



# Towards a Zero Subsidy World?

*David Reiner*

*with Arjun Mahalingam & David Newbery*

*EPRG, University of Cambridge*

*EPRG-CEEPR European Energy Policy Conference,  
Madrid, 3 July 2014*

# Outline

---

- 2020 Starting point & Common Diagnosis
- Towards a 2030 energy and climate package
- New 2014-2020 State aid guidelines
- EF Study: Choice of countries for comparison
  - UK EMR v FiTs in Germany
- Looking Forward:
  - Greater Auctions
  - Tensions b/n Deployment & Research Support
- Closing Questions

# EU 2020 Climate & Energy Package

---

- 20% share of energy produced from renewables
- 20% reduction in GHG emissions (from 1990 levels)
- 20% improvement in energy efficiency
  - Not binding with indicative targets from April 2013
- Four pieces of complementary legislation
  - Reform of EU ETS (grandfathering -> auctioning)
  - National Targets for Non-EU ETS (Effort Sharing Decision)
  - National renewable energy targets (Renewables Directive)
  - CCS Directive

# Overview of Subsidy Regimes in EU

---

## Definition of renewable support:

*“Originating from a market intervention by a Member State that help energy from renewable sources to find a market by reducing the cost of production of this energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased”*

- European Commission

# Overview of Subsidy Regimes in EU

## FORMS OF RENEWABLE SUPPORT:

SUPPORT	FEATURES	RISKS	COUNTRIES
Feed-in Tariff (FiT)	<ul style="list-style-type: none"> <li>Guaranteed price to eligible RES-E producer</li> <li>Fixed payment/MWh for a promised duration</li> </ul>	<ul style="list-style-type: none"> <li>Investment (G) – low</li> <li>Volume (G)</li> <li>Balancing (SO)</li> </ul>	Most except NL, ES, PL...
Feed-in Premium (FIP)	<ul style="list-style-type: none"> <li>Guaranteed payment/MWh + revenue from selling electricity to wholesale market</li> </ul>	<ul style="list-style-type: none"> <li>Price (G)</li> <li>Balancing (G)</li> </ul>	NL, FI, UK (CfD), DE, IT
Quota Obligations	<ul style="list-style-type: none"> <li>Minimum share of RES-E to be produced/consumed by agents</li> <li>Penalty for falling short (recycled back)</li> <li>Maybe combined with tradable ROCs and TGCs; serves as a proof of compliance</li> </ul>	<ul style="list-style-type: none"> <li>Financial (G/C)</li> <li>Price (G/C)</li> </ul>	UK, IT, BE, etc...
Investment Grants	<ul style="list-style-type: none"> <li>Provided upfront at start of project</li> <li>Calculated as % of expected RE output [or] total investment cost</li> <li>Reduce cost of investment</li> <li>Stimulate market diffusion of less mature technologies</li> </ul>	<ul style="list-style-type: none"> <li>Investment (G) – low</li> </ul>	Most except DE, ES, IT,...
Fiscal Incentives	<ul style="list-style-type: none"> <li>Tax incentives/ exemptions; tax rebate are most common</li> <li>Complementary to other schemes</li> </ul>		FR, IT, PL, SE, UK, etc...

G: Generator; C: Consumer; SO: System Operator;

