

# EPIC – Guest lecture

## *Renewable energy in the EU. The case of renewable energy policy in Spain.*

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# 1. THE EU AND ITS ENERGETIC STRATEGY

## 1.1. Brief introduction

- At the **beginning of 1970s fossil fuels** was the **dominant source** of energy worldwide. **Ever since the crisis in the 1970s**, governments started to look actively for **fossil substitute** energy, especially renewable energy sources (e.g., wind, solar, biomass, etc.).
- More recently, **fossil fuels represented more than 80% of total primary energy and around 70% of electricity generation.**

# 1.1. BRIEF INTRODUCTION

- Despite that, policy makers, on one hand, and private decision makers, on the other, are searching for a sustainable transition towards **fossil-free system**. This **implies at least two main priorities**:
  - ✧ **renewable energy sources** development and promotion;
  - ✧ **energy efficiency**.
- Throughout different policies and mechanisms, governments continued shaping these aspects. This is not meant just for protecting the environment, but also for facilitating the access to energy of millions of people that have difficulties in this sense, as well as for creating new opportunities (REN21, 2015).
- <http://www.iea.org/publications/freepublications/publication/keyworld2014.pdf>.

# 1.1. BRIEF INTRODUCTION

**Table 1. Promoting programs for developing renewable energy**

Items	Objects	Fiscal incentive tools	Non-financial incentive tools
<b>Research, development and demonstration (RD&amp;D)</b>	<ul style="list-style-type: none"> <li>• Government</li> <li>• Electric producers</li> <li>• Grid producers</li> </ul>	<ul style="list-style-type: none"> <li>• Subsidies for research and development</li> <li>• Capital grants</li> <li>• Third-party finance</li> </ul>	<ul style="list-style-type: none"> <li>• Legislation and international treaties</li> <li>• Research, development and demonstration</li> <li>• Guidelines for energy conservation</li> <li>• Public investment</li> </ul>
<b>Investment</b>	<ul style="list-style-type: none"> <li>• Government</li> <li>• Electric producers</li> <li>• Grid producers</li> </ul>	<ul style="list-style-type: none"> <li>• Capital grants</li> <li>• Bidding system</li> <li>• Subsidies for investment</li> <li>• Third-party finance</li> <li>• Investment tax credits</li> <li>• Accelerated depreciation</li> </ul>	<ul style="list-style-type: none"> <li>• Voluntary programs</li> <li>• Regulatory and administrative rules</li> </ul>
<b>Production and distribution</b>	<ul style="list-style-type: none"> <li>• Electric producers</li> <li>• Grid producers</li> </ul>	<ul style="list-style-type: none"> <li>• Guaranteed Price</li> <li>• Production tax credits</li> <li>• Tradable certificates</li> </ul>	<ul style="list-style-type: none"> <li>• Obligations</li> <li>• Voluntary programs</li> </ul>
<b>Consumption</b>	<ul style="list-style-type: none"> <li>• Government</li> <li>• Consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer grants/rebates</li> <li>• Excise tax exemptions</li> <li>• Net metering</li> <li>• Fossil fuel taxes</li> </ul>	<ul style="list-style-type: none"> <li>• Obligations</li> <li>• Government purchases</li> <li>• Green pricing</li> <li>• Public awareness</li> </ul>

Source: Liao et al. (2011)

# 1.1. BRIEF INTRODUCTION

- Nowadays not all countries are situated in the same phase of the renewable energy promotion. It is true that the majority of the countries worldwide are already in the intermediary stage of developing renewable energy market. Still, many differences could be highlighted according to their development stage

