



**SPAIN'S GREEN
ENERGY EXPERIMENT:
A CAUTIONARY TALE**

IER INSTITUTE FOR
ENERGY RESEARCH

Highlights

Although the Obama administration urged the U.S. to look to Spain as a model for renewable energy development, Spanish policies have actually had the following effects:

- Spain's feed-in tariffs have created a "rate deficit" amounting to \$41 billion (about \$850 per Spaniard) as of February 2014. This deficit exists between the price that utilities are obligated to pay for renewable energy and the price that they are allowed to pass on to consumers, creating the impetus for **high electricity prices** and **high taxes** to fund the gap.
- Spain suffers from **far higher electricity prices** than the US does. In 2011, Spain's domestic electricity prices (including taxes) amounted to 29.46 U.S. ¢/kilowatt-hour (kWh), while the U.S.'s prices only reached 11.69 U.S. ¢/kWh. High domestic prices create an "**energy poverty**" problem for low-income Spaniards, who are ultimately hit the hardest by rising costs.
- Spanish industrial electricity prices (including taxes) also surpassed those of the U.S. In 2011, Spanish industrial prices amounted to **14.84 U.S. ¢/kWh**, while American prices were only **6.81 U.S. ¢/kWh**. High industrial prices can force industries to move offshore due to a lack of global competitiveness.
- Spain's electricity prices have also **risen more dramatically** than the U.S.'s since 2005. Between 2005 and 2011, Spain's domestic prices have grown by **92 percent**, while the U.S.'s have only grown by about **24 percent**. Industrial prices reflect a similar story. Spain's prices jumped by **78 percent** within the same timeframe, while American prices only grew by **19 percent**.
- Despite aggressive renewable subsidies, mandates, and quotas—programs the Obama administration is urging the U.S. to accelerate to reduce greenhouse gas emissions—Spain's carbon dioxide (**CO2**) **emissions have still increased by 34.5 percent** between the beginning of the country's renewable push in 1994 and 2011.

Introduction

Since the 1990s, Spain has attempted to transform its energy sector and to move to renewable sources. This includes a 1994 law implementing a feed-in tariff that obligates utilities to purchase renewable energy at rates above the market value, regardless of whether they actually need such energy or not.¹

Spain sped up government-funded renewable development in the early-to-mid-2000s, adding premiums to the feed-in tariff system, adopting aggressive renewable portfolio standards (RPSs), and subsidizing renewable energy—particularly biofuels. During this nascent period of European Union (E.U.), coordinated energy policies, each E.U. member state (and the E.U. as a whole), was required to set an RPS target for the amount of power generation that would come from renewable sources by 2020.²

Spain's aggressive subsidies for renewables had President Obama urging the United States to "look to Spain" as a model for renewable energy policy in 2009. He stated,

And think of what's happening in countries like Spain...where they're making real investments in renewable energy. They're surging ahead of us, poised to take the lead in these new industries...There is no reason we can't do the same thing right here in America.³

In response to President Obama's claim, IER commissioned a study by Dr. Gabriel Calzada Álvarez on the Spanish energy situation. This study became renowned for noting that 2.2 jobs were lost for every one job created (or 9 jobs lost for every 4 created)⁴ through renewable subsidies. For Dr. Calzada, however, the most

¹ Pedro Linares, *Reliance on Renewables: Clash Between Expectation and Reality?*, HPEG Meeting—Harvard Kennedy School of Government, December 13 2013, <http://www.hks.harvard.edu/hepg/Papers/2013/LinaresHEPGDec13.pdf>

² International Energy Agency (IEA) and International Renewable Energy Agency (IRENA), *Spain*, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/renewableenergy/?country=Spain>

³ *Obama on recovery, green jobs and renewable energy*, Environmental Economics, January 17 2009, <http://www.env-econ.net/2009/01/obama-on-recovery-green-jobs-and-renewable-energy.html>

⁴ Gabriel Calzada Álvarez, Study of the effects on employment of public aid to renewable energy sources, Universidad Rey Juan Carlos, March 2009, <http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf>

important part of the study was the finding that Spain's renewable energy policies would create an electricity rate deficit that would either raise electricity prices or taxes.

