
Study concerning the effects on the industrial sector of measures in Europe to promote the use of electricity from renewable energy sources

**The FIT System in Europe and Information about the Cost
for Companies and Measures to Reduce the Cost**
Primarily Concerning Germany

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1. Introduction

■ Background and objective of this study

- Survey concerning the effects on the industrial sector in Europe of policies to encourage the use of electricity from renewable energy sources
- Increased use of the feed-in-tariff (FIT) system and of electricity from renewable energy sources in Europe

Summary of discussions concerning the effects on the industrial sector, including the economic cost and changes in the business environment, as well as measures to reduce these effects

■ Today's report

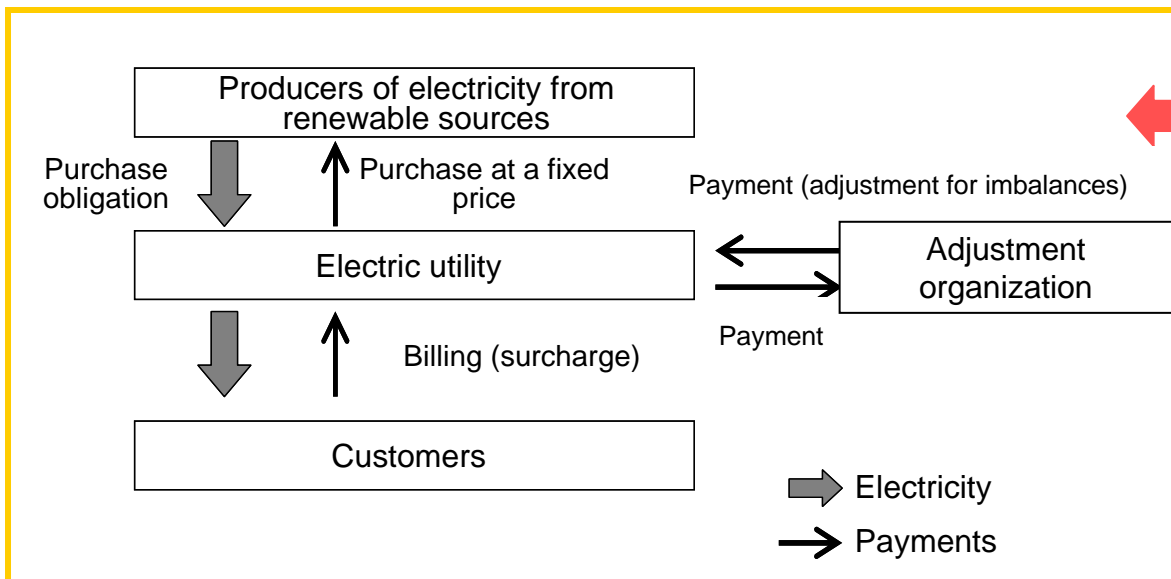
- Using Germany as the primary example, this report presents information about the cost resulting from implementation of the FIT system and measures to reduce this cost for industries that consume large amounts of electricity. The report includes a discussion of the FIT system and associated issues, including the latest revisions, along with information about discussions in each countries about this system.

*This is a preliminary version of the report. The final version may differ from this report.

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The Feed-in-Tariff System

- **Basic structure of the FIT system and characteristics**
 - Electricity from renewable sources is purchased at a fixed price over a certain period.
 - The purchase price (tariff) is determined to provide a suitable profit margin over the cost of generating electricity based on the energy source, size of the equipment and other matters.
 - The purchase price is reduced along with the cost of generating electricity.
 - Electricity consumers cover the cost of purchasing this electricity by paying a surcharge for power.



Start of the FIT system in Japan:

The Act on Special Measures concerning the Procurement of Renewable Electric Energy by Operators of Electric Utilities

(July 1, 2012)

Source: Act on Special Measures concerning the Procurement of Renewable Electric Energy by Operators of Electric Utilities (Renewable Energy Purchase Law)

Implementation of the FIT System in Europe

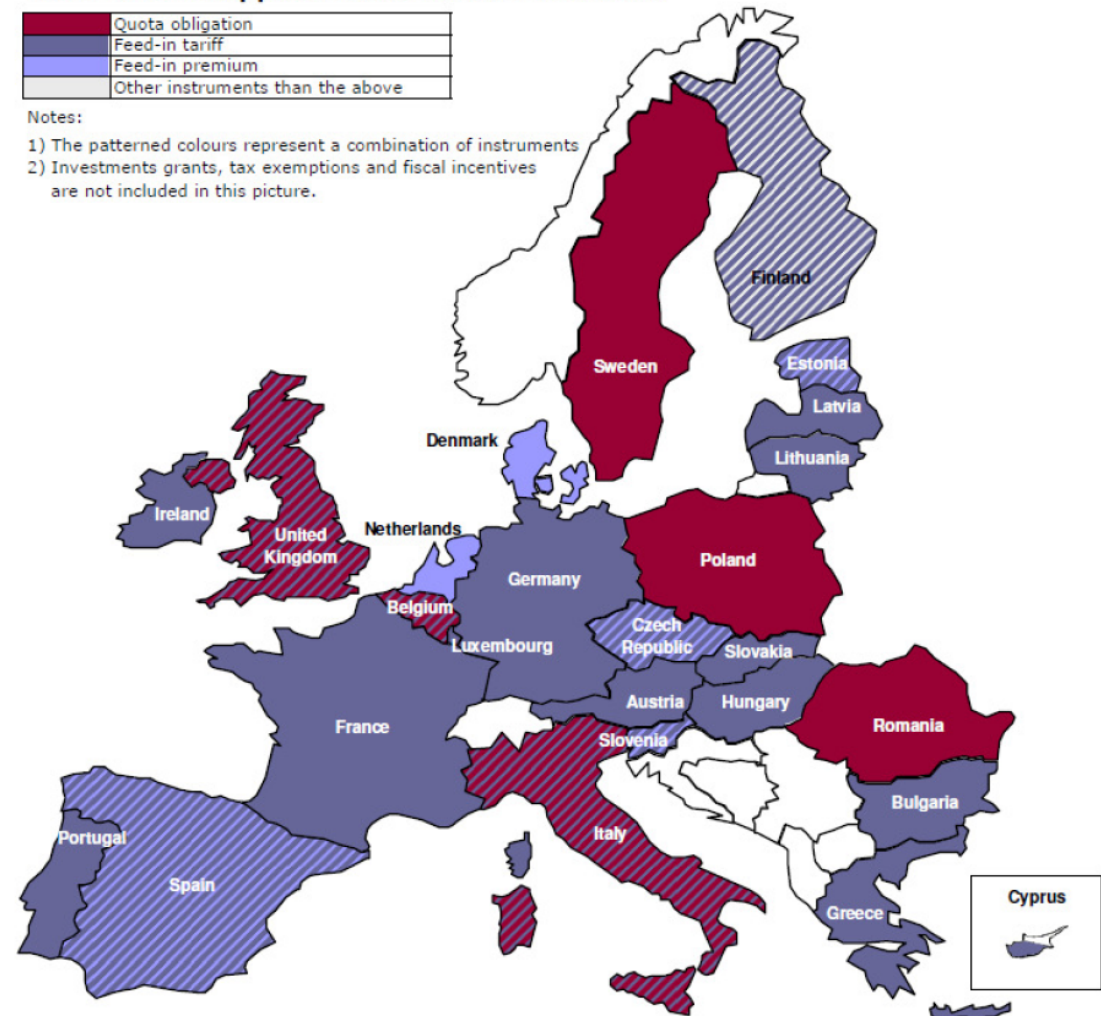
- Many countries have started using the FIT system as the primary means of achieving their targets for the use of renewable energy.
- Germany is recognized as a success story regarding the use of FIT to produce more renewable energy.
- But there are problems involving the additional cost and other issues associated with how to operate the FIT system.

Promotion of Renewable Energy in Europe

	Quota obligation
	Feed-in tariff
	Feed-in premium
	Other instruments than the above

Notes:

- 1) The patterned colours represent a combination of instruments
- 2) Investments grants, tax exemptions and fiscal incentives are not included in this picture.