Phase	1 <sup>st</sup> Stage: Undeveloped market	2 <sup>nd</sup> Stage: Developing market	3 <sup>rd</sup> Stage: Developed market	Phase
<b>Steps</b>	<b>R&amp;D, investment</b>	<b>Production</b>	<b>Consumption</b>	<b>Production, consumption</b>
<b>Goals</b>	<ul style="list-style-type: none"> <li>To establish renewable energy market</li> </ul>	<ul style="list-style-type: none"> <li>To improve the production of renewable energy</li> </ul>	<ul style="list-style-type: none"> <li>To improve the consumption of renewable energy</li> </ul>	<ul style="list-style-type: none"> <li>To replace fossil fuel by renewable energy</li> <li>To return to the free market mechanism</li> </ul>
<b>Non-market based policies</b>	<ul style="list-style-type: none"> <li>Regulatory instruments</li> <li>Policy processes</li> <li>Voluntary agreement</li> <li>Education and outreach</li> </ul>			
<b>Market based policies</b>	<ul style="list-style-type: none"> <li>RD&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>Financial</li> <li>Incentives/subsidies</li> <li>Tradable permits</li> </ul>	<ul style="list-style-type: none"> <li>Financial</li> <li>Public Investment</li> </ul>	<ul style="list-style-type: none"> <li>Liberalization</li> </ul>
<b>Specific applications</b>	<ul style="list-style-type: none"> <li>R&amp;D grants and subsidies</li> <li>Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>Investment deduction</li> <li>Tax credit</li> <li>Accelerated depreciation</li> <li>Guaranteed price</li> <li>Obligations and tradable permits</li> </ul>	<ul style="list-style-type: none"> <li>Tax incentives</li> <li>Grants and subsidies</li> <li>Public investment</li> </ul>	<ul style="list-style-type: none"> <li>Removal of the fossil energy subsidies</li> <li>Carbon tax</li> <li>Green pricing</li> <li>Removal of RE incentives/subsidies</li> </ul>
<b>Mechanisms</b>	Quota system	Quota system, Price system	Price system	Free market system

# 1.1. BRIEF INTRODUCTION

- A dominant instrument for promoting renewable energy sources in the EU, especially for electricity generation from renewables, is the feed-in tariff scheme.
- The EU's long-term strategy is to achieve a harmonised framework for electricity from renewable energy support at EU level based on feed-in tariff (FIT) scheme (Muñoz et al., 2007).



# 1.1. BRIEF INTRODUCTION

- With the current legislation, EU member states are allowed to use the support scheme considered most appropriated to each country's circumstances and socioeconomic objectives. In the Spanish case, the broad social and political coalition leading to political commitment and continuity of support schemes and the specific design elements of the support scheme itself (i.e., the feed-in tariff) are the two main factors that explain the success of its model. As a way of adapting concerns of different actors, especially the government – due to the financial impact on electricity consumers – and electricity from renewables generators, the authorities decided to modify several times the regulatory framework regarding FITs.

# 1.1. BRIEF INTRODUCTION

- However, it must be pointed that generally, the support of electricity from renewables is finally paid by electricity consumers as part of their electricity bills (Sáenz de Miera et al., 2008) despite the fact that Jensen and Skytee (2003) underlined that higher electricity from renewables deployment would even incur in a reduction of final electricity prices.
- The promotion of electricity from renewables encourages its generation having lower variable costs than fossil-fuel conventional electricity. Wholesale electricity price is generally established by fossil-fuel-fired plants, which are usually the marginal generation plant. At the same time, these types of plants are substitute for renewable energy sources. Therefore, the wholesale electricity price would be reduced at a higher deployment of renewables.

# 1.1. BRIEF INTRODUCTION

- This reduction could balance the growth in final electricity prices as a consequence of renewables support, leading to a net reduction in retail prices. In other words, renewables promotion could lead to a win–win situation while an increase of renewables deployment (counting as well with its environmental and socioeconomic benefits) is contributing to the reduction of the electricity prices (Sáenz de Miera et al., 2008).

# 1. THE EU AND ITS ENERGETIC STRATEGY

- The slow development of the European Union's energy policy conducted to differences, divergences and disagreements between the Member States of the European Union (EU). The result of the absence of an effective common foreign policy and of the low confidence in joint actions conducted towards an unsustainable energy policy in the long run given the challenges that the EU has to face (Marín-Quemada, 2008).
- Ever since the 1950s the EU based its birth on energy resources and energy pacts. Nevertheless, one of the first aspects considered by the EU regarding the energy sector was its liberalization with the aim of enhancing competition within the sector.

# 1. THE EU AND ITS ENERGETIC STRATEGY

- However, under the awareness of the environmental changes and their consequences, the focus of the EU energy policy moved towards the environmental impact of energy generation. In other words, the EU policy started to urge the reduction of fossil fuels at the time of increasing renewable energy sources and energy efficiency.
- The European objective regarding renewable energy sources suggested that each Member State, by 2020, should generate the 20% of electricity by using renewable energy sources.
- Thus, each member state of the EU triggered different mechanisms to support the development of renewables in order to reach the agreed mandatory targets.

# 1. THE EU AND ITS ENERGETIC STRATEGY

- For achieving the target established in this sense, the governments must choose out of a wide range of strategies the most adequate one to the country's context. Though, the promotion and implementation of the proper strategy is not an easy task, as many snags must be faced. One of the most common is the accumulation of deficit due to the high amount of subventions to renewable energy sources as well as the conflict between traditional and renewable energy producers and suppliers.