As Calzada predicted, the rate deficit has grown into a terrible problem. The Spanish government has been forced to significantly curtail its support for renewable promotion programs. The country began to progressively cut support for the feed-in tariff scheme beginning in 2010⁵, until it finally announced the end of the program altogether and replaced it with a less lucrative subsidy in July 2013.⁶ The government has also continually slashed its RPS targets, dropping from a 2010 goal of achieving 22.7 percent of gross final energy consumption from renewable sources by 2020⁷ to a 2011 goal of 20 percent by 2020.⁸ The Spanish government itself, in its explanation for a 2012 law revoking support for certain renewable projects⁹, admitted,

The financial support for new installations that produce electricity from renewable energy sources or waste, or for new CHP installations, will also be temporarily abolished...Hence, the costs of the financial support for the electricity from renewable energy sources have been **significantly higher than had been anticipated**. This situation together with the complex economic and financial current climate, advises the withdrawal of economic

⁵ *Ibid.*

⁶ Jorge Alcauza, *Spain kills Feed-in Tariff for renewable energy*, CSP World, July 13 2013, <https://www.csp-world.com/news/20130713/001121/spain-kills-feed-tariff-renewable-energy>

⁷ IEA and IRENA, *National Renewable Energy Action Plan 2011-2020*, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,24876,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzc0ic3ViTlVudSI-PGRpdjBjbGFzc0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkIudGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

⁸ IEA and IRENA, *Sustainable Economy Law*, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,24697,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzc0ic3ViTlVudSI-PGRpdjBjbGFzc0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkIudGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

⁹ Boletín Oficial del Estado, *Disposiciones Generales*, January 28 2012, <http://www.boe.es/boe/dias/2012/01/28/pdfs/BOE-A-2012-1310.pdf>

incentives for these installations, on a temporary basis, **while the reduction of the system's tariff deficit is achieved.**¹⁰ [emphasis added]

Although the Obama administration has portrayed Spain as an exemplar for U.S. energy (and specifically renewable) policy, it is anything but a model of excellence. A combination of expensive feed-in tariffs, renewable subsidies, and aggressive targets has engendered fuel poverty and rising electricity prices, all without meaningfully impacting CO₂ emissions. Realizing this, the Spanish government has begun to back off of its failing policies. The United States would do well to do the same.

Spain's Renewable Energy Policies: An Overview

Feed-in Tariff

In 1994, Spain implemented a feed-in tariff for electricity from renewable sources, including wind, solar, and hydroelectric power. The policy obligates utilities to purchase energy from these renewables at above-market rates. The law was designed to provide an incentive for developers of renewable energy who would be assured of higher prices for the energy they would produce.¹¹

The feed-in tariffs were quite expensive. For example, Royal Decree 661/2007 in 2007 set the tariff for solar between 25 U.S. ¢ and 60 U.S. ¢/kWh (depending on the size of the installation) (compared to average residential electricity rates of 12¢/kWh in the U.S.), the tariff for onshore wind at 9.79 U.S. ¢/kWh, and the tariff for biomass between 7 U.S. ¢ and 22 U.S. ¢/kWh.¹²

¹⁰ Explanation from the official Spanish state announcement (see note 9), translated by IEA and IRENA: IEA and IRENA, *Royal Decree Law 1/2012 revocation of public financial support for new electricity plants from renewable energy sources, waste or CHP*,

<http://www.iea.org/policiesandmeasures/pams/spain/name,25136,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzc0ic3ViTlVudSI-PGRpdjBjbGFzc0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkkludGVybmF0aW9uYWwgRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

¹¹ Linares, see note 1.

¹² Anne Held, Claus Huber, and Katarina Vertin, *Feed-In Systems in Germany, Spain and Slovenia: A Comparison*, Fraunhofer Institute for Systems and Innovation Research, October 2007,

<http://www.mresearch.com/pdfs/docket4185/NG11/doc44.pdf>

In 2010, Spain's government, however, began to scale back support for the feed-in tariff. In 2010, the government cut feed-in tariff support for wind energy by 35 percent and cut support for solar ground installations by 45 percent¹³. Then, in 2012, Spain suspended the feed-in tariff¹⁴, and in July 2013, it announced the end of the scheme and replaced it with a less lucrative subsidy.¹⁵

The Spanish government ended the feed-in tariff program because, as Calzada predicted in 2009, it created what is known as a "tariff deficit" or a "rate deficit." The feed-in tariff program works through the following sequence of events—developers produce renewable energy by constructing renewable technologies (for example, by building a wind or solar farm), and then the utility companies are required to purchase that renewable energy at above-market rates, regardless of whether the companies want or need the energy. Next, the utilities sell electricity to Spanish people who will use it to heat their homes, turn the lights on, and go about their daily lives.¹⁶ The problem is that the Spanish government did not pass on the full cost of the feed-in tariff to ratepayers and obligated the utility companies to sell electricity to buyers at a lower price than the full cost of the renewable-generated electricity.¹⁷

Utilities were required to buy renewable energy at higher prices *and* to sell electricity produced from those renewable sources at lower prices. Thus, the "tariff deficit" is the shortfall incurred by utilities between the high costs of production and the artificially low price at which they are required to sell electricity. Ultimately,

¹³ IEA and IRENA, *New regulation on electrical energy from wind and thermal electric technologies (Royal Decree 1614/2010)*, IEA/IRENA Joint Policies and Measures Database,

<http://www.iea.org/policiesandmeasures/pams/spain/name,24875,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFz0ic3ViTWVudSI-PGRpdjBjbGFz0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkkludGVybmF0aW9uYWwgRW5lcmd5IEFnZW5jeSZ6d25qOzwwYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

¹⁴ Brady Yauch, *Governments rip up renewable contracts*, Financial Post, March 18 2014, <http://opinion.financialpost.com/2014/03/18/governments-rip-up-renewable-contracts/>

¹⁵ Alcauza, see note 6.

