REF

RENEWABLE ENERGY FOUNDATION

Proposed Changes to the Renewables Obligation

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RTPI Energy & Spatial Planning Seminar

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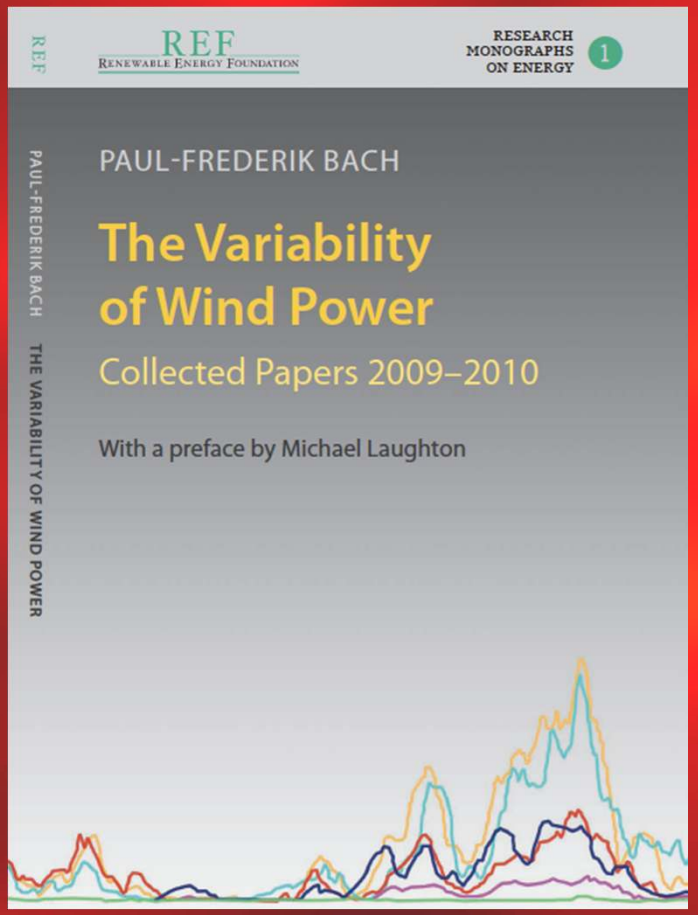
Renewable Energy Foundation

- UK registered charity
- No political affiliation
- Data and analysis on the energy sector
- Free databases of all UK renewable installations
- www.ref.org.uk



Overview

- Q: Why are UK Renewables subsidies being reduced?
  - Feed-in Tariff cuts
  - Renewables Obligation reduced ROCs / MWh
- A: Treasury now classifies the RO and FiT as tax, and the revenues as public expenditure, and has imposed a cap
  - HMT, *Control Framework for Levy-Funded Spending (2011)*

HMT *Control Framework for Levy Funded Spending*

- Caps DECC's ability to draw subsidies from consumer bills

Policy	2011–12 (£m)	2012-13 (£m)	2013–14 (£m)	2014–15 (£m)
RO	1,764	2,191	2,615	3,203
FiT	80	161	269	357
WHD	250	275	300	310

DECC, *Control Framework for DECC levy-funded spending: Questions and Answers* (29 March 2011. URN 11D/675).