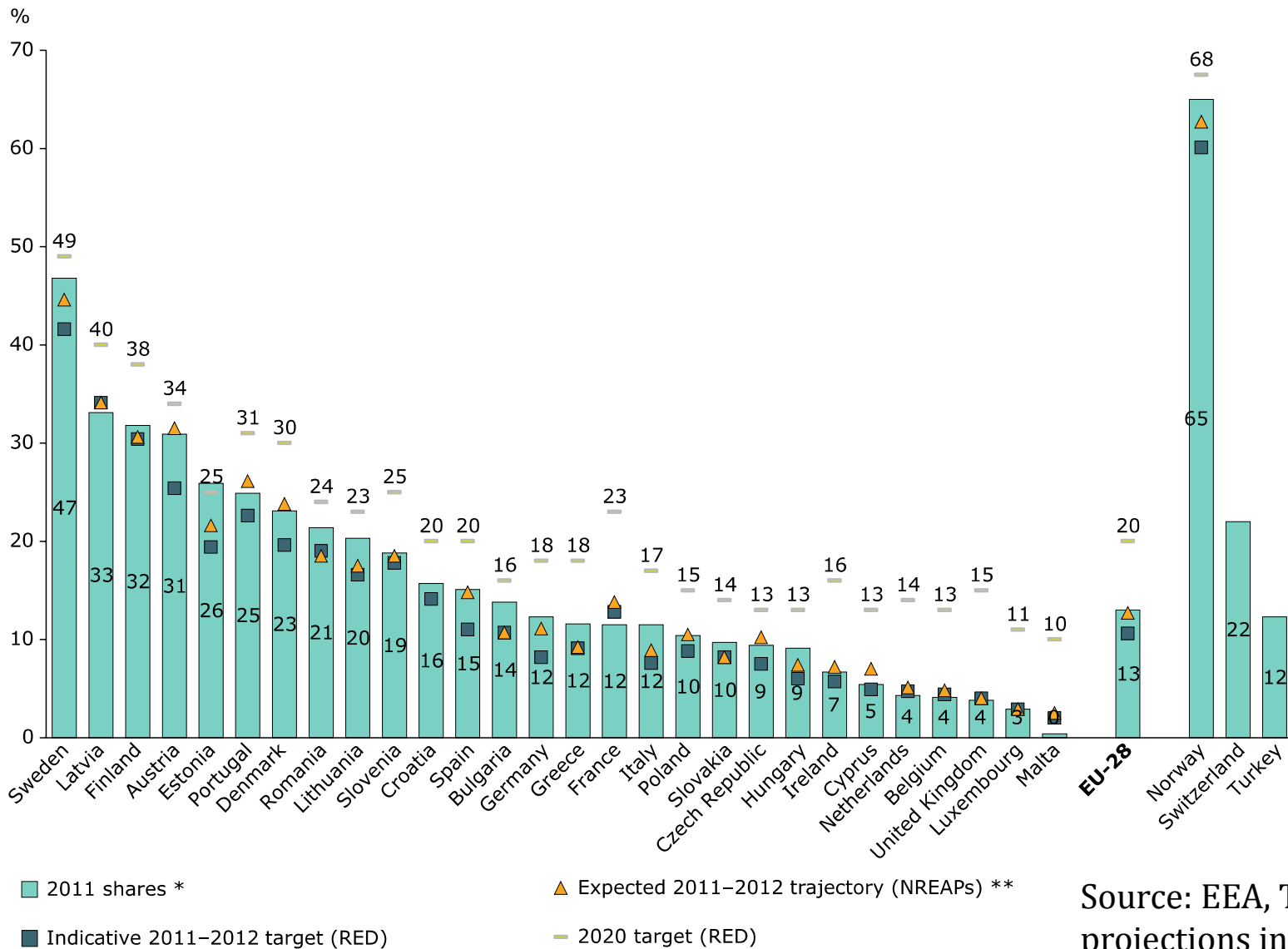
# Overview of Subsidy Regimes in EU

COUNTRY	% share of renewable energy in gross final energy consumption		Progress towards 2020 target	SUPPORT SCHEMES						
	2012	2020 TARGET		FIT	FIP	Investment subsidy/Soft Loans	Quota system	Tax regulation	Tenders	Net metering
EU (28 countries)	14.1	20	n.a.							
EU (27 countries)	:	20	↑							
Belgium	6.8	13	↓			✓	✓	✓		
Bulgaria	16.3	16	↑	✓		✓				
Czech Republic	11.2	13	-	✓	✓	✓				
Denmark	26	30	-							
Germany	12.4	18	↑	✓	✓	✓				
Estonia	25.2	25	↑		✓	✓		✓		
Ireland	7.2	16	-	✓				✓		
Greece	15.1	18	↑	✓		✓				
Spain	14.3	20	↑							
France	13.4	23	↓	✓		✓		✓	✓	
Croatia	16.8	20	n.a.	✓		✓				
Italy	13.5	17	↑	✓	✓		✓	✓	✓	✓
Cyprus	6.8	13	-	✓		✓				
Latvia	35.8	40	↓	✓		✓		✓		

# Overview of Subsidy Regimes in EU

COUNTRY	% share of renewable energy in gross final energy consumption		Progress towards 2020 target	SUPPORT SCHEMES						
	2012	2020 TARGET		FIT	FIP	Investment subsidy/Soft Loans	Quota system	Tax regulation	Tenders	Net metering
Lithuania	21.7	23	↑	✓		✓		✓		✓
Luxembourg	3.1	11	↑	✓		✓				
Hungary	9.6	14.65	↑							
Malta	1.4	10	↓	✓		✓		✓		
Netherlands	4.5	16	↓		✓	✓				✓
Austria	32.1	34	-	✓		✓				
Poland	11	15.48	-			✓	✓	✓	✓	
Portugal	24.6	31	-	✓				✓		
Romania	22.9	24	↑			✓	✓			
Slovenia	20.2	25	↑							
Slovakia	10.4	14	↑							
Finland	34.3	38	↑		✓	✓				
Sweden	51	49	↑			✓	✓	✓	✓	
United Kingdom	4.2	15	↓	✓		✓	✓	✓		
Iceland	:	64	n.a.	✓			✓	✓		
Norway	64.5	67.5	↑				✓			
Switzerland	:	:	n.a.	✓						

# Progress towards 2020 RES targets



Source: EEA, Trends and projections in Europe 2013



# Common Economist Diagnosis

- Move away from renewable targets and subsidies and towards a credible and rising economy-wide carbon price, which would:
  - Encourage demand response via conservation, energy efficiency, technology improvements, building retrofits, etc.
  - Lead to fuel switching to lower carbon fuels (coal to gas).
  - Provide greater assurance of returns for investors in low-carbon technologies (nuclear, CCS, etc) which is essential given the expensive, multi-decade nature of the infrastructure involved.
  - Allow the raft of subsidies on most low-C technologies (wind, biofuels, etc) to be ramped down or removed entirely and allow these technologies to compete with one another
  - Avoid confusing climate policy with other worthy policy objectives such as energy security, competitiveness

**WORLD CUP 2014 »**

GOAL ALERTS FRA 2 vs 0 NGA FINAL GER 4 PM ET TODAY ROUND OF 16 ARG 12 PM ET TOMORROW ROUND OF 16 BEL 4 PM ET TOMORROW ROUND OF 16 USA MORE

BUSINESS

# Spain's Solar-Power Collapse Dims Subsidy Model

Email Print 57 Comments

A A

By ANGEL GONZALEZ and KEITH JOHNSON  
Updated Sept. 8, 2009 12:01 a.m. ET

Spain's hopes of becoming a world leader in solar power have collapsed since the Spanish government slammed the brakes on generous subsidies.

The sudden change has rippled across the global solar industry, in a warning of the problems that government-supported renewable-energy programs can encounter.



A solar power plant in Alvarado. *REUTERS*

In 2008, Spain accounted for half the world's new solar-power installations in terms of wattage, thanks to government subsidies to promote clean energy. But late last year, as the global economic crisis worsened, the government dramatically scaled back those subsidies and capped the amount of subsidized solar power that could be installed.

Factories world-wide that had ramped up production of solar-power components found that demand for solar panels was plummeting, leaving a glut in supply and pushing prices down. Job cuts followed.

"The solar industry in 2009 has been undermined by [a] collapse in demand due to the decision by Spain," says Henning Wicht, a solar-power analyst at research group iSuppli.

Spain is providing important lessons for the U.S., where lawmakers are engaged in a

**Popular Now**

What's This?

ARTICLES


- 1 Furor Erupts Over Facebook Experiment**


- 2 High Court Makes Religious Exception to Health Law**


- 3 The Distraction-Industrial Complex**


- 4 How to Convert a Soccer Hater**


- 5 Sex Video Sheds Light in Glaxo Case**



# Spain Caps Earnings From Renewables in Subsidy Overhaul

By Marc Roca | Jun 6, 2014 4:48 PM GMT+0100 | 0 Comments Email Print

**Spain** approved a clean energy bill that introduces an entirely new subsidy system that will cap the earnings of all existing renewable power plants.

Under the decree, generators will earn a rate of return of about 7.5 percent over their lifetimes, the industry ministry said in a statement today. This rate, which may be revised every three years, is based on the average interest of a 10-year sovereign bond plus 3 percentage points.

The bill is Spain's latest move to contain the mounting cost of subsidies for clean energy plants, which generate almost a third of the country's electricity. The measures are part of a wide-ranging power reform first announced in July, which aims to eliminate the growing gap between the system's revenue and costs.

"The measures have three main objectives: grant stability to the system, guarantee reasonable returns on investment and provide certainty to the industry," Industry Minister Jose Manuel Soria said in a press conference in **Madrid** today. Renewable energy subsidies had to be revised or the power system would have gone bankrupt, he said.

Soria said Spain has already paid about 56 billion euros (\$76.5 billion) to clean energy generators since 1998 and will pay another 142 billion euros over their lifetimes. The subsidies, including those for co-generation, totaled 9 billion euros last year.