# 1. THE EU AND ITS ENERGETIC STRATEGY

- Despite the possible barriers renewables support may imply, recent events (e.g., the Arab spring, the accident at the oil platform in the Gulf of Mexico, the Fukushima nuclear accident), in words of Burgos-Payán et al. (2013), underline some of the hostile consequences of using fossil fuel as an energy source: (a) supply uncertainty and price volatility of the oil and its derivatives; (b) environmental degradation and health risks; (c) huge expenditures (especially public funds) needed for mitigating the damages provoked. Yet, it is worth mentioning that renewable energy failed, so far, in being a protuberant competitor to fossil energy technologies as a consequence of the multiple barriers in implementing renewable technologies (Liao et al., 2011).

# 1. THE EU AND ITS ENERGETIC STRATEGY

- The high production cost and the low return on the investment of renewable energy sources compared with traditional fossil energy contributed to the limitations of renewable energy market (Pimentel et al., 1994). Furthermore, the use of fossil fuels may contribute to the security supply due to the low intensity damages on a daily basis. Having flexible fossil fuel generation in the system the randomness of the energy from renewable sources could be alleviated. Thus, a Barriers are divided mainly into four groups: (a) financial and economic; (b) institutional and political; (c) technical and (d) awareness/information/capacity (European Environmental Agency, 2004).



# 1. THE EU AND ITS ENERGETIC STRATEGY

- The initiative of promoting renewable energy sources is not new despite the fact that the EU issued a specific directive in this sense in 2009 (Directive 2009/28/EC). The Spanish government started its promotion more dynamic back in the 1990s by introducing an active system to jointly support renewables and cogeneration (the so-called special regime). Subsequently, a high expansion of renewables was experienced, especially of wind energy (Gelabert et al., 2011) as well as solar energy (Sebastian, 2015).

# 1. THE EU AND ITS ENERGETIC STRATEGY

- Thus, Spain climbed to the leading positions of the EU member states in the amount of wind power in the energy mix ranking in 2014, following Germany (ENTSO-E, 2015). This could be explained by the capacity of wind energy of generating savings that overcome the subsidies received for promoting this technology (Azofra et al., 2014; Saenz de Miera et al., 2011; Gil et al., 2011).
- Since the end of 1996 and beginning of 1997 until today, the regulatory process that has been affecting the energy sector has been very deep. This is not only due to the high number of directives issued, but also due to the profound changes triggered by the dynamism of the legal framework.

# 1. THE EU AND ITS ENERGETIC STRATEGY

- If during the 2000s, energy policy caused many conflicts between renewables and traditional energy generators/suppliers for the enormous support of renewables, after 2020, the weaker policy framework for future renewables and energy efficiency development does not seem to continue giving investors certainty regarding their investments in clean energy (Buchan et al., 2014).

# 2. THE CASE OF SPANISH RENEWABLE ENERGY POLICY

## 6.1. The evolution of the renewable energy policy

- As a member of the European Union, since the beginning of 2000s, Spain started its strategy for achieving the 20/20/20 objective of EUROPE 2020 (known as Lisbon strategy until 2010).
- EUROPE 2020's energy and environment objective:
  - ✧ 20% less greenhouse gas emissions compared to the level of 1990
  - ✧ 20% energy from renewable source
  - ✧ 20% more energy efficiency
- Dependency of foreign fossil fuels 70% in Spain and around 50% in the EU
- Buchan, Keay and Robinson (2014) stated that the EU takes its foot off the pedal in terms of energy and environment
- What about Spain? Is Spain following the same trend as the EU? Do they need to take the foot off the renewable pedal?
- Not long ago, the Spanish government focused its energy policy on renewable energy
- But what was the cost of this evolution?

## 2.1. THE EVOLUTION OF THE RENEWABLE ENERGY POLICY

- While Spanish law had collected various regulations regarding the generation of renewable energy, the strong increase in generation from these energy sources is much bigger and it is linked to recent policy changes of the late 90s (RD 2818/1998) and especially the Royal Decree 436/2004 and Royal Decree 661/2007 of May 25, by which production of electricity in special regime is regulated.
- The framework came to be consolidated in the Law 54/1997 of 27<sup>th</sup> of November of the electricity sector, which developed the European Directive 96/92/EC of December 19. Certainly this Act prioritized other objectives that were considered in the more defining moments, but not without taking environmental issues into account.

