

Towards a Zero Subsidy World?

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

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

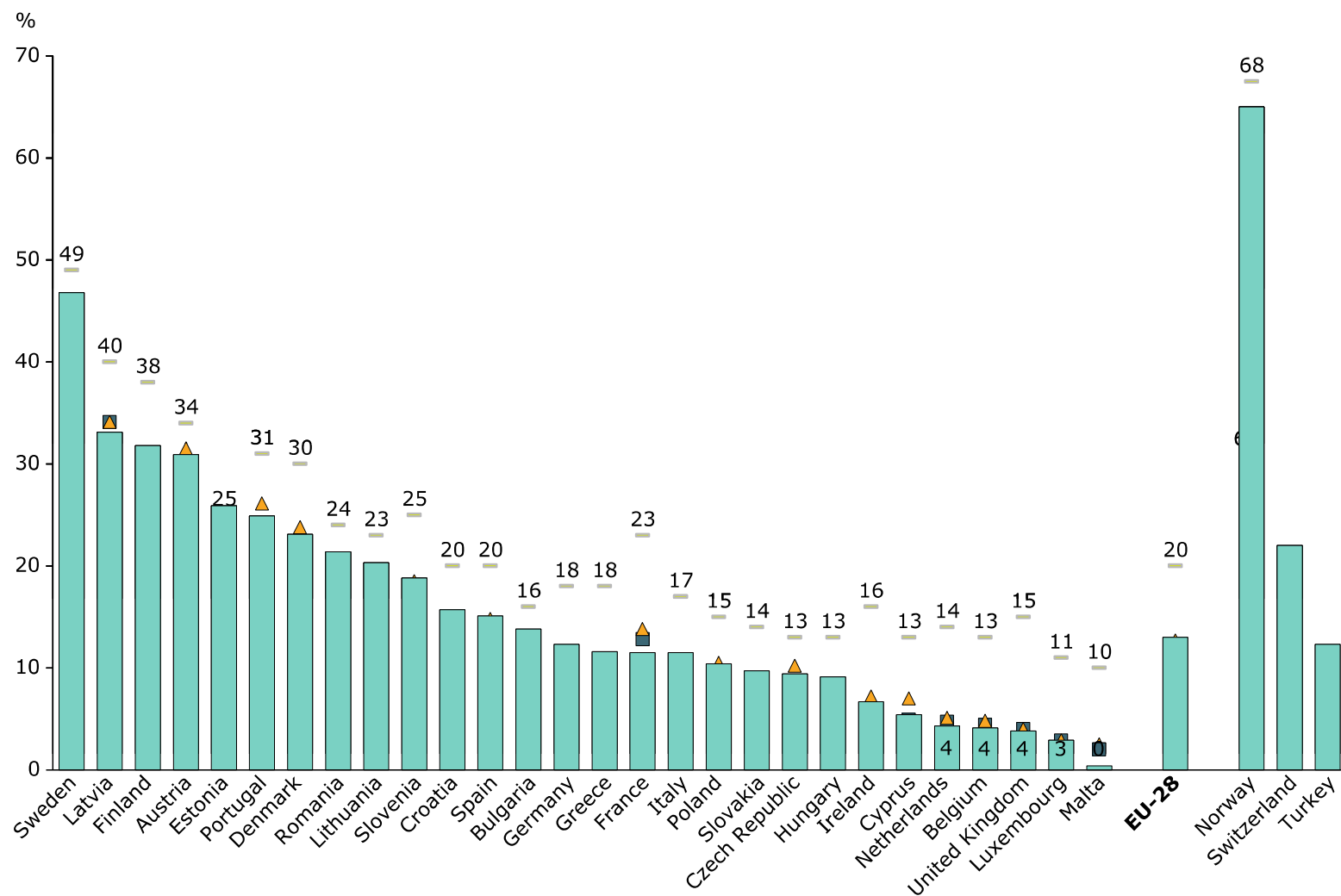
Overview of Subsidy Regimes in EU

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



■ 2011 shares *

■ Indicative 2011-2012 target (RED)

▲ Expected 2011-2012 trajectory (NREAPs) **

— 2020 target (RED)

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

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BUSINESS

Spain's Solar-Power Collapse Dims Subsidy Model

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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

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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 angered the renewable **energy industry**, which says the government

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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-

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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?