¹⁶ Toby D. Couture, *FITs and Stops: Spain's New Renewable Energy Plot Twist & What It All Means*, IE3 Analytics, March 2012, http://www.e3analytics.ca/wp-content/uploads/2012/05/Analytical_Brief_Vol4_Issue1.pdf

¹⁷ *Ibid.*

these companies cannot sustain their business at this pace, thus creating an unsustainable electricity system that cannot reliably deliver.¹⁸

The Spanish government has attempted to fix this shortfall by simply paying the difference. Unfortunately, it does not have the funds to do so, and that money comes from Spanish people in the form of taxes. Thus, while the government is afraid to pass on the costs to people buying electricity by forcing utilities to charge lower rates, it is *still passing on the costs indirectly* by using taxpayer money to attempt to eliminate the tariff deficit.¹⁹ Paying the difference has proven costly—the deficit is currently estimated at about \$41 billion.²⁰ Only 47 million people live in Spain, so the rate deficit alone is over \$850 per Spaniard.

This situation is what Calzada predicted in 2009—he cautioned in his testimony before the Senate Environment & Public Works Committee,

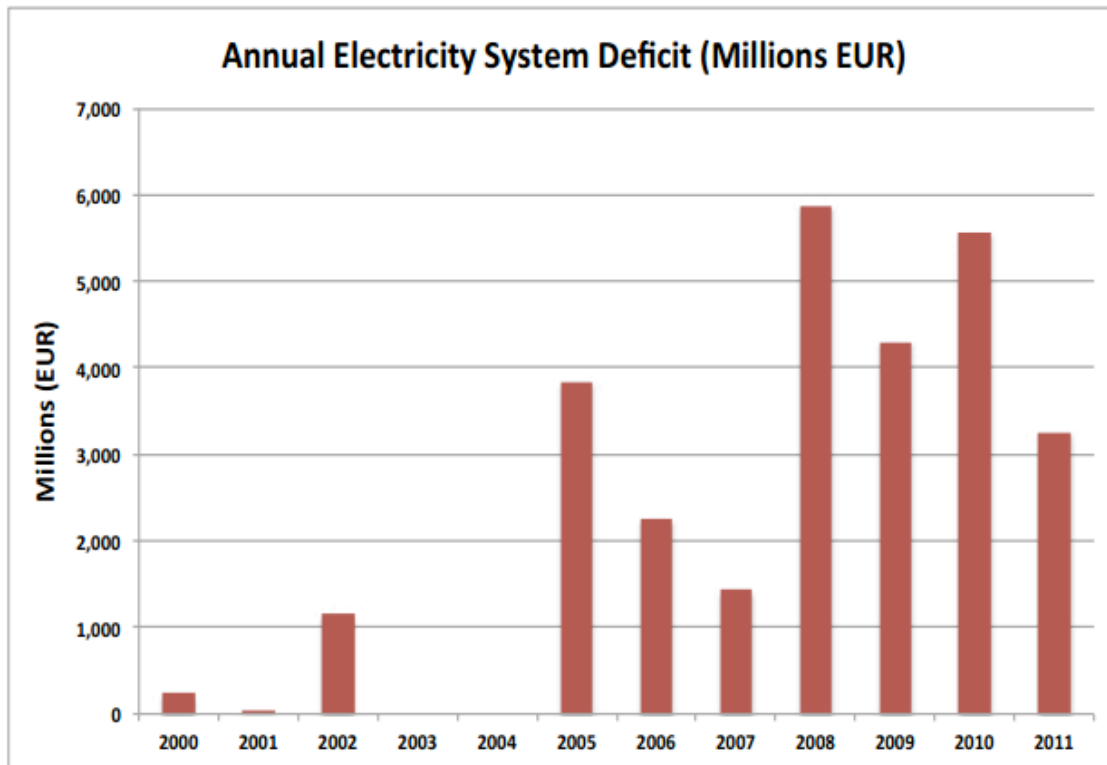
The feed-in price system and the bubble produced a deficit to the energy distributors (called the rate deficit) that the government promised to repay. The rate deficit (mainly produced by renewable subsidies) that started in year 2000 with 250 million Euros and in year 2008 was already 5 billion Euros, has now an accumulated amount of over 16 billion Euros (**more than \$23 billion USD**)...Our experience shows this will be economically harmful for consumers of electricity and for the society as a whole. The only ones who benefit...and benefit handsomely...are **the corporate interests who are paid princely sums for their fashionable but inefficient energy**.²¹
[emphasis IER's]