Solar PV Subsidy Reductions: FiT

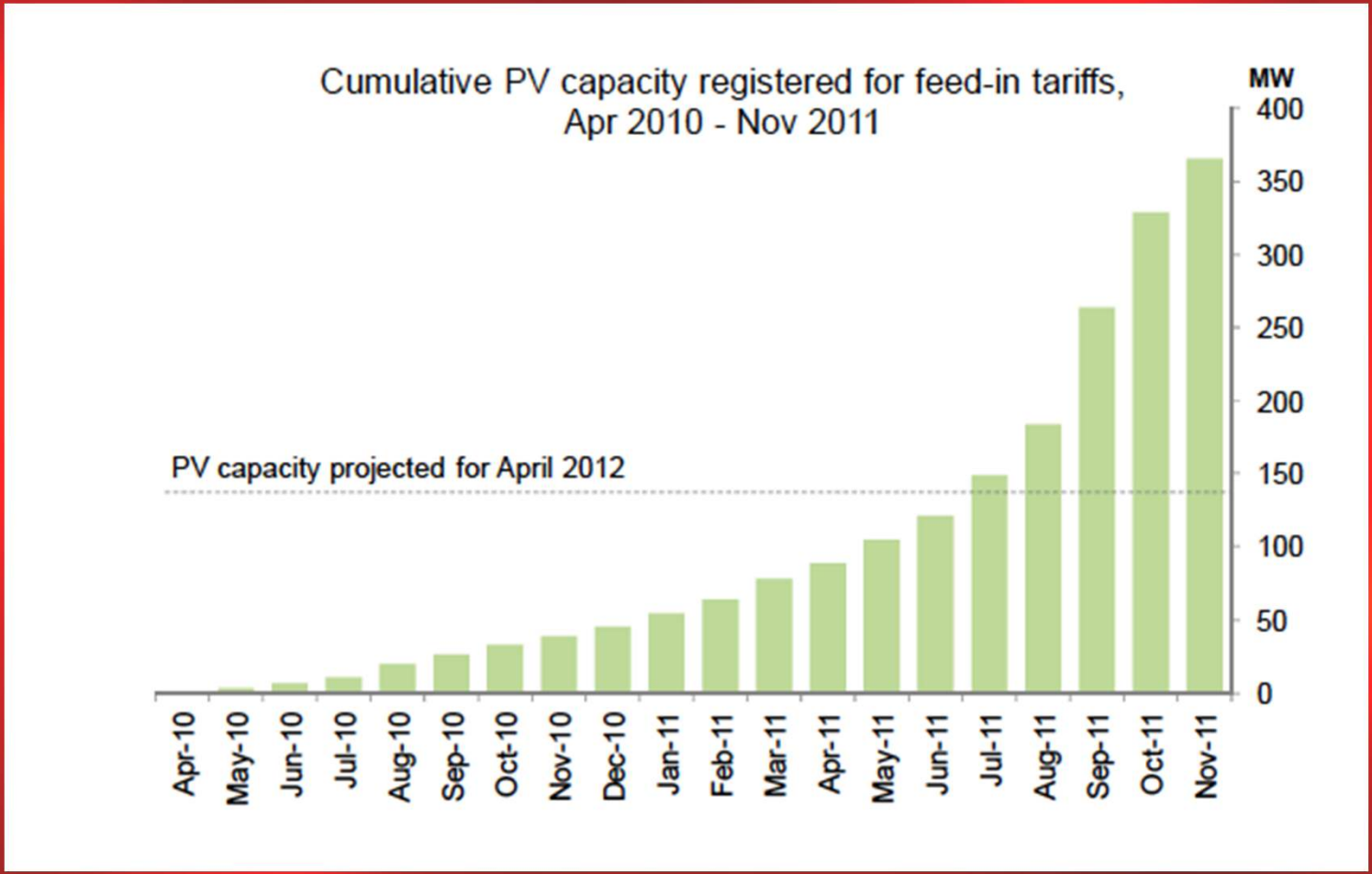
Capacity Band	Current Tariff (p/kWh)	Proposed Tariff (p/kWh)
4 kW or less (new build)	37.8	21 (– 44 %)
4 kW or less (retrofit)	43.3	21 (– 51.5 %)
> 4–10 kW	37.8	16.8 (– 56 %)
> 10–50 kW	32.9	15.2 (– 54 %)
> 50–100 kW	19	12.9 (– 32 %)
> 100–150 kW	19	12.9 (– 32 %)
> 150–250 kW	15	12.9 (– 14 %)
> 250 kW–5 MW	8.5	8.5

Why Reduce FiTs?

