



# Renewable energy policy and planning at the country level

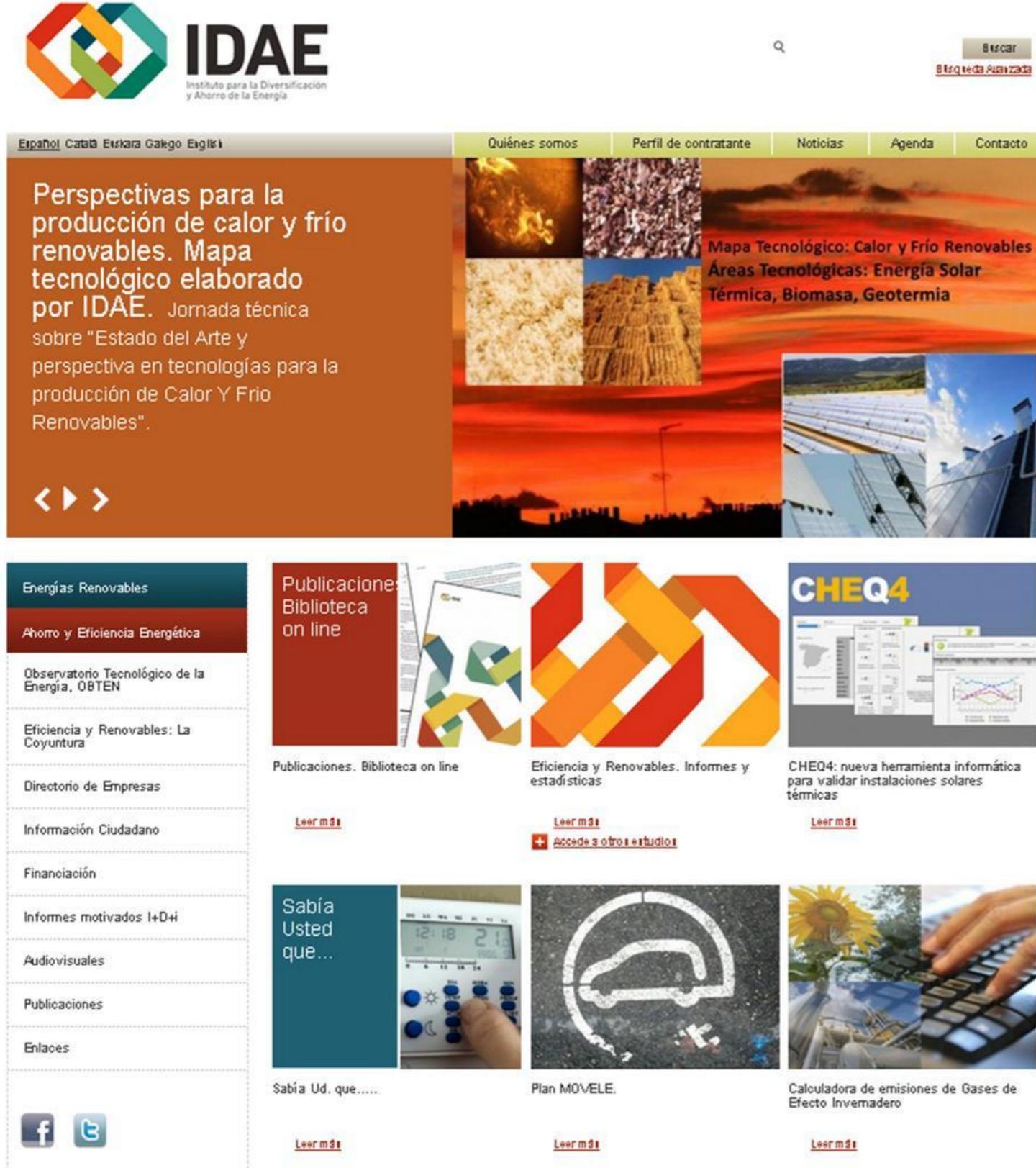
**Regional ECREEE Training  
Workshop on National Renewable  
Energy Policy and Incentive  
Schemes**

**Praia, 9-11 April 2012**

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## Table of contents

- 1. IDAE: mission and activities**
2. Challenges for RES deployment and planning
3. Spanish case
4. Conclusions