¹⁸ *Ibid.*

¹⁹ *Q&A-Tackling Spain's power tariff deficit*, Reuters, November 23 2010, <http://www.reuters.com/article/2010/11/23/spain-tariffs-qa-idUSLDE6AM2AY20101123>

²⁰ Mary J. Hutzler, Testimony Before the Subcommittee of International Development and Foreign Assistance, Economic Affairs, International Environmental Protection, and Peace Corps, Committee on Foreign Relations, *Hearing on U.S. Security Implications of International Energy and Climate Policies and Issues*, July 22 2014, <http://instituteeforenergyresearch.org/wp-content/uploads/2014/07/Hutzler-Testimony-Subcommittee-of-Foreign-Relations-FINAL.pdf>

²¹ Gabriel Calzada Álvarez, *Testimony before the Committee on Environment and Public Works*, Hearings on “Climate Change and Ensuring that America Leads the Clean Energy Transformation,” August 6 2009, <http://instituteeforenergyresearch.org/media/pdf/Calzada%20EPW%20Testimony%20Aug%206%202009.pdf>



(Source: IE3 Analytics²²)

Recognizing the unsustainability of the Spanish electricity system, Fitch Ratings went so far as to downgrade five Spanish securitizations backing a reduction in the tariff deficit in March of 2014. Fitch's verdict states,

We recently downgraded five securitisations backed by Spanish electricity TD [tariff deficit] credit rights...bringing them into line with the sovereign credit rating. The downgrades reflected the lack of a credible and predictable plan to substantially reduce or end TDs. The Negative Outlooks reflect our opinion that **the risk of further political interference is high, and the failure so far of regulatory initiatives to reduce TDs, which reached a cumulative total close to EUR30bn, 211% of annual regulated revenues, at FYE13.**²³ [emphasis added]

The impact of an ongoing tariff deficit problem is an electricity sector that cannot sustain itself. Utility companies cannot reliably deliver electricity to the Spanish

²² Couture, see note 16.

²³ Carlos Terre, Francesca Fraulo, and Mark Brown, *Portugal Can Eliminate Tariff Deficit, Spain Less Certain*, Fitch Ratings, March 13 2014, https://www.fitchratings.com/gws/en/fitchwire/fitchwirearticle/Portugal-Can-Eliminate?pr_id=823596

people if they cannot cover their own costs of production, and the government cannot afford to indefinitely finance the shortfall from taxpayers' pocketbooks.²⁴

Renewable Subsidies

In 2000, Spain began a new program to subsidize renewable energy with the passage of its "Promotion Plan for Renewable Energies."²⁵ Since then, the country's subsidies for renewables have included direct financial support, tax deductions, loans, and tradable certificate schemes.²⁶

In particular, many of the government's subsidies were targeted at biofuels. Between 2008 and 2012, Spain passed about three different laws subsidizing biofuels, including a tradable certificate scheme in which biofuel producers could obtain and trade certificates for the industry as a whole to meet the country's biofuel use quotas.²⁷ Government support for the biofuel industry in 2011 totaled approximately between \$284.8 million and \$316.8 million for ethanol and about \$1.3 billion for biodiesel.²⁸

²⁴ *Spanish Utilities: The cost of the tariff deficit*, Morgan Stanley, January 17 2011, file:///Users/johnny/Downloads/UTILSWEEKLY_140111.pdf

²⁵ IEA and IRENA, *Plan on Renewables*, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,21369,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzcz0ic3ViTWVudSI-PGRpdjBjbGFzcz0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

²⁶ IEA and IRENA Database, see note 2.

²⁷ IEA and IRENA, Regulation of the allocation of biofuel production quotas to the count towards the achievement of the mandatory targets for biofuels (IET/2736/2012), IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,30213,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzcz0ic3ViTWVudSI-PGRpdjBjbGFzcz0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

²⁸ Chris Charles, Alicia Natalia Zamudio, and Tom Moerenhout, *Biofuels—At What Cost?: A review of costs and benefits of Spain's biofuel policies*, Global Studies Initiative and International Institute for Sustainable Development, September 2013, http://www.transportenvironment.org/sites/te/files/publications/bf_costeffective_ness_spain.pdf

Spain, caught in an economic recession, has begun to scale back renewable subsidies since about 2010. In 2012, it passed Royal Decree Law 1/2012, which revoked all public financial support for new electricity plants that use energy from renewable sources, waste, or Combined Heat and Power (CHP).²⁹ The Spanish government report detailing the reason for withdrawing funding acknowledged that financial incentives for biofuels were unsustainable in a dire economic climate.³⁰