## Retroactive Measures

The retroactive measures have entered the renewable **energy industry**, which says the government

Save +  
Facebook  
Twitter  
Google+  
LinkedIn

Get the Bloomberg Washington Newsletter. Learn more

SIGN UP >

### HEADLINES

Popular Latest Recommended

Based on your reading history you may like

**Climate-Change Proposal in U.S. Poses Pascal's Wager: Economy**

**Carbon Has Best Quarter in Six Years Amid EU Permit-Supply Curbs**

**Vestas Wins 450 Megawatts of U.S. Wind-Turbine Orders**

**Slowing China Economy Dims Profit Outlook to 2012 Low**

**GE Said Near Brazil Wind-Turbine Deals for \$604 Million**

**Russian Advisers Ready Iraq to Use New Combat Aircraft**

**Bloomberg Businessweek**

What Happens When the Amish Get Rich

Facebook's Emotional Manipulation Test



HOME > SOLAR > ITALY CLAWS BACK SOLAR SUBSIDIES

## Italy claws back solar subsidies



25/06/2014

The Italian government has introduced a decree that would decrease the feed-in tariff guaranteed to existing solar photovoltaic plants with nominal capacity of more than 200kW.

The decree forms part of the Italian government's efforts to reduce electricity costs and has entered into force with its execution by the Italian President.

However, it is subject to the approval of the Italian parliament within a period of 60 days.

Under the terms of the decree, operators of existing PV plants that received a guaranteed 20-

[Bio](#) >

[Comment](#) >

[Company News](#) >

[Geo, fuels & others](#) >

[Grid](#) >

[Hydro](#) >

[Offshore Wind](#) >

[Onshore Wind](#) >

[Politics](#) >

[Medium Wind](#) >

[Solar](#) v

[Good Energy files 15MW solar](#)

[Lightsource wins Co Antrim nod](#)

[SunEdison fills Chile PV coffers](#)

# BloombergBusinessweek

## News From Bloomberg

f Like 568k

t Follow @BW

- Global Economics
- Companies & Industries
- Politics & Policy
- Technology
- Markets & Finance
- Innovation & Design
- Lifestyle
- Business Schools
- Small Business
- Video & Multimedia

Bloomberg News

# German Lawmakers Vote to Reduce Renewable-Energy Subsidies

By Stefan Nicola | June 27, 2014

German lawmakers backed an extensive revision of the country's EEG clean-energy law to curb subsidies and slow gains in power prices that are the second-costliest in the European Union.

The legislation, which introduces limits on how much onshore wind and biomass capacity qualifies for the full subsidies and lowers existing targets for solar and offshore wind, pulls energy policy "out of the quicksand," Economy Minister Sigmar Gabriel told reporters after the vote in the lower house. "We have to expand renewables with more planning security."

Chancellor Angela Merkel is seeking to curb subsidies in Europe's biggest renewables market even as she pushes through an "energy switch" from nuclear power. Her plan would see all the country's reactors shut by 2022 and the share of renewables rise to at least 80 percent by 2050, from about a quarter now. "Excessive" power-price gains are making the expansion of renewables unsustainable, Gabriel said earlier today.

**STORY: Is Renewable Energy Ready for Takeoff?**

### Most Popular

Feed

- Read
- Shared
- Discussed

- What Happens When the Amish Get Rich
- Facebook's Emotional Manipulation Test Was Unethical—and So Is the Rest of Social Media
- How an MBA Could Have Saved Snapchat's Founder From Himself
- Two Older Planes That Airlines Won't Let Fade Away
- British Airways Creates a 'Happiness Blanket' to Help First-Class Fliers Sleep Better


Subscribe to our *daily* Newsletter [Sample copy](#)

## BloombergBusinessweek


**LinkedIn's Hoffman Reveals Secret to Finding Talent**



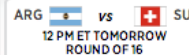
**The Risks of Regulating Disruptive Tech**



**Court Rejects Google on Street View Privacy Suit**



## WORLD CUP 2014 »



## EUROPE NEWS

## Germany Defies EU on Energy Policy

Minister Accuses Brussels of Trying to 'Destroy' German Industry

Email Print 5 Comments



By ANDREA THOMAS And JAN HROMADKO

June 27, 2014 10:14 a.m. ET

BERLIN—Germany threw down the gauntlet at the European Commission on Friday when Parliament adopted new legislation to promote renewable energy that Brussels claims breaches European law.

The vote came after a defiant speech by German Economics Minister Sigmar Gabriel, who on Thursday accused the European Union's executive arm of working "to destroy" both Germany's ambitious renewable-energy push and the country's energy-hungry industry.

With the bill, Berlin is seeking to mitigate the side-effects of its flagship project to replace nuclear power with renewables over the next eight years and most fossil fuels by midcentury. The "energy transformation," as the policy is known here, has seen green-power production rocket but resulted in [steep price rises for consumers and many businesses](#).

The new law trims the subsidies for new green power plants, which range from vast wind farms to small solar panels installed on private roofs. It also spreads the power-price surcharge that has funded these subsidies more equally among businesses. Many companies had previously been exempted because they operate in energy-hungry industries or decided to build their own power plants.

## Popular Now

What's This?

## ARTICLES

## 1 Furor Erupts Over Facebook Experiment



## 2 High Court Makes Religious Exception to Health Law



## 3 The Distraction-Industrial Complex



## 4 How to Convert a Soccer Hater



## 5 Sex Video Sheds



### Business



## Europe's Green Energy Industry Faces Collapse As Subsidies Are Cut

1:13 PM 06/24/2014

223 
 62 
 Share

**Michael Bastasch**

[See All Articles](#)  
[Email Michael Bastasch](#)  
[Subscribe to RSS](#)

European countries are cutting back their solar subsidies to rein in energy costs and cut debt. The solar industry in Germany, Italy and Spain are all facing huge problems due to subsidy cuts and power rate hikes.

#### Germany plans to tax solar generation

The German solar demand is in freefall with only 818 megawatts of photovoltaic (PV) solar panels in the first five months of this year, a 45 percent drop from last year. This comes after a 60 percent decline in PV solar demand between 2012 and 2013.

Solar power [set record levels of energy generation](#) in June, but more is needed to meet Germany's goal of getting at least 55 percent of its power from green energy sources by 2035. Even as the solar industry touts record generation levels, falling demand amid

### Register for Emails

Email Address

[Terms of Use](#)

### Join TheDC On Facebook

Like 365,925 people like this.