"a review of funding for solar PV [...] has been triggered as a result of the funding cap being imposed. This is because of Government concerns that higher than expected uptake of solar PV will result in the cap for FITs being exceeded."

House of Commons Library, SN/SC/5870

Rapid Growth in Solar PV



Source: House of Commons Library, SN/SC/6112

REF Database for FiTs

- REF searchable database: www.ref.org.uk
- Based on data from Ofgem (REF FoI request)

FiT Class	Number of Installations	Total Capacity
All FiT Generators	147,111	661.05 MW
Solar PV	143,488	596.27 MW

- In the period 01.12.11 to 22.12.11
  - 7,257 PV Installations (31.58 MW)

The Renewables Obligation

Technology	Number of sites	Installed capacity
All	2,355	8,889 MW
Wind	801	6,422 MW
Offshore	19	1,970 MW
Onshore (> 250 kW)	278	4,434 MW
Biomass	132	545 MW
Landfill Gas	438	1,020 MW
Sewage Gas	162	165 MW

Planning Success Rate

Status	Biomass	Waste	PV	Offshore Wind	Onshore Wind
Approved	3,812 MW	1,266 MW	357 MW	6,176 MW	10,242 MW
Refused	179 MW	362 MW	11 MW		5,350 MW
Total	3,991 MW	1,628 MW	368 MW	6,176 MW	15,592 MW
% Refused	**4%**	**22%**	**3%**	**0%**	**34%**
In Planning	1,140 MW	315 MW	62 MW	1,720 MW	6,977 MW

82% of applications are approved

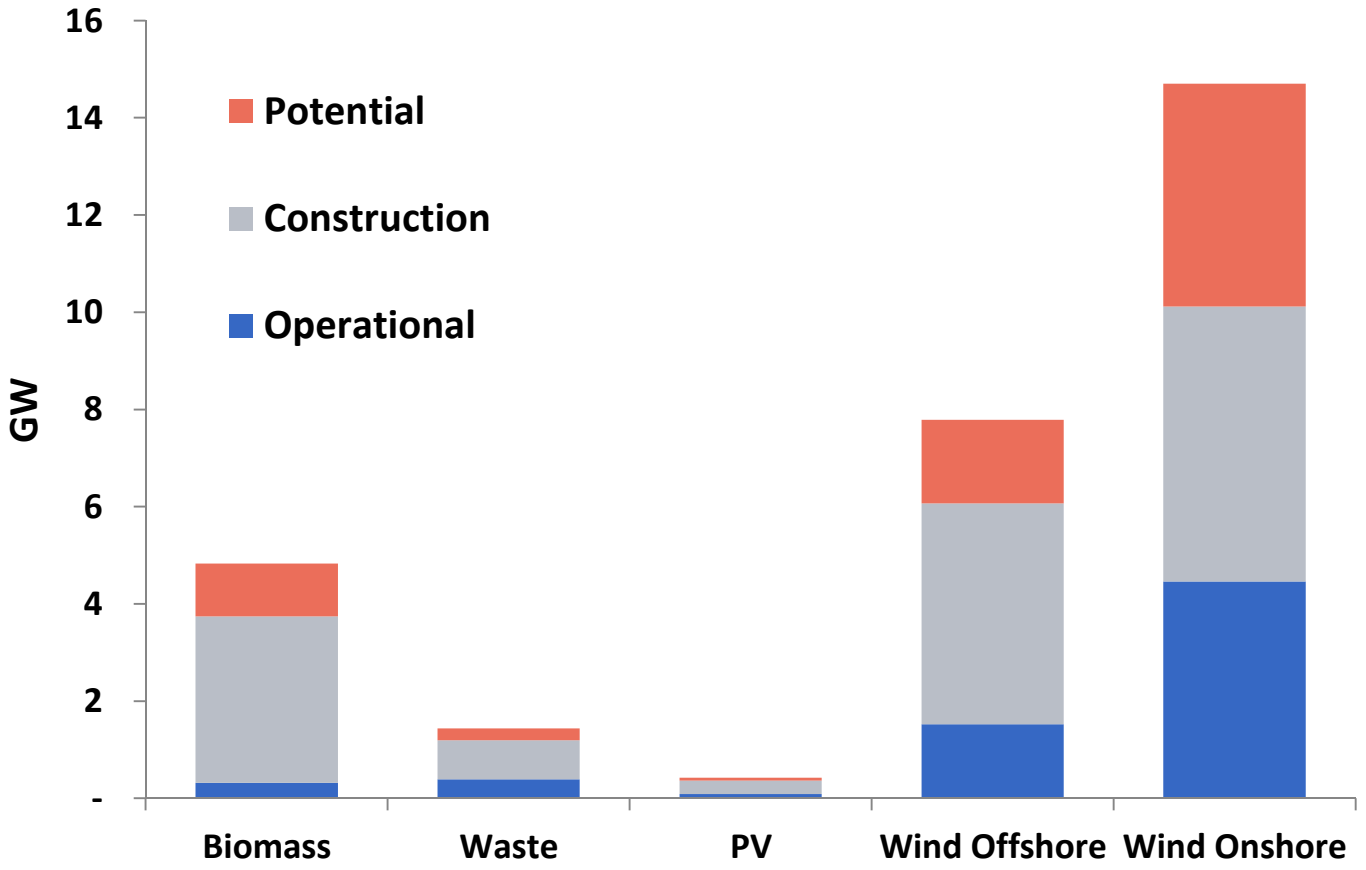
Source: REStats (DECC)