Not only are biofuel subsidies unsustainable, the biofuel production harms the environment. According to a United Nations report on the environmental impacts of biofuels, these energy sources threaten environmental goals in the following ways: (1) The farming, refining, and conversion processes that go into creating biofuel sources release greenhouse gas (GHG) emissions, (2) Biofuel production specifically releases nitrous oxide, a more potent GHG than CO₂, and (3) Expansion of biofuel production threatens biodiversity and increases the risk of deforestation, as grasslands and savannas are converted into land for biofuel crops. The U.N. report also specifically recommends that countries reconsider their targets for liquid biofuel production.³¹ Jean Ziegler, the U.N. Special Rapporteur on the right to food, also denounced the diversion of arable soil that could be used for agricultural production into soil for biofuel production as a “crime against humanity.”³²

²⁹ IEA and IRENA, *Royal Decree Law 1/2012 revocation of public financial support for new electricity plants from renewable energy sources, waste or CHP*, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,25136,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzc0ic3ViTWVudSI-PGRpdjBjbGFzc0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwgRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

³⁰ Boletín Oficial del Estado, see note 9.

³¹ United Nations Educational, Scientific and Cultural Organization (UNESCO), Scientific Committee on Problems of the Environment (SCOPE), and United Nations Environment Programme (UNEP), *Biofuels and environmental impacts: Scientific analysis and implications for sustainability*, UNESCO – SCOPE – UNEP Policy Briefs, June 2009, <http://unesdoc.unesco.org/images/0018/001831/183113e.pdf>

³² United Nations, *UN independent rights expert calls for five-year freeze on biofuel production*, UN News Centre, October 26 2007, <http://www.un.org/apps/news/story.asp?NewsID=24434&#.U7F4z41dUm8>

Renewable Portfolio Standards (RPSs)

Spain met its first renewable energy target of producing 12 percent of total energy demand from renewable sources by 2010.³³

Throughout the early- to mid-2000s, most of Spain's quotas were for biofuel use, specifically. The country's first biofuel target, set in 2005, mandated that 5.83 percent of transport fuel be met by biofuels by 2010.³⁴

In 2010, the E.U. required each of its member states to adopt renewable quotas and to submit an action plan to outline how those quotas would be achieved. Spain's 2010 action plan demanded that 22.7 percent of gross final energy consumption come from renewable sources and that 18.9 percent of heat consumption, 40 percent of electricity demand, and 13.6 percent of energy demand all be met by renewables by 2020.³⁵

Since 2010, however, Spain has scaled back its targets. The 2011 action plan only mandated that 20.8 percent of gross final energy consumption come from

³³ IEA and IRENA, Renewable Energy Promotion Plan, IEA/IRENA Joint Policies and Measures Database,

<http://www.iea.org/policiesandmeasures/pams/spain/name,21127,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdiBjbGFzcz0ic3ViTWVudSI-PGRpdiBjbGFzcz0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

³⁴ IEA and IRENA, Renewable Energy Plan 2005 – 2010, IEA/IRENA Joint Policies and Measures Database,

<http://www.iea.org/policiesandmeasures/pams/spain/name,22830,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdiBjbGFzcz0ic3ViTWVudSI-PGRpdiBjbGFzcz0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

³⁵ IEA and IRENA, National Renewable Energy Action Plan 2011-2020, IEA/IRENA Joint Policies and Measures Database,

<http://www.iea.org/policiesandmeasures/pams/spain/name,24876,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdiBjbGFzcz0ic3ViTWVudSI-PGRpdiBjbGFzcz0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwGRW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

renewable sources by 2020³⁶, and the 2011 Sustainable Economy law reduced that figure to 20 percent.³⁷

Spain's Renewable Energy (non-Biofuel) Quotas

Year Enacted	Quota	Law
1999	<ul style="list-style-type: none"> 12% of total energy demand to be met by renewable sources by 2010 	Renewable Energy Promotion Plan
2007	<ul style="list-style-type: none"> 37% of gross electricity consumption to come from renewable energy by 2020 	Spanish Strategy on Climate Change and Clean Energy 2007 – 2012 – 2020
2010	<ul style="list-style-type: none"> 22.7% of gross final energy consumption to come from renewable sources by 2020 18.9% of heat consumption to come from renewable sources by 2020 40% of electricity demand to be met by renewable sources by 2020 13.6% of energy demand to be met by renewable sources by 2020 	National Renewable Energy Action Plan 2011 – 2020

³⁶ IEA and IRENA, Renewable Energy Plan 2011 – 2020, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,24877,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzc0ic3ViTWVudSI-PGRpdjBjbGFzc0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwgrW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

³⁷ IEA and IRENA, *Sustainable Economy Law*, IEA/IRENA Joint Policies and Measures Database, <http://www.iea.org/policiesandmeasures/pams/spain/name,24697,en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return=PGRpdjBjbGFzc0ic3ViTWVudSI-PGRpdjBjbGFzc0iYnJlYWRjcnVtYnMiPjxhIGhyZWY9Ii8iPkludGVybmF0aW9uYWwgrW5lcmd5IEFnZW5jeSZ6d25qOzwvYT4mbmJzcDsmZ3Q7Jm5ic3A7PGEga>

