; Informe precios regulados 2017)

- ▶ **Working in Municipalities:** Estimated investment **4,890 Mill€**

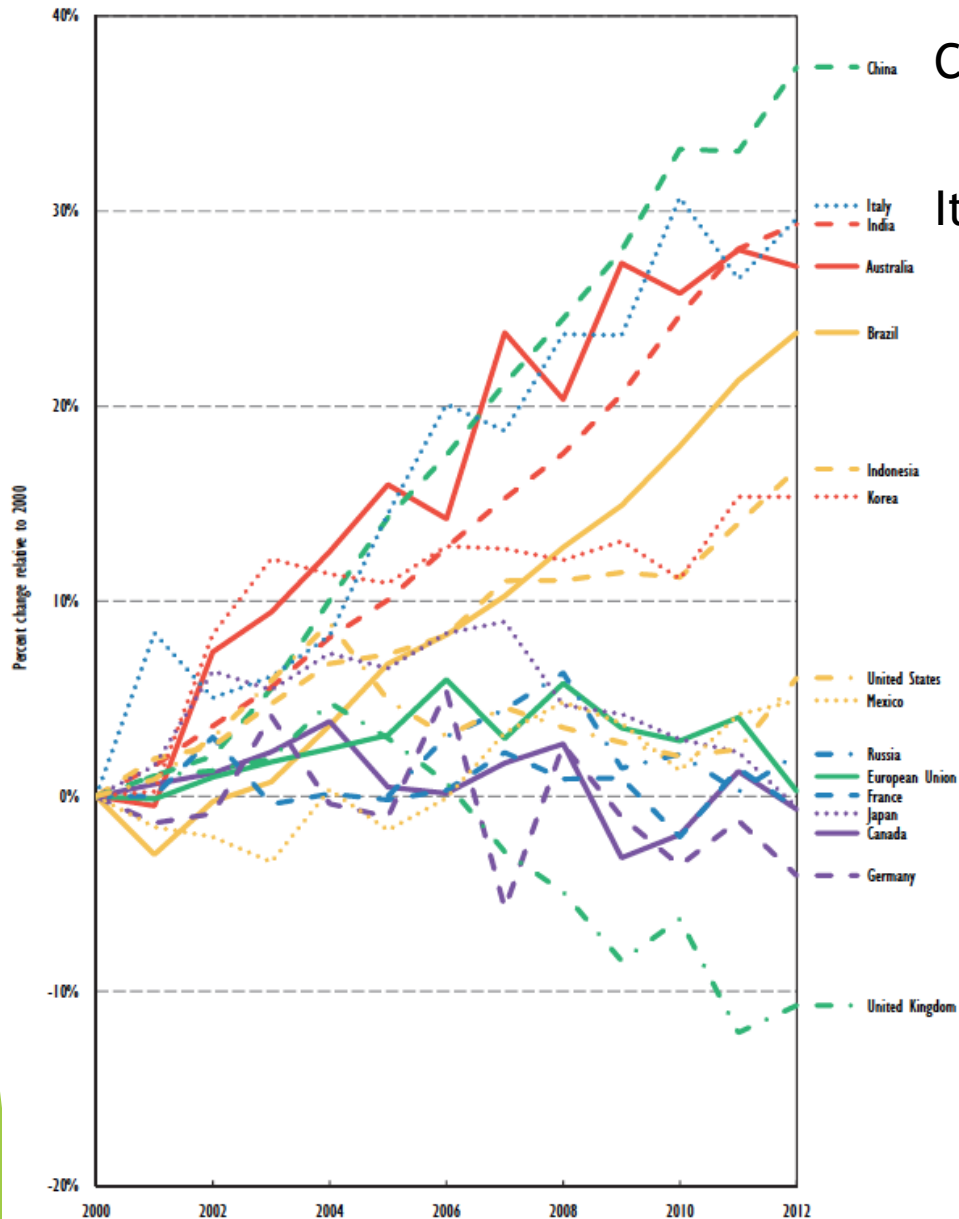
| Potential energy efficiency  | Potential achievements  |
|--|-------------------------|
| Energy savings   | <b>5,193 GWh/year</b>   |
| Economical savings   | <b>415 Mill€/year</b>   |
| CO <sub>2</sub> Emissions reduction                                      | <b>2.1 Mtn CO2/year</b> |
| Tax collection (VAT for the total of investments + Annual corporate tax) | <b>1,071 Mill€</b>      |

What can we do?



# KPIs: the Smart Indicator

## Building Energy Performance Metrics



China

Italy and India

Change in building energy use in Major Economies Forum on Energy and Climate (MEF) 2000-12