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Germany Defies EU on Energy Policy

Minister Accuses Brussels of Trying to 'Destroy' German Industry

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A A

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.

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Business



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

1:13 PM 06/24/2014



Michael Bastasch

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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

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Germany must scrap its green energy law, say experts

BY MADELINE CHAMBERS

BERLIN Wed Feb 26, 2014 9:12am EST

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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.

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

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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

Region	Country	Climate Change	Renewable Energy					Energy Efficiency				Total Energy Mix							
			Wind	Solar	Hydro	Geothermal	Bio	Buildings	Industry	Transport	Power	Coal	Natural Gas	Oil	Nuclear	Hydro	Wind	Solar	
WESTERN COUNTRIES	UK	34%	13%	-	↑	-	↑	↑	20%	-	-	↑	2000%	2000%	2000%	200%	0.36%	4.34%	20.1
	Germany	40%	33%	↓	↑	-	-	↑	9%	-	-	↑	2000%	2000%	2000%	200%	1.54%	8.34%	20.7
	France	30%	20%	↓	↑	↑	-	-	38%	-	↑	↑	4000%	4000%	4000%	400%	0.08%	3.09%	20.1
	Spain	10%	20%	↓	↓	↑	-	↑	9%	↑	↑	-	4000%	2000%	2000%	200%	3.20%	10.31%	20.0
	Italy	13%	38%	-	↓	↑	↑	-	2.60%	-	↑	↑	3000%	3000%	3000%	300%	5.77%	6.71%	20.5
	Sweden	14%	23%	-	↑	↑	-	↑	9%	-	↑	↑	3000%	1500%	400%	3000%	5.37%	2.21%	20.4
SOUTH AMERICA	Brazil	40%	50+%	↑	-	-	-	↑	9%	-	↑	↑	2000%	100%	200%	2000%	33.67%	8.01%	20.0
	Colombia	20%	33%	↑	↑	↑	↑	↑	20%	↑	↑	↑	4000%	2000%	1400%	200%	0.02%	19.85%	17.0
	Peru	30%	67.50%	↑	-	↑	↑	↑	20%	↑	↑	↑	2000%	200%	100%	200%	67.18%	0.97%	20.1
	Venezuela	20%	38%	↓	↑	↑	↑	↑	9%	↑	↑	-	2000%	2000%	2000%	2000%	14.33%	9.06%	20.4
CENTRAL & EASTERN EUROPE	Poland	13%	1%	↓	↑	-	↑	-	9%	-	-	↑	2000%	200%	2000%	200%	5.86%	1.72%	20.0
	Czechia	70%	13%	↑	↑	↑	↑	↑	9%	↑	-	↑	2000%	1000%	2000%	2000%	1.60%	3.17%	20.0
	Hungary	14%	13%	↑	↑	-	↑	↑	9%	-	↑	↑	2000%	2000%	2000%	2000%	0.4%	3.21%	20.0
	Romania	10%	13%	-	↑	↓	↑	↑	9%	↑	↑	↑	2000%	4000%	2000%	2000%	0.22%	2.70%	20.0

Country selection for case studies

	COUNTRY	GDP (Millions of USD)	% of RES in Electricity Mix	ENERGY MARKET DRIVERS		TECHNOLOGY-SPECIFIC DRIVERS		
				Prioritization of RES	Variability of RES	Wind*	Solar*	Others
WESTERN COUNTRIES	UK	2,476,665	10.60%	61.9	69.5	58.5	42.1	25
	Germany	3,429,519	22.11%	74	72.3	58.8	58.4	43.4
	Netherlands	770,867	13.13%	64.5	61.3	43.8	31.5	27.2
	Spain	1,323,500	31.43%	58.7	67	33.3	42.7	20.6
	Italy	2,014,078	30.25%	68.4	64.2	35.4	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	44.8	20.2	37.5
	Denmark	314,889	43.52%	62.5	60.5	45.8	29	27.9
	Norway	499,633	96.98%	49.4	58.9	42.9	12.8	35.7
	Finland	247,646	33.30%	61.8	59.5	42.7	30.1	28
CENTRAL & EASTERN EUROPE	Poland	91,915	17.86%	N/A	N/A	N/A	N/A	N/A
	Czechia	195,657	8.92%	58.2	47.8	34.4	28.7	23.6
	Slovakia	489,795	8.41%	62.8	51.6	29.2	24.9	29.2
	Hungary	175,660	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 3rd 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:

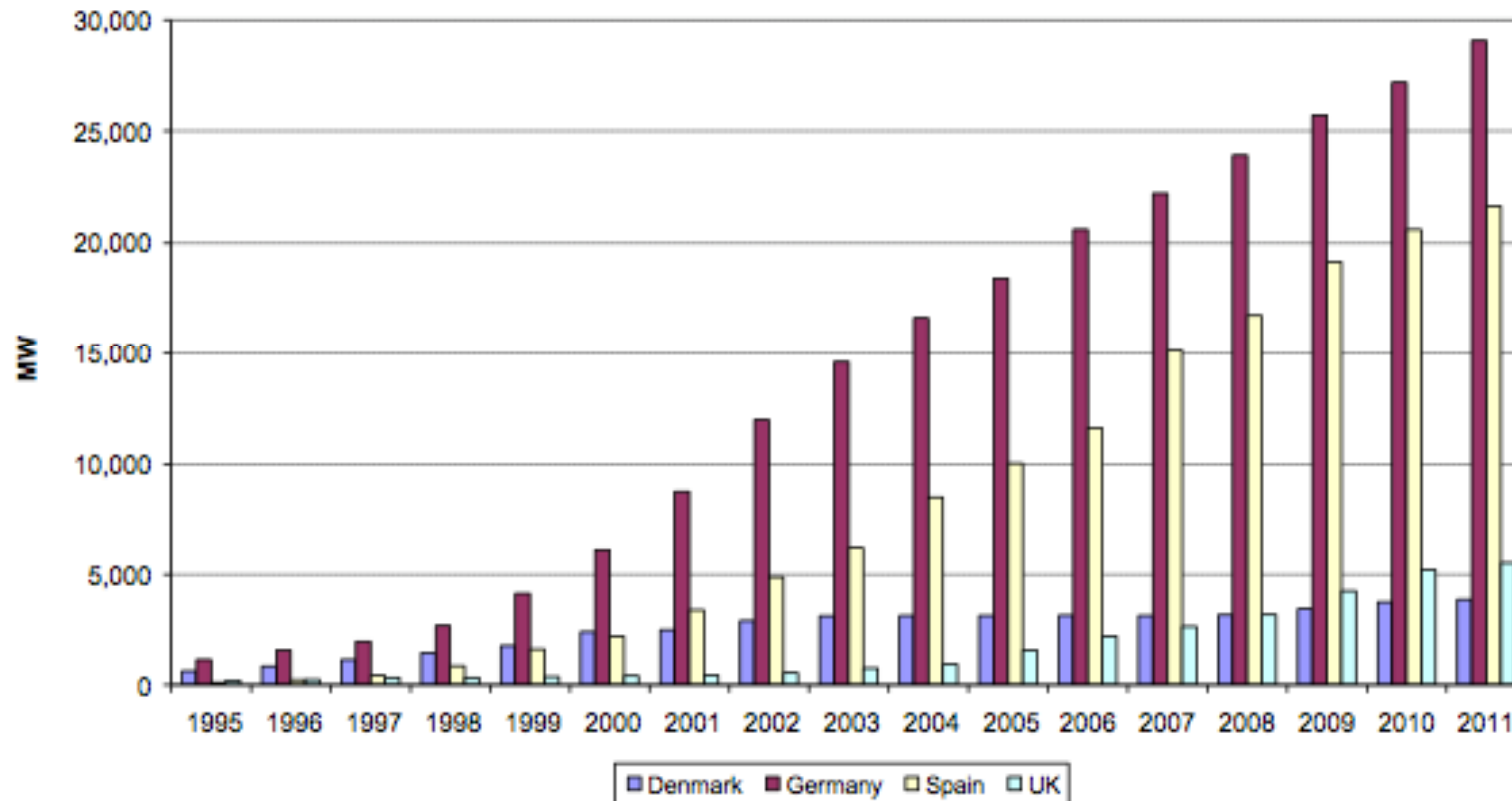
- ROC bands were reformed (e.g., onshore wind reduced from 1 ROC/MWh to 0.9 ROC/MWh irrespective of wind levels)
- CfD strike prices were set at generous rates in comparison to WACC so as to discourage ROCs (phased out by 2017)
- CPF capped at £18/ton from 2016-17 until 2019-20
- Strike prices to be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