2011	<ul style="list-style-type: none"> • 20.8% of gross final energy consumption to come from renewable sources by 2020 	Renewable Energy Plan 2011 – 2020
2011	<ul style="list-style-type: none"> • 20% of gross final energy consumption to come from renewable sources by 2020 • 10% of the transport sector to be met by renewable sources by 2020 	Sustainable Economy Law

(Source: IEA/IRENA Joint Policies and Measures Database)³⁸

Spain’s Biofuel Quotas

Year	Quota	Law
2005	<ul style="list-style-type: none"> ○ 5.83% of transport fuel to come from biofuels by 2010 	Spanish Renewable Energy Plan
2007	<ul style="list-style-type: none"> • 10% of transport fuel to come from biofuels by 2020 	Spanish Strategy on Climate Change and Clean Energy 2007 – 2012 – 2020
2008	<ul style="list-style-type: none"> • At least 20% of the public vehicle pool is required to use biofuels by 2009 	Energy Saving and Efficiency Plan 2008 – 11

³⁸ IEA and IRENA Joint Database, see note 2.

2008	<ul style="list-style-type: none"> • 3.4% of fuel use to be from biofuels by 2009 • 5.83% of all fuel use to be biofuel by 2010 • 6.2% of all diesel and gasoline to be biofuel in 2011 • 6.5% of all diesel and gasoline to be biofuel in 2012 • 6.5% of all diesel and gasoline to be biofuel in 2013 • 6% of diesel to be biofuel in 2011 • 7% of diesel to be biofuel in 2012 • 7% of diesel to be biofuel in 2013 • 3.9% of gasoline to come from biofuels in 2011 • 4.1% of gasoline to come from biofuels in 2012 • 4.1% of gasoline to come from biofuels in 2013 	Mandatory Biofuel Requirement (Law 34/1998)
2011	<ul style="list-style-type: none"> • 6.5% of total transportation fuel to be biofuel in 2012 – 2013 	Mandatory Biofuel Content in Transportation Fuels (Royal Decree 459/2011)
	<ul style="list-style-type: none"> • 6% of diesel to be biofuel in 2011 	
	<ul style="list-style-type: none"> • 7% of diesel to come from biofuels in 2012 – 2013 	
	<ul style="list-style-type: none"> • 3.9% of gasoline to come from biofuels in 2011 	
	<ul style="list-style-type: none"> • 4.1% of gasoline to come from biofuels in 2012 – 2013 	

(Source: IEA/IRENA Joint Policies and Measures Database)³⁹

The Consequences of Spain's Renewable Energy Policies

Energy Poverty

One consequence of Spain's renewable policies has been to increase the rates of energy poverty in the country. That is, because these policies have made energy

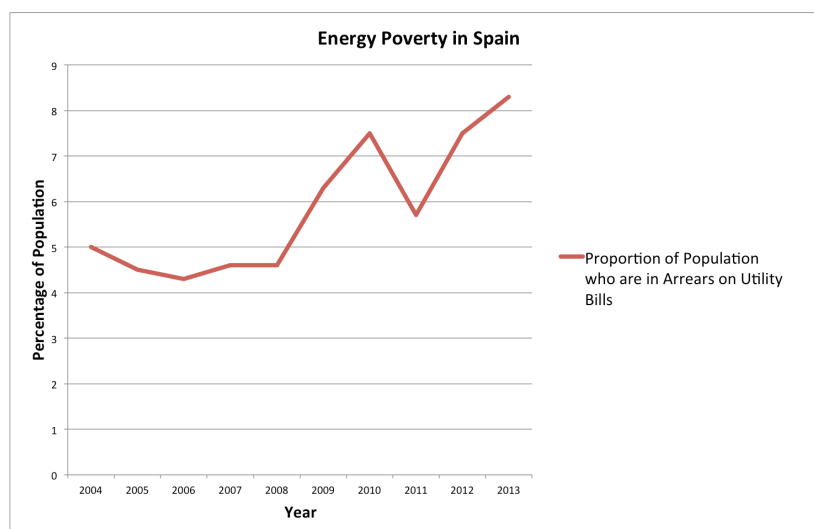
³⁹ IEA and IRENA Joint Database, see note 2.

more expensive, low-income people who have less money to spend on electricity have been hit the hardest. Energy poverty rates have become particularly acute recently as Spanish people have been hurt by the combination of an economic recession and government policies that make energy more expensive.⁴⁰

Unemployment is also a problem in Spain—in January 2013, Spain’s unemployment rate was 26 percent, the highest among E.U. member states.⁴¹