*"This law has therefore as a basic goal the establishment of the regulation of the electricity sector with a triple and traditional objective of ensuring power supply, ensure the quality of the supply and ensure that they will obtain it at the lowest possible cost. All this was framed without forgetting environmental protection. This aspect is particularly relevant given the nature of this economic sector. "*

## 2.1. THE EVOLUTION OF THE RENEWABLE ENERGY POLICY

- The development of this Act through the RD mentioned of 2004 and 2007, they not only allowed the new facilities and their access to the electricity networks but through a dual system of tariffs and production subsidies were at the base of the significant investments that have been produced in the generation of renewable energy since that time.
- However, with numerous provisions that have been launched in 2012 (and before regarding premiums to certain technologies), generosity in supporting investment in renewable generation has produced an overall increase in subsidies this sector that have hardly sustainable in a context of budgetary constraints.
- The Spanish system resulting from these incentives, it might be considered effective, as has allowed as great achievements in their participation in the national electricity mix, it can not be considered to be efficient subsidies received very high relative to costs production (Agosti and Padilla, 2010). These considerations, in particular, are not common to all kinds of technology, falling in solar photovoltaic major imbalances, to the point of being considered its development as a true bubble emerged under the aegis of a very generous public subsidy.

# 2.1. THE EVOLUTION OF THE RENEWABLE ENERGY POLICY

- The strong start to support renewable energy took place after the approval of the RD 2818/1998 by which remuneration for each type of consistent technology was associated in a fixed premium on the market price of electricity.
- The adoption in 1999 of the Plan of Development of Renewable Energies (RFLP), driven by EU rules supposed commitments to their participation in the final production of energy said that the rules were changed through the RD 436/2004. It is this RD regulation that allowed producers to sell their production to distribution companies at a fixed rate or sell it on the market at market price plus a **premium** or with greater incentives in some cases. The practical consequence is that most of the producers went to the second option since that time, as it meant higher subsidies to these productions.
- The RD 436/2004 was approved by the Council of Ministers of March 12, two days before the general elections that changed 04/14/2004 the Government of Spain. The new policy orientation of the government came to coincide with the review of PFER and in 2005 a new 2005-2010 Renewable Energy Plan (PER) which sought to give fresh impetus to investment before the evidence was approved, with plans and standards of the moment, the EU committed targets for 2010.



## 2.1. THE EVOLUTION OF THE RENEWABLE ENERGY POLICY

- Obviously could not be reached, the time of economic euphoria also acted as a driver for the provision of additional resources to finance new projects.
- In order to increase investments with higher subsidies, in 2007 the RD 661/2007 of May 25, by which the activity of production of electricity in the special regime is approved, but not change the payment system above, increased economic incentives to investment, thereby reinforcing expectations of the various renewable energy technologies (Agosti and Padilla, 2010).
- Thanks to increased incentives RD 661/2007, especially regarding the very attractive pricing for promoters of photovoltaic facilities (€ 0.440381 / kWh, i.e. 575% of the average reference rate that year) in May 2008 they reached the 1,000 MW of installed capacity, and in October the same year exceeded 2,200 Mw., when the PER 2005-10 envisaged a target installed capacity of 400 MW in 2010. This "boom" of PV installations, referred to as financial investment products for large national and international investors, led to the adoption of the RD 1578/2008, by which it was intended to rationalize the economic system by modifying compensation to the floor, a tariff of 0.32 € / kWh for photovoltaic systems of type I.2.



## 2.1. THE EVOLUTION OF THE RENEWABLE ENERGY POLICY

- Later, unable to keep existing aid under, the government approved the RDL 1/2012 introducing a serious cuts to existing premiums, while paralyzing incentives to new facilities until further notice, so that the IRR of the PV installations are located at 6.75% in 2011, with a coverage ratio of debt service next technical default (Collins, 2012). This situation, regardless of the effects on our legal credibility at an international level, also poses problems facing the energy planning and the implementation of commitments Directive 2009/28 / EC on the promotion of the use of energy from renewable sources , contained in the Renewable Energy Plan 2011-2020. Scenarios for changes to apply to grants represent a substantial modification of the plan and necessarily must change if they want to achieve the objectives of the electricity mix by 2020.
- The last modification of the legislation in this sense was carried out at the beginning of last month through the Royal Decree 900/2015 of 9<sup>th</sup> October. It is centred on the auto consumption and auto-production. This new reform seems that it is not supporting renewable energy not for producer nor for consumers. One of the most relevant modification is related to the solar energy. Still this RD of 2015 seems to be in contradiction with the Article 9 of the Law 24/2013