### Videos

Drone-Hunting Lasers Coming Soon to U.S. Navy Ship

# Germany must scrap its green energy law, say experts

BY MADELINE CHAMBERS

BERLIN Wed Feb 26, 2014 9:12am EST

0 COMMENTS |  Tweet 30 |  Share  Share this  8+1 |  Email  Print

## RELATED TOPICS

[Energy »](#)

[Industrials »](#)

Feb 26 (Reuters) - A commission of experts appointed by the German parliament has recommended Chancellor Angela Merkel's government to abolish all subsidies for green energy, highlighting mounting opposition to plans to reform instead of scrap the system.

Economy and Energy Minister Sigmar Gabriel is finalising much-disputed changes to the Renewable Energy Law (EEG) which includes reductions in subsidies for green energy before he presents it to cabinet in early April.

Shifting Europe's biggest economy to energy from the sun and wind and away from nuclear and fossil fuels is a top priority of Merkel's new right-left coalition government.

But the project, which offers some 20 billion euros in green subsidies a year and is paid for by electricity users, has been dogged by the competing interests of industry, a booming green sector and the country's 16 federal states.

The Commission for Research and Innovation (EFI) handed its report to Merkel on Wednesday.

It concluded that the system of feed-in-tariffs, under which green power producers are paid guaranteed, above-market prices to put electricity on the grid, is fundamentally flawed.

It is not a cost-efficient instrument for climate protection and is not producing a measurable effect on innovation, said the report, basing its view on patent filings.

"For both these reasons, there is no justification for a continuation of the EEG," the report said.

The report is unlikely to have much impact on policy.

## MOST POPULAR

- 1 Fear, cash shortages hinder fight against Ebola outbreak
- 2 Goldman says client data leaked, wants Google to delete email
- 3 Asian stocks tread water ahead of U.S. jobs data
- 4 U.S. increases security at overseas airports amid bomb concerns
- 5 California couple accused of keeping autistic boy in cage

## Follow Reuters



Facebook



Twitter



RSS



YouTube



# ZDF "Heute Show" on the Energiewende



A total of 21.8 billion euros for power which ...

2:01 / 6:14

German TV show mocks green policies of grand coalition

climategaten1 - 18 videos

33,089

Subscribe 43

Share with Hookbot

111 2

Like About Share Add to

Published on Apr 20, 2014

Oliver Welke's Heute Show on ZDF national TV in Germany with guest roles for Albrecht Humboldt and Tina Hausten give a great show which sadly is all too truthfull...

Show more

ALL COMMENTS (32)

REWIND - Cancelled TV show pilot - Time Travel Sci-fi/Action (Promo)  
by Italianoboy UK  
759,941 views  
1:18:02

Mock the week too hot for tv 2 extras  
MockWeek  
by MockTheWeekWeeK  
1,094 views  
42:33

Lions Don't Attack This Man - Amazing Lion Ranger Kevin  
by Wildlife Documentary  
245,328 views  
48:05

heute-show vom 02.05.2014  
by Zornesroste  
33,492 views  
58:05

<https://www.youtube.com/watch?v=-e2U2cYcPro>



on the market had a value of only 2 billion. That's sick!

2:03 / 6:14





### German TV show mocks green policies of grand coalition

 climategaten1 · 18 videos 33,089  
Subscribe 43 Share with Hooklet 111 2

Like About Share Add to

Published on Apr 20, 2014  
 Oliver Welke's Heute Show on ZDF national TV in Germany with guest roles for Albrecht Humboldt and Tina Hausten give a great show which sadly is all too truthfull...

ALL COMMENTS (32)

- 
**REWIND - Cancelled TV show pilot - Time Travel Sci-fi/Action (Promo)**  
 by Italianoboy UK  
 759,941 views
- 
**Mock the week too hot for tv 2 extras MockWeek**  
 by MockTheWeekWeeK  
 1,094 views
- 
**Lions Don't Attack This Man - Amazing Lion Ranger Kevin**  
 by Wildlife Documentary  
 245,328 views
- 
**heute-show vom 02.05.2014**  
 by Zornesroste  
 33,492 views



2:29 / 6:14

### German TV show mocks green policies of grand coalition

climategaten1 - 18 videos

33,089

Subscribe 43

Share with Hooklet

111 2

Like, About, Share, Add to

Published on Apr 20, 2014  
Oliver Welke's Heute Show on ZDF national TV in Germany with guest roles for Albrecht Humboldt and Tina Hausten give a great show which sadly is all too truthfull...

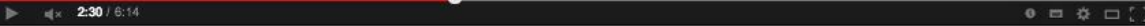
Show more

ALL COMMENTS (32)

- REWIND - Cancelled TV show pilot - Time Travel Sci-fi/Action (Promo)**  
by Italianoboy UK  
759,941 views  
1:18:02
- Mock the week too hot for tv 2 extras MockWeek**  
by MockTheWeekWeeK  
1,094 views  
42:33
- Lions Don't Attack This Man - Amazing Lion Ranger Kevin**  
by Wildlife Documentary  
245,328 views  
48:05
- heute-show vom 02.05.2014**  
by Zornesroste  
33,492 views  
36:05



now that we have no rational explanation for it?



### German TV show mocks green policies of grand coalition

climategatenl · 18 videos

33,089

Like, Dislike, Share, Add to, Playlist, Watch later icons

Published on Apr 20, 2014  
Oliver Welke's Heute Show on ZDF national TV in Germany with guest roles for Albrecht Humboldt and Tina Hausten give a great show which sadly is all too truthfull...

Show more

ALL COMMENTS (32)

- REWIND - Cancelled TV show pilot - Time Travel Sci-fi/Action (Promo)**  
by Italianoboy UK  
759,941 views
- Mock the week too hot for tv 2 extras MockWeek**  
by MockTheWeekWeeK  
1,094 views
- Lions Don't Attack This Man - Amazing Lion Ranger Kevin**  
by Wildlife Documentary  
245,328 views
- heute-show vom 02.05.2014**  
by Zarnasrosta  
33,492 views

# Policy Framework for Climate & Energy 2020-30

---

- Commission Proposal (22 Jan 2014):
  - 40% reduction in GHG emissions (from 1990)
  - EU-wide renewable target of 27% with no enforced national level targets
  - No efficiency target at the moment
- European Parliament (5 Feb 2014) calls EC proposal ‘short-sighted & unambitious’:
  - 40% reduction in GHG emissions
  - at least 30% renewable energy
  - and a 40% target for energy efficiency
- To be finalised no later than Oct 2014

# 2014-2020 State Aid E&E Guidelines

---

- Contribute to a well-defined objective of common interest
- Needed to remedy a well-defined market failure
- Appropriate to address the objective of common interest
- Incentivises market players to behave differently from how they would otherwise
- Proportionate
- Transparent
- Avoids major negative effects on competition

Adopted 9 April 2014, came into force on 1 July 2014

# State Aid Guidelines on RES-E

---

- New aid for RES-E should be granted as premium in addition to market price, or via certificate-based system with a price determined by market.
- From 2017, aid should be granted through competitive bidding process where all RES generators can participate.
- **No technology neutrality:** Member States can organise technology specific tenders under certain conditions.
- Aid scheme can be authorised for maximum ten years, after which it should be re-notified.