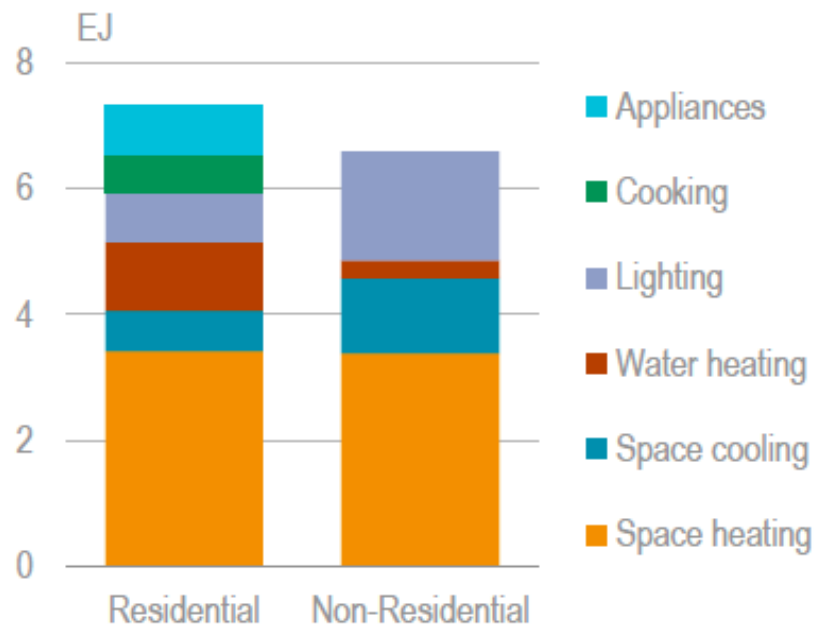
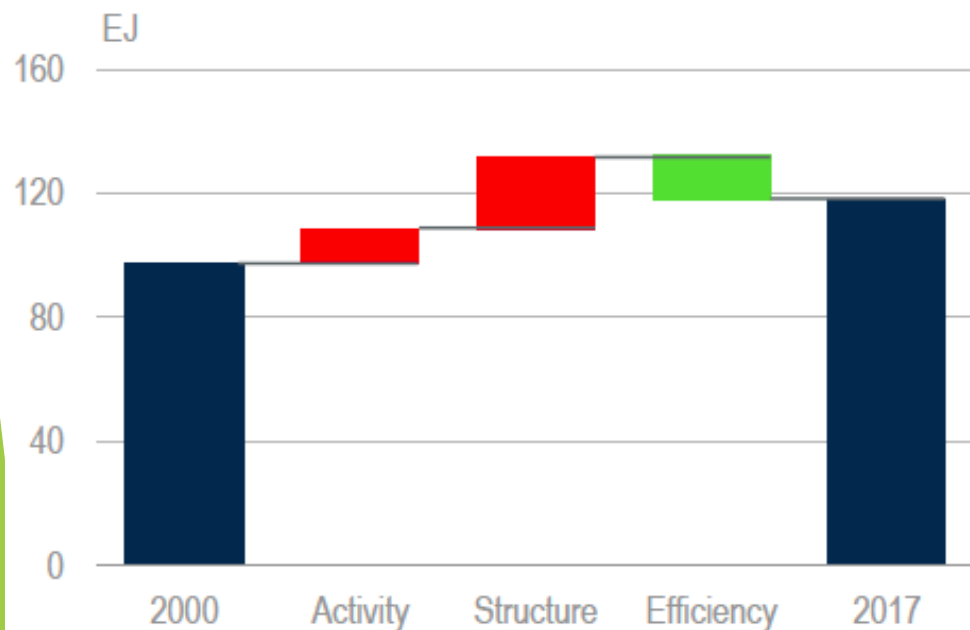
European Union and Japan

United Kingdom

# KPIs: the Smart Indicator

The majority of energy savings in the Efficient World Scenario come from extending and strengthening heating and cooling measures.

For space heating, if all countries were to achieve best practice market averages (such as in Japan and Scandinavia), global heating energy consumption could be cut in half (IEA Market Report Energy Efficiency, 2018)



# KPIs: the Smart Indicator

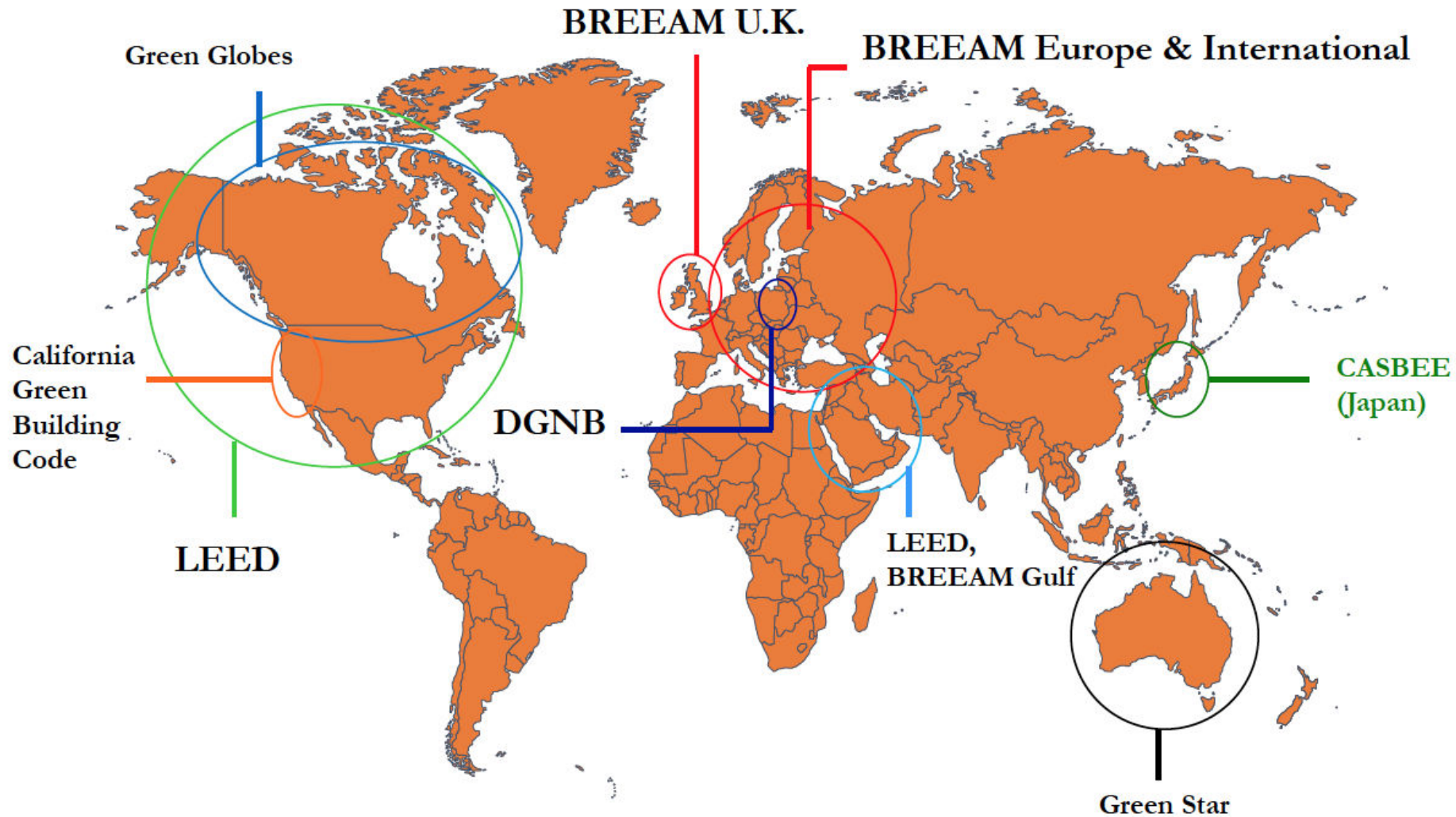
## Conceptual building energy performance metrics framework