Eurostat, the statistics arm of the E.U., has two means of measuring fuel poverty: (1) the proportion of the population who report that they are unable to adequately heat their home, and (2) the proportion of the population who are in arrears on their utility bills. Spain has performed relatively poorly. In 2013, 8 percent of the population reported being unable to adequately heat their homes⁴², while 8.3 percent of the population were in arrears on utility bills.⁴³

In particular, the proportion of Spanish people in arrears on utility bills has increased steadily since 2004—it has shot from 5 percent to 8.3 percent, a 66 percent increase.⁴⁴



(Source: Eurostat)⁴⁵

⁴⁰ Sergio Tirado, *Fuel Poverty in Spain*, EU Fuel Poverty Network, February 10 2012, <http://fuelpoverty.eu/2012/02/10/fuel-poverty-in-spain/>

⁴¹ Hutzler, see note 20.

⁴² Eurostat, *Inability to keep home adequately warm (source: SILC)*, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_mdes01&lang=en

⁴³ Eurostat, *Arrears on utility bills (source: SILC)*, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_mdes07&lang=en

⁴⁴ *Ibid.*

Because energy poverty is a relatively understudied issue in Spain, evidence or analysis about the causes of this kind of poverty is somewhat scant.⁴⁶ A report by the Spanish Association of Environmental Sciences, however, speculates that the energy poverty rates are a result of the combination of high electricity prices and lower incomes.⁴⁷

Electricity Prices

Spanish electricity rates are much higher than those in the U.S., and prices have risen steadily. In 2011, Spain's domestic electricity prices (including taxes) amounted to 29.46 U.S. ¢/kilowatt-hour (kWh), while the U.S.'s prices only reached 11.69 US ¢/kWh.⁴⁸ Spanish industrial prices are also higher than American industrial prices. In 2011, Spanish industries paid 14.84 U.S. ¢/kWh for electricity, while U.S. industries only paid 6.81 U.S. ¢/kWh.⁴⁹

Spain's domestic prices, including taxes, have also risen from 15.38 U.S. ¢/kWh in 2005 to 29.46 U.S. ¢/kWh in 2011, a 91.51 percent increase over only 6 years. Compare these figures to the U.S., where domestic prices have only risen from 9.46 U.S. ¢/kWh in 2005 to 11.69 U.S. ¢/kWh in 2011—a 24.64 percent increase.⁵⁰ The story has been similar with industrial electricity prices. In Spain, industrial electricity prices, including taxes, have jumped from 8.35 U.S. ¢/kWh in 2005 to 14.84 U.S. ¢/kWh in 2011, a 77.79 percent increase. In the U.S., on the other hand, industrial prices have only grown from 5.74 U.S. ¢/kWh in 2005 to 6.81 U.S. ¢/kWh in 2011, an 18.56 percent increase.⁵¹

⁴⁵ Eurostat, see notes 42 and 43.

⁴⁶ Tirado, see note 40.

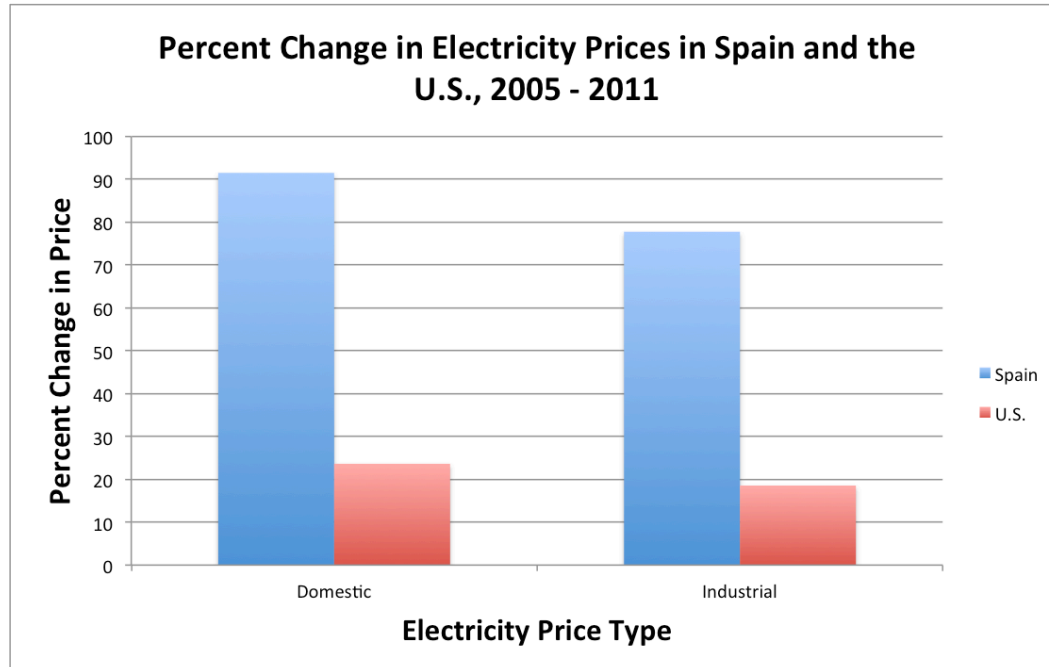
⁴⁷ *Energy poverty rises in Spain*, World Wildlife Fund, April 3 2014, <http://www.wwf.gr/crisis-watch/crisis-watch/energy-climate/10-energy-climate/energy-poverty-rises-in-spain/81-energy-poverty-rises-in-spain>

