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Spain: Energy Policy and Proposal

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POSC 370: Energy Politics

Professor David Shafie

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Country Background

The country of Spain is located on the Iberian Peninsula, touching Portugal, France, and Morocco. It is populated by about 46.5 million people, with another 68.5 million tourists visiting every year. There are seventeen different autonomous regions: Catalonia (where Barcelona is located), Galicia, Asturias, Cantabria, the Basque Country, Navarra, Castillo y Leon, La Rioja, Aragon, Madrid, Extremadura, Castilla-La Mancha, Andalusia, Murcia, Valencia, and the Canary Islands. This makes it a decentralized country, but not a federal state. Each autonomous region has its own elected Parliament that has control over a range of services like health care and education. Two regions, Catalonia and the Basque country have their own police forces, and the Basque Country and Navarra have independent fiscal systems.

There are many different rules each autonomous region has to follow. This has caused extreme tensions between the Spanish government and the regions. An example of this tension is the fact that Catalonia makes \$223.6 billion euros a year, which is around 20% of the entire countries GDP.¹ Also, Business Insider has calculated that if Catalonia split from Spain, they would make \$16 million dollars more just from taxes! The tensions between Catalonia, along with many other different autonomous regions, and the Spanish government have only increased

¹ Megan Specia, "Spain is a Collection of Glued Regions. Or Maybe Not So Glued." The New York Times. 2017

<https://www.nytimes.com/2017/10/29/world/europe/spain-autonomy-catalonia.html>

over the years. This has made it difficult for the country as a whole to agree on many different important issues, including energy use.

Energy Consumption

As of 2016, Spain's energy consumption was as follows: 22% nuclear, 6% oil, 20% gas, 14% coal, and 39% renewable energy. With the renewable energy: 2% biofuels and waste, 13% hydro, 5% solar, and 18% wind. Other than renewable, nuclear power is the leading source of energy for Spain. There are seven different nuclear power plants all over the country that have been around for many years. There was a law in place that only allowed the power plants to run for 40 years, however, in 2011 they extended it to 60 years because of the success of the power plants. Nuclear power is obviously a very controversial topic all over the world, as it is in Spain. Because of this, the future of nuclear power in Spain has been uncertain.

The other major source of energy for the country is renewable energy. With hydropower producing 2.75 Mtoe per year, they stand in the middle rank of West European countries in terms of hydroelectric resources. They have multiple hydroelectric power locations across the country, however they are very expensive to maintain. Solar power only produces around 5% of their total energy. One would assume that the country would produce a large amount of their renewable energy from solar power since the country is predominantly sunny. This is what many investors and developers assumed in the past as well. In the early 2000s,

there was major research and development, and by 2012 subsidies reached 8.1 billion euros. However, this high level of support became unsustainable. Then, in 2015, a “sun tax” was put in place for solar energy consumers. This tax made it so solar energy consumers pretty much paid the same fees as all other electricity consumers in Spain. After this tax was put into place, consumer stopped wanting to put in solar panels because there were no financial benefits.

Wind energy is the fastest growing form of sustainable energy in the world, and Spain is said to be at the forefront of that. In just 12 years, the contribution of wind energy has gone from being considerably insignificant to playing a substantial role in the country’s electricity production. Spain gets the majority of its renewable energy from wind power, with 18%. This makes Spain the 5th largest wind power producer in the world! This is a major achievement because the only countries that are ahead of them are Germany, India, China, and the United States. Not only are they at the forefront of wind power generation, they are also a world leader in windmill production and generation. However, even though wind generation looks like it is on the rise, it has been subject to multiple legal challenges over the years. In 2012, an energy reform bill was presented and passed to slash subsidies to suppliers.

Even with the reform bill, Spain still managed to keep their wind supply fairly unchanged. There are a total of 210 windmill production factories in the entire country, and over 1,080 wind farms producing energy. This means that there

are about 23,026 windmills being used throughout the entire country, and there are many more scheduled to be installed soon. In 2017, wind power produced 47,886Gwh of energy, which is equivalent to supplying electricity to 12 million homes! ² This was a great achievement for Spain, and a major step towards a more sustainable future due to the avoided emission of 28 M Ton of carbon dioxide into the atmosphere.

Anticipated Problems

There are many problems that may arise from Spain's current energy consumption model. First, there is high regulatory instability in the Spanish government. It is difficult to implement new policies about energy resources due to this reason. The tensions between the different autonomous regions and the capital only enhance this issue because it makes it even more difficult to implement policies for the entire country. There are also many different concerns about the amount of nuclear energy used to generate energy in Spain. Yes, nuclear energy is more clean and efficient than burning coal or natural gasses, but there are also major downsides to it. One major problem is how Spain deals with radioactive waste management.