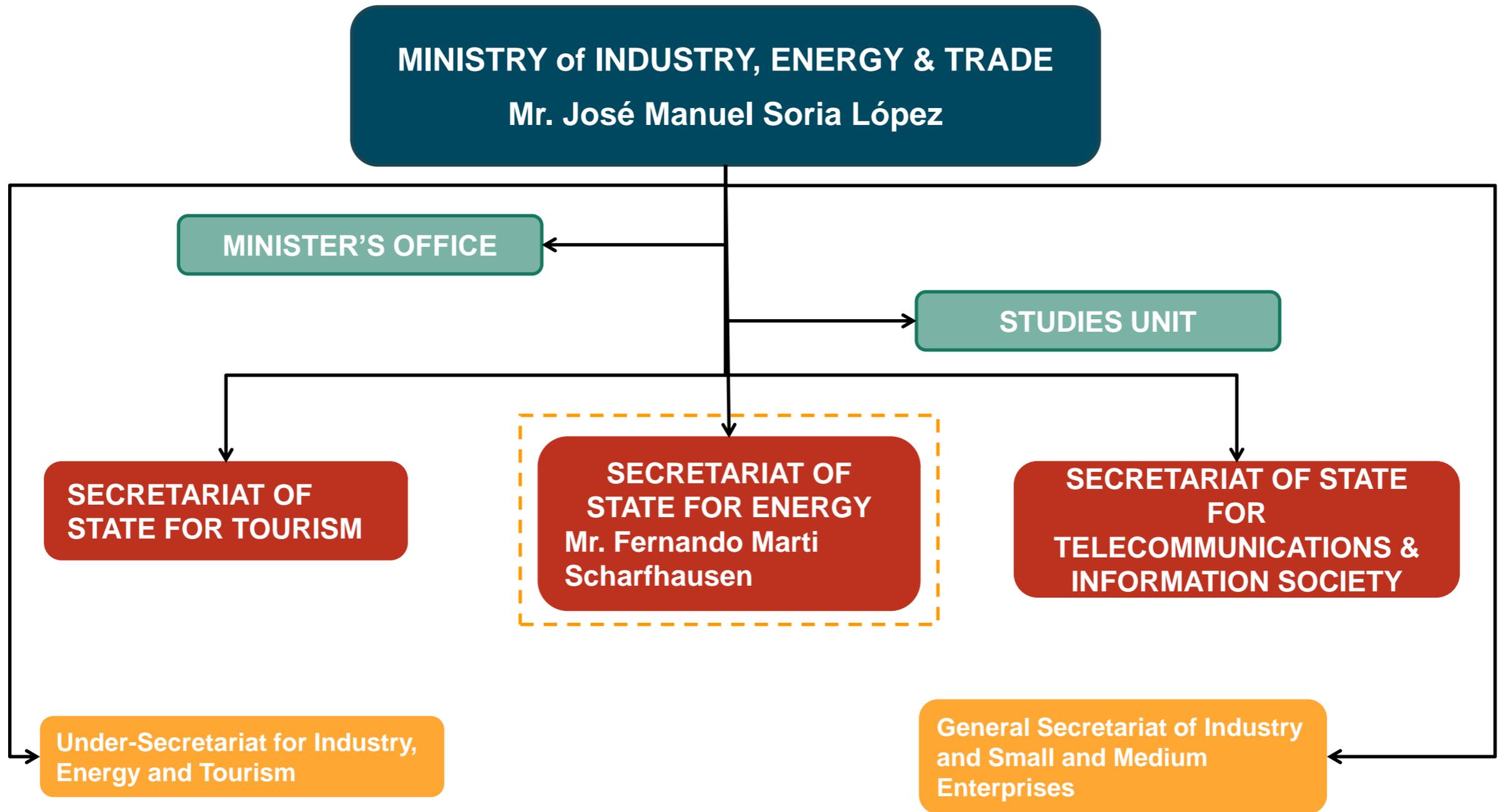


## What is IDAE?

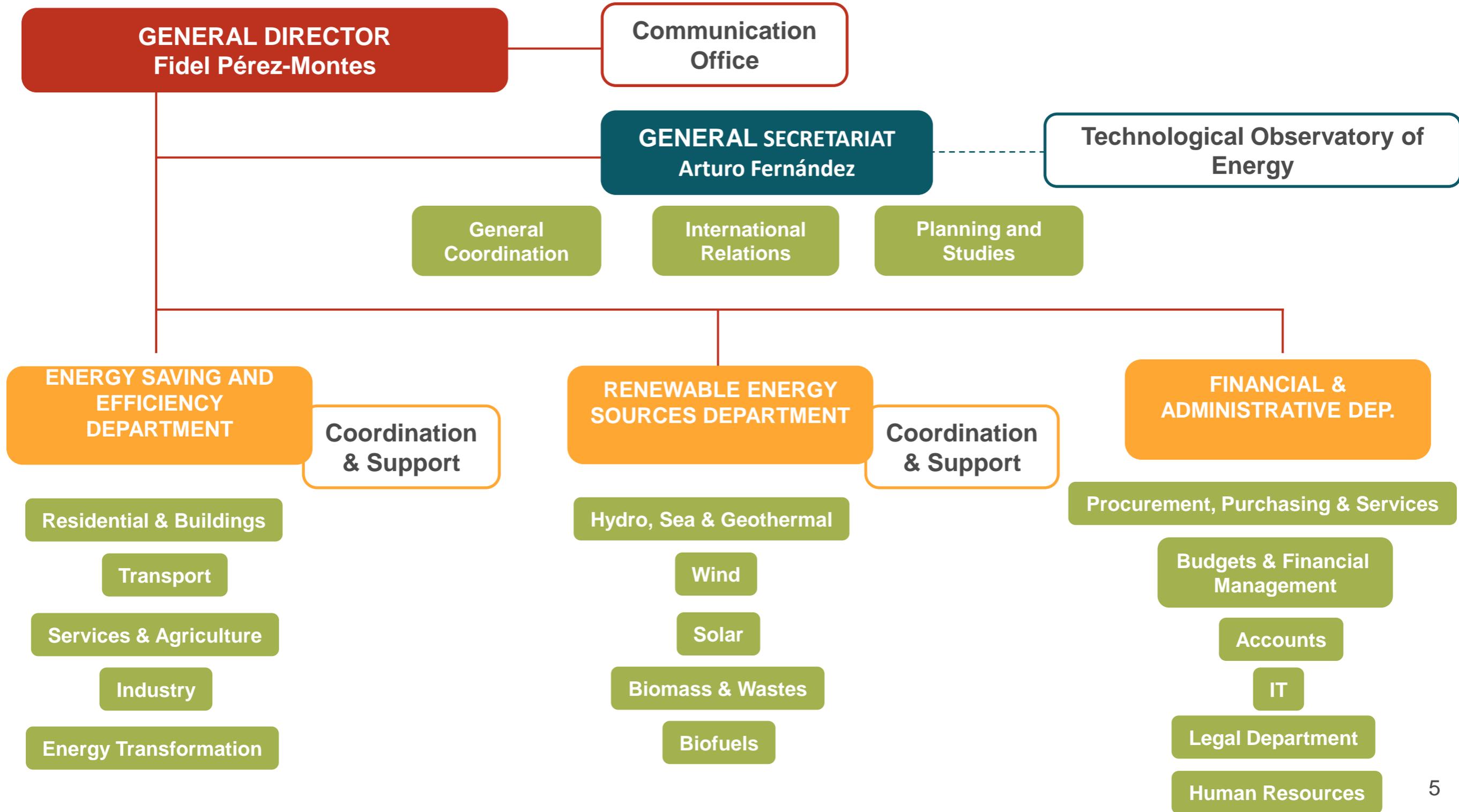
A public business entity reporting to the Ministry of Industry, Energy and Tourism through the State Secretariat for Energy

## Mission

- Promote **energy efficiency** and the rational use of energy in Spain
- Promote the diversification of energy sources and the increasing use of **renewable energies**
- Foster these activities through **technical consultancy** and implementation of innovative projects



# IDAE's Organization Chart



## Table of contents

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- 2. Challenges for RES deployment and planning**
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# Challenges for renewable energy deployment

- Development and deployment of renewable energy face critical regulatory and infrastructural impediments
  - Weak legal and regulatory framework
  - Weak institutional and individual capacity
  - Market structure and insufficient infrastructure
  - Price distortions:
    - High initial investment costs for suppliers
    - High initial capital costs for consumers
  - Lack of awareness
- First identify barriers. Then policy instruments can be developed.
  - Depends on the unique situation of each country (economic, political, social, environmental...)
  - Interconnections: bigger supportive markets
  - Incentives are just one element within a broader framework to be customized to each country

## Challenges for renewable energy planning

- Policies objectives:
  - Implementation of incentives to improve profitability
  - Development of an adequate institutional framework
  - Development of capacity and diversification
  - Improving awareness
  - Integration of RETs in development policies, including small scale, off-grid and rural areas
- Energy planning process starts by the country's overall energy situation.
  - Set of indicators for sustainable development and evaluate different future energy system scenarios in a consistent, rigorous and transparent way (e.g. energy efficiency)
  - Design of future socio-economic and technology development scenarios is the next
  - Evaluation of all present and future possible energy supply options (diversification and flexibility)
  - Compare scenarios (futures) with their ability to support national development objectives:
    - Define critical policies, investments or strategies
    - Minimize undesirable consequences
    - Determine the most cost-effective

## Challenges for renewable energy planning

- Pro-active and long-term policy-oriented renewable energy programs
  - Transparent and participative process
  - Designed to demonstrate the economic and environmental benefits of RETs in the country
  - Propose short and medium term policy initiatives towards large-scale RETs deployment
  - Highlight economic and social benefits of RE: job creation, income generation, GDP contribution, CO<sub>2</sub> reductions, savings in imports of oil or natural gas....
  - Appropriate technology, technology transfer and building local capacity
- Right measures at the right time (considering market development, maturity of RETs...)
- Network, infrastructure and grid planning: role of Operator and Regulator
- Report and monitoring

*A country that deploys renewable energy needs to continuously adapt its policy tools*

## Table of contents

1. IDAE: mission and activities
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## Renewables in Spain

- Renewable energies and energy efficiency provide a solution to the three main challenges of the Spanish energy policy (common to many countries):
  - Increasing security of supply (external energy dependency)
  - Improving domestic economy competitiveness
  - Ensuring a sustainable economic, social and environmental development
- Implementation of the renewable energy policy in Spain supported by:
  - Binding objectives established through energy planning and infrastructure planning
    - Renewable Energy Control Centre (CECRE)
  - Economic regulatory framework and financing support schemes and programmes
  - Technical regulatory framework: priority access and investment in infrastructures
  - Institutional and technological support (R&D)
  - A mature business sector