⁴⁸ United Kingdom Department of Energy & Climate Change, *Statistical Data Set: International domestic energy prices*, <https://www.gov.uk/government/statistical-data-sets/international-domestic-energy-prices>

⁴⁹ United Kingdom Department of Energy & Climate Change, *Statistical Data Set: International industrial energy prices*, <https://www.gov.uk/government/statistical-data-sets/international-industrial-energy-prices>

⁵⁰ U.K. Domestic Energy Price Data Set, see note 48.

⁵¹ U.K. Industrial Energy Price Data Set, see note 49.



(Source: U.K. Department of Energy & Climate Change)⁵²

The tariff deficit resulting from feed-in tariff policies is a key reason for the hike in electricity prices. Since Spain has begun to cut back its subsidies, utility companies have started attempting to make up for the shortfalls themselves. These charges on the tariff deficit amount to about 8 percent of Spaniards' electricity bills.⁵³

CO2 Emissions

The question remains—while Spain's renewable energy policies incurred significant costs, did the climate change-related benefits outweigh the costs? The answer is, "No."

Since the beginning of Spanish renewable energy policy (the 1994 law establishing the feed-in tariff), carbon dioxide emissions have *increased* rather than *decreased*. CO2 emissions have gone from 236.9 million metric tons in 1994 to 318.6 million metric tons in 2011, a 34.5 percent increase.⁵⁴

⁵² U.K. Energy Price Data Sets, see notes 48 and 49.

⁵³ Jerónimo Andreu, *The shocking price of Spanish electricity*, El País, Jan. 1, 2014, http://elpais.com/elpais/2014/01/01/inenglish/1388590410_230748.html

⁵⁴ U.S. Energy Information Administration, *International Energy Statistics: CO2 Emissions*,

Although carbon dioxide emissions began to decrease in 2007, the economic recession played a much larger role in the reduction than renewable policies. Pedi Chiemena Obani of the UNESCO-IHE Institute for Water Education and Joyeeta Gupta, professor of environment and development in the global south at the Amsterdam Institute for Social Science Research⁵⁵, noted in a study,

Although in 2008, Spain exceeded its GHG [greenhouse gas] emission allowance under the Kyoto Protocol by 20.9% a recent study shows a downward trend in this figure **as a result of the economic recession, and financial crisis facing the country.**⁵⁶ [emphasis IER's] (Source: EIA)⁵⁷

While the renewable policies themselves were likely not the cause of the emissions increase, the upward trend does prove that renewable energy policies were insufficient to reduce CO2 emissions over a roughly twenty-year period.

Conclusions: Lessons for the U.S.

Spain is anything but the model for American energy policy. The country's expensive feed-in tariff system, subsidies, and renewable energy quotas have plunged a sizable portion of Spaniards into fuel poverty, raised electricity bills, all while having almost no meaningful impact on curtailing carbon dioxide emissions.

Consider one Spaniard, Juan Luis Presa, whose story appeared in the Spanish newspaper *El País*. During the winter of early 2014, his electric radiator remained turned off, and he, his wife, and his three children coped with the cold temperatures by using more blankets and wearing heavier clothing—not by using electricity to make their homes warmer. Presa is 62 years old and lost his job. Neither of his two

<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=90&pid=44&aid=8&cid=SP,&syid=1994&eyid=2011&unit=MMTCD>

⁵⁵ The Amsterdam Institute for Social Science Research is jointly run by the University of Amsterdam and UNESCO-IHE Institute for Water Education.

⁵⁶ Pedi Chiemena Obani and Joyeeta Gupta, *Climate Change and Recession: Eight Trends*, Earth System Governance Conference, January 28-31 2013, http://tokyo2013.earthsystemgovernance.org/wp-content/uploads/2013/01/0177-OBANI_GUPTA.pdf

⁵⁷ *Ibid.*

children is currently employed. Out of the check from the government the family receives for \$582.2 per year, they must spend \$109.3 on electricity.⁵⁸

Although the administration has portrayed Spain as an exemplar of what the U.S. energy policies should look like, we should instead use Spain as an example of what *not* to do, lest many Americans find themselves in similar situations to the Presa family.

⁵⁸ Andreu, see note 53.