In 1984, ENRESA (Empresa Nacional de Residuos Radiactivos SA) was established to take over all of Spain's radioactive waste and decommissioning of

² "The figures of the Spanish wind power industry" *Asociación Empresarial Eólica*: <https://www.aeeolica.org/en/about-wind-energy/wind-energy-in-spain/>

nuclear power plants. Since then, there have been a lot of regulation changes and additions that have made it more difficult for ENRESA to continue their work unchanged.³ This makes the future of nuclear energy unclear. One more anticipated problem that can arise from nuclear energy is the unsafe aspect of it. There have been multiple accidental radioactive waste release incidents. This is not only extremely harmful to the environment and to the people living near the power plants, it is also a major penalty and the plants can be fined millions of dollars. Many people in Spain do not believe nuclear power is safe enough, and are lobbying to end it.

In terms of wind energy, there are many concerns that are preventing advancement. First, the Energy Reform Bill of 2012 threatened the viability of renewable projects because subsidies were reduced. The renewable energy sector was hit especially hard, and Spanish energy stocks fell sharply.⁴ This led to regulatory uncertainty that has definitely hit the wind power industry. Since the Energy Reform Bill passed, wind energy generation has been on the decrease. Other types of energy that were not hit by this bill, like coal and nuclear have increased. This is a problem because there are multiple goals that Spain plans to reach that can be hindered.

³ "Nuclear Power in Spain" *World Nuclear Association*: <http://www.world-nuclear.org/information-library/country-profiles/countries-o-s/spain.aspx>

⁴ "Spanish energy reforms slash subsidies to suppliers" *Financial Times*: <https://www.ft.com/content/a7e539a8-eb0c-11e2-bfdb-00144feabdc0>

They set a goal to get 20% of their energy from wind power generation by 2020. This goal was feasible for multiple years, and in the early 2010's, they even surpassed this goal. However, after the Energy Reform Bill, wind generation dropped, and now they are still trying to reach that goal. Lastly, there are many research and development challenges like offshore winds, grid integration, storage, and continuing to reduce costs to maintain the energy sectors competitiveness. All of the mentioned anticipated problems show us that the Spanish energy model is far from perfect, and there is much to be done to fix it.

Policy Proposal

I propose that Spain do the following three things: cut out coal production completely, decrease nuclear power, and drastically increase wind power. Coal is a completely outdated, harmful, and inefficient way to produce gas. Besides the fact that it is relatively cheaper than most other types of energy sources, there is really no need to continue using it. Spain should slowly decommission their coal power plants, and use the money they would save from production costs, employee costs, and coal costs on development of renewable energy sources. By doing this, they will reduce carbon dioxide emissions which will help with the European Union's goal to reduce greenhouse gas emissions by 80-95% by 2050. ⁵

⁵ "2050 Energy Strategy" *European Commission*:
<https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy>

Spain could follow the lead of Germany, who recently decided to phase coal power out by 2020. They believe it is the right thing to do in order to help the environment and further their goal of being completely fueled by clean energy. Mobilizing support from the Spanish people for this proposal, however, could be very difficult. The Spanish government believes that shutting down coal power plants threaten the security of the Spanish energy supply. In case of an energy emergency however, Germany has a plan to keep some coal power plants on emergency reserve. This means that in an emergency, they will be able to fire up some of the power plants. This is also a policy Spain could adopt in order to account for their energy security. Spain could close down some of their power plants for good, and keep a few on reserve in case of a dire emergency.

Next, Spain should also decrease their nuclear power use. As stated above, nuclear power is more efficient than many other energy sources; however, there are still many problems that arise from using it. This is why I propose that they decrease nuclear power. This is something that has been mentioned by some people in the Spanish government, but not much has been done about it. They have however, recently shut down one of their 8 running nuclear power plants because there was too much uncertainty surrounding the plants viability. Environmentalists have claimed for many years that the plant was too outdated and unsafe, so this was a big win for them. These environmentalists, and many other citizens of the Spain, believe that nuclear power is far too unsafe, and should not be used as a source of

energy. Mobilizing support, however, could still be difficult because the majority of the Spanish government is still very pro-nuclear power. To convince government officials to change their opinion, there would need to be a lot of push from environmentalists and renewable energy companies.

In order to decrease the use of nuclear power, Spain needs to increase the use of some other form of energy. This is why I also propose that Spain increase wind power throughout the entire country. Spain already has the resources and infrastructure to produce the amount of wind power they would need to take over the energy deficit they would incur from decreasing nuclear power. Because Spain is the fourth biggest wind turbine exporter in the world, it would be no problem to build more turbines if needed! There are a few things that Spain needs to do, however, in order to increase wind energy generation. First, there is a major demand coverage problem. In order to begin to fix this, I recommend that Spain increase flexible generation and development of demand management tools, like wind power storage.⁶ One of the main reasons it is difficult to increase any time of renewable power is the fact that storage is difficult. However, in Spain, there are many scientists who say it should not be a problem at all.