## Renewables in Spain: planning

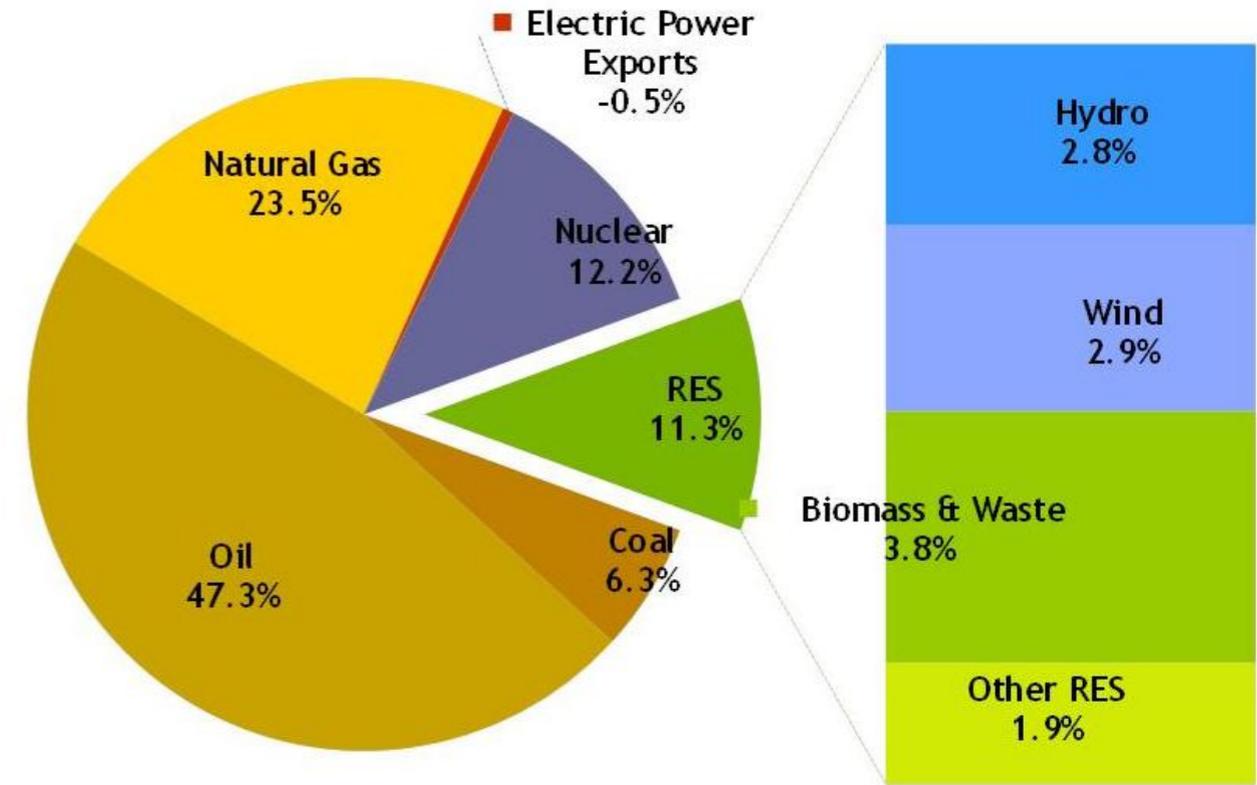
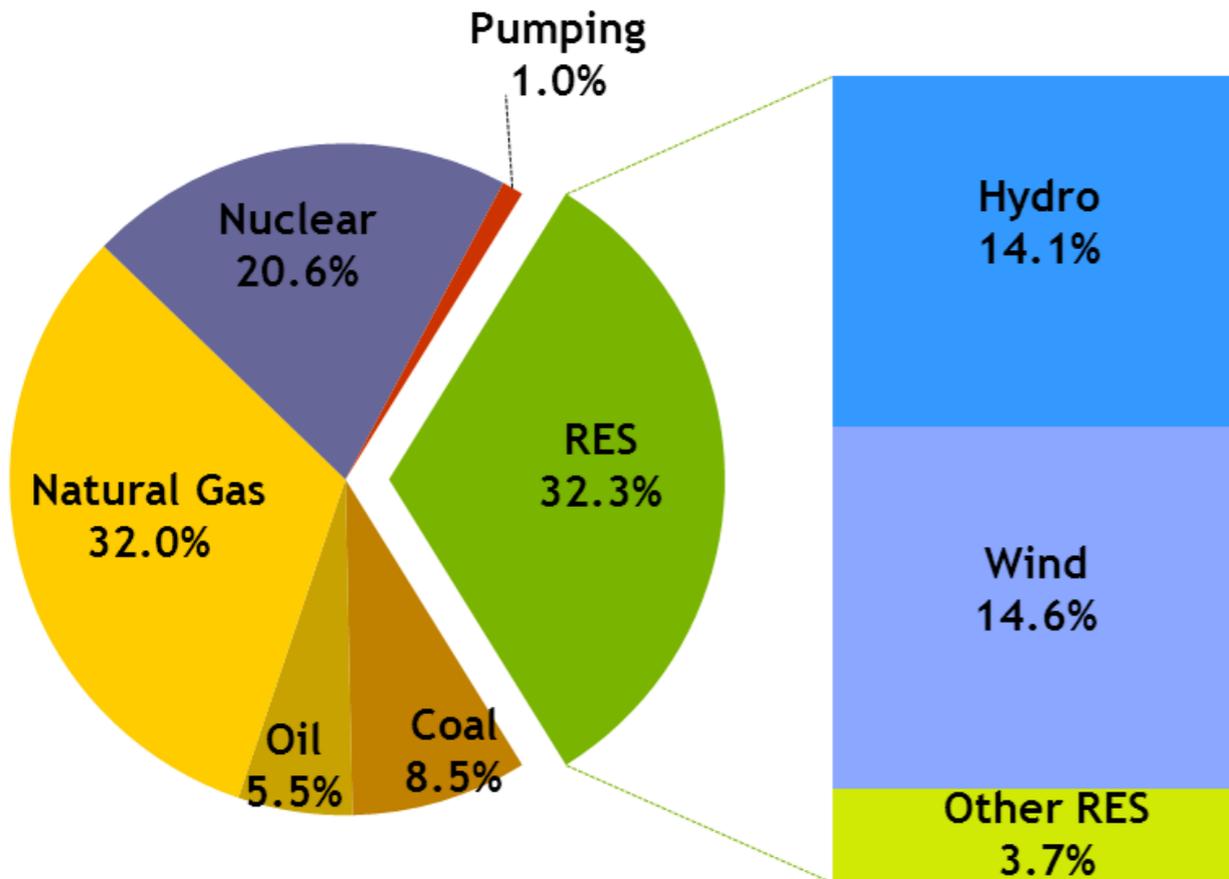
- Law 82/1980 on energy conservation
- Renewable Energy Plan 1986-1988
- Renewable Energy Plan 1989-1995
- National Energy Plan 1991-2000
- Law 54/1997 on the Electricity Sector, which deregulated the electric power market and made Spain the first European nation to introduce a legally-binding renewable sources objective: 12% of the primary energy demand in 2010
- Plan 2000-2010 for the Promotion of Renewable Energies
- Renewable Energy Plan 2005-2010
- Directive 2009/28, on the promotion of RES
- Renewable Energy Plan 2011-2020

**Drafting of REPs has been a transparent and participatory process, which embraced the Autonomous Communities, the National Commission for Energy (Spanish national regulatory body), the Ministries of Economy, Finance and the Environment, as well as manufacturers, business associations and the general public (Trade Unions, NGO's...)**