**Table B1 • Conceptual framework for the development of building energy performance metrics with examples for metric parameters**

|                              |   |                                       |
|------------------------------|---|---------------------------------------|
| <b>Inputs</b>                | Final energy (total, electricity, gas, etc.)  | <b>Energy Consumption</b>             |
|                              | Primary energy (total, electricity, gas, etc.)<br>Energy cost (total, electricity, gas, etc.) |                                       |
|                              | <i>Per</i>  |                                       |
| <b>Outputs</b>               | Persons served (total population, occupants, employees, etc.)                                 | <b>Building census</b>                |
|                              | Floor area served (total, occupied, heated, cooled, enclosed)                                 |                                       |
|                              | Buildings served (total, grid-connected, etc.)  |                                       |
|                              | Service level provided (amount of heating, cooling, lighting, etc.)                           |                                       |
|                              | Economic value (GDP, property value, etc.)  |                                       |
|                              | <i>For</i>  |                                       |
| <b>Scope</b>                 | Sector (all buildings, residential sub-sector, services sub-sector [commercial and public])   | <b>Building census</b>                |
|                              | Building types (single-family, multi-family, office, healthcare, etc.)                        |                                       |
|                              | End uses (heating, cooling, water heating, lighting, appliances, cooking, etc.)               |                                       |
|                              | Region (country, state, city, etc.)   |                                       |
|                              | <i>Normalised by</i>  |                                       |
| <b>Normalisation factors</b> | Climate (ground temperature, heating degree days, cooling degree days)                        | <b>Climate and socioeconomic data</b> |
|                              | Economic indicators (purchasing power parity, currency, etc.)                                 |                                       |
|                              | Time (percent change from baseline date, lifecycle)   |                                       |

# KPIs: the Smart Indicator

## Green building certifications around the world





# KPIs: the Smart Indicator

## Energy certifications in buildings: Europe

### Display Energy Certificate

BER for the building detailed below is: **C1**

**A** **C** **D**

#### Name of building

Street Name  
Town Name  
County Name

#### Building Type:

Useful Floor Area (m<sup>2</sup>):

Main Heating Fuel:

Building Environment:

XXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXX

BER No.: XXXXXXXX

Date of Issue: DD/MM/YY

Valid Until: DD/MM/YY

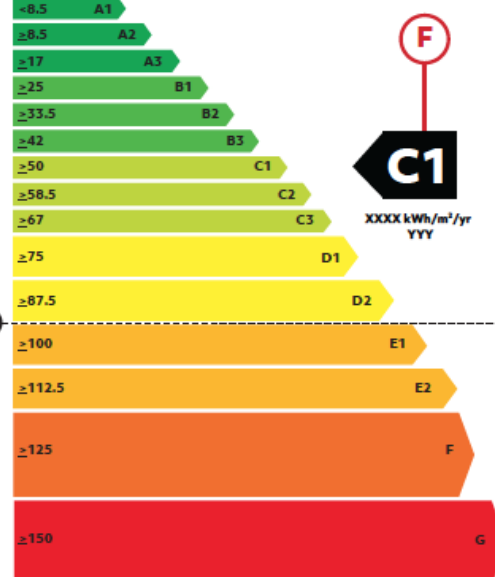
Assessor No.: XXXXXXXX

**B**

**E**

#### Building Energy Rating (Indicator)

LOW ENERGY USE

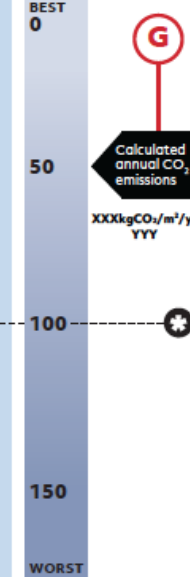


**F**

**H**

#### Carbon Dioxide (CO<sub>2</sub>) Emissions Indicator

BEST 0



**G**

HIGH ENERGY USE

Typical building of this type

#### Annual Energy Use

This building

Non Electrical (kWh/m<sup>2</sup>/yr)