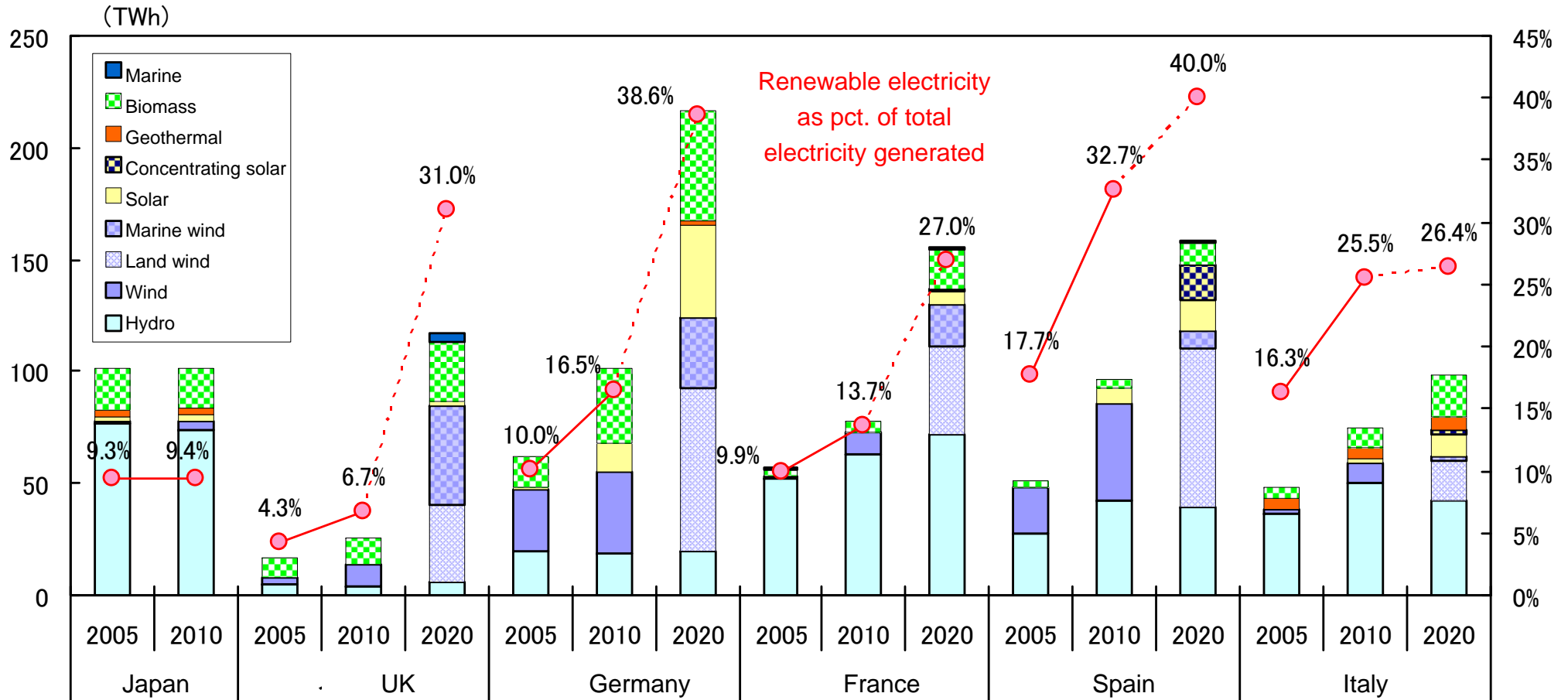


Source: [Ecofys](#), "Financing Renewable Energy in the European Energy Market," January 2, 2011

Renewable Electricity in Major Countries and Plans



Growth in renewable electricity in major countries and plans

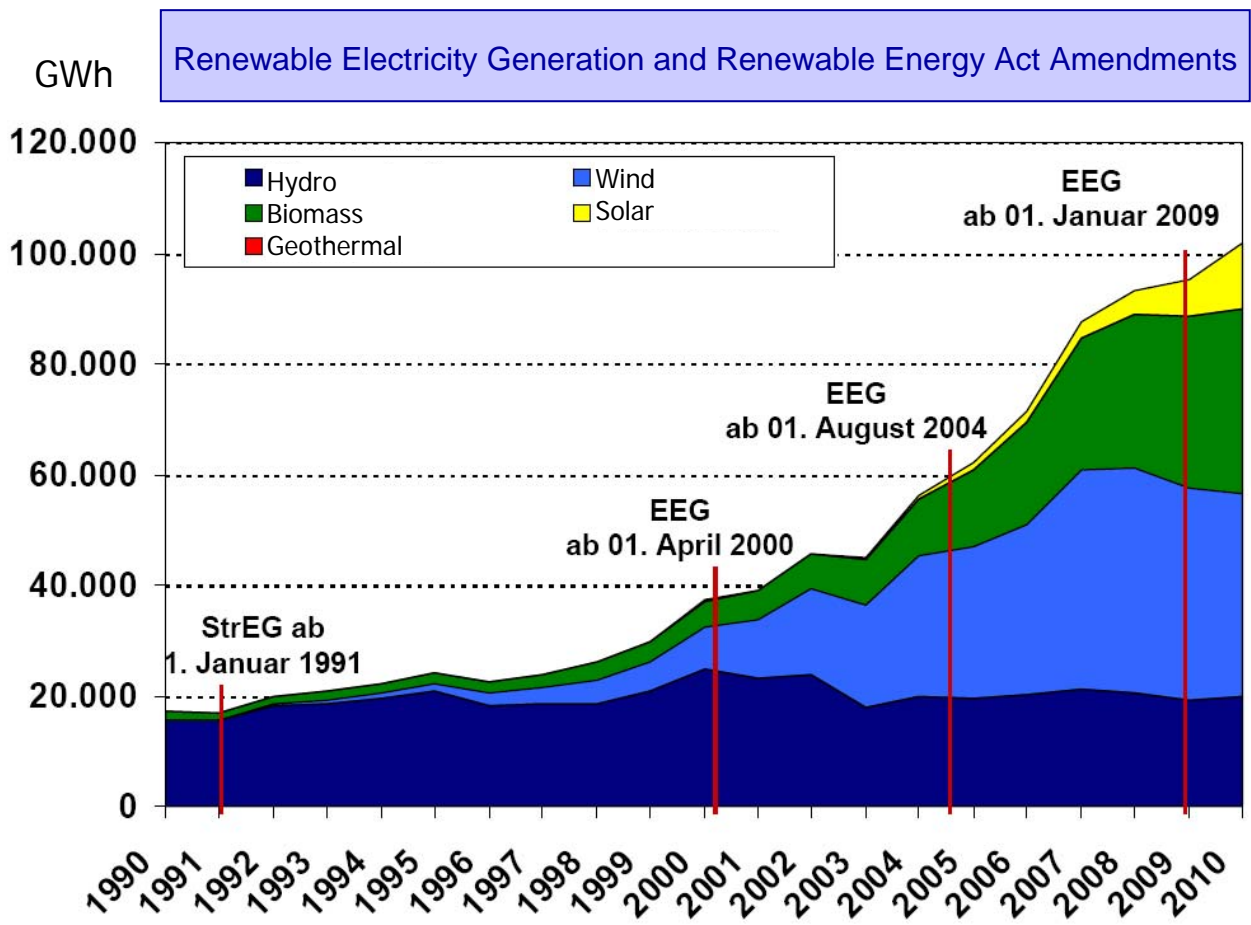


Source: IEA "Energy Balances of OECD Countries" for 2005 and 2010 (actual); NREAP (National Renewable Energy Action Plan) of EU countries for 2020 (plan)

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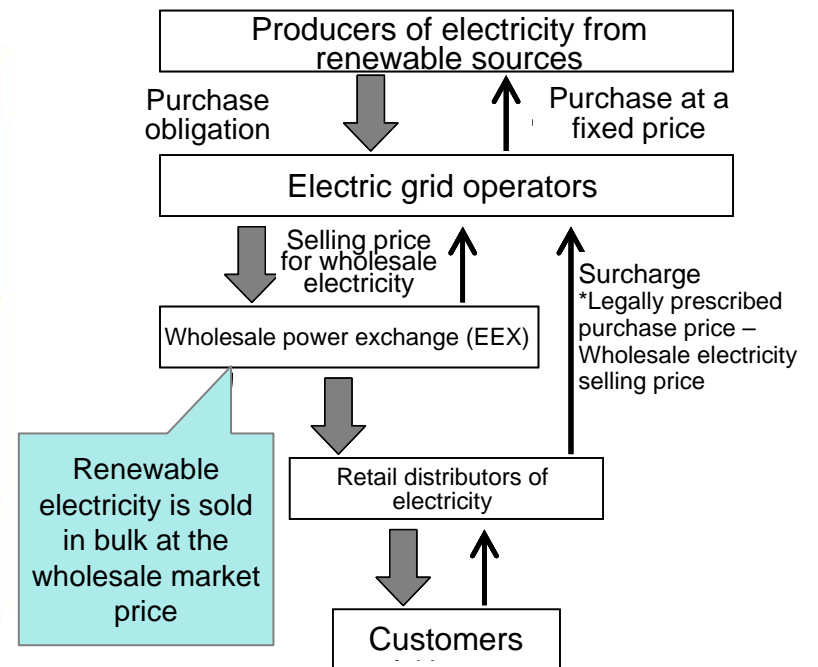
The FIT System in Germany

- Started the feed-in-tariff system in 2000 with passage of the Renewable Energy Act (EEG)
- Amended law will be enacted in 2012 (passed in July 2011)