# Where are we? (2010 data)

## Primary Energy Consumption

Total consumption: 131.9 Mtoe  
 RES consumption: 14.9 Mtoe



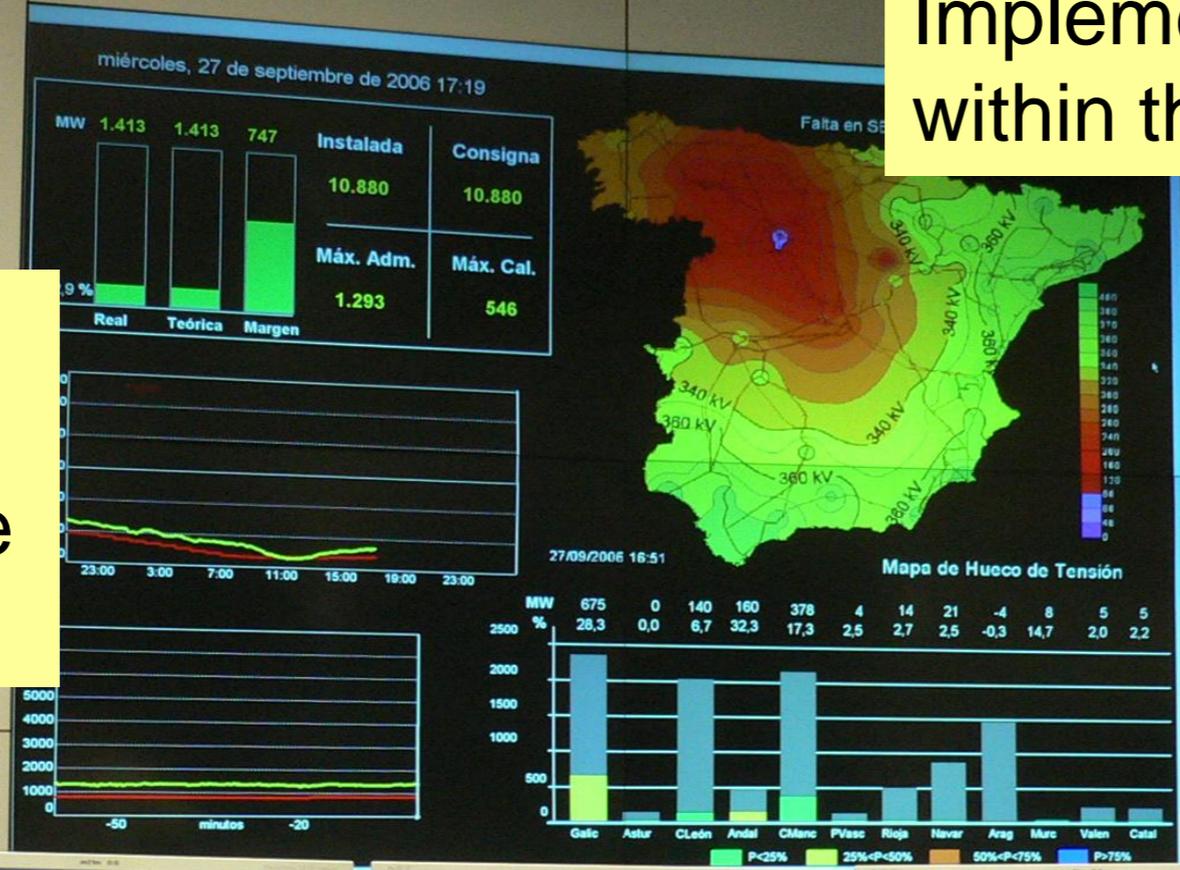
## Electricity Generation

Gross Electricity Production:  
**290,285 GWh**

- 2<sup>nd</sup> largest wind capacity in Europe and 4<sup>th</sup> worldwide (21,000 MW)\*
- 1<sup>st</sup> Solar Thermoelectricity producer in the world (1,000 MW)\*
- 2<sup>nd</sup> largest PV capacity in Europe and in the world (4,200 MW)\*
- 3<sup>rd</sup> producer in Europe in mini-hydro

CECRE:  
Implemented in June 06 by REE  
within the Control Structure

CECRE is the  
First RES  
Control Centre  
in the world



## Renewable Energy Plan 2011-2020: objectives

- **Directive 2009/28/EC** establishes minimum mandatory 2020 objectives for Spain:
  - ✓ 20% **RES** in gross final energy consumption (same as EU average)
  - ✓ 10% **of renewables in transport**, in the EU as a whole and for each Member State

### Criteria Used for Target Setting

- Amount of renewable national **resources harnessable** by the different renewable energy technologies (various analysis and studies have been carried out)
- Medium-term/ long-term outlook: technical development **prospects** and **costs projections** up to 2020 and 2030
- Decrease of Spain's **energy dependence**
- Contribution to the **environmental sustainability**
- Renewable energy **integration** into the energy system (in particular, into the electrical grid)
- Improvement of renewable energy economic competitiveness and their **contribution to the economic sustainability of Spain's** energy system
- Contribution to the **economic and social development**:
  - ✓ Job creation and balanced distribution of regional activity
  - ✓ Major boost towards a modern industrial sector

# Template for National Renewable Energy Action Plans under Directive 2009/28/EC

- The template aims to ensure that NREAPs are complete, cover all the requirements laid down in the Directive and comparable with other Member State biannual reports:
  - National renewable energy policy: overview of the national renewable energy policy describing the objectives of the policy (such as security of supply, environmental, economic and social benefits) and the main strategic lines of action
  - Expected Final Energy Consumption 2010-2020
  - Renewable energy targets and trajectories
  - Measures for achieving the targets
  - Assessment: Total contribution expected of each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity, heating and cooling and transport

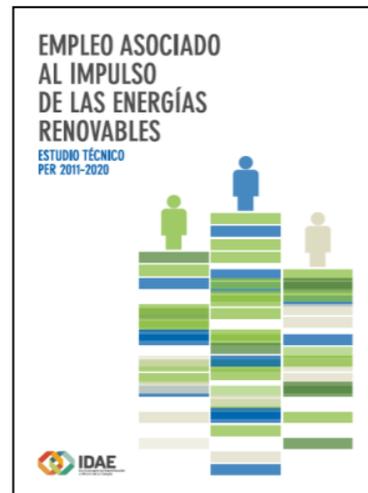
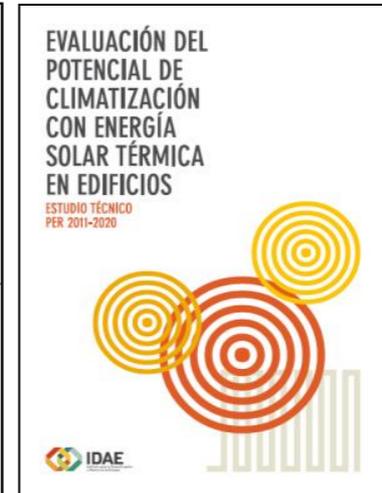
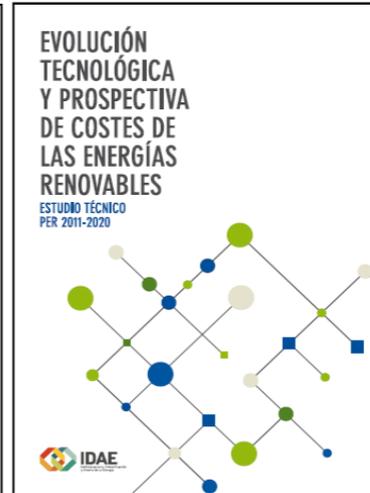
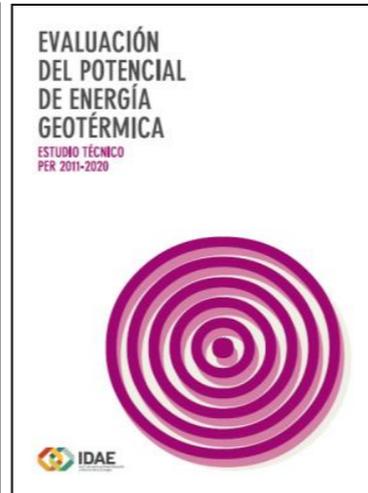
## REP 2011-2020: Analysis and Studies