XXX

Electrical (kWh/m<sup>2</sup>/yr)

XXX

Typical building of this type

Non Electrical (kWh/m<sup>2</sup>/yr)

XXX

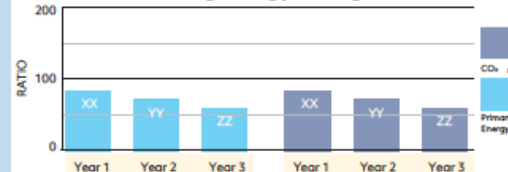
Electrical (kWh/m<sup>2</sup>/yr)

XXX

**I**

**J**

#### Previous Building Energy Ratings



**K**

- A** Display Energy Certificate rating (also known as Actual Building Energy Rating)
- B** Name and address of the building
- C** Technical information about the building, e.g. floor area, fuel type, etc
- D** Unique Building Energy Rating number
- E** Information about the expiry date of DEC and Assessor's Registration Number
- F** DEC rating for building and consumption in terms of kWh/m<sup>2</sup>/yr and DEC point scale
- G** CO<sub>2</sub> emissions emitted by the building in terms of kgCO<sub>2</sub>/m<sup>2</sup>/yr and DEC point scale
- H** Benchmark for typical building of this type (representing 100 points on the DEC scale)
- I** Annual Energy Use of building in kWh/m<sup>2</sup>/yr in terms of electrical and non-electrical
- J** Annual Energy Use of typical building of similar type
- K** Comparison of current DEC with previous 2 years to show any significant energy savings

# KPIs: the Smart Indicator

## Energy certifications in buildings: Spain

Only 5,1% of the Spanish existing apartments and houses got the ECB

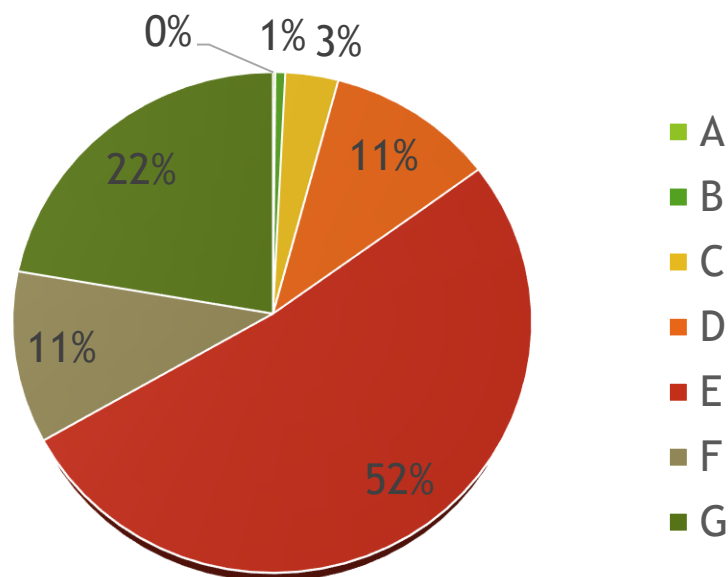
2,6 millions existing apartments were analysed

**96% are D or less (CONSUMPTION)**

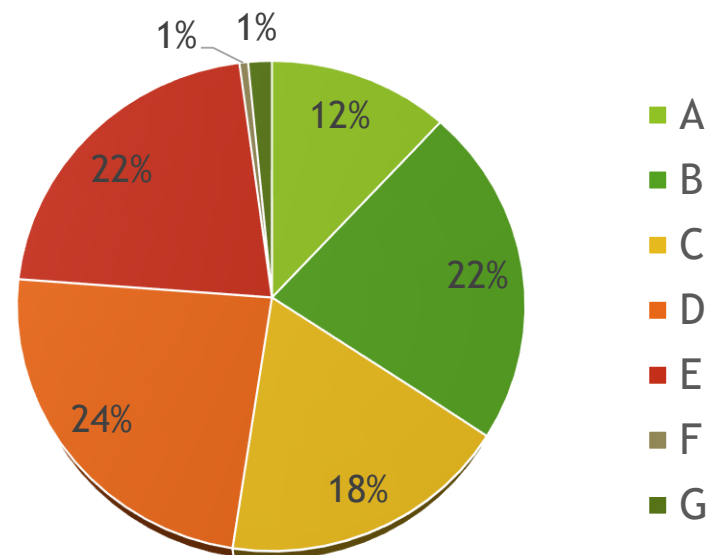
0.04 millions new apartments were analysed

