

SPAIN

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INTA

INTRODUCTION AND BACKGROUND

The Spanish energy market is a faithful image of the current national economy situation. Since the 2008 crisis, Spanish energy demand has exhibited a continuous downward trend. The main cause has been decreased industrial activity.

The same trend is evident in primary energy consumption and electricity demand. The energy consumption rate was 6% lower in 2013 than it was in 2012.



Figure 1 Electricity demand tendency. Positive rates start in 2014

However, if we look at the electricity sector we see more positive figures. Although the installed power capacity has not changed from 2012, the data show a decrease in the consumption of fossil fuels thanks to the continuous growth of hydroelectric and wind energy production. Renewable energies now account for over 40% of primary energy consumption in 2013. The renewable energies have supplied 14.2% of the total primary energy consumption in 2013, increasing their share 7 percentage points from 2012.

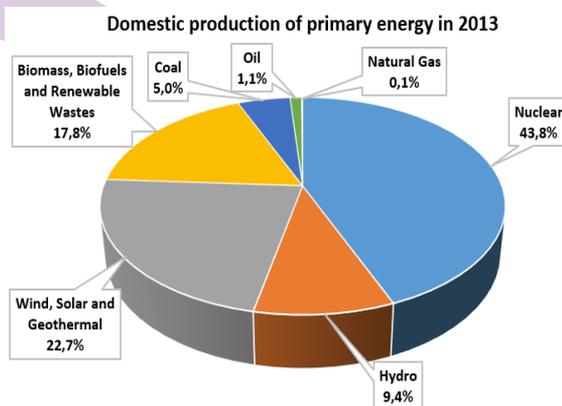


Figure 2 Spanish Primary energy consumption in 2013.

VITAL STATISTICS

EU Member

Population

46,464,053 habitants
(01/07/2014)

Territory

Total Area: 507,782 km²
Land: 499,542 km²
Water: 5240 km²

Capital

Madrid

GDP/capita

€22.780/per capita

Average Annual GDP Growth

2014: +1.4%
2013: -1.2%

Primary Energy Structure

2013

Production

Total production: 34,422 ktoe
Coal: 1,762 ktoe – 5.0%
Crude Oil: 375 ktoe – 1.1%
Natural Gas: 50 ktoe – 0.1%
Nuclear: 14,785 ktoe – 43.8%
Hydro: 3,163 ktoe – 9.4%
Wind, solar & geo: 7,331 ktoe – 22.7%
Biomass: 6,956 ktoe – 17.8%

Imports

Total Imports: 93,148 ktoe
Coal: 9,250 ktoe
Crude Oil: 57,871 ktoe
Natural Gas: 26,027 Ktoe
375,525 GWh

Exports

N/A



Electricity

Production

Total production 280,670 GWh

Coal: 42.398 GWh – 15%

Fuel: 35.674 – 13%

Natural Gas: 32.248 – 11%

Nuclear: 56.731 GWh – 20%

Hydro: 41.072 GWh – 15%

Renewable Energies: 72.547 GWh – 26%

Imports / Exports

Imports – Exports = -6.732 GWh

Total Demand/ Consumption

Primary Energy Demand:

121.119 ktoe

Electricity Consumption:

262.105 GWh

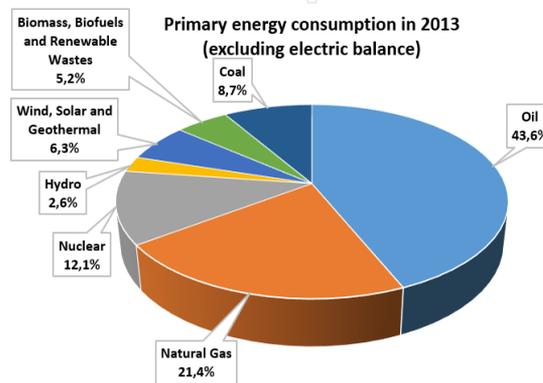


Figure 3 – Primary Energy production of Spain in 2013. Half of the primary energy produced in Spain comes from renewable energies. Spain does not have any fossil fuels deposits.