The studies and analysis carried out for the Renewable Energy Plan 2011 – 2020 fulfil the following requirements:

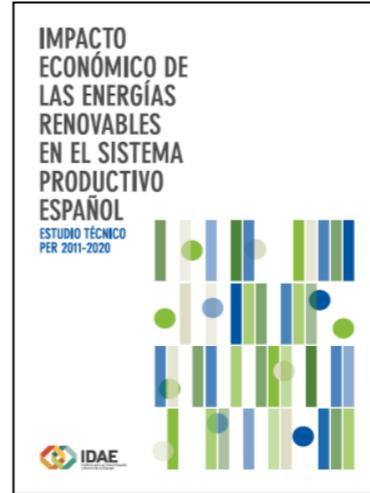
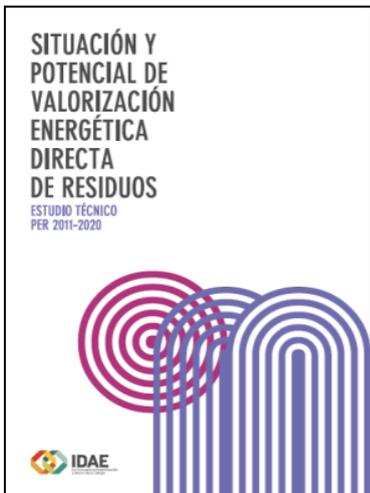
- Publishable and accessible via Internet
- Those with geographic components: transferred to a Geographic Information System (GIS)
- Homogenous results of the different studies

In general, the studies regarding the different technologies have analysed:

- Resource
- Barriers
- Technological situation
- Current costs
- Costs forecasts



# PLAN DE ENERGÍAS RENOVABLES 2011-2020



# Wind offshore potential assessment : Wind Atlas of Spain

## Double target:

- ✓ Support for all **public administrations** for the wind area related planning studies.  
In particular: **Evaluation of the Spanish wind potential (REP 2011-2020)**
- ✓ **Providing stakeholders a tool for initial evaluation of the wind resources**

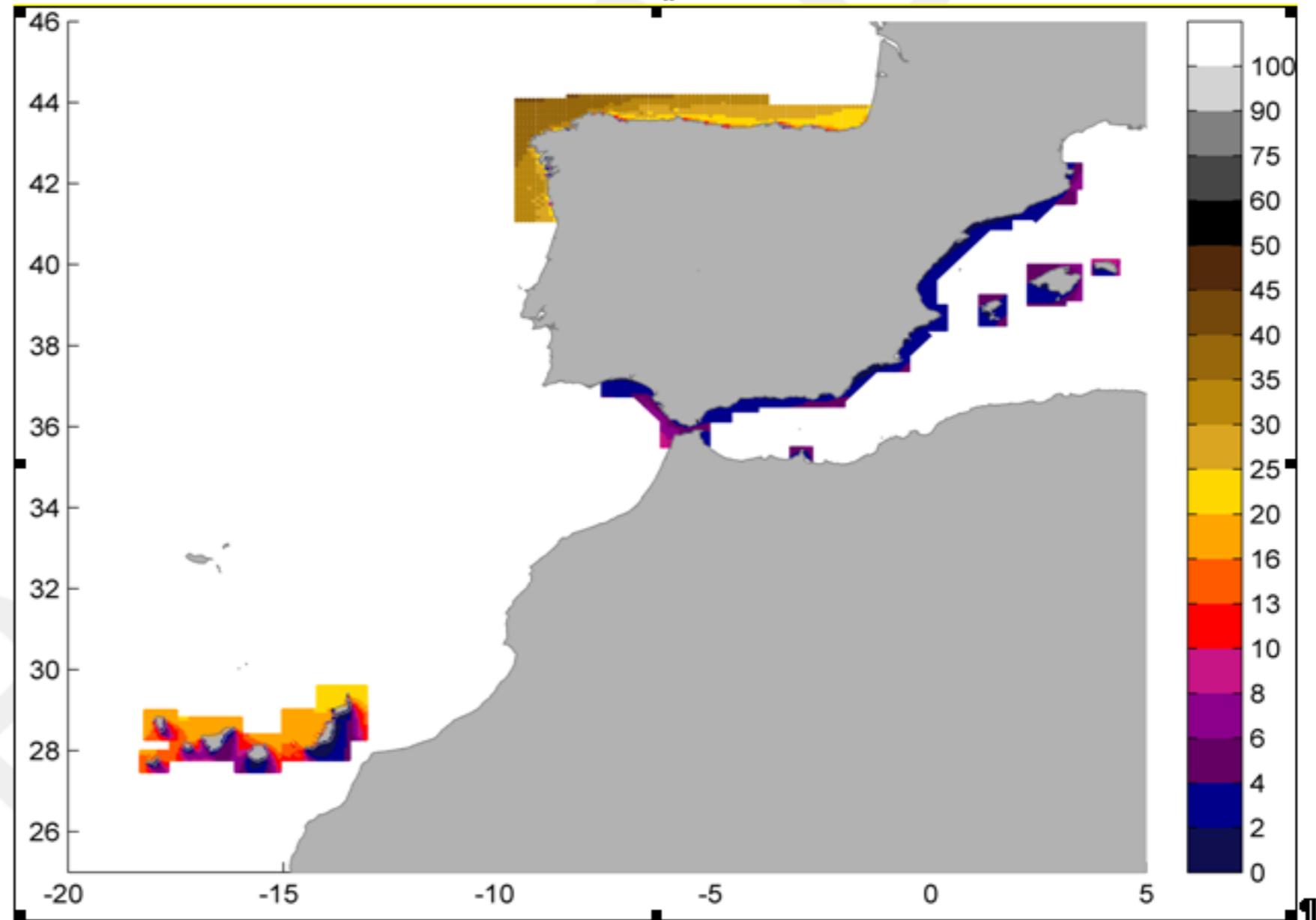
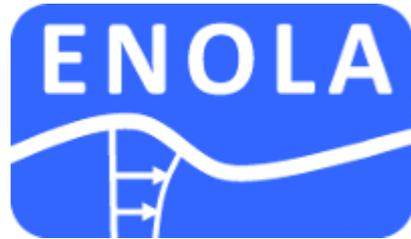
**Geographical Information System (GIS), Freely available –via Internet–.**  
(Grid resolution: 100 m)