### Law 82/1980

- Conservation of Energy and shy **RES support**

### RD 2366/1994

- Electricity produced by **hydro sources, cogeneration and RES**
- basic contractual relationship between RES-E producers and distribution companies
- Distributors buy the electricity surplus of plants with less than 100 MW installed capacity

### Law 54/97

- Liberalization of the electricity market +**Strong support of RES**
  - Different treatment under special regime
  - Guaranteed grid access
  - Price support

### RD 2818/1998

- Options for RES-E generators: **fixed-premium or fixed-feed-in**
- **Double issue:**
  - creates **huge imbalances**
  - **overloads** the final price for **consumers**

### PFER 1999

- Set commitments for 2010 → final production of **RES-E 29.4%**

### RD 436/2004

- support based on the **average electricity tariff**, annually set
- encouraging the participation of RES-E in the wholesale electricity market
- intermittent RES-E generation and their impact with an increasing share on the stability of the grid focus
- triggered an increase of RES-E generators choosing to sell their electricity directly to the market



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## 2.1. THE EVOLUTION OF THE RENEWABLE ENERGY POLICY

- Promoting and supporting renewable energy sources, for the Spanish government meant the increase of the tariff deficit. Since early 2000s, but especially since 2005, a growing trend marked the beginning of a new stage, which ended in a tariff deficit (cumulative) of more than 32,000 million euros until the end of 2012. Despite the sharp increase in the rate paid by consumers in recent years and the efforts to find the optimal recipe in energy regulation, the increasing importance of renewable energy sources in the energy mix have contributed considerably to the increase of the tariff deficit, expected to follow the same path in the future (Fabra and Fabra, 2012).
- Sallé-Alonso (2012) pinpoints that tariff deficit could have been solved with small adjustments (each two, three or six months) with a frequency adapted to the size of the imbalance detected. In his opinion, the government has four different regulative keys as depicted below in figure 6. Accordingly, an improper management of the four keys is the reasons of the accumulation of the tariff deficit of the Spanish system.
- Tariff deficit is the difference between the recognized rights of incomes and the electricity tariffs.

## **Energetic planification**

- Efficient energy mix versus other objectives
- Demand management versus installed capacity
  - Etc.