**47% are D or less (CONSUMPTION)**

Existing buildings (CONSUMPTION)  
N = 2.606.216

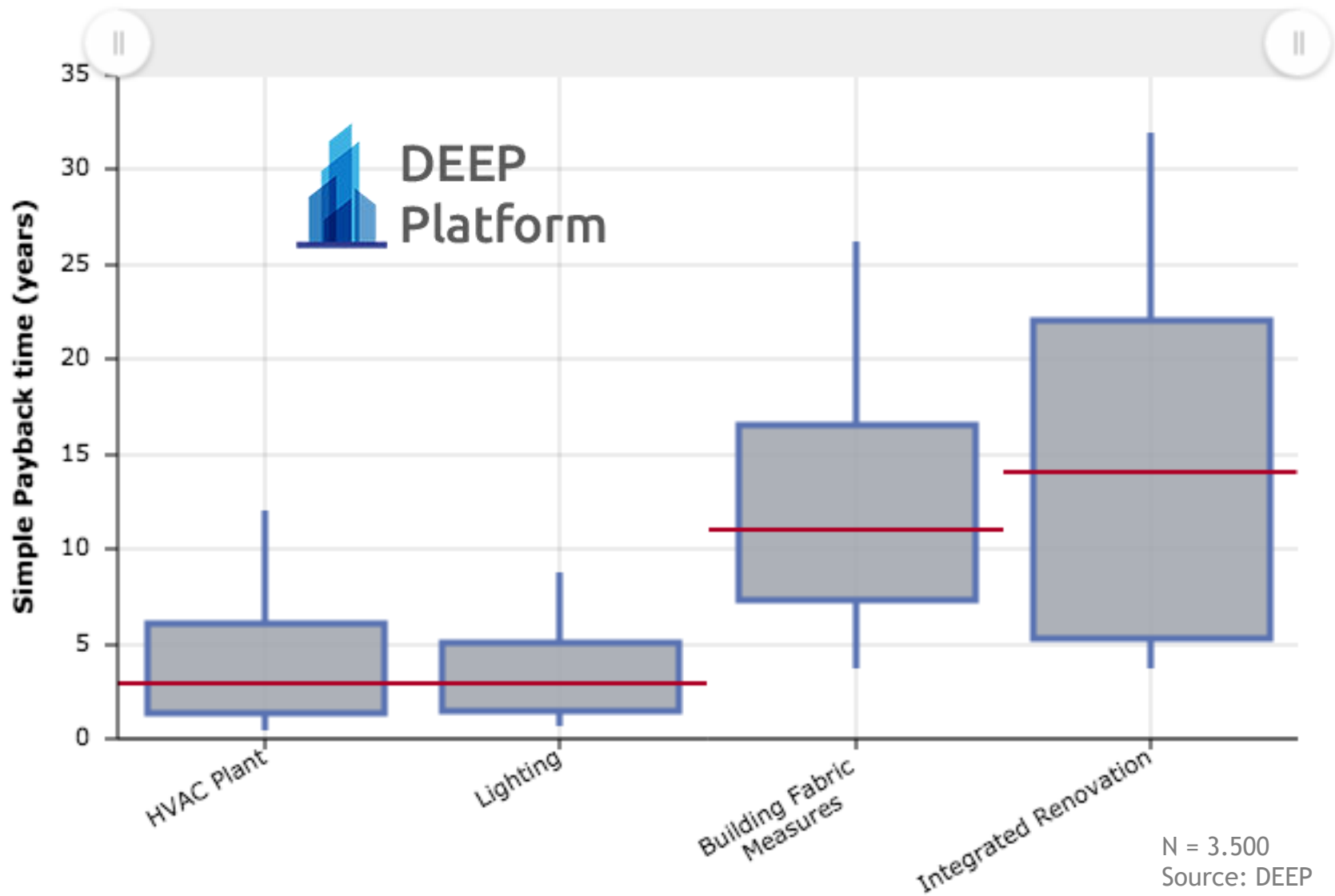


New buildings (EMISSIONS)  
N = 40.690



# KPIs: the Smart Indicator

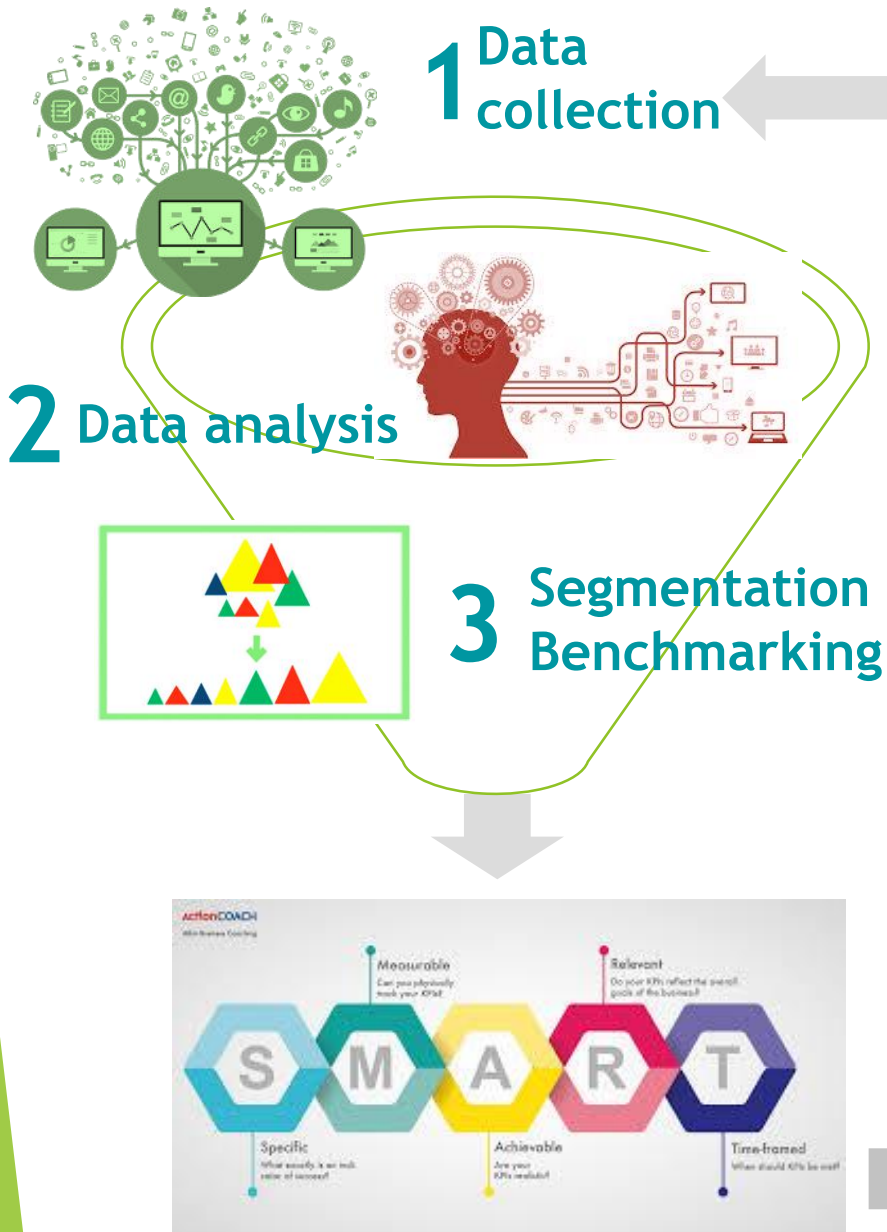
**Distribution of payback time on 10%, 25%, 75% and 90th percentiles - Measure types**