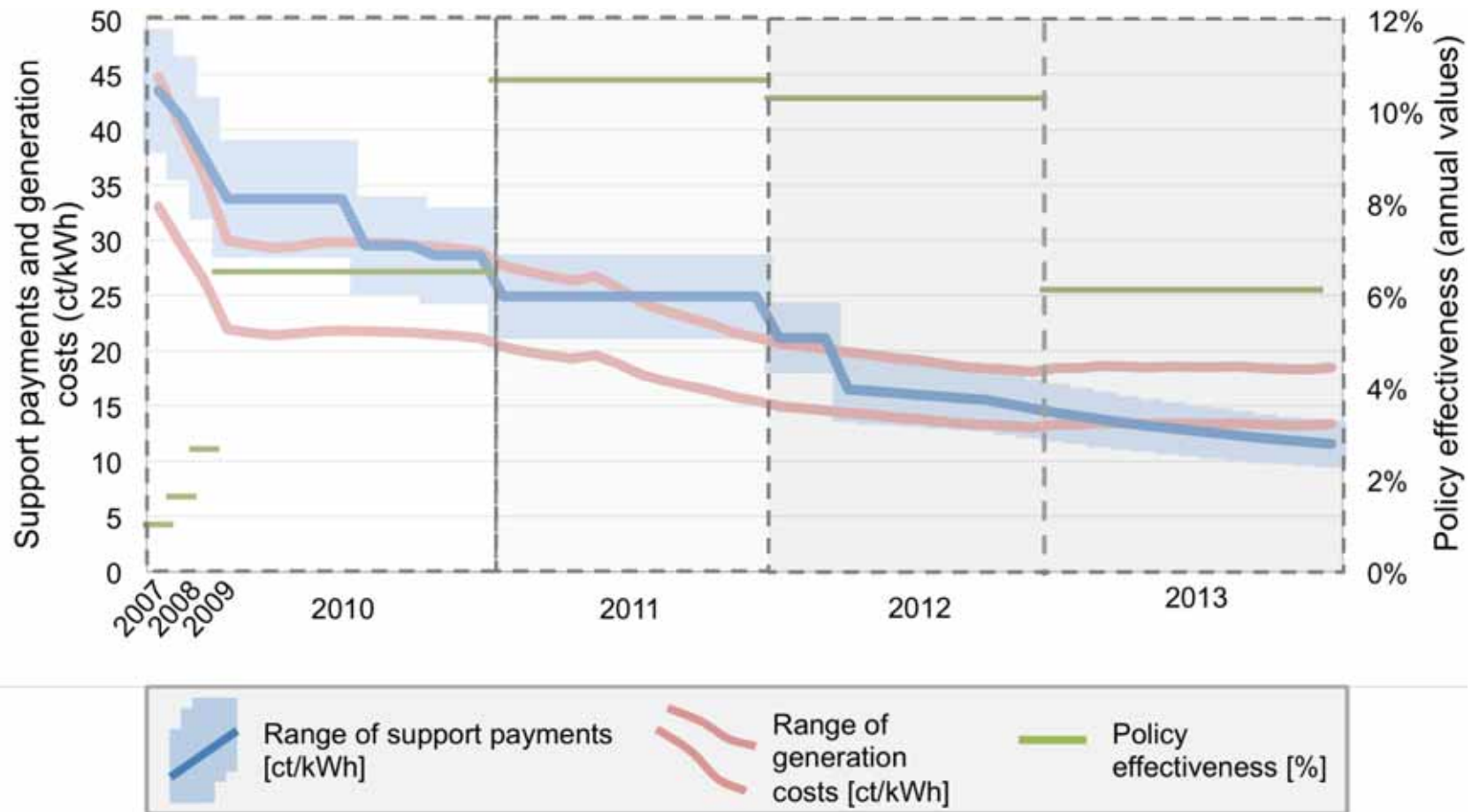
FiTs in Germany

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