# Other specific state aid guidelines

---

- No more investment aid for food-based biofuels, except for conversion. All aid to end by 2020.
- Energy efficiency
- Resource efficiency – waste management
- CCS
- Interconnections and cross-border networks
- Generation adequacy
- Tradeable permit schemes (same as 2008)
- *Nuclear power not included*



# Country selection for case studies

---

## **METHODOLOGY:**

- Based on a decision criteria designed to represent diversity in energy policies within EU member states
- Factors considered in the selection process were:
  - Trends in renewable energy, energy efficiency support
  - Share of RES in electricity mix
  - Progress towards 2020 targets
  - GDP
  - Energy market and technology-specific drivers (RECAI)
- 4 country dyads + Germany → 9 countries

# Country selection for case studies

---

## **RECAI – Renewable Energy Country Attractive Index**

- EY indicators that rank countries on renewable policy and investment climate
- Points based system with weighted average of several factors
- Based on 3 key drivers – macro, energy market, technology-specific
- Relevant indicators:
  - Prioritization of RE
  - Bankability of RE
  - Project attractiveness

# Country selection for case studies

	COUNTRY	CLIMATE CHANGE	RENEWABLE ENERGY					ENERGY EFFICIENCY				TOTAL ENERGY MIX							
		GHG reductions target (1990 levels)	% RES in Energy mix by 2020	Subsidy	FiTs/FIP	Fiscal	Quota	Grants	EE Target for 2016 (*2020)	Subsidy	Fiscal	Grants	Oil	Natural Gas	Coal	Nuclear Energy	Hydro electric	RES	TPEC (MT Oil-eq)
WESTERN COUNTRIES	UK	34%	15%	-	↑	-	↑	↑	20%*	-	-	↑	33.63%	34.61%	19.21%	7.83%	0.58%	4.14%	203.6
	Germany	40%	35%	↓	↑	-	-	↑	9%	-	-	↑	35.77%	21.72%	25.41%	7.22%	1.54%	8.34%	311.7
	Netherlands	30%	20%	↓	↑	↑	-	-	18%	-	↑	↑	49.55%	36.82%	9.51%	1.00%	0.03%	3.09%	89.1
	Spain	10%	20%	↓	↓	↑	-	↑	9%	↑	↑	-	44.06%	19.50%	13.33%	9.59%	3.20%	10.31%	144.8
	Italy	13%	38%	-	↓	↑	↑	-	9.60%	-	↑	↑	39.50%	38.04%	9.97%	0.00%	5.77%	6.71%	162.5
	France	14%	23%	-	↑	↑	-	↑	9%	-	↑	↑	32.97%	15.58%	4.65%	39.22%	5.37%	2.21%	245.4
SCANDINAVIA	Sweden	40%	50+%	↑	-	-	-	↑	9%	-	↑	↑	26.07%	1.87%	2.76%	27.62%	33.67%	8.01%	52.9
	Denmark	20%	33%	↑	↑	↑	↑	↑	20%*	↑	↑	↑	44.84%	20.69%	14.60%	0.00%	0.02%	19.85%	17.0
	Norway	30%	67.50%	↑	-	↑	↑	↑	20%	↑	↑	↑	22.42%	8.05%	1.37%	0.00%	67.18%	0.97%	48.1
	Finland	20%	38%	↓	↑	↑	↑	↑	9%	↑	↑	-	34.43%	10.48%	10.92%	19.88%	14.33%	9.96%	26.4
CENTRAL & EASTERN EUROPE	Slovak Republic	13%	14%	↓	↑	-	↑	-	9%	-	-	↑	20.90%	31.82%	18.98%	20.71%	5.86%	1.72%	16.9
	Czech Republic	20%	13%	↑	↑	↑	↑	↑	9%	↑	-	↑	21.65%	17.57%	39.66%	16.36%	1.64%	3.12%	41.9
	Poland	14%	15%	↑	↑	-	↑	↑	9%	-	↑	↑	25.75%	15.28%	55.29%	0.00%	0.47%	3.21%	97.6
	Hungary	10%	13%	-	↑	↓	↑	↑	9%	↑	-	↑	27.18%	40.04%	13.55%	16.31%	0.22%	2.70%	21.9

# Country selection for case studies

	COUNTRY	GDP (Millions of USD)	% of RES in Electricity Mix	ENERGY MARKET DRIVERS		TECHNOLOGY-SPECIFIC DRIVERS		
				Prioritization of RES	Bankability of RES	Wind*	Solar*	Others
WESTERN COUNTRIES	UK	2,476,665	10.60%	61.9	69.5	58.5	42.1	35
	Germany	3,429,519	22.11%	74	73.3	58.8	58.4	43.4
	Netherlands	770,867	13.13%	64.5	61.3	43.6	31.5	27.2
	Spain	1,323,500	31.43%	56.7	67	33.3	43.7	20.6
	Italy	2,014,078	30.25%	68.4	64.2	36.4	47	41.5
	France	2,613,936	12.54%	56	63.3	49.4	47.8	39.7
SCANDINAVIA	Sweden	523,804	56.22%	64.3	63.9	44.6	20.2	37.5
	Denmark	314,889	43.52%	62.5	60.5	46.6	29	27.9
	Norway	499,633	96.98%	49.4	58.9	42.9	12.8	36.7
	Finland	247,646	33.30%	61.8	59.5	42.7	10.1	28
CENTRAL & EASTERN EUROPE	Slovak Republic	91,915	17.86%	N/A	N/A	N/A	N/A	N/A
	Czech Republic	195,657	8.92%	58.2	47.6	24.4	28.7	23.6
	Poland	489,795	8.41%	62.8	55.6	39.2	24.3	29.2
	Hungary	125,660	8.05%	N/A	N/A	N/A	N/A	N/A

# Country selection for case studies

COUNTRY/ COUNTRY PAIRS	DECISION CRITERIA			
	RES Support	RES in Energy Mix	RES in electricity mix	GDP
<i>UK/France</i>	Green	Red	Orange	Green
<i>Italy/Spain</i>	Red	Orange	Green	Green
<i>Germany</i>	Orange	Orange	Orange	Green
<i>Sweden/Finland</i>	Orange	Green	Green	Orange
<i>Czech Republic/ Poland</i>	Green	Red	Red	Orange