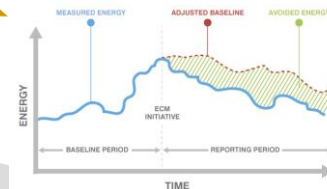
N = 3.500  
Source: DEEP

*use*@R!

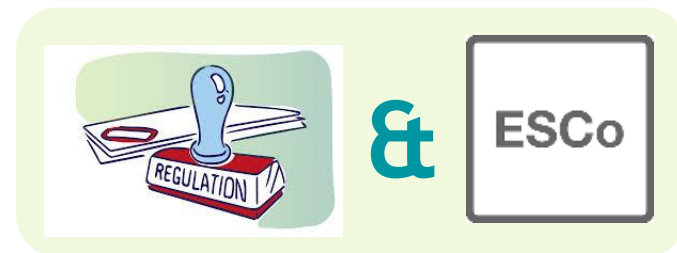
# KPIs: the Smart Indicator



## 6 CONTROL M&V and Certification



## 5 Provide the support



## 4 Allocate finance and taxes

# Regulation

## Legislation in favor of monitoring and control

### Clean Energy for all Europeans:

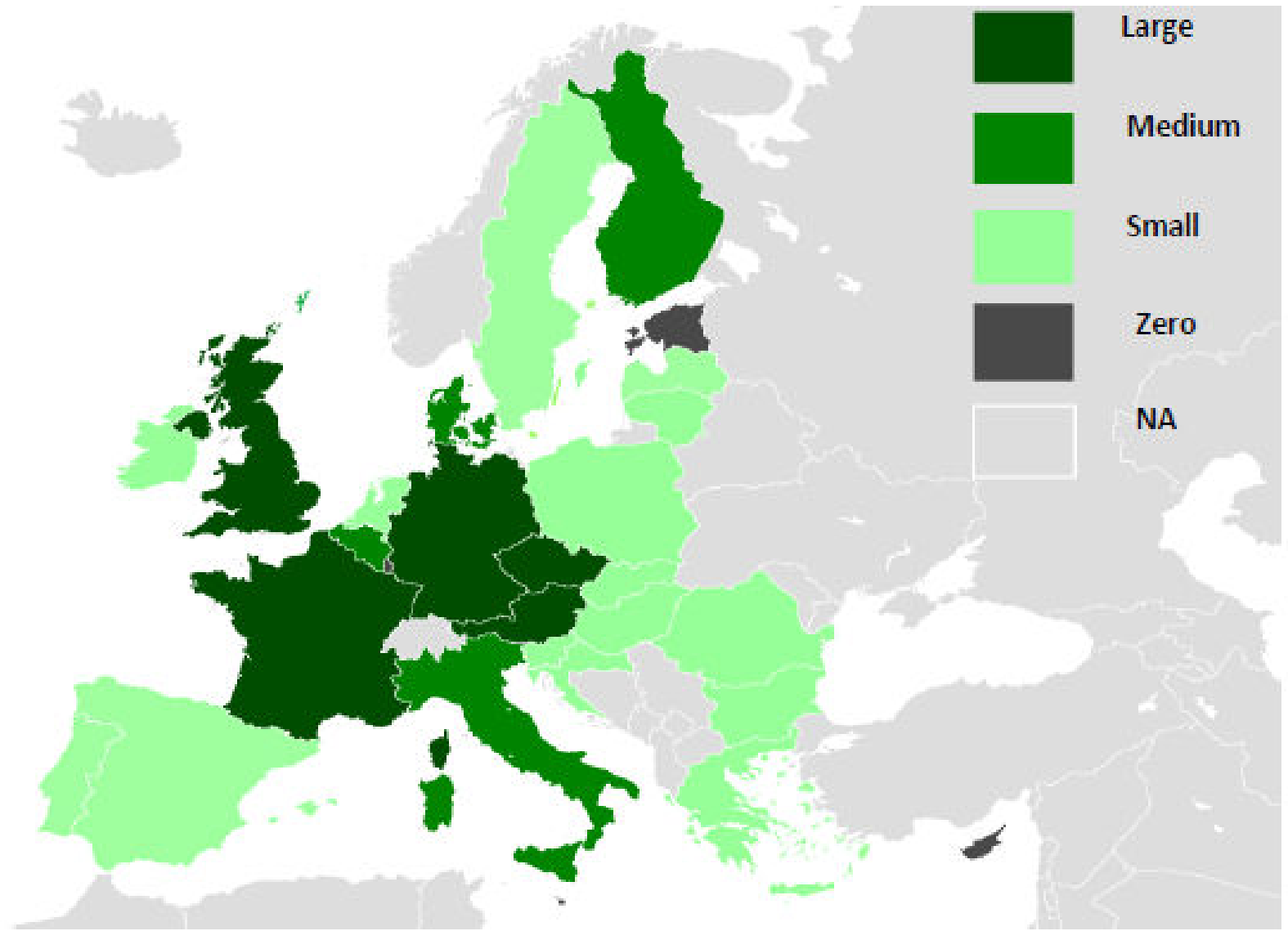
- Prepare a **long-term strategy** for building renovation
- Introduce **aggregation and risk reduction** mechanisms to facilitate investment
- Improve the **connectivity of buildings** to control their energy performance
- Promote **electric mobility**
- Enter a "smart building" indicator
- Linking **policies and funding to building energy certificates**
- Provide information on energy consumption of buildings to different market players (EPC database)
- **Smart Finance for Smart Buildings Initiative**