<http://atlaseolico.idae.es>



# Wave Energy Potential Assessment in Spain

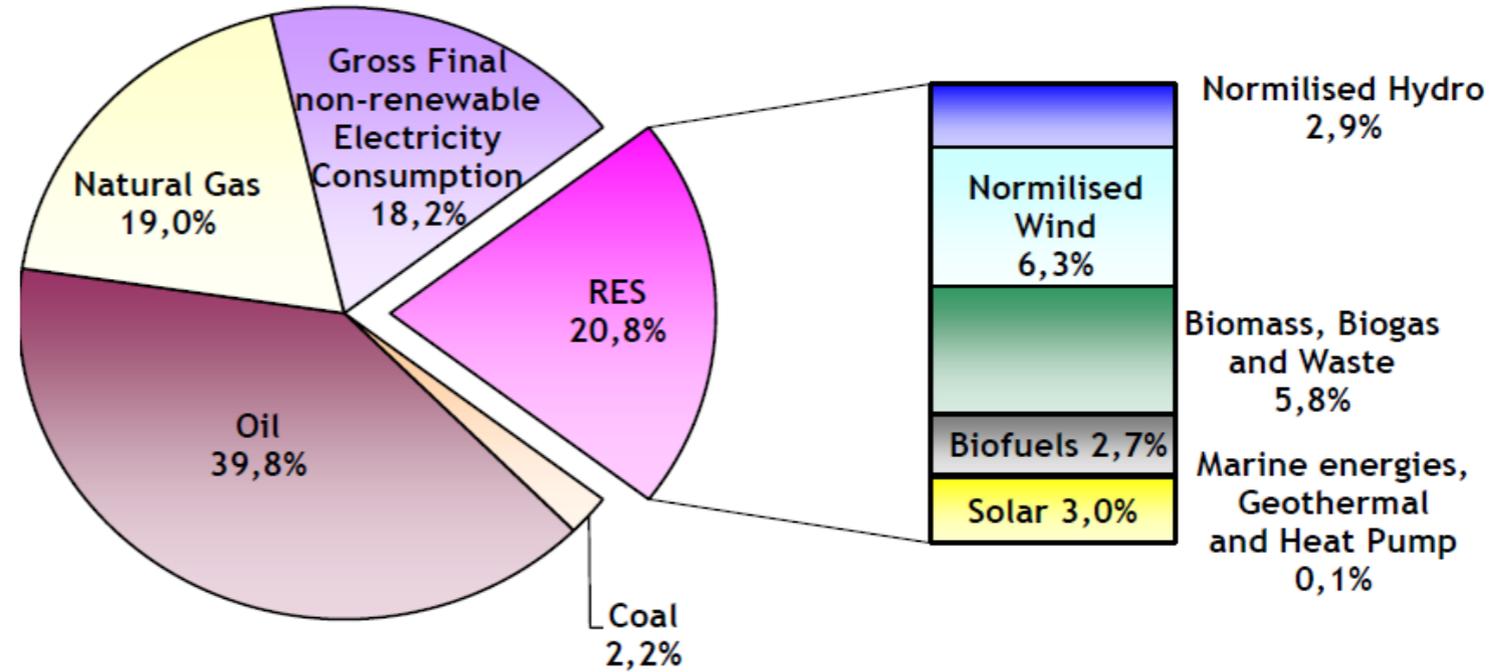
- Study on wave power potential in Spain. Accessible application in [IDAE's website](#)



*Yearly average potential (kW/m) in Spanish Coasts*

# Where do we want to be? Renewable Energies 2020

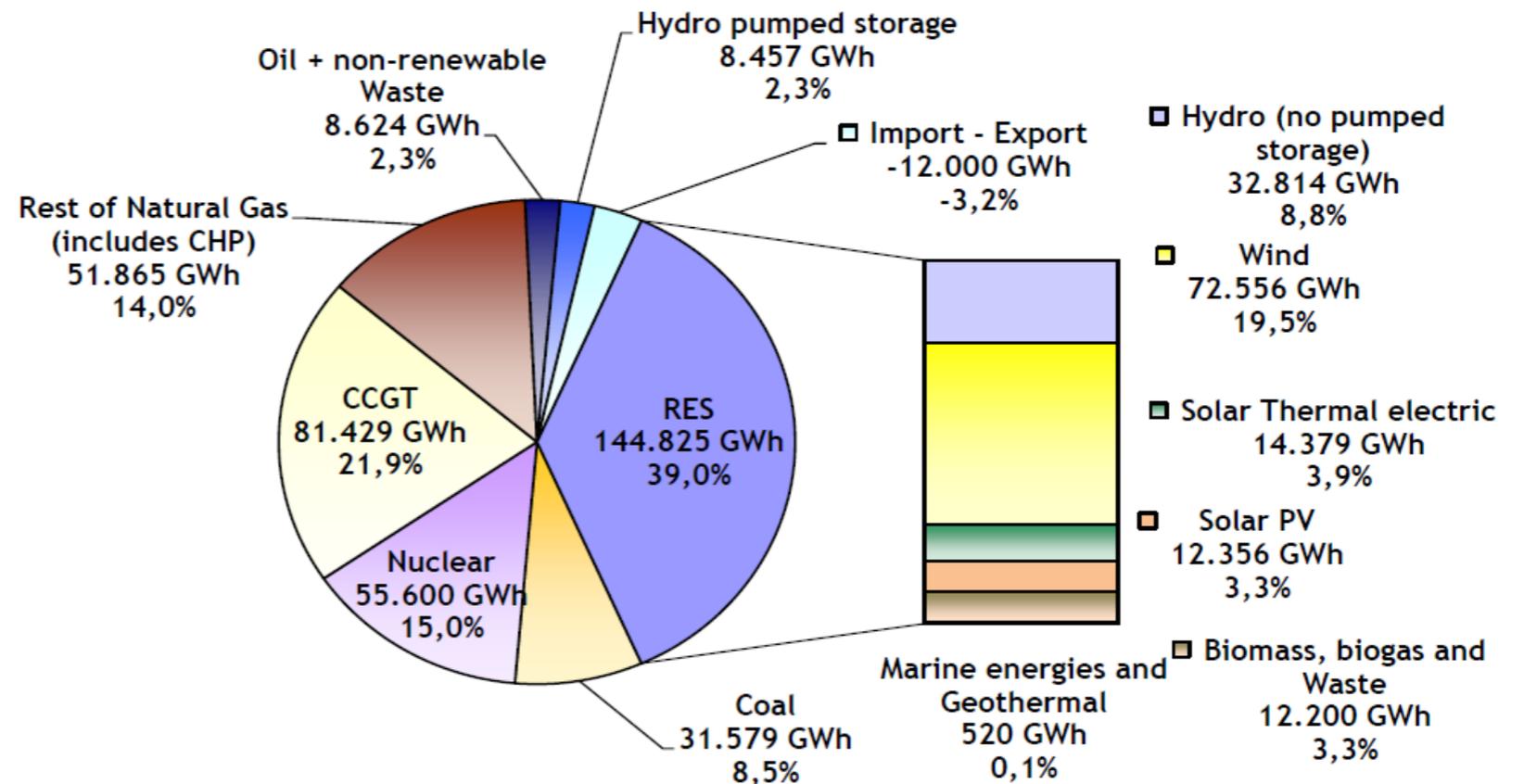
## Gross Final Energy Consumption in 2020