Source: Erfahrungsbericht 2011 zum Erneuerbare-Energien-Gesetz (EEG-Erfahrungsbericht), BMU, May 3, 2011

Flowchart of the FIT System in Germany



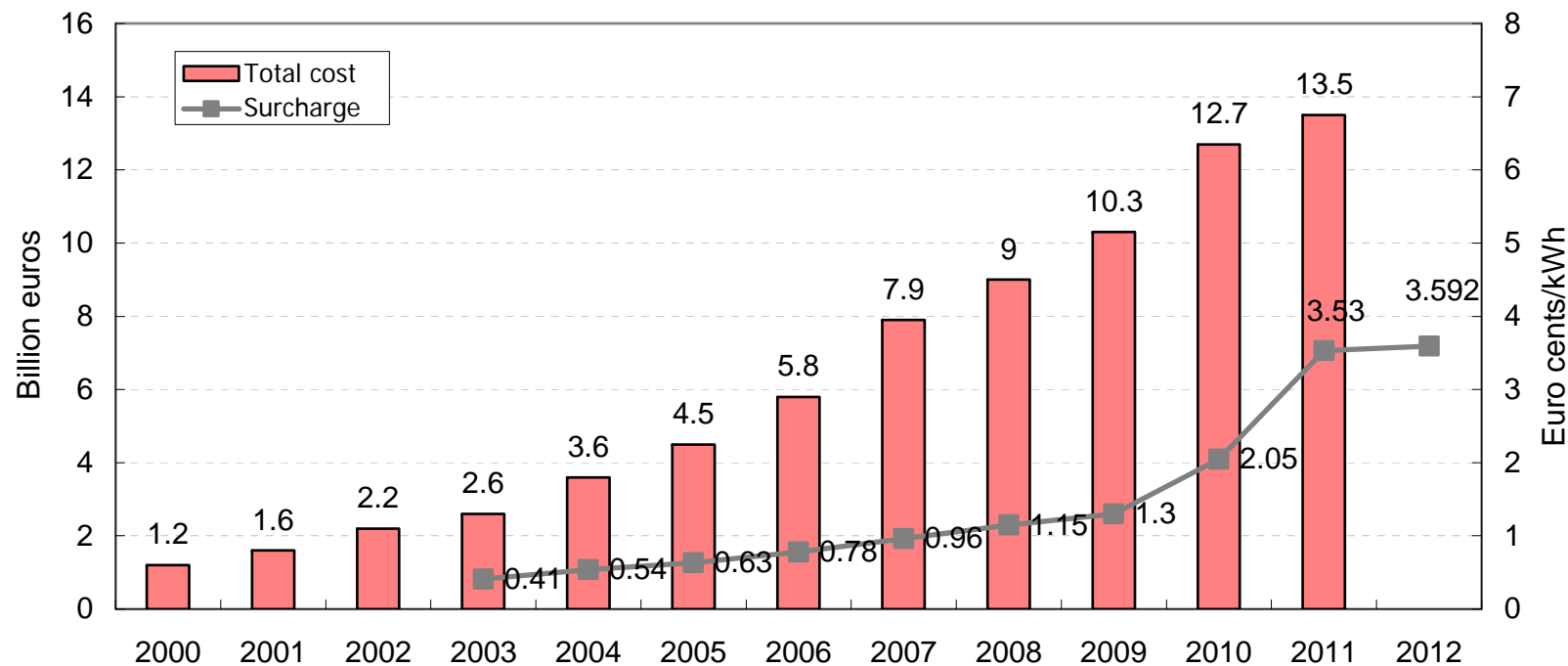
Source: Overseas electricity survey materials

Cost of the FIT System

FIT system cost resulting from EEG

■ Purchase cost – Wholesale electricity price = EEG cost ➔ EEG surcharge

Total EEG Cost and Surcharge

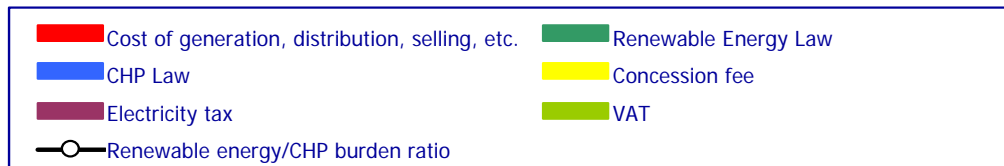
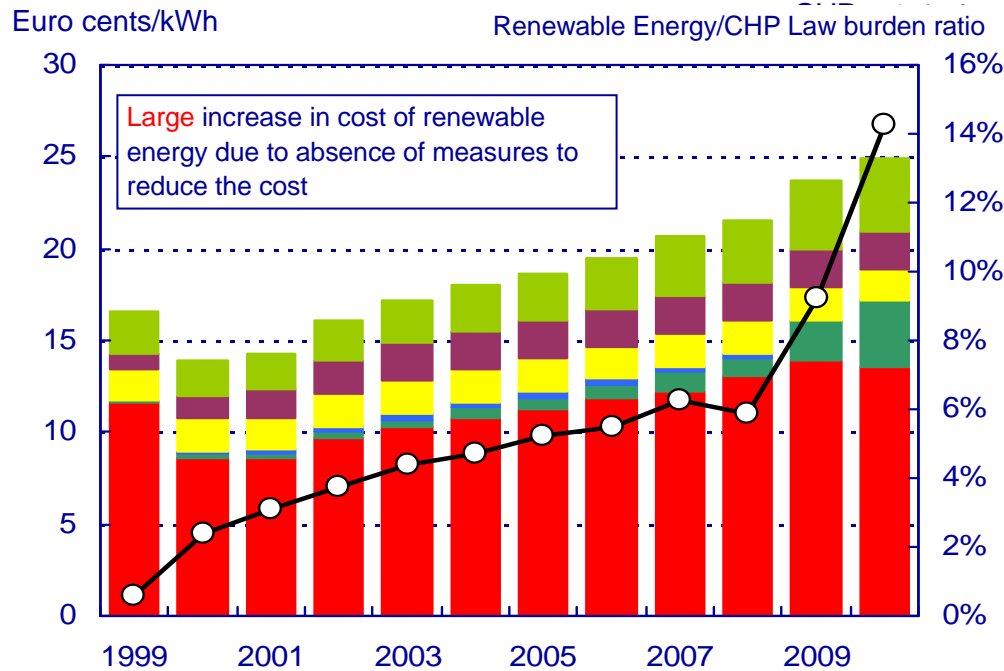


Note: Figures for 2009 and 2010 are estimates.
 Source: BDEW materials for 2009-2010; BMWi and VIK hearings for 2011

The Cost of the FIT System in Germany

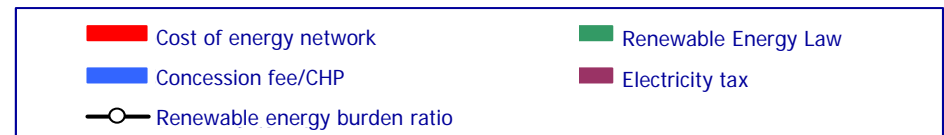
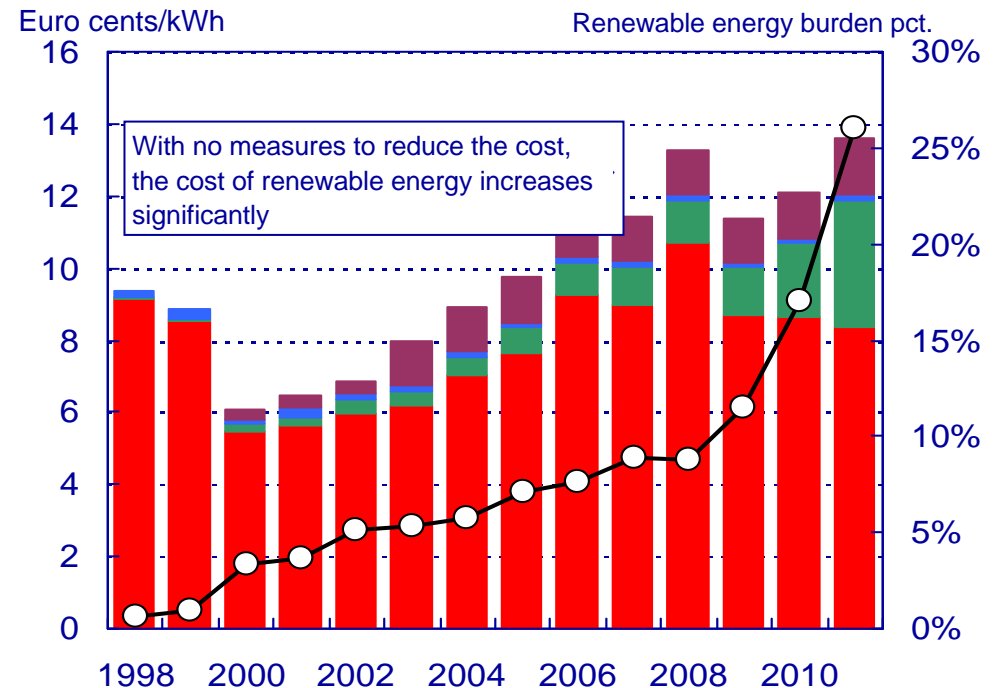
■ In most cases, measures to increase the use of renewable energy sources result in the addition of taxes and other charges to electricity bills.