EU Directive 2018/844, May 30th, 2018 - "Article 14" Automotion and control systems for buildings

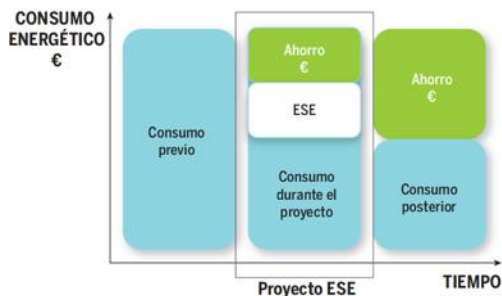
**... but it is necessary that the transposition of the directives are done on time to achieve the potencial energy savings**

# ESCO market

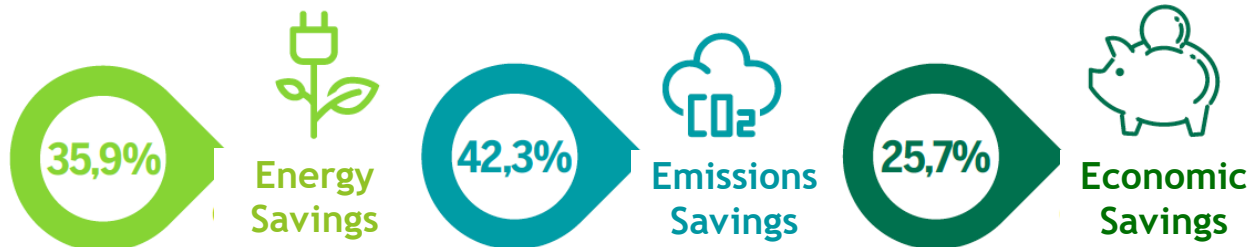
## Level of EPC market development in Europe



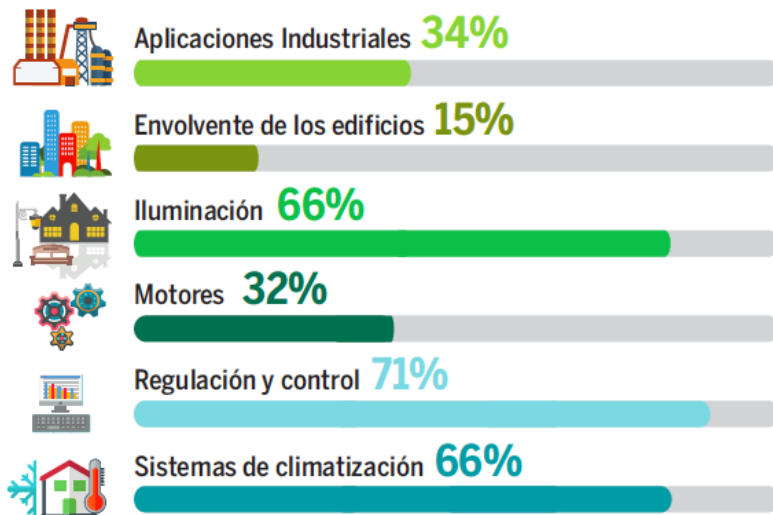
# Drive the energy efficiency goals through the ESCO model guarantees the energy savings and the employment during 8 years