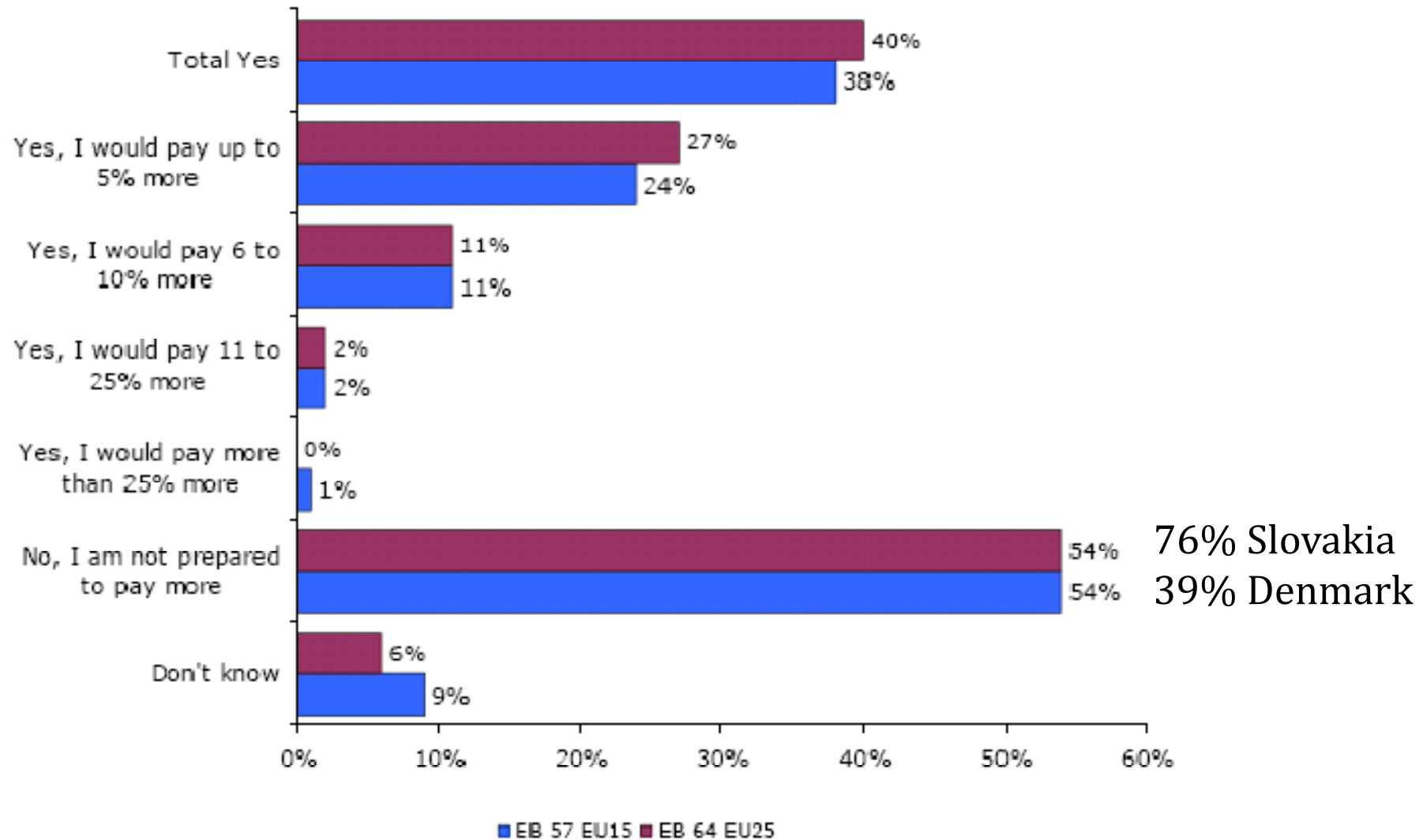
Tensions between Research and Deployment