Cost for Households



Note: Based on 3,500kWh/year; 2009 and 2010 incorporate the CHP surcharge
 Source: "Electricity from Renewable Energy Sources: What does it cost" Federal Environment Ministry of Germany, others

Cost for Industrial Users



Note: Medium voltage, consumption of 100kW/1,600 hours to 4,000kW/5,000 hours (no Renewable Energy Law cost reduction measures)

Source: Annual editions of "Strategy & Key Figures," E.on

Summary of Cost Reduction Measures

- Cost reduction measures in EEG Law
 - 2004 Amendments (§ 16) Established as permanent measures
 - 2009 Amendments (§ 40-44) Now in effect
 - 2012 Amendments (§ 40-44) To take effect on January 1, 2012
- Purposes of cost reduction measures
 - Reduce the cost of electricity for manufacturers that consume much electricity and railway companies, maintain an international competitive edge and the ability of different transport methods to compete among themselves
- Measures to reduced costs for industries with high electricity use
 - Surcharge reductions
 - No surcharge for use of electricity that is generated internally
 - Energy conservation certification system

Provisions for Measures to Reduce Cost (Currently in effect)

Two standards are used to determine eligibility for cost reduction measures:

- Electricity purchased and consumed in one year by a company (GWh)
- Cost of electricity as pct. of gross value added (%)

2004 Amended Law/2009 Amended Law		
Case 1	Eligibility	Annual electricity purchase/consumption of more than <u>100GWh</u> and cost of electricity of more than <u>20%</u> of value added
	Cost reduction	EEG surcharge is 0.05 cents/kWh
Case 2	Eligibility	Annual electricity purchase/consumption of more than <u>10GWh</u> and cost of electricity of more than <u>15%</u> of value added
	Cost reduction	EEG surcharge is 0.05 cents/kWh for 90% of annual electricity purchased/consumed
Energy certification	Requirement for assessment of electricity consumption and potential for energy conservation	

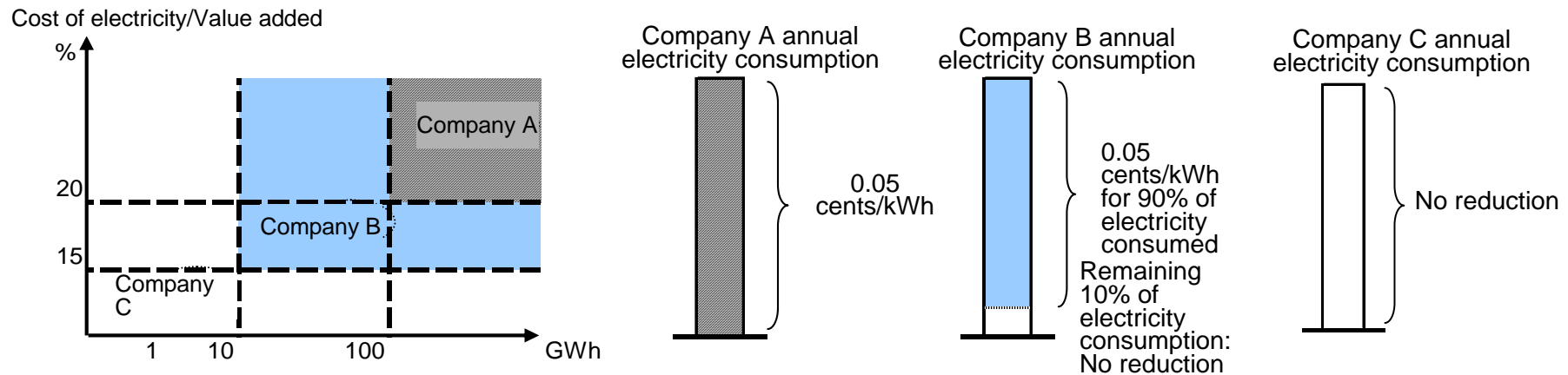
Provisions for Measures to Reduce Cost (Amendments)

2012 Amended Law		
Case 1	Eligibility	Annual electricity purchase/consumption of at least <u>1GWh</u> and cost of electricity of at least <u>14%</u> of value added
	Cost reduction	For electricity purchased/consumed for internal use: <ul style="list-style-type: none"> ■ Up to 1GWh: Entire EEG surcharge ■ 1GWh-10GWh: 10% of EEG surcharge ■ 10GWh-100GWh: 1% of EEG surcharge ■ More than 100GWh: EEG surcharge is 0.05 cents/kWh
Case 2	Eligibility	Annual electricity purchase/consumption of more than <u>100GWh</u> and cost of electricity of more than <u>20%</u> of value added
	Cost reduction	EEG surcharge 0.05 cents/kWh
Energy certification	Companies with annual electricity purchases/consumption of 10GWh or more must undergo an assessment for electricity consumption and energy conservation potential.	

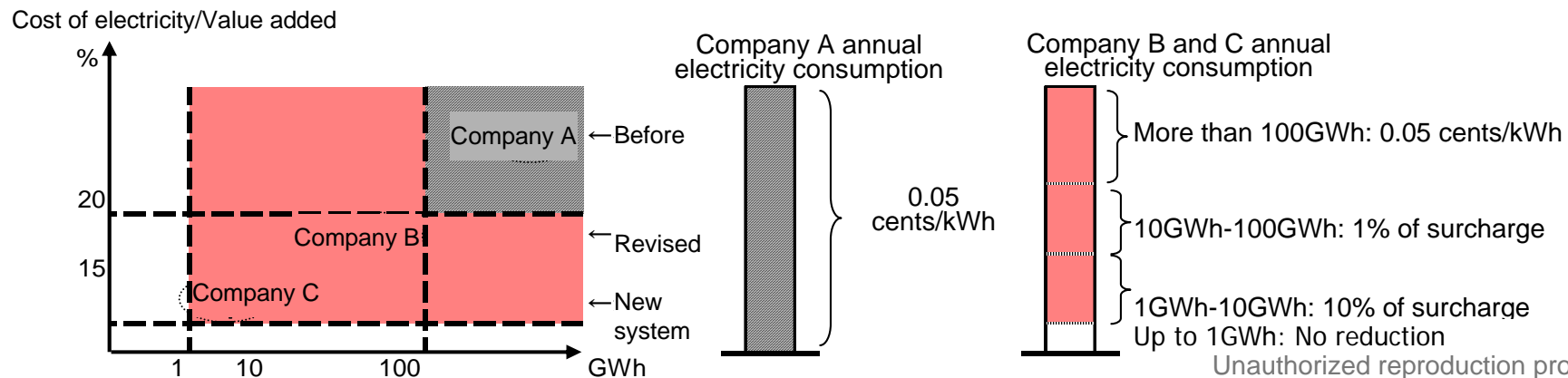
Rules for Measures to Reduce Cost

- The 2012 amendments will make more companies eligible for these measures and **will** revise the nature of the cost reductions.
- However, there will be no change in the “maximum reduction” measure that was established by the 2004 amendment.