## **Sources of funding for regulated activities**

- Political decisions costs out of the tariff
- Own costs of the tariff

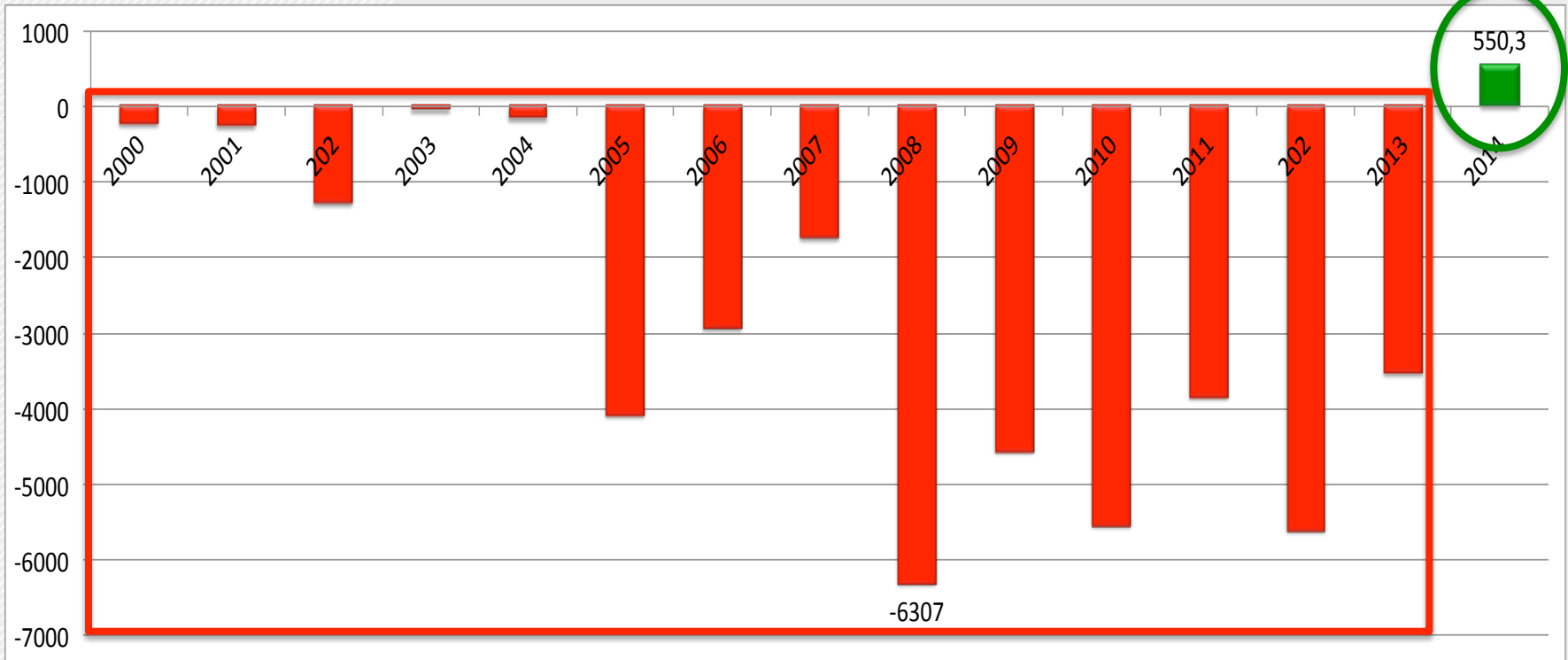
## **Tariff planification**

- Tariffs reflecting costs

## **Remuneration systems of regulated activities**

- Boosting efficiency
- Reasonable profitability as for attracting investment
- Systems that avoid bubbles
  - Learning curve

# Evolution of the tariff deficit in Spain (2000-2014)

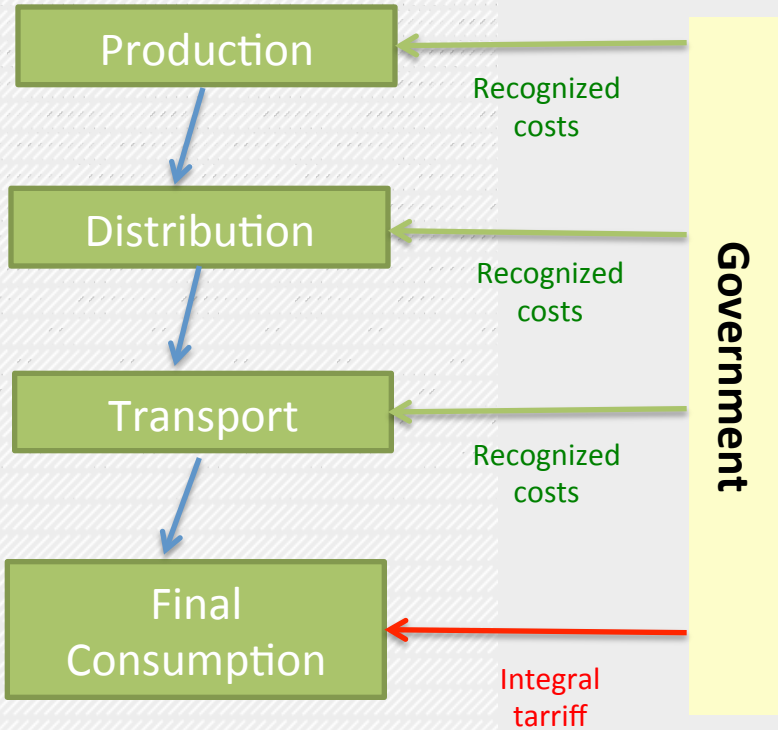


## 2.2. EFFECTS ON THE ELECTRICITY PRICES

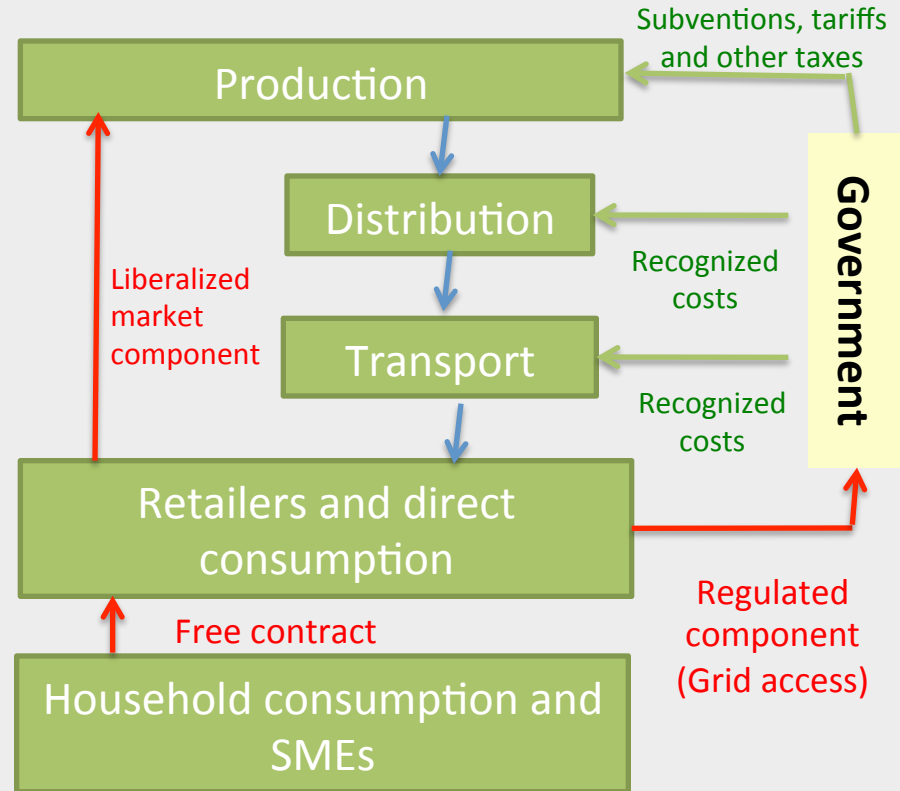
- Electric system must take into consideration mainly:
  - ✧ Generation/production
  - ✧ Transport
  - ✧ Distribution
  - ✧ Consumption
- Mainly two contexts:
  - ✧ Stable legal framework (1988-1997)
  - ✧ Liberalized market (after 1997)