RO Generators & Planning

Status	Biomass	Waste	PV	Offshore Wind	Onshore Wind	All Technologies
Operational	322 MW	390 MW	87 MW	1,525 MW	4,463 MW	8,030 MW
Under & Pre-Construction	3,421 MW	806 MW	276 MW	4,543 MW	5,658 MW	15,478 MW
In Planning	1,140 MW	315 MW	62 MW	1,720 MW	6,977 MW	10,417 MW
Refused	179 MW	362 MW	11 MW	0	5,350 MW	5,915 MW

Source: REStats (DECC)

RO Generators & Planning



Assuming current success rates at planning.

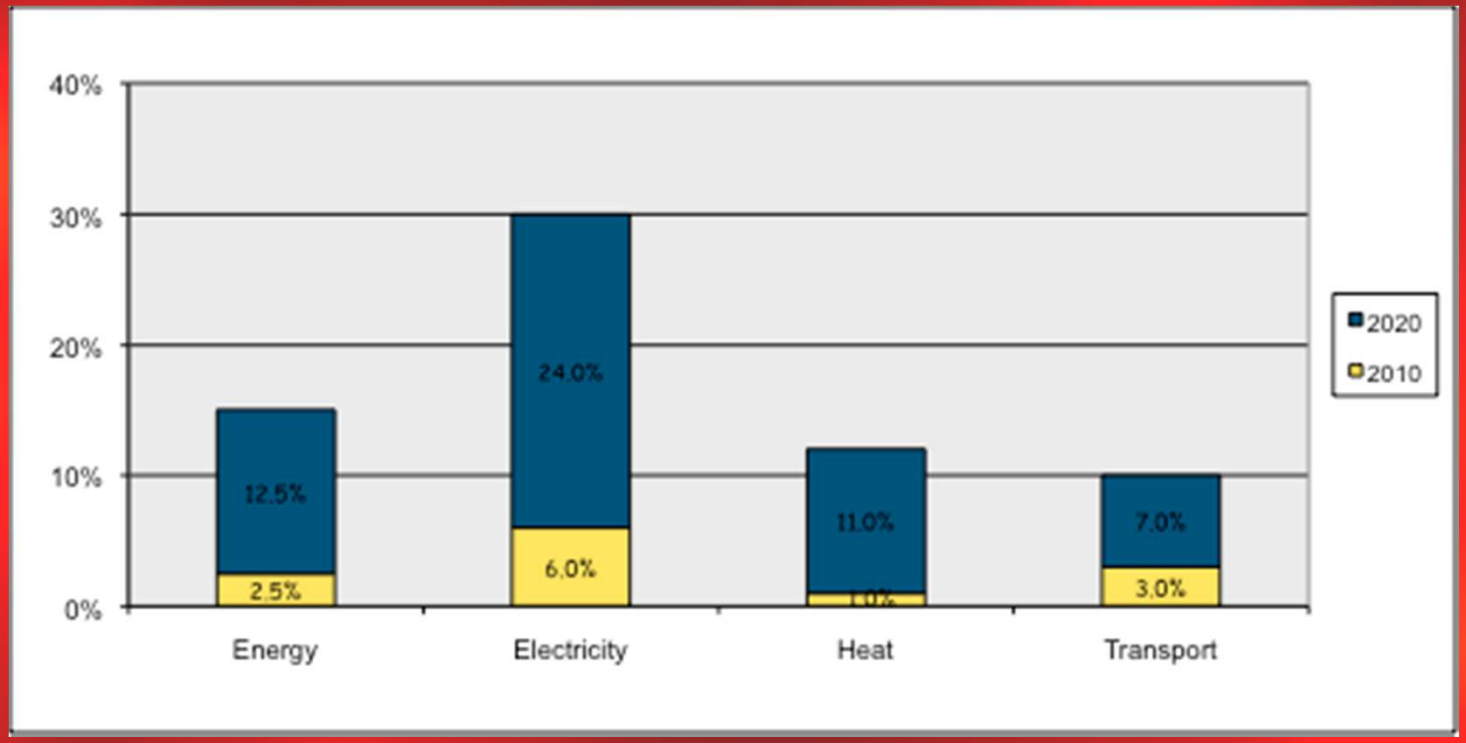
Some Proposed RO Re-Bandings

Technology	ROC / MWh			
	Current	2013/15	2015/16	2016/17
Advanced gasification	2	2	1.9 (–5%)	1.8 (–10%)
Anaerobic digestion	2	2	1.9 (–5%)	1.8 (–10%)
Biomass conversion	1.5	1 (–33%)	1 (–33%)	1 (–33%)
Co-firing of biomass	0.5	0.5	0.5	0.5
Landfill gas	0.25	0 (–100%)	0 (–100%)	0 (–100%)
Onshore wind	1	0.9 (–10%)	0.9 (–10%)	0.9 (–10%)
Offshore wind	2013/14: 2 2014/15–: 1.5	2	1.9 (–5%)	1.8 (–10%)