2004 Amended Law/2009 Amended Law



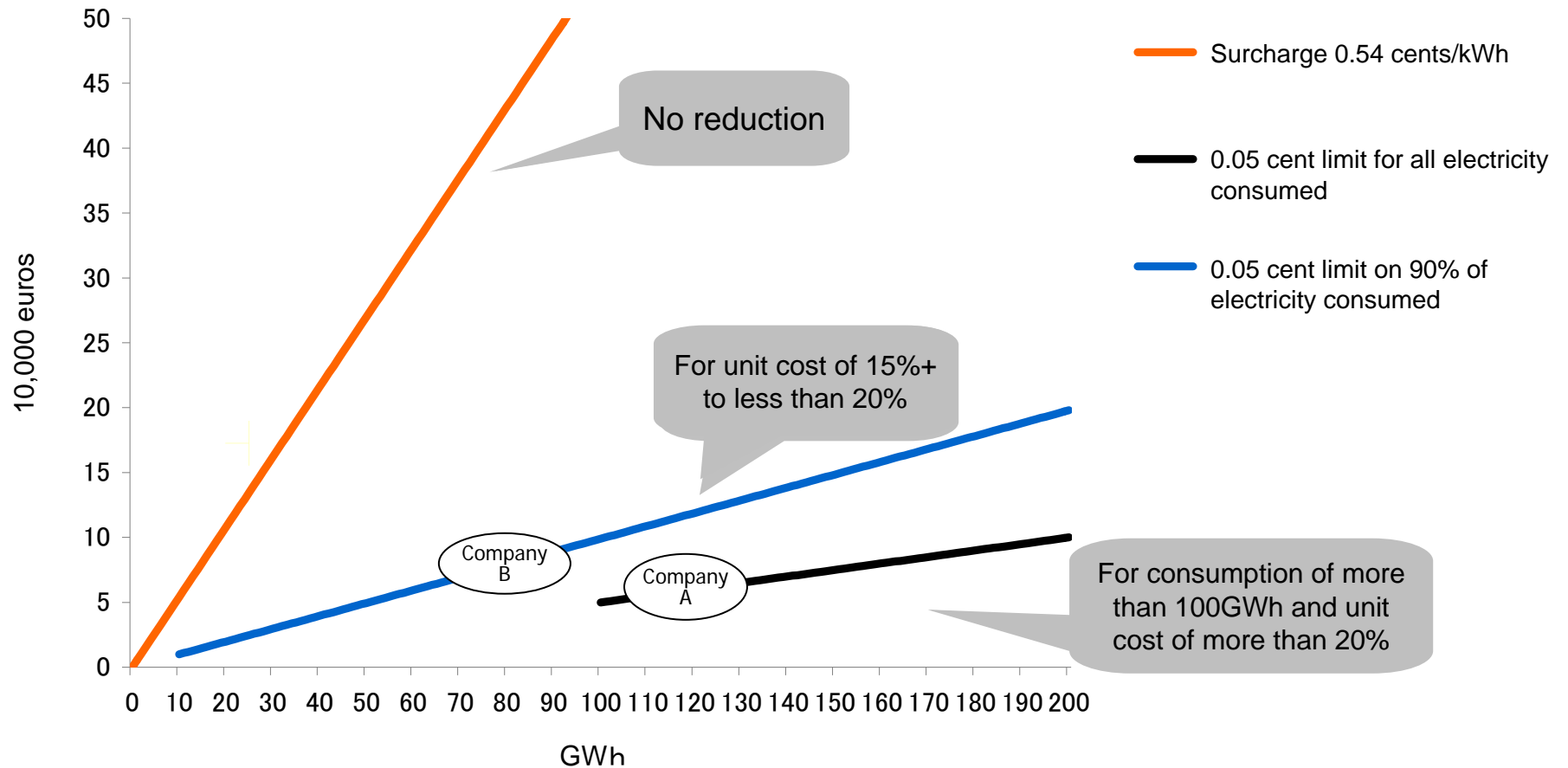
2012 Amended Law



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Eligibility for Cost Reduction Measures (When first established)

Cost reduction measures in the 2004 amended law and 2009 amended law are applied to the surcharge as of 2004 (0.54 cents/kWh)

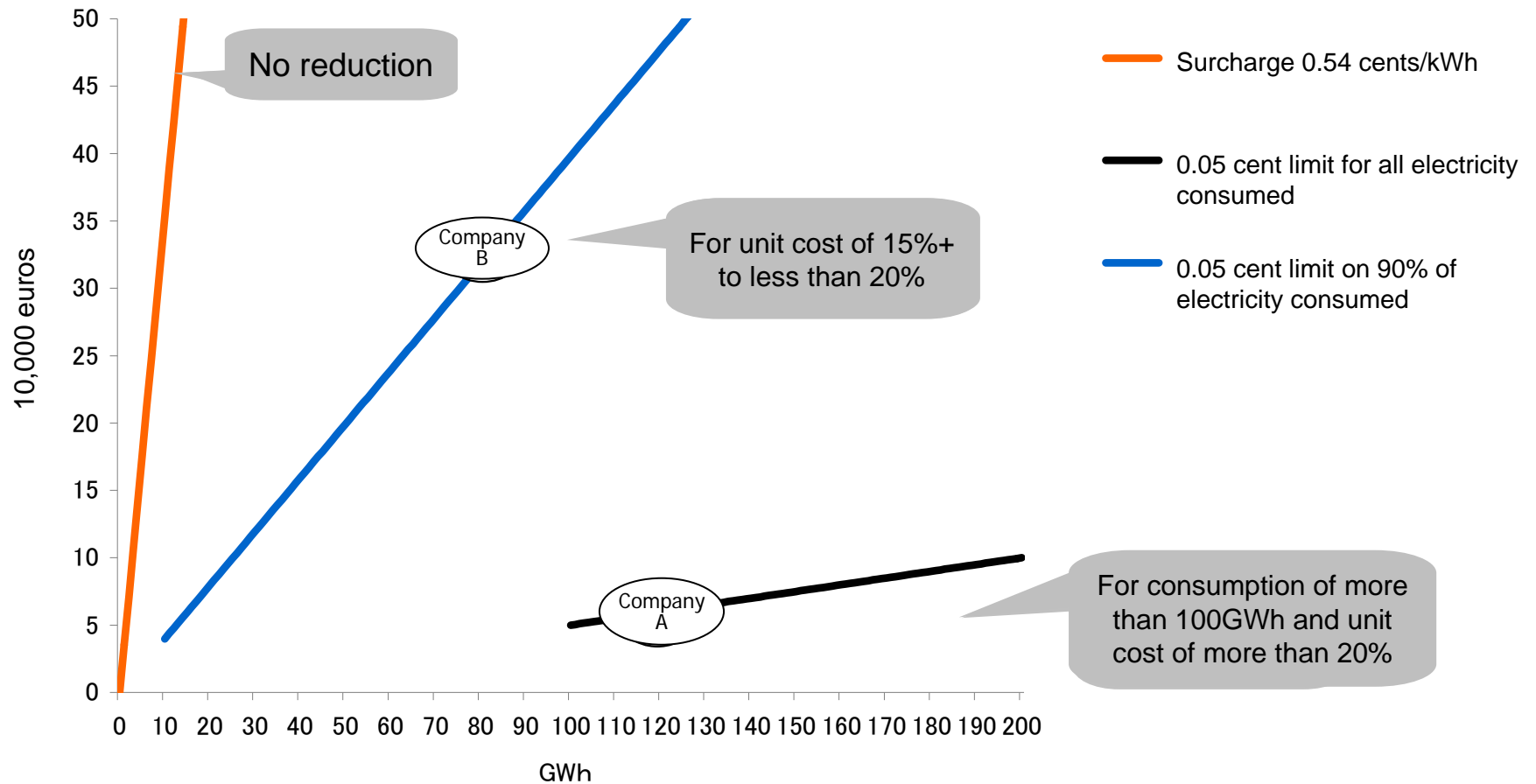


Source: EEG Law materials and hearings

Eligibility for Cost Reduction Measures (Currently in effect)

2004 Amended Law and 2009 Amended Law
 Cost based on surcharge as of 2011 (3.53 cents/kWh)

⇒ Higher surcharge,
 larger differences

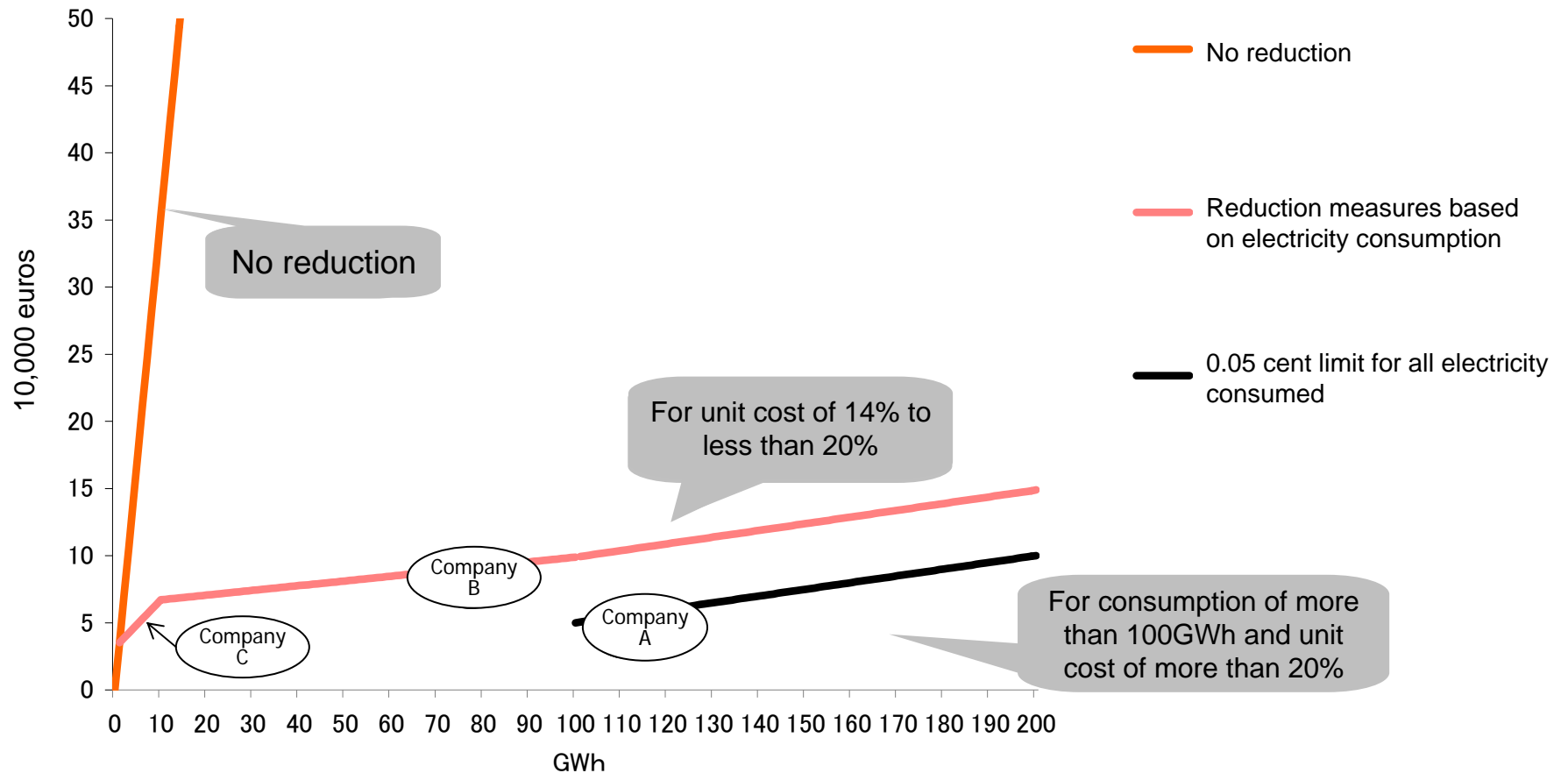


Source: EEG Law materials and hearings

Eligibility for Cost Reduction Measures (Amended)

Assuming the surcharge as of 2011 (3.53 cents/kWh) in the 2012 Amended Law

⇒ Smaller differences in some cases



Source: EEG Law materials and hearings

Note: This diagram is a model based on the 2011 surcharge. The actual cost reduction based on the 2012 amendments will be based on the surcharge beginning in 2013.

Eligibility Standards for Cost Reduction Measures

- The standard is the ratio of the cost of electricity to gross value added. As a result, companies in industries with a high cost of sales due to costly raw materials or other reasons can meet the eligibility standard more easily.

Eligibility standards for cost reduction measures:

- Germany: Cost of electricity/Gross value added
- Japan: Cost of electricity/Net sales

(Ref.) Cost of Electricity Ratios in Japan for Manufacturers (2009)

	Cost of electricity/Gross value added	Cost of electricity/Value of goods produced
Iron and steel	15.9%	3.5%
Non-ferrous metals	8.3%	2.6%
Ceramics, stone and clay products	6.9%	3.7%
Plastic products (ex. items listed separately)	5.8%	2.5%
Electronic parts, devices and circuits	5.8%	2.4%
Lumber and wood products (ex. furniture)	5.7%	1.9%
Textiles	5.5%	2.5%
Paper, pulp and paper products	5.2%	2.0%
Rubber products	4.2%	2.0%
Fabricated metals	4.0%	1.7%
Chemicals	3.5%	1.7%
Petroleum and coal products	3.5%	0.4%
Food	3.3%	1.3%
Printing and associated activities	3.2%	1.4%
Furniture and fixtures	2.8%	1.1%
Production machinery and devices	2.4%	1.1%
Transport equipment and devices	2.4%	0.8%
General-purpose machinery	2.2%	1.0%
Electrical machinery and devices	2.0%	0.8%
Other manufacturing	2.0%	0.9%
Leather, leather products and fur	1.9%	0.7%
Beverages, tobacco and feedstuffs	1.9%	0.6%
Business machinery	1.7%	0.7%
Information/communication equipment	1.1%	0.4%

Sales	Value of external purchases (Cost of sales)	Cost of procuring products
		Direct cost of materials
		Cost of procuring parts
		Cost of outsourced processing
		Indirect cost of materials
	Value added	

Source: Industrial Production Statistics, 2009, for companies with 30 or more employees

Industries Eligible for Cost Reduction Measures

- About 600 companies with high electricity consumption are eligible
- About 1/6 of all domestic electricity consumed (about 458TWh) is eligible for cost reduction measures

Sectors eligible for cost reduction measures (2011 applications)

Sector	A) Eligible companies	B) Electricity consumed by eligible companies (GWh/year)	C) Electricity consumed per company (B/A) (GWh)
Chemicals	69	19,437	282
Paper	79	12,125	153
Non-ferrous metals	19	8,081	425
Steel and alloys	33	8,913	270
Railways	49	4,190	86
Cement	24	3,231	135
Lumber and wood products	30	2,196	73
Metals and processing	64	2,143	33
Food	51	1,579	31
Energy	21	1,152	55
Others	153	9,542	62
Total	592	72,589	123

Note: Lumber and wood products do not include furniture.

Debate about Cost of Measures to Promote Use of Renewable Energy

■ Companies with high electricity consumption

- Cost reduction measures must remain due to concerns about the negative impact of costly renewable energy on the ability to compete in global markets.
- Alarmed about the view that German companies are superior in terms of their production technology and competitive edge in global markets

■ *German Steel Federation, others*

- Consensus has been obtained in Germany to avoid placing an excessive burden on the industrial sector.
- Under the current system, the burden on small/midsize companies is high; no major changes expected from amendments, except for small/midsize companies.

■ *ThyssenKrupp AG, others*

- Excessive EEG burden would have a severe impact on German companies due to intense global competition.
- More energy is consumed to make products that help protect the environment.
- Eligibility for cost reduction measures should, as in Germany, use profit margins rather than sales.
- Emerging countries are not making high-quality products simply because there is low demand, not because they lack the required technologies. Excessive evaluations of technologies in developed countries should be avoided.
- The transfer of factories to other countries is not easy, but a slow decline in investments is foreseen.

Debate about Cost of Measures to Promote Use of Renewable Energy

■ Small/midsize companies with high electricity consumption

- Incentives are “distorted” due to differences in the burden depending on eligibility for cost reduction measures.
- Pleased with implementation of measures in stages

■ *Association for the Industrial Energy and Power Sector (VIK), electricity-intensive industries (EID), others*

- Asked for maximum for surplus but no legal limit was established. Gov’t initially expected surcharge would not exceed 1.5 cents/kWh, but the surcharge is now much higher. Small/midsize company costs are rising rapidly.
- A small difference in standard values has a big impact on the surcharge, creating problems regarding fairness.
- Risk of blocking the incentive for companies to conserve energy
- Pleased with amendments that expand threshold values and implement measures in stages
- Key points of amendments include not only the increase in the EEG surcharge but also the growing gap in the burden between sectors eligible and not eligible for cost reduction measures
- Questions about the continuation of the exemption system and changes in the EEG surcharge are creating significant concerns at companies.

Issues concerning the Cost of the FIT System

■ Economic associations

- Pleased with expansion of scope of eligibility for cost reduction measures
- Doubts about EEG benefits seen on the Internet, such as job creation
- Inconsistency of interests involving implementation of EEG

■ *Federation of German Industries (BDI), others*

- Eligibility standards are politically determined numbers, not clear standards (BMW)
- Pleased with implementation of cost reduction measures in stages and expansion of threshold values
- Confidentiality of energy-related data makes it difficult to determine in advance changes caused by expansion of standards. Expect to see companies that fall barely short of the threshold in the textile, casting, metals and other sectors.
- Difficult to determine cause-effect relationship regarding EEG and shift of industrial activity to other countries; but apparently some non-ferrous metals companies are considering an overseas move because of the cost of EEG.
- Many reports state that EEG creates only jobs that are not competitive and are skeptical about a net increase in jobs.
- Increasing use of renewable energy provides advantages for some industries.
- Worries about higher costs due to outlook for 25 billion euros in costs between now and 2020 for expansion and stabilization of electricity grids

Debate about Cost of Measures to Promote Use of Renewable Energy

- Government, renewable energy industries, academic research institutes, others
 - Recognized that EEG creates an environment for consistent renewable energy investments and yields environmental and economic benefits
 - But the lack of a maximum purchase price and other measures may lead to excessive investments

- *German Federal Ministry of the Environment (BMU) *Based on survey of publications*
 - Reduction in greenhouse gas emissions: 53 million tons of CO₂/year
 - Reduction in cost of electricity from renewable sources: Cost of solar power generation system has dropped by 50% over the past five years
 - Job creation: Estimate of approximately 370,000 jobs (2010) associated with renewable energy
- *German Federal Ministry of Economics and Technology (BMWt)*
 - Ten years of using the EEG Law has revealed problems involving the purchase of all electricity with no restrictions on terms or volume, irrespective of the supply-demand balance.
- *German Institute for Economic Research (DIW)*
 - Growth in the supply of renewable electricity has cut the cost of electricity; cost reduction measures for companies should reflect this benefit.

Measures for Suppliers of Electricity

Revisions to rules for purchase terms in order to hold down the rapid cost increase

- 2010 Amendments (August 17, 2010)

- Small reductions in purchase price for solar electricity

- (Example) Rooftop solar system of below 30kW: From 43.01 cents/kWh in 2009 to 39.14 cents in 2010

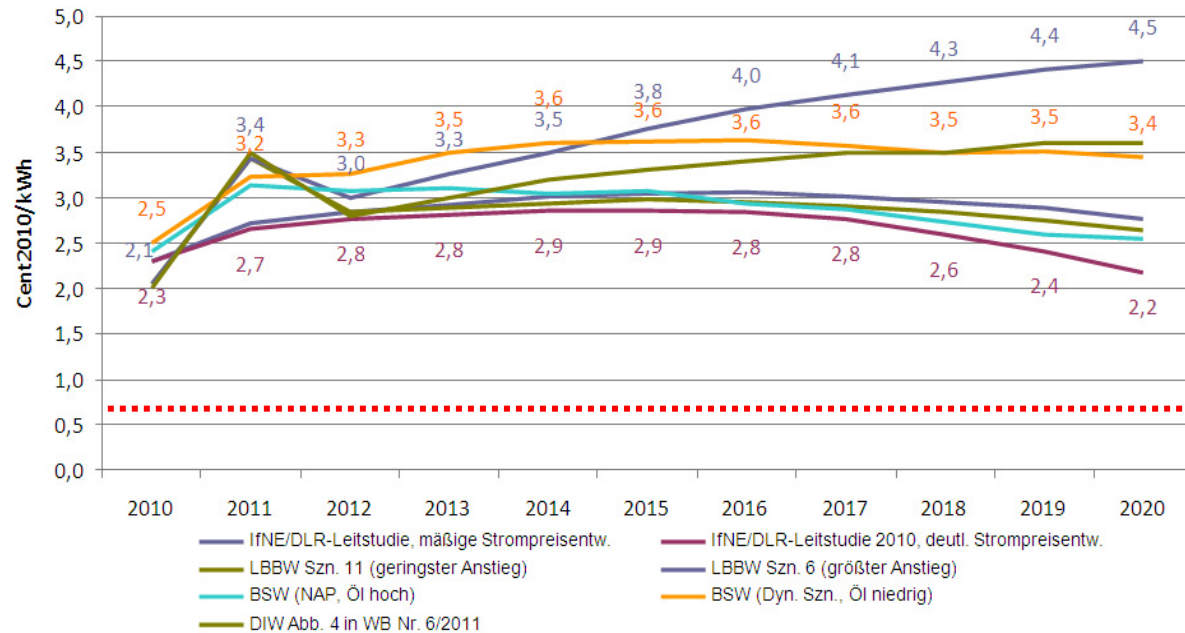
- Added reduction ratio that changes depending on annual use of solar electricity

- 2012 Amendments (July 6, 2011)

- Established incentive for favorable treatment of electricity supplied to reflect changes in supply and demand

Outlook for Germany's FIT System

Example of Outlook for Renewable Energy Surcharge by Research Institutes, Associations and Others



Additional costs for grid expansion and stability too over the long term?

Note: IfNE/DLR = Institute for New Energy and the German Aerospace Center; Massige strompreis = Low electricity bill; Deutl. strompreis = High electricity bill; LBBW = State Bank of Baden-Wurttemberg; Geringster Anstieg = Low electricity bill; Grosster Anstieg = High electricity bill; BSW = German Solar Energy Industry Association; OI hoch = High price of crude oil; OI niedrig = Low price of crude oil

Source: Draft of EEG 2011 Progress Report

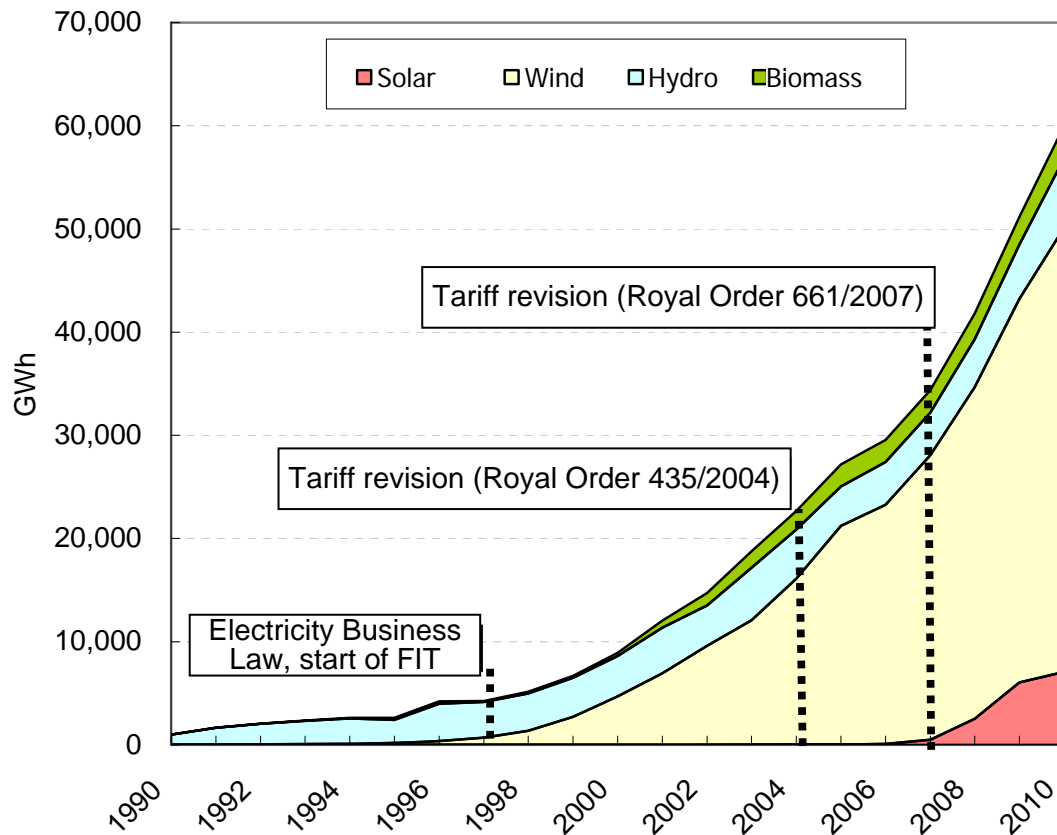
- System was revised due to the increasing difference between eligible and ineligible companies for cost reduction measures
- Problem with current system is big difference in cost due to establishment of threshold values (value and definition)
- The key point is whether or not the cost increase can be held down

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The FIT System in Spain

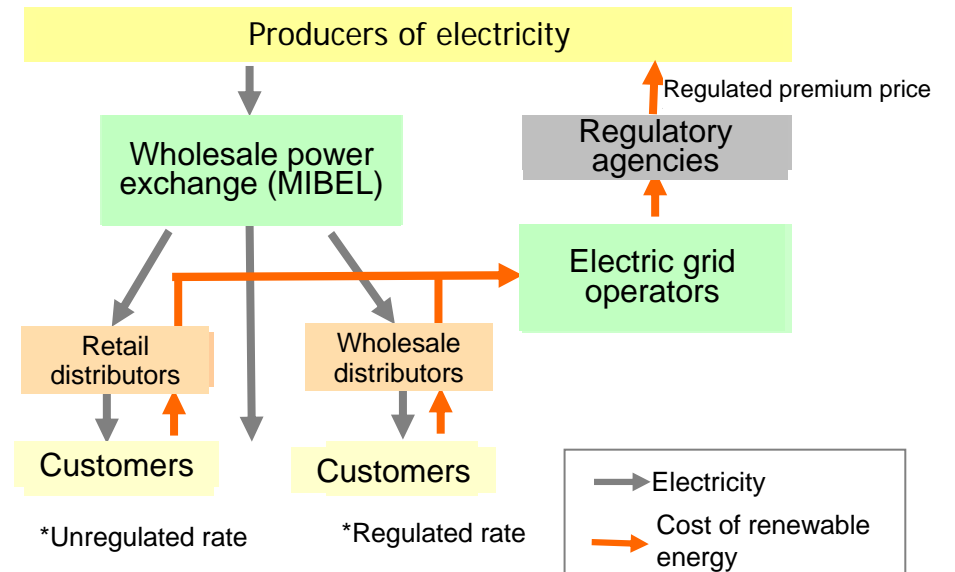
■ Established “Special System” in 1998; excessive solar power investments in 2007-2008

Renewable Electricity Generation and FIT System Amendments



Source: National Energy Commission (CNE)

Flowchart of the FIT System Cost Recovery

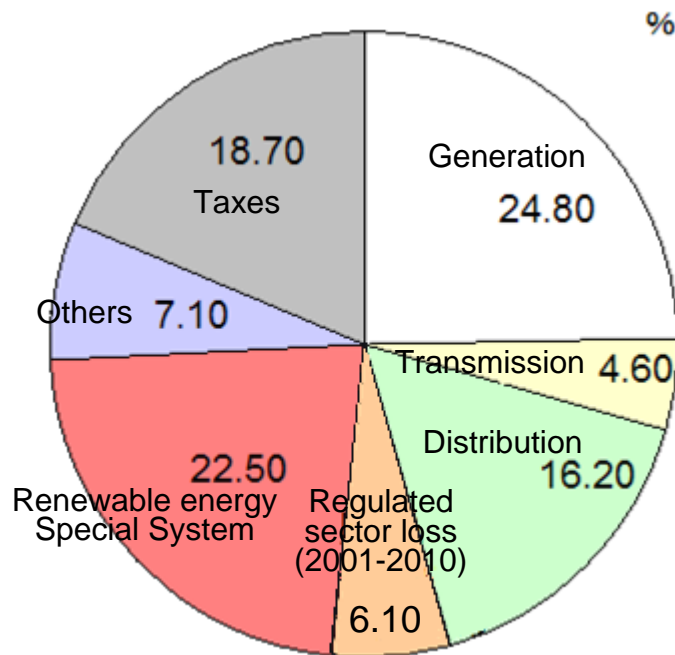


Source: Project team for purchase of all renewable energy and overseas electricity survey committee

Cost of the FIT System in Spain

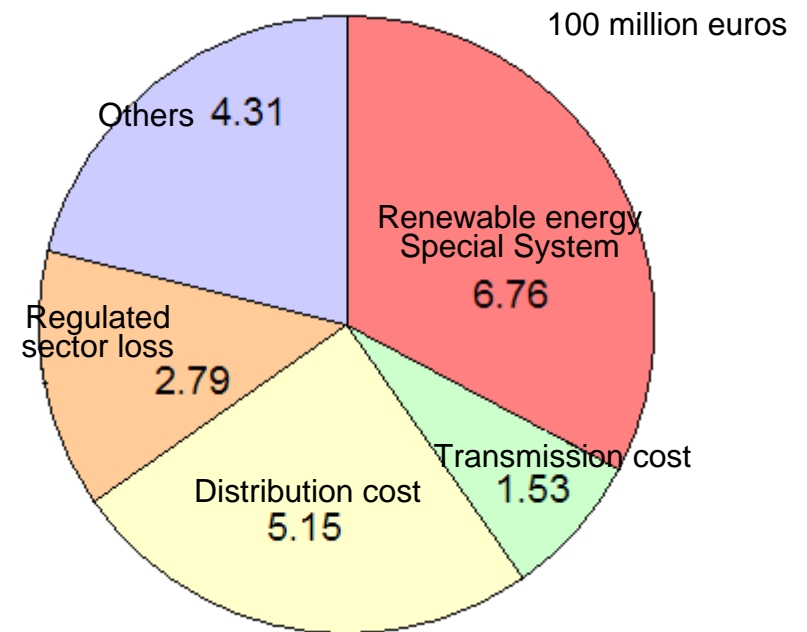
- Cost of the Special System is 22.5% of the cost of electricity (2010)
- Cost of the Special System is billed in a manner that includes the “grid utilization fee.”

Cost of Supplying Electricity (2010)



Source: Spain Electric Power Industry Association (UNESA)

Power Grid Utilization Fee (2011 forecast)



Source: National Energy Commission (CNE)

Cost of the FIT System in Spain

- Grid utilization fee (including Special System cost) is based on the voltage and time of day
- Breakdowns and basis for calculations are not shown to customers.

Grid Utilization Fee (for customer of at least 450kW)

Fee category	Voltage category	Time of Day					
		Peak 1	2	3	4	5	Off-peak 6
Fixed rate (euros/kW, annual)							
6.1	1kV~36kV	16.269	8.141	5.958	5.958	5.581	2.718
6.2	36kV~72.5kV	14.011	7.012	5.131	5.131	5.131	2.341
6.3	72.5kV~145kV	13.157	6.584	4.819	4.819	4.819	2.199
6.4	145kV~	9.855	4.932	3.609	3.609	3.609	1.647
6.5	Grid-related	9.855	4.932	3.609	3.609	3.609	1.647
Variable rate (euros/kW)							
6.1	1kV~36kV	0.070	0.052	0.028	0.014	0.009	0.006
6.2	36kV~72.5kV	0.023	0.017	0.009	0.005	0.003	0.002
6.3	72.5kV~145kV	0.019	0.014	0.007	0.004	0.002	0.002
6.4	145kV~	0.010	0.008	0.005	0.003	0.002	0.001
6.5	Grid-related	0.010	0.008	0.005	0.003	0.002	0.001

High

Low

Notes:

1. Table shows access fees for customers that use at least 450kW.
2. Figures differ from actual rates due to rounding.
3. Table shows rates effective starting on January 1, 2010.

Source: Spain Ministry of Industry, Tourism and Trade

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Debate about the Cost of Renewable Energy

- Recovery of the additional cost of the FIT system is inadequate because the system does not properly reflect the higher cost in electricity rates.
- Losses in regulated business operations are transferred to industrial companies.
- Lack of clarity about FIT expenses when billing customers for electricity is creating concerns about transparency.

- *Energy-intensive Industries Association (AEGE), others*
 - Cost for electricity producers has shifted to expansion of renewable energy sources, creating concerns about higher costs over the long term.
 - Objective assessment is needed to determine the competitiveness of renewable electricity.
- *Large companies (Arcelor Mittal), others*
 - Worried about government arbitrarily maintaining current electricity rates
- *Economic associations (Spanish Steel Association (UNESID)), others*
 - Worried about the fact that industrial users are offsetting losses in the household sector
 - Worried about a system that buys all electricity produced irrespective of the supply and demand for electricity
- *Government agencies (Institute for Energy Diversification and Saving of Energy (IDAE))*
 - Political decisions about passing on the cost of promoting renewable energy to electricity rates

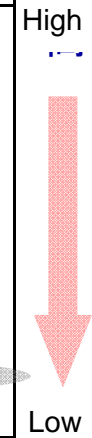
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The FIT System in Italy and the Associated Cost

- The cost of the FIT system (A3 rate) is billed in accordance with voltage, contracted power volume and power consumption.
- There is a limit for large-scale electricity users (more than 8GWh of electricity consumed per month).

Cost of Renewable Energy (A3 Rate) in 4th Quarter of 2011

Voltage category	Fee category	Annual fixed cost : Monthly Cent /KWh				
		per contract point (cents)	consumption up to 4GWh	Monthly consumption 4-8GWh	Monthly consumption 8-12 GWh	Monthly consumption over12 GWh
Low voltage						
	3kW>					
	Annual consumption 1800kWh>	-	1.626			
	Annual consumption 1800kWh~2640kWh	-	2.439			
	Annual consumption 2640kWh=<	-	3.535			
	3kW=< Non-home use					
	Annual consumption 1800kWh>	-	3.535			
	Annual consumption 1800~2640kWh	-	3.535			
	Annual consumption 2640kWh=<	-	3.535			
	Public lighting	-	3.058	3.058	3.058	3.058
	Others					
	1.5kW>	-	2.423			
	1.5kW=<	7,243.08	3.287	3.287	3.287	3.287
Mid voltage	Public lighting	-	2.423	2.423		
Mid Voltage	Others	6,026.69	2.699	2.699		
High voltage		7,600.58	2.718	1.359	1.359	
Special high voltage		7,600.58	2.718	1.359	1.359	



Federation of Electric Power Companies

- FIT system expenses of 10 billion euros/year between 2010 and 2020 = cost of 2.7-3.2 cents/kWh in 2020

Confederation of Italian Industry

- Very worried about higher costs

Source: Energy Regulatory Bureau (AEGE)

- Large electricity users are exempt from renewable energy cost; no strong dissatisfaction with the additional cost at this time, but concerns exist about upcoming increases in costs for the FIT system.
- The key point is whether or not total costs can be held down as the FIT system is operated.

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Closing Summary

■ Germany

- Has substantial cost reduction measures so that electricity-intensive industries can remain competitive in global markets.
- Big differences in the cost depending on eligibility for cost reduction measures
- The difference associated with cost reduction measures will become even larger as the cost of the FIT system grows.
- There is a risk of a rapid increase in expenses due to the difficulty of controlling the magnitude and speed of the growth in FIT system expenses.
- Germany is revising the FIT system to hold down its cost and reduce cost differences; the question is whether or not Germany can actually hold down the growth in the cost of the FIT system.

■ Spain

- Spain must improve the FIT system and its transparency because problems involving the cost not yet been resolved.

■ Italy

- There is no significant dissatisfaction with the cost of the FIT system at this time, but industrial companies are concerned about future growth in FIT expenses.