## 2.2. EFFECTS ON THE ELECTRICITY PRICES

Main actors under the Stabil Legal Framework 1988-1997



Main actors under a liberalized market

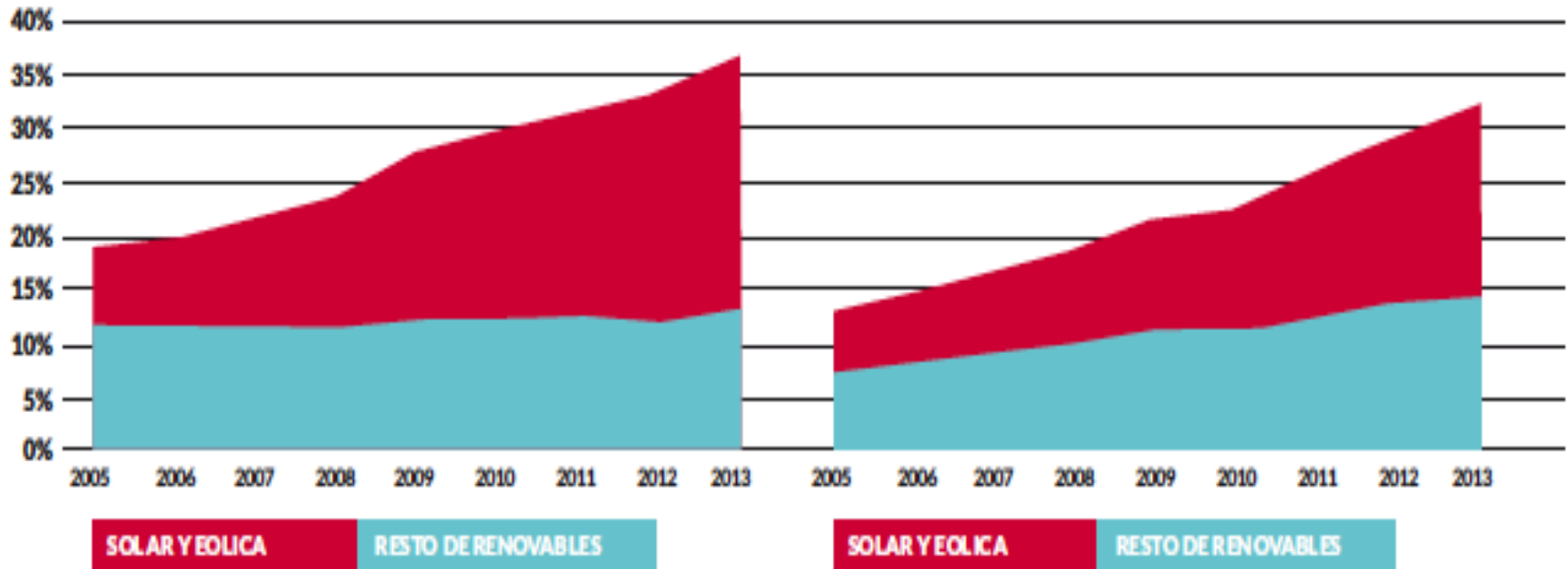




## 2.2. EFFECTS ON THE ELECTRICITY PRICES

Spain

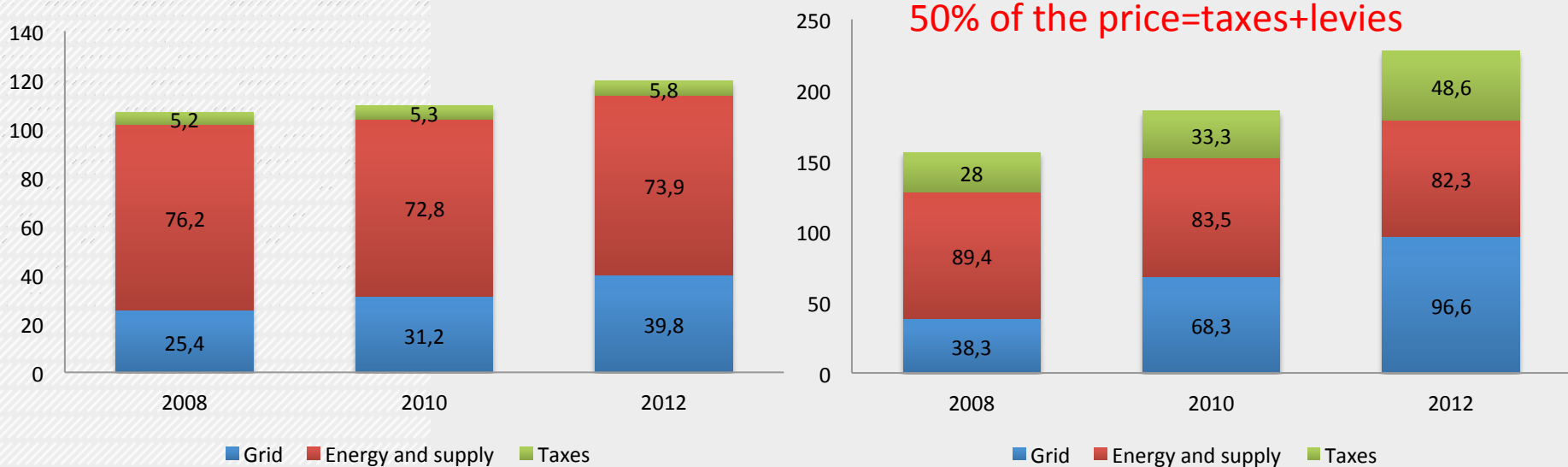
Germany



Fuente: Eurostat

## 2.2. EFFECTS ON THE ELECTRICITY PRICES

Power retail prices for industrial (left) and residential (right) users



2008-12 electricity prices increased around 46% despite the huge tariff deficit accumulated over the last decade and a half (around 30 billiones €)

# 3. PNG & FIJI RENEWABLE ENERGY STATUS

- OPEN DISCUSSION



## 4. CONCLUSIONS

- The latest legal framework developments are a response to the electricity tariff deficit accumulated in the last 15 years (30 bill €). This is due to the unwillingness of several governments since 2001 to pass on the full costs of their policy decisions on customers
- The government is trying to stop the tariff deficit from growing further through increasing regulated tariffs to final customer and cutting payments for regulated activities (including renewable power) -> negative effect on the elections => not comfortable for government, customers and firms
- The lack of transparency in the legislation introduction conducted to confusion and uncertainty (what is going to be the situation when deficit will disappear and tariffs will rise?)

## 4. CONCLUSIONS

- The introduction of new regimes of distribution and auto-consumption leads to concerns (investors & customers) strongly criticised by regulatory and competition authorities in Spain
- No long term strategy => confusion, unintended and undesirable consequences
- Alternatives characterised by more transparency and greater efficiency
- There is no intention of excluding solar companies from the market, but there is a clear need of deficit reduction

# Thank you!

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