EU 2020 Renewables Directive Target

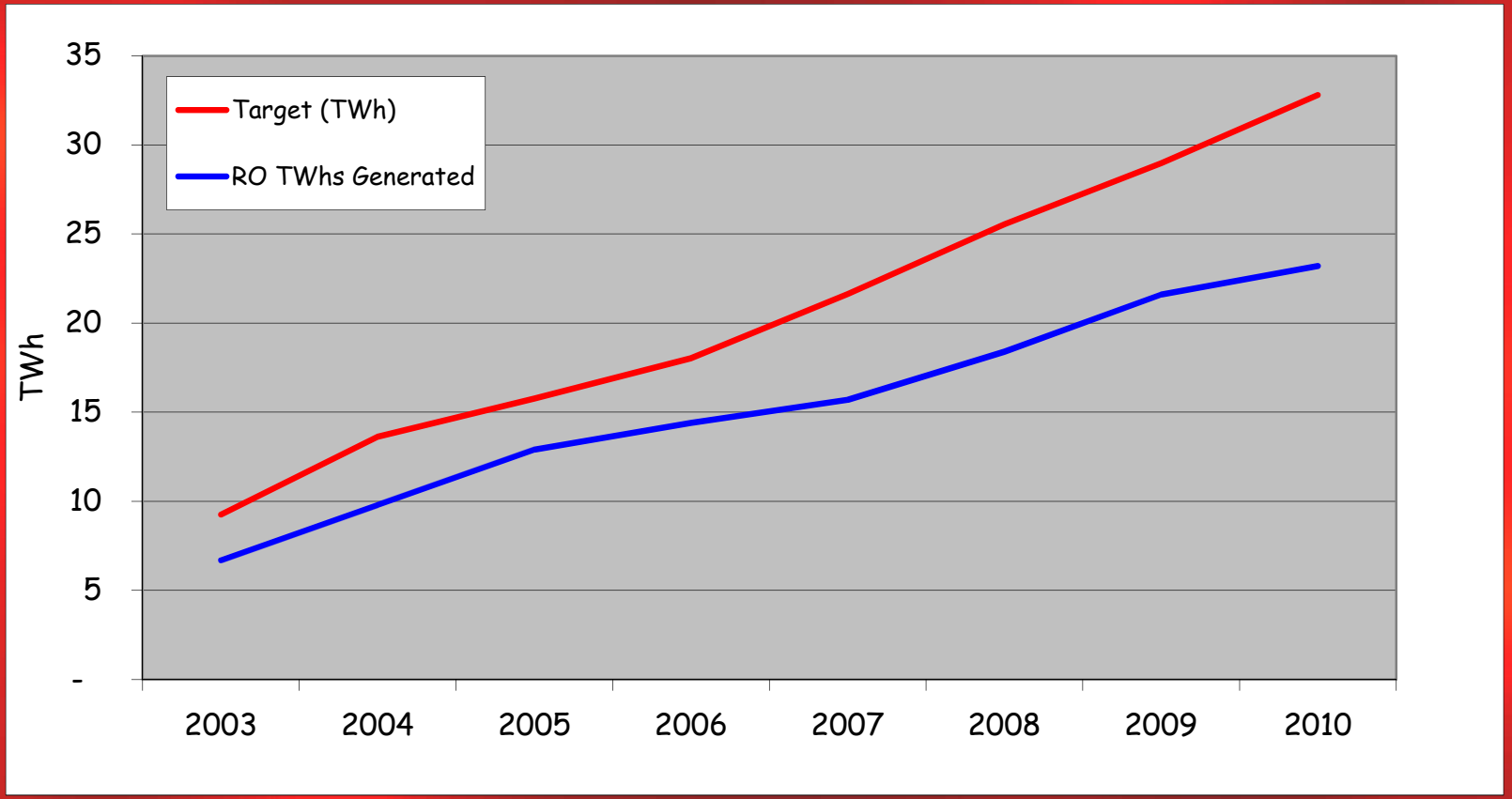
- UK energy policy driven by EU directives
- 15% of Final Energy Consumption (FEC) must be renewable in 2020
  - UK 2010 FEC: 2.5% renewable
- UK FEC = 150 mtoe
- 150 mtoe x 0.15 = 22.5 mtoe (260 TWhs)
  - UK electricity consumption: 330 TWhs