- 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

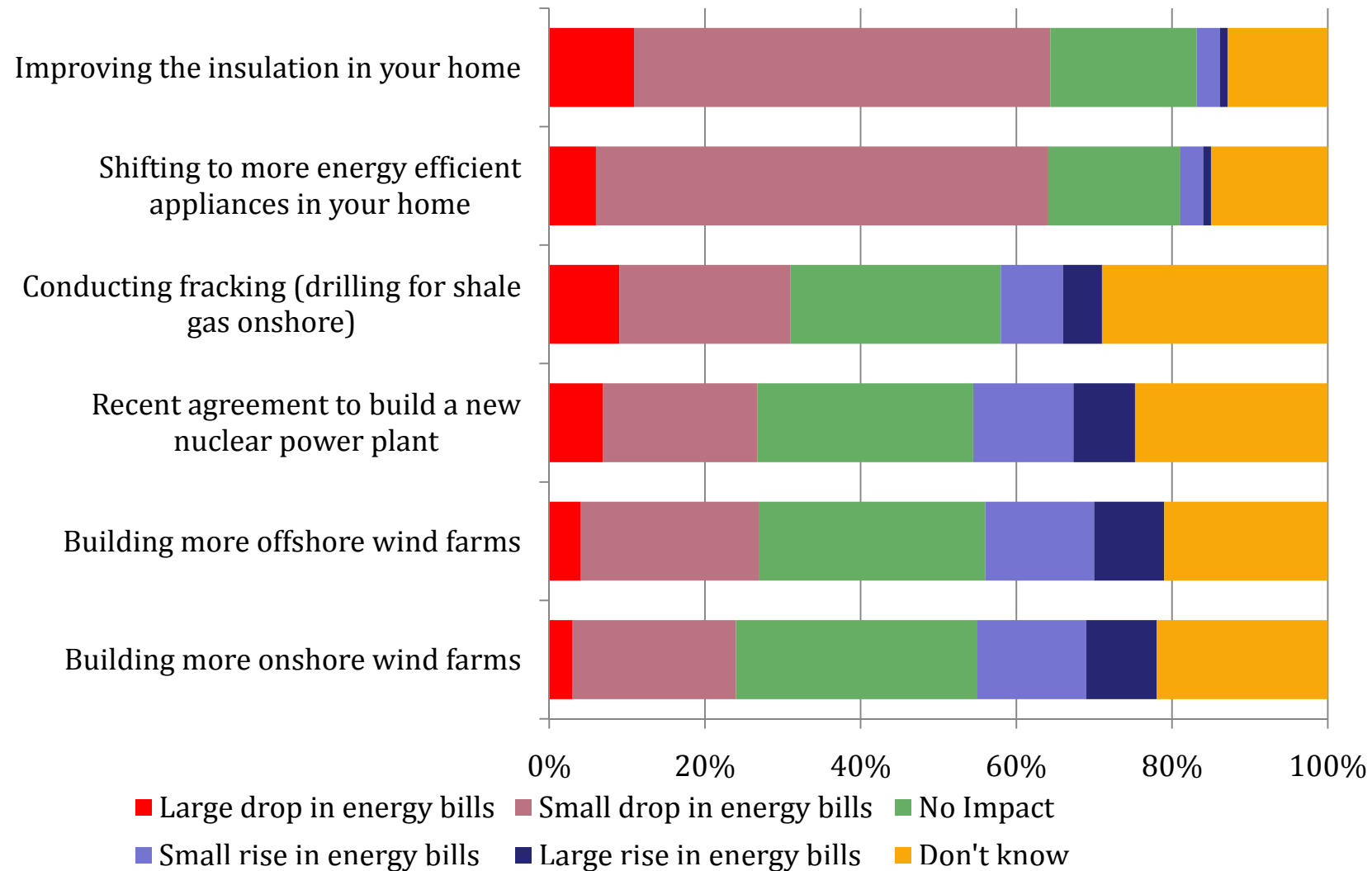
- Will the emergent 2030 regime offer greater certainty needed for investment in low-C generation and a lower cost approach to emissions reductions?
- What lessons can be learned from experience with subsidy regimes across EU member states? Implications of subsidy withdrawal?
- How will new state aid 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