### Objectives 2020

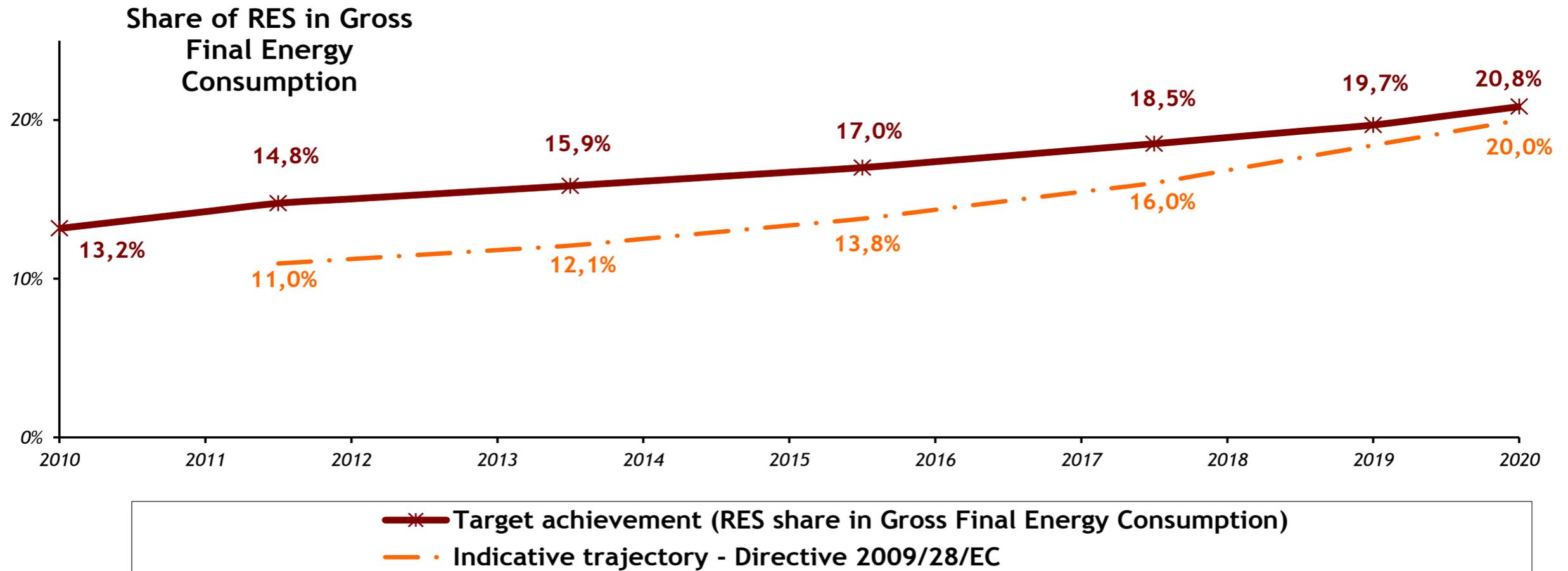
- 20,8 % RES share in gross final energy consumption
- 11,3 % RES share in final consumption of energy in transport
- 38,1 % Renewable electricity share in gross electricity consumption

## Electricity Generation in 2020



# Trajectories 2011 – 2020 for RES contributions

## Renewable energy in Gross Final Energy Consumption: REP 2011-2020 vs. Indicative Trajectory Directive 2009/28/EC



## National Harnessable Resource

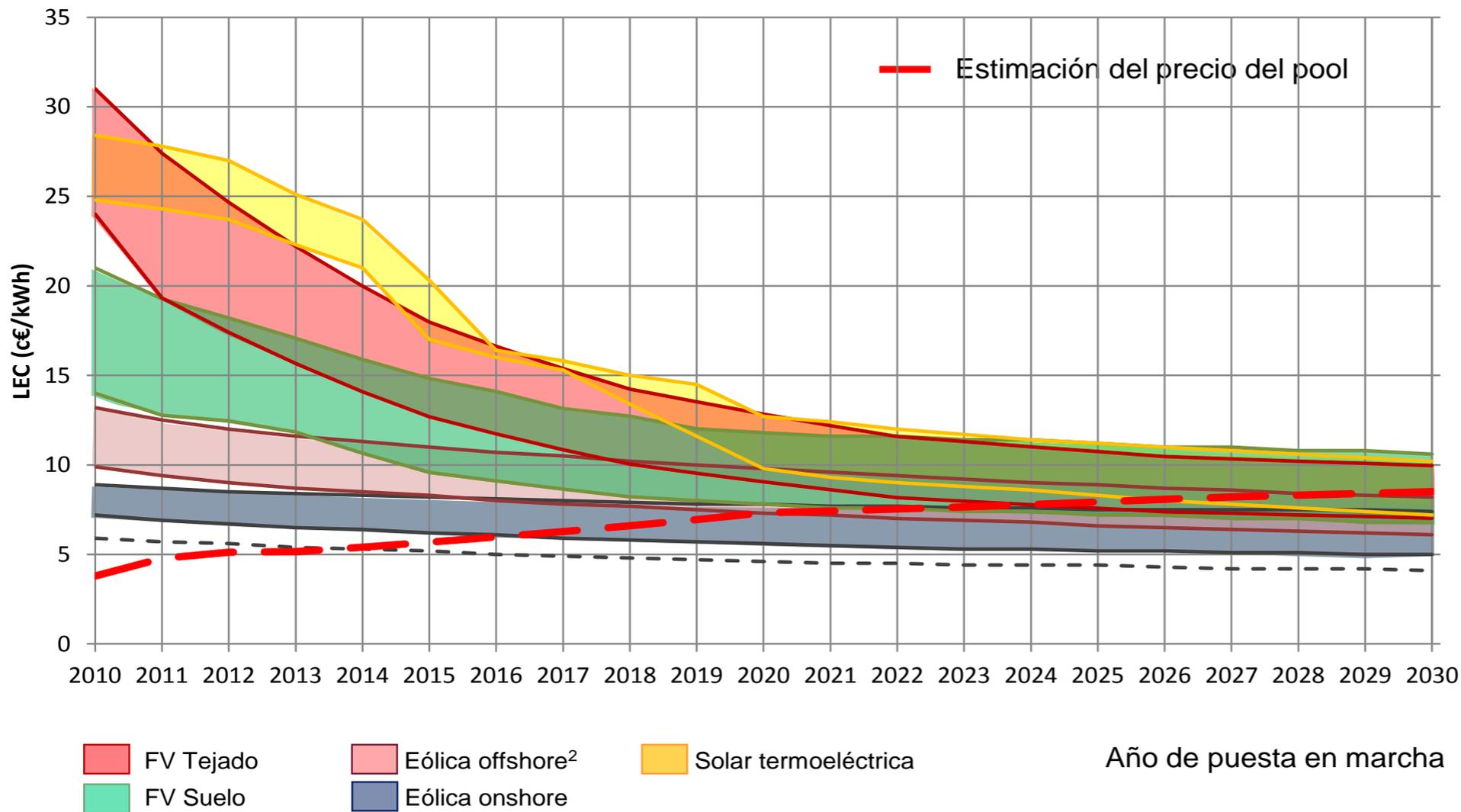
Technologies	Resource (GW)
<b>Solar</b>	<b>&gt; 1.000</b>
<b>Onshore and offshore Wind</b>	<b>340</b>
<b>Geothermal (1)</b>	<b>2,5</b>
<b>Geothermal (2)</b>	<b>20</b>
<b>Wave</b>	<b>20</b>
<b>Hydro</b>	<b>13</b>
<b>Pumping capacity</b>	<b>13</b>
<b>Electrical biomass</b>	<b>8</b>
<b>Municipal Solid Waste</b>	<b>1,8</b>
<b>Biogas</b>	<b>1,2</b>

(1) *Regarding areas already studied and recognised by IGME*

(2) *Regarding favourable geological areas (non analysed)*

# Electricity generation costs for PV, solar thermoelectricity and wind

Coste de generación eléctrica (c€<sub>2010</sub> / kWh)



## Caracterización de los rangos en el coste de generación

### Fotovoltaica de tejado y suelo

- Rango de variación en función de la tecnología
- Límite superior: tecnología de Thin Film
- Límite inferior: tecnología cristalina