Meeting the 2020 Target



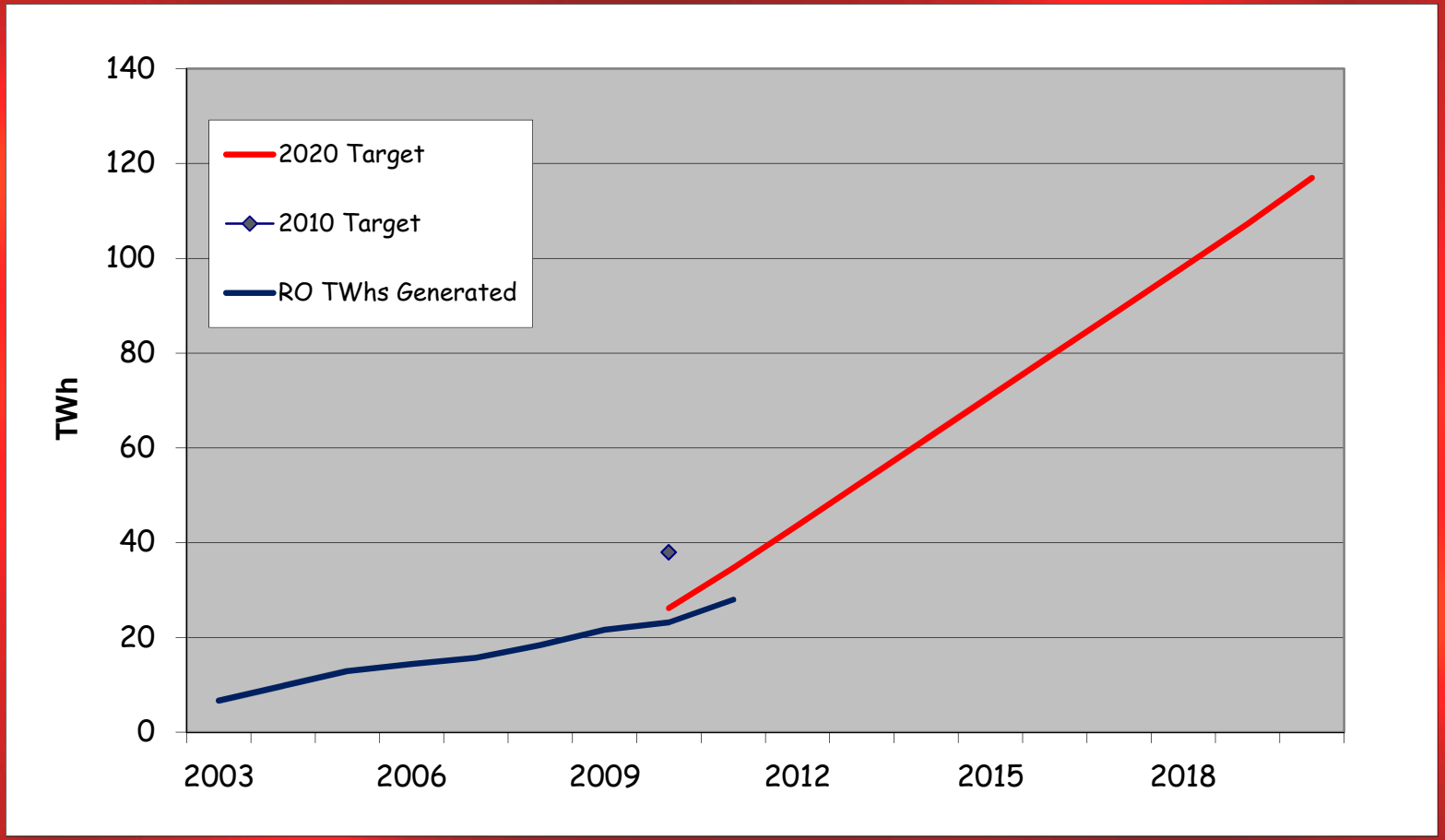
Source: DECC National Renewable Energy Action Plan (2010) and REF calculations (2011)

2010 Electricity Target : 10% Renewables



Source: Ofgem. Chart by REF.

Progress towards 2020 Target



Source: Ofgem, DECC. Chart by REF.

Environmental Subsidy Costs

Levied invisibly on electricity and gas bills.

Policy	Period	Cost (£ billion)
EEC	2002 – 2008	1.5
CERT	2008 – 2011	3.9
CESP	2009 – 2011	0.2
FiT	2010 – 2011	0.02
RO	2002 – 2011	7.3
Total		12.3
VAT		1.9 (REF estimate)

Source: Lord Marland to Lord Vinson, 25.10.11, Hansard WA128

UK Renewable Electricity Subsidies

- Subsidy cost in 2020: £8bn per year in 2020
- Subsidy Cost 2002–2030: ca £130 bn