UPDATE ON MEMBER’S ENERGY FRAMEWORK

UPDATE ON RELEVANT POLICIES

Spain’s latest energy policies have been focused on the electricity sector. A new law on Electricity regulation (Ley del Sector Eléctrico 24/2013) was approved in December 2013. It effectively drives competition in the industrial sector. New rules have been introduced: to increase the competition among the utilities; to help the consumer with more information and the means to choose their electricity suppliers; and to reduce the electricity cost. Financial stability in the electricity generation sector is the main target of the new special retributive regime.

As well, a new 2013–2018 Mining Action Frame has been signed. This will promote an alternative economy in mining regions, in accordance with the EU Regulation.

Spain continues to work hard on energy efficiency and saving, following the initiatives promoted by the EU, giving continuity to the policies developed during the last decade.

Research and Innovation policies, including legislation for science, technology and innovation, have also been addressed by the Spanish authorities since 2011. In February 2013, a single state plan for Scientific and Technical Research and Innovation was set into law. Reform proposals within this new law cover the governance system, the quality of human resources, the funding allocation system and knowledge transfer between parties. Objectives and priorities have been well aligned with the objectives of Europe 2020, the Innovation Union and Horizon 2020. Public-private cooperation has been reinforced by the introduction of legal changes to researchers’ contracts, thereby stimulating mobility between the public and the private sector.

Key action items include: better matching between supply and demand for innovation; a favorable financial framework for innovation; high quality human capital and its engagement in R&I activities of Spanish industry; an increase in risk capital activities and instruments; and a reorientation of some public procurement towards innovative products and services.

Energy is a specific topic in the plan, looking for solutions to the sustainability, efficiency and safety, with priority activities to fight against the climate change and the energy dependency and to assure the market competition and energy savings.





UPDATE OVERVIEW ON RELEVANT PROGRAMS AND PROJECTS

Funding

New programs, including PIMA and CLIMA, have been approved. PIMA is focused on the environmental issues related to climate change. In an effort to improve air quality, subsidies are provided to buy more efficient and lower emissions gas vehicles and electric bikes. The Ministry of Agriculture, Food and Environment has allocated €9.2 million to finance the purchase of these cleaner vehicles.

CLIMA is focused on decreasing emissions in the transport, residential and wastes sectors. The third phase was launched in 2014. More than 100 projects focused on reducing CO₂ emissions by developing clean technologies and low emissions activities have already been “signed” into action. The National Climate Office will pay €15 million for the verified reduction of emissions according to the agreed amounts for these 4 year projects.

The state plan for Scientific and Technical Research and Innovation has annual calls to finance projects with a budget of around €120 million per year for the eight topics.

Highlights of Progress

All the initiatives led by the Spanish government and followed by the citizenry and industry are helping to get closer to the 2020 targets. More electric vehicles are starting to circulate in our cities. Renewable energies are increasing their share of energy production. Moreover, new low emissions technologies and activities are starting to show profitability.

Reliable data recorded in 2013 observed a reduction of CO₂ emissions, highlighting our progress. Spain is the third country in the EU to reduce the CO₂ emissions from energy use in 2013: 32.4 million tons of CO₂ emission were emitted by the energy and water supply, transport, manufacturing and construction activities.