### Solar termoeléctrica<sup>1</sup>

- Rango de variación en función de la tecnología: cilindro parabólico y torre
- Límite superior: tecnología de torre hasta ~2015 y de cilindro parabólico en adelante
- Límite inferior: tecnología de cilindro parabólico hasta ~2015 y de cilindro en adelante

### Eólico onshore

- Rango de variación para instalaciones de 50 MW en función de la intensidad de viento
- Límite superior: zonas de viento moderado (~2.000 horas)
- Límite inferior: zonas de viento medio (~2.400 horas en 2010)
- Punteado: zonas de viento intenso (~2.900 horas en 2010)

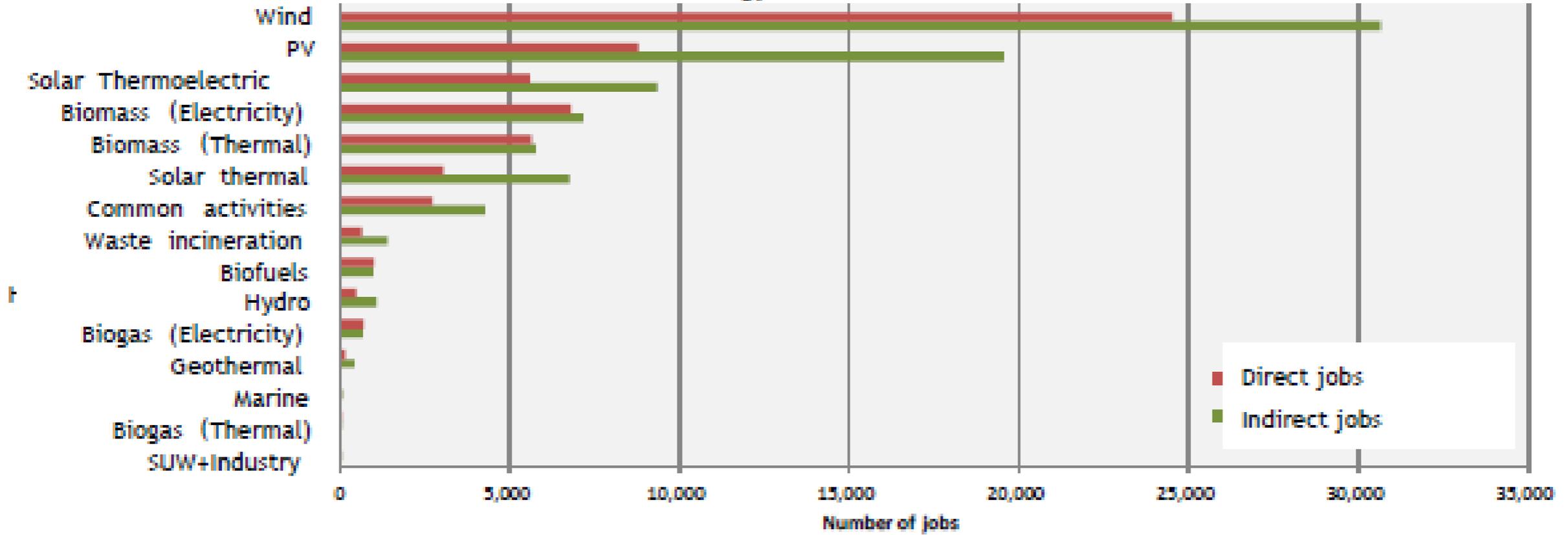
### Eólico offshore

- Rango de variación para instalaciones de 150 MW en función de la distancia a la costa
- Límite superior: 100 km de distancia a la costa
- Límite inferior: 50 km de distancia a la costa

1. Torre: escala de tamaño de 20MW a 40 MW en 2015 y a 50MW en 2018. En 2020 se desarrolla una tecnología disruptiva; cilindro parabólico: Escala de 50MW a 100MW en 2016 y a 200MW en 2020; la torre supera en costes al cilindro parabólico a partir de 2015 si se apoya suficientemente 2. Profundidad <40 m  
Nota: las plantas termoeléctricas tienen un ciclo de construcción de 2-3 años: los costes de plantas puestas en marcha en 2012 están definidos por costes actuales

# Employment associated with RES

Renewable-Energy Related Jobs in Year 2010

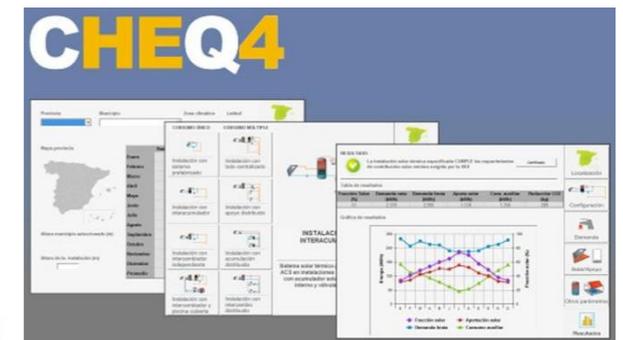


Source: ISTAS and IDAE

## REP 2011-2020 – some important aims and measures

- Consolidation of the more mature technologies, reducing existing barriers
- Development of emerging technologies (geothermal, marine energies)
- More efforts in R&D
- Technical requirements of renewable energy installations aimed at their technical integration into the electrical grid
- Essential to further develop Spain's electricity interconnections with the European system and to increase pumping capacity
- Implementation of more demand-side measures:
  - Development of a net metering mechanism (photovoltaic, small wind turbines), exclusively in terms of an electricity balance (no payment to the producer)
  - Smart meters
- ICAREN: Support mechanism for RES-heat through ESCOs

*La energía de tu casa*



## REP Economic Balance

<b>PER 2011-2020: BALANCE ECONÓMICO DE EFECTOS DIRECTOS</b>			
<b>BENEFICIOS (millones de euros)</b>		<b>COSTES (millones de euros)</b>	
Menor importación de gas natural	17.412	968	Subvenciones
Menor importación de gasóleo	7.125	77	Costes de financiación
Ahorros por reducción de consumo de gasolina	981	67	Otros gastos
Ahorros por reducción de emisiones de CO2	3.567	23.235	Prima equivalente régimen especial
		191	Sistema de incentivos al calor renovable
		99	Menor recaudación IH (*)
<b>TOTAL</b>	<b>29.085</b>	<b>24.637</b>	<b>TOTAL</b>

(\*): Menor recaudación en impuesto de hidrocarburos correspondiente a biocarburantes. Partida que proviene del PER anterior y finaliza en 2013.

<b>PER 2011-2020: Otros beneficios a considerar</b>	
Creación acumulada de riqueza (incrementos de contribución al PIB) durante 2011-2020 (millones de €)	33.607
Estimación de empleo total vinculado a las energías renovables en 2020	287.513
Reequilibrio balanza de pagos: Exportación de tecnología	

## Table of contents

1. IDAE: mission and activities
2. Challenges for RES deployment and planning
3. Spanish case
- 4. Conclusions**

## Conclusions

- Energy planning is a strategic effort to develop energy objectives and formulate related policies and programs
  - It addresses energy, environmental, economic, and social issues
  - It can be undertaken at local, national and regional level
- Establish a multi-agency, multi-stakeholder collaborative process to develop a plan
- Establish policy objectives and specific goals
  - Diversified and flexible energy mix
- Forecast energy demand
- Assess RES Potential
- Examine policy options that can help expand the use of cost-effective RETs
- Evaluate impacts of policy scenarios
- Link plan to action
- Coordinate implementation and monitoring

# Thanks for your attention



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