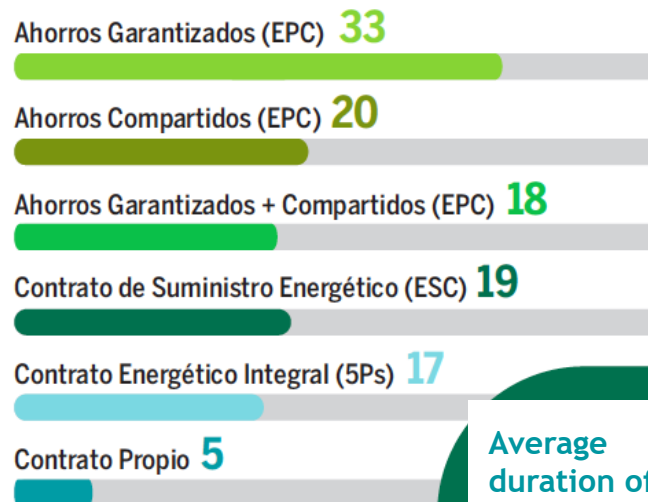
## ESCO achievements in Spanish market



## Implemented technologies



## Types of contracts (No. ESCOs)



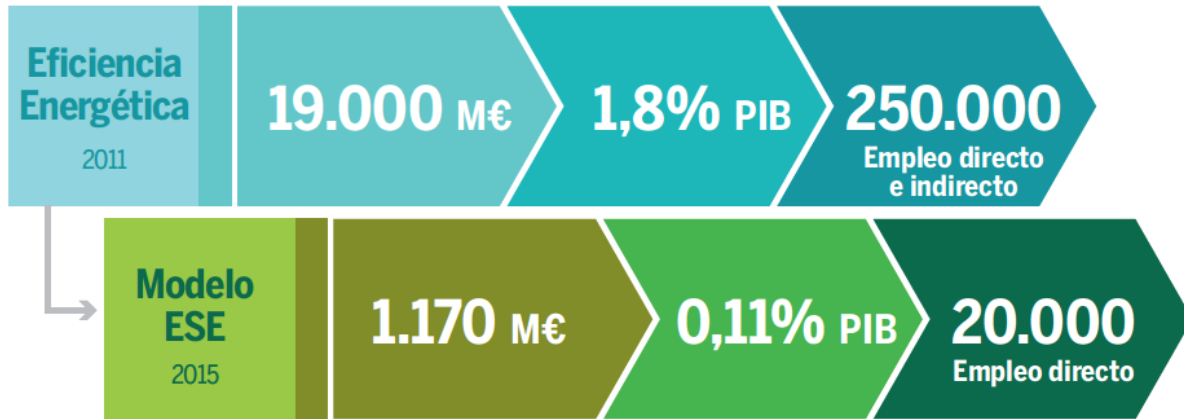
Average amount of an ESCO contrat

522.976 €

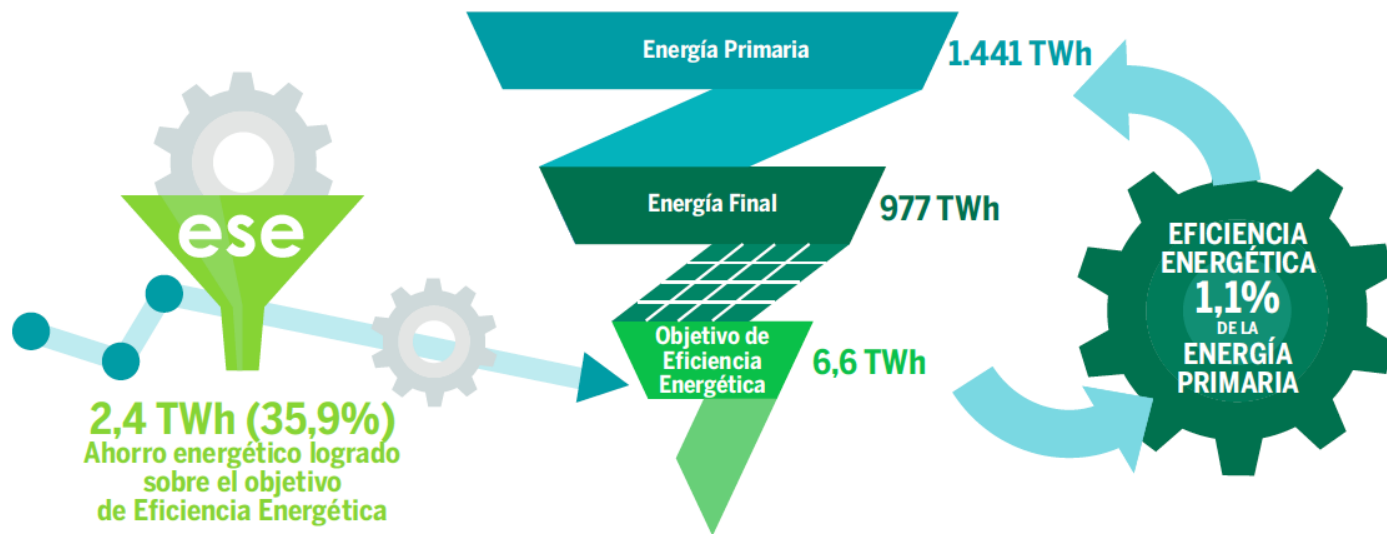
Average duration of an ESCO contrat: 7,6 years



# The ESCOs provides 20,000 direct employment with high qualification and add a 0.11% of the GDP



Modelo ESE: eficiencia energética con ahorros garantizados





- Classify the projects
- Aggregate the projects in portfolios of so that they meet the requirements of each investment fund

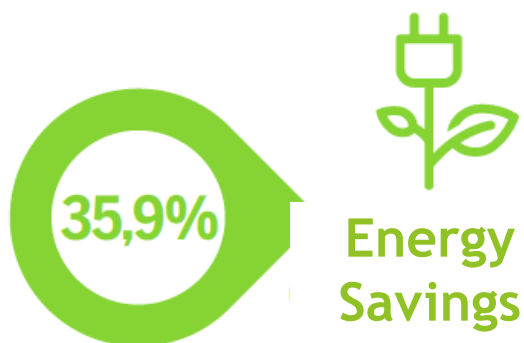


- ✓ We have the **NEED: energy optimization for CO2 emissions reduction**
- ✓ We have the **CUSTOMERS**
- ✓ We have the analysis tools:
  - ✓ Massive data
  - ✓ Big data tools
  - ✓ Artificial intelligence capacity
- ✓ We have the energy efficiency technologies
- ✓ We have the energy efficiency experts
- ✓ We have the money
- ✓ and we have the strategy through our directives

**Now it is time to ACT for achieving the benefit for the end user**

# Add an ESCO to your team as expert in energy management

ESCO achievements in Spanish market



[link Observatorio](#)

**2016** Observatorio  
de **Eficiencia Energética**  
El mercado de las Empresas de Servicios Energéticos



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