There has been an experiment in the works at Navarre University by Doctor Monica Aguado. It involves a warehouse with four different storage systems: Lithium-ion, flow, supercapacitors, and lead-acid batteries. Depending on supply

⁶ "Integration of Renewables" *Red Eléctrica De España*:
<http://www.ree.es/en/red21/integration-of-renewables>

and demand, a model is designed to store and distribute energy.⁷ When properly executed, Doctor Aguado believes it is definitely possible to live on 100% renewable energy, especially wind. Obviously there is a lot to do before this can be adopted throughout the entire country, but it is definitely something that the Spanish government should strongly consider looking into. Mobilizing support for increased wind energy generation would not be extremely difficult. This is because there are already so many government officials and companies invested in it. The only thing that could stop support of more wind power would be the costs associated with building more wind farms, and the costs of research and development of storage facilities. However, if Spain decides to increase wind generation dramatically, these would smart things to use taxpayer money on.

There are a lot of things that Spain can do in order to produce more renewable energy, but there are also some measures they can take to reduce energy use in general. Something that some countries have begun to do is making public transportation more environmentally friendly. This means that instead of having regular diesel trains, they are beginning to use electric trains. This is a strategy that Spain should definitely adopt. Public transportation is the largest source of transportation throughout the entire country, and millions of people use it each and every day. Right now, Spain has a small amount of electric trains going throughout the entire country. However, they are mostly used for long-range travel.

⁷ "Green Energy: When Spain had the wind in its sails" *El País*:
https://elpais.com/elpais/2017/06/02/inenglish/1496410806_286113.html

I recommend that Spain implement the use of electric trains in its major cities in order to reduce energy use. Mobilizing support for this should not be extremely difficult because many of the large cities are trying to become more environmentally friendly, especially Barcelona. Also, Catalonia has much more money than many of the other autonomous regions because it is the home of one of the world's largest tourist cities: Barcelona. This region is the best candidate for short distance electric trains.

Energy Security

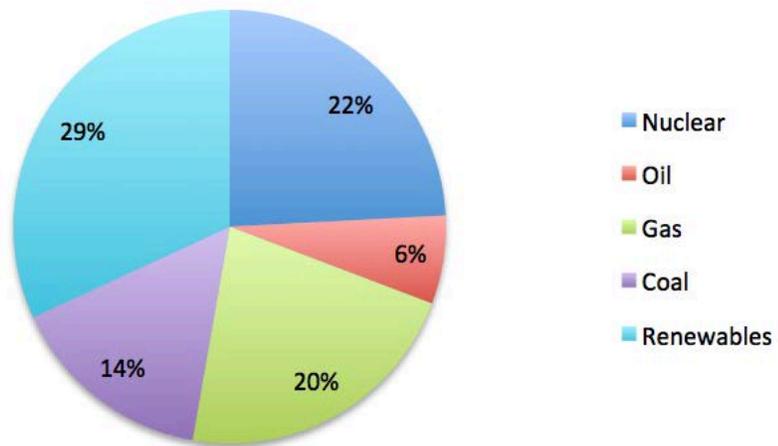
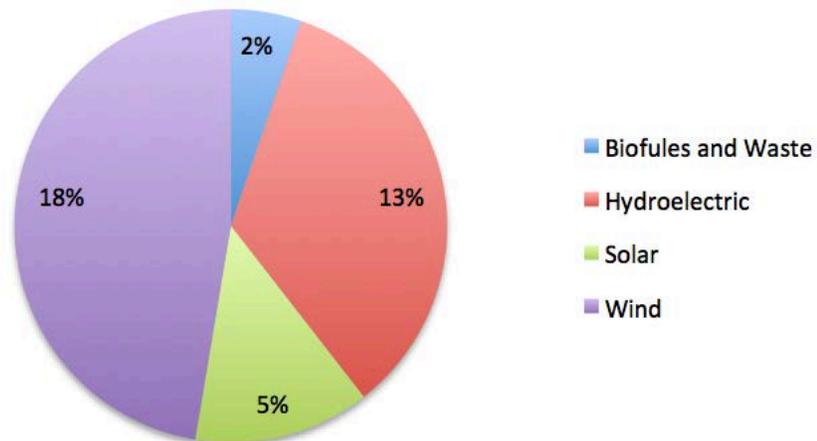
Surprisingly, the IEA praised Spain for its energy security in their 2015 report. Their dependence on energy imports drastically decreased recently due to a decrease in imports in general, and a major increase in renewable energy supply. "With oil stocks that are substantially higher than what is required by law and a liquefied natural gas (LNG) capacity that is significant by international comparison, Spain enjoys robust energy security."⁸ Spain's energy generation is also very diverse and they have a reliable power system.