HYDROGEN R,D&D SPECIFICS

PROGRAMS, PROJECTS, INITIATIVES IN BRIEF

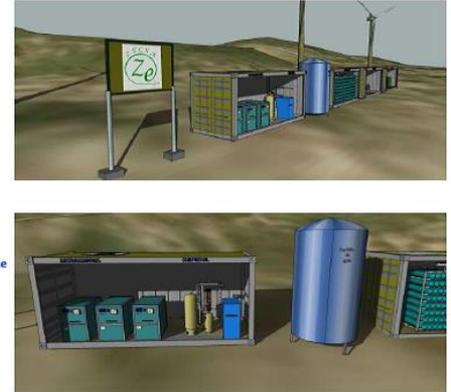
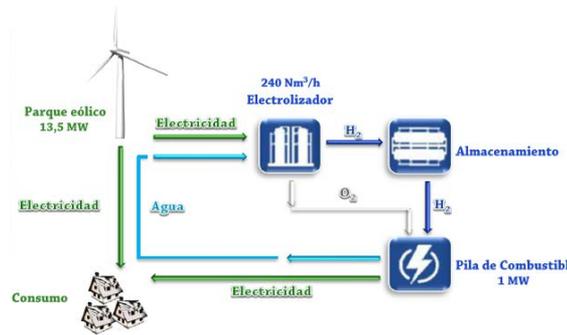
For the first time, hydrogen and fuel cells are considered a priority topic in the 2013–2016 Spanish Strategy for Science, Technology and Innovation Program. This priority topic will cover activities to promote the production, storage and distribution of hydrogen, as well as research and development of hydrogen and fuel cell technologies, and end users applications.

“SOLANTES”

Solantes is a wind park with hydrogen storage facilities located in the Canary Islands. In 2013 this project started. The target is to build the “Solana de Tesjuate” R,D&D Wind Park in Fuerteventura. It will be the biggest Wind Park with hydrogen storage in the world. It will count three wind turbines of 4.5 MW, each producing 13 M Nm³/h per year. The H₂ storage system will have a capacity of 750 kg and the H₂ will feed a fuel cell of 1 MW of power.



The sponsor of the project is the Canary company ZECSA. The ZECSA slogan summarizes its perspective for the hydrogen market: “to go further than the ‘know-how’ —to reach the ‘know-why’.” The investment of the project is €31 million.



RENVAGAS

Based on the technology of “power to gas,” this project tries to develop a synthetic natural gas plant from biogas and methanation with hydrogen produced from renewable energies. The project is lead by ENAGAS, and it is carried out by a public-private partnership with partners including Abengoa Hidrógeno, Gas Natural Fenosa, FCC AQUALIA, TECNALIA, ICP-CSIC and CNH₂. It is financed by MINECO, Spanish Economy and Competitiveness Ministry.

LIFE-AQUASEF



The project LIFE-AQUASEF is focused on introducing new technologies such as solar energies and fuel cells to the aquaculture sector, to improve its energetic, economical and environmental capacities. The partnership is comprised of ARIEMA, HelioTrónica, D&B Tech, Esteros de Canela y el Centro Tecnológico de Acuicultura de Andalucía

(CTAQUA). The total budget of the project is €1,899,318. It is funded by the EU with €919,744 (LIFE call 2013). The project must be completed in June 2017.

HYCARUS and H2TRUST

Spanish companies are participating in some EU projects financed by the European Commission.

The target of the HYCARUS project, co-funded by the FCH JU, is to demonstrate the promise of hydrogen-air Proton Exchange Membrane (PEM) fuel cell system technologies in non-essential aircraft applications. Launched in May 2014, HYCARUS will develop and integrate a Generic Fuel Cell System (GFCS) for on-board aircraft applications. The GFCS will be integrated and tested in a representative environment in 2016 to reach





TRL 7 level. INTA, the Spanish partner, will be in charge of most of the mechanical and environmental tests, carried out to certify its compliance with the DO160 standard; needed to get the “permit to fly.”

H2TRUST is a consortium lead by the Spanish company MATGAS. It was created to foster a smooth and well managed transition to the full-scale commercialization of fuel cell and hydrogen applications in Europe, and emphasize the importance of hydrogen SAFETY among all stakeholders. It is co-funded by the EC-supported Fuel Cells and Hydrogen Joint Undertaking (FCH JU), the results of the project are available on its website.

REFERENCES

- 1] www.inta.es
- 2] www.mityc.es - “La energía en España 2013”. Ministry of Industry, Tourism and Trade.
- 3] www.ree.es - “El sistema eléctrico español 2014”. Red Eléctrica de España.
- 4] www.ine.es
- 5] www.micinn.es
- 6] www.zecsa.org
- 7] www.h2trust.eu

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