Green: High

Orange: Medium

Red: Low

# Choice of countries for comparison

---

- **United Kingdom:**
  - Offers insight into problems faced by liberalized electricity markets (forerunner in reform, 2001) in meeting climate change targets
  - Most explicit reform of electricity market to date to meet the requirements of TEM
- **Germany:**
  - Very successful with on-shore wind in terms of installed capacity and investment
  - Similar wind potential and population density to UK, facilitates comparison in terms of cost-effectiveness of support schemes

# UK Electricity Market Reform

- As a part of reforms to meet requirements for the 3<sup>rd</sup> Energy Package and TEM
- Carried out in 4 stages until after 2020s
- Need to support a larger share of renewables in electricity
- Energy Act 2013 → policies to meet climate change targets
  - Carbon Price Support (CPS)
  - ***Contracts for Difference (CfD)***
  - Emissions Performance Standard (EPS)
  - Capacity Market

# UK Electricity Market Reform

---

## Key features:

- ROC bands were reformed (e.g., onshore wind reduced from 1 ROC/MWh to 0.9 ROC/MWh irrespective of wind levels)
- CfD strike prices were set at generous rates in comparison to WACC so as to discourage ROCs (phased out by 2017)
- CPF capped at £18/ton from 2016-17 until 2019-20
- Strike prices to be reduced after 2017

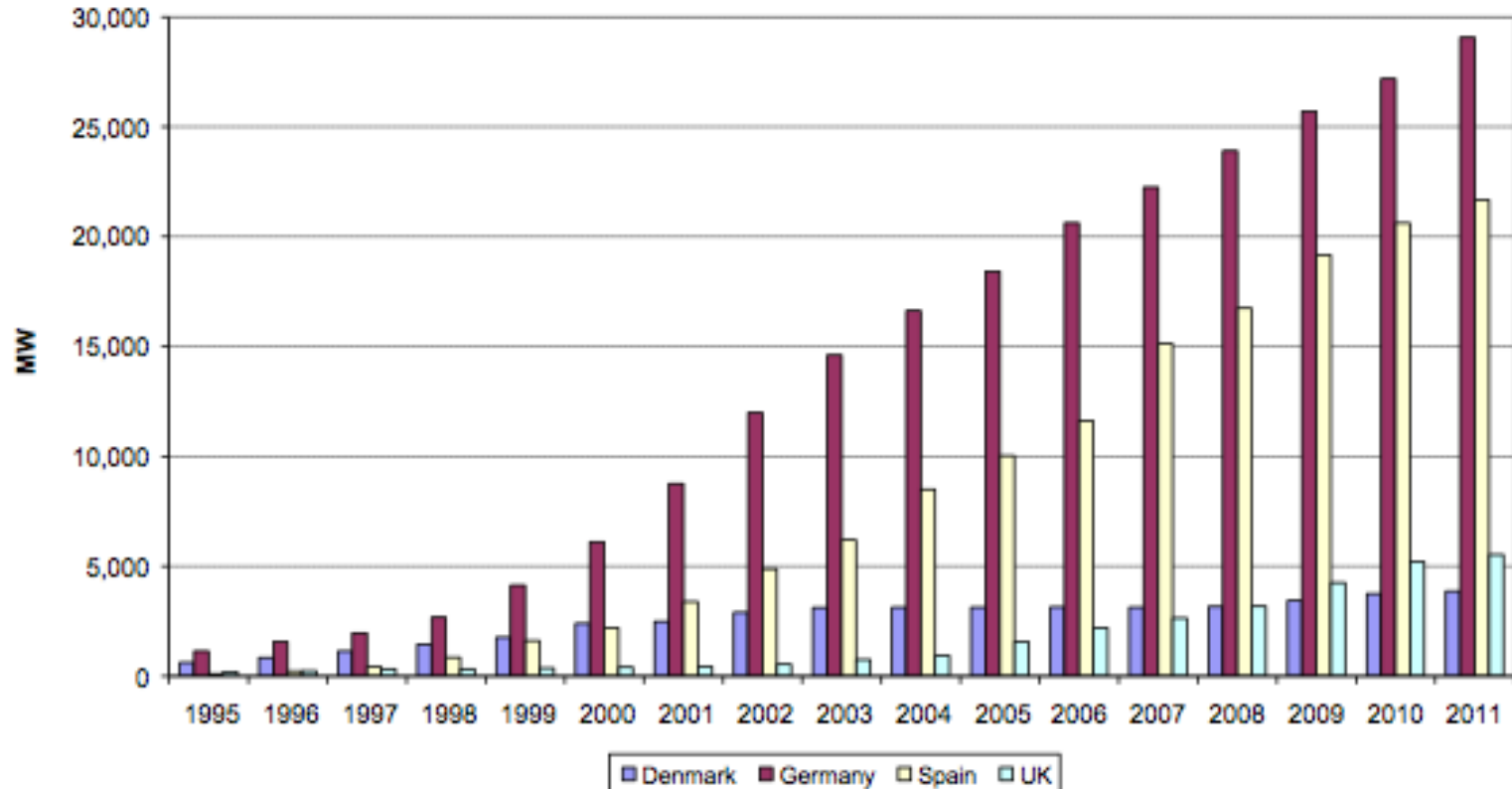


# FiTs in Germany

- Successful in achieving high rates of onshore wind investment in Germany than UK
- Rapid growth primarily due to higher earlier FiTs with degression at 1% p.a.
- Despite, UK having favorable wind resource than Germany and similar population density
- German FiT for on-shore wind (2015) ~ £74.1/MWh
  - First 5 years for windy locations and
  - 20 years for less windy locations
  - Subsequent rates are £40.5/MWh