The increase in renewable energy has had a major contribution to the increase in Spain's energy security because it can directly contribute to the reduction of imports. This is especially true for wind power in Spain. However, there are some questions about how secure wind power is. This is because the

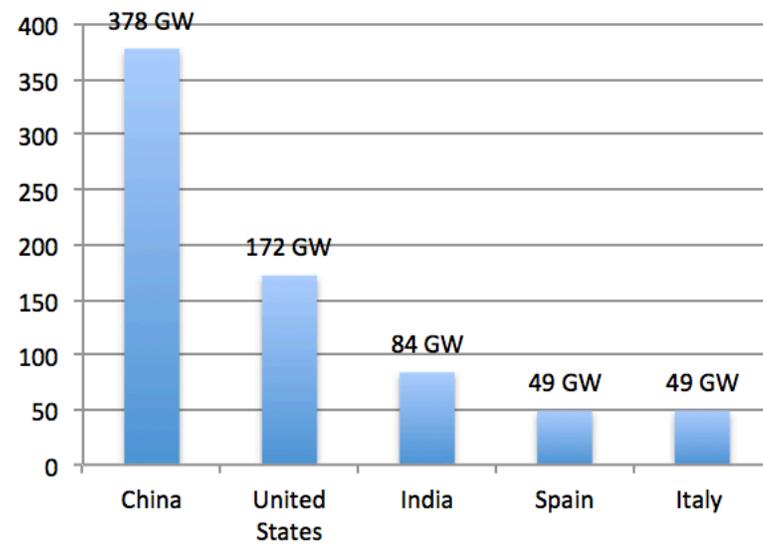
⁸ "Energy Policies of IEA Countries: Spain - 2015 Review" *International Energy Agency*: <https://www.iea.org/newsroom/news/2015/july/iea-praises-spain-for-robust-energy-security.html>

annual power output from a windmill can differ due to wind speeds, location, season, or mechanical problems. Spain has combatted these concerns by having a vast amount of windmills all over the country. There are off shore windmills, windmills on top of mountains, windmills in arid parts of the country, and even windmills in some valleys. This shows us that even though the concern of windmill security is valid, they have enough variety that this should not be a problem.

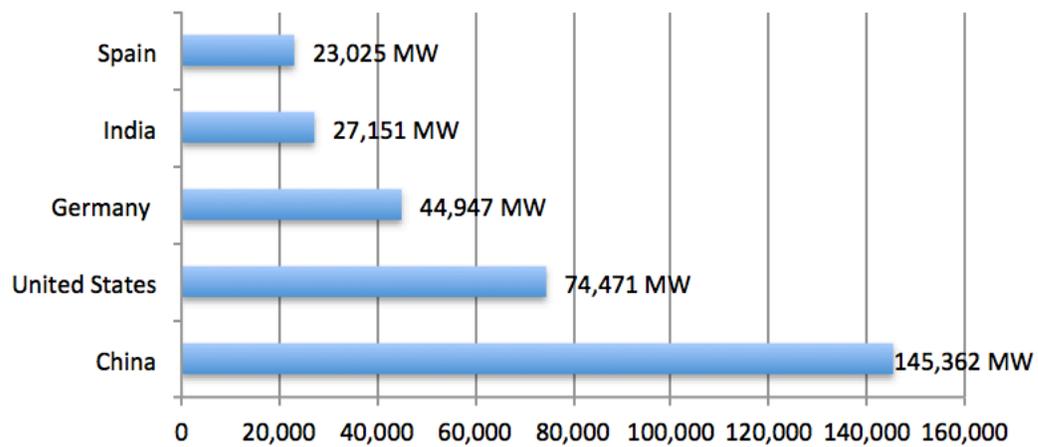
Lastly, with respect to climate change, Spain is working hard to do their part. They are part of the European Union, as well as members of the Paris Agreement and other climate change agreements. Being that they are constantly trying to increase renewables and decrease carbon dioxide emissions, they believe they need to do their part in helping the environment. Also, like stated above, they are also working to make each major city more environmentally friendly by finding new ways to get rid of trash, adding solar panels, and even reducing the use of plastic bags. Overall, Spain is a fairly green country, and they are constantly working toward being more green in the areas that need improvement.

*Figures***Sources of Energy in Spain****Sources of Renewable Energy in Spain**

Renewable Energy World Leaders



Wind Energy World Leaders



Sources

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