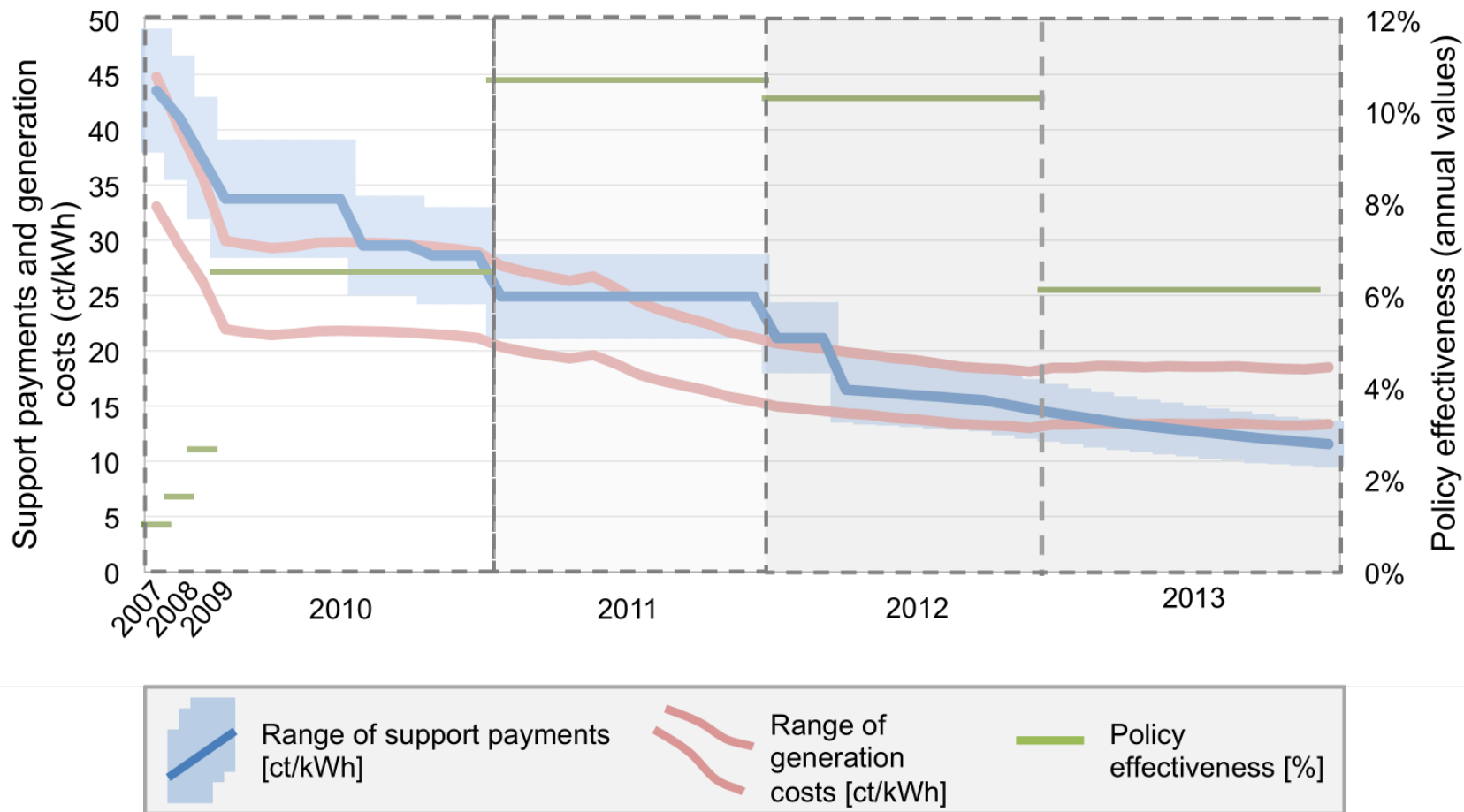
# FiTs in Germany

Installed wind capacity in MW



*Installed capacity of UK in 2011  $\approx$  Germany in 2000*

# FiTs for PV in Germany



Source: DIACORE Policy Brief, June 2014

# FiTs in Germany

- German support system has been more cost-effective:
  - FiT not indexed to price level unlike GB CfD
  - Wind farms effectively subsidized only for first 5 years
  - CfD for GB: £90/MWh; index eq. in Germany: £49-65/MWh (net of transmission charges)
  - **Germany:** Extracts infra-marginal rent from windier sites by making contract length depend on first 3 years' output
  - **UK:** All wind farms have same length of contract at same strike price or ROC (passed on as additional cost to consumers as developer extracts rent)

# Greater Use of Auctions

---

- *Guidelines* advocate auctions as least cost way of supporting RES-E; stresses need for auctions to be transparent
- Competition and clarity in what is being auctioned could reduce WACC
- Multi-dimensional auctions where bidders specify a range of different packages of characteristics would be compatible with new guidelines
- Work is needed in designing suitable auctions that could achieve the desired outcomes

# Tensions between Research and Deployment

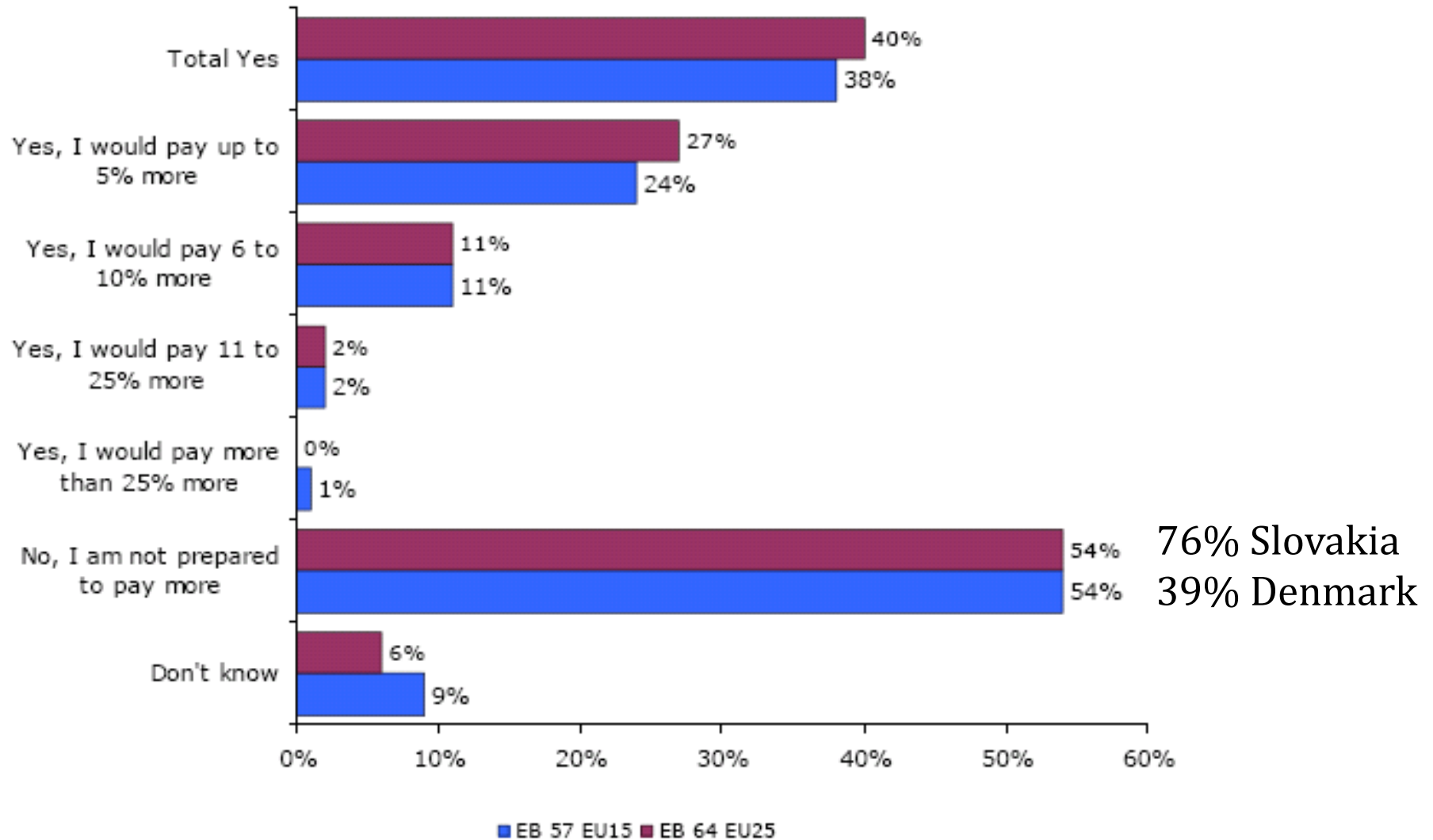
---

- MSs provide massive subsidies for deployment whereas SET plan call for trebling R&D has seen little tangible support
- UK caps subsidies at £7.5 billion/year
- Deployment support for different RE technologies counteract cost minimization objective
- How to reform overall RES Research, Development, Demonstration and Deployment (RDD&D) support?
  - One option would be to replace RES target with equivalent financial target -> focus would move to the overall cost of meeting RES target + extra low-carbon R&D

# Closing Questions

- Will the emergent 2030 regime offer greater certainty needed for investment in low-C generation and a lower cost approach to emissions reductions?
- What lessons can be learned from experience with subsidy regimes across EU member states? Implications of subsidy withdrawal?
- How will new state aid guidelines be implemented and affect technology choice?
- Will we see greater use of multi-dimensional auctions?
- Can RES subsidies move towards a common regime with low-carbon R&D?
- How to explain resilience of subsidy regimes?
  - Renewable lobby? Public opinion? Veto players?

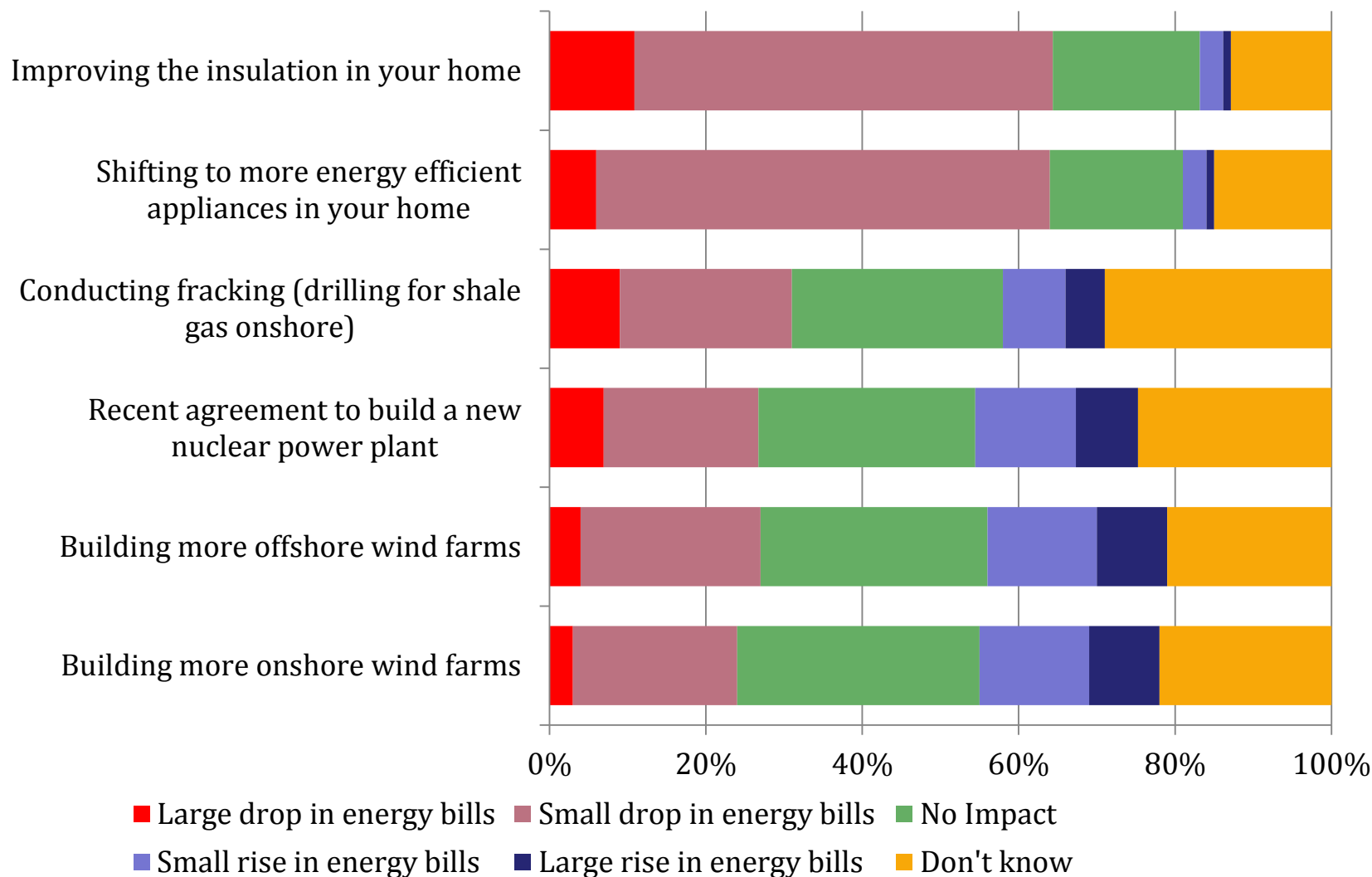
# WTP for Renewables



Source: Eurobarometer 57 and 64 (2005/6)



# What impact do you believe the following will have on your future energy bills?



Source: Cambridge-YouGov Survey, 29-30 Jan, 2014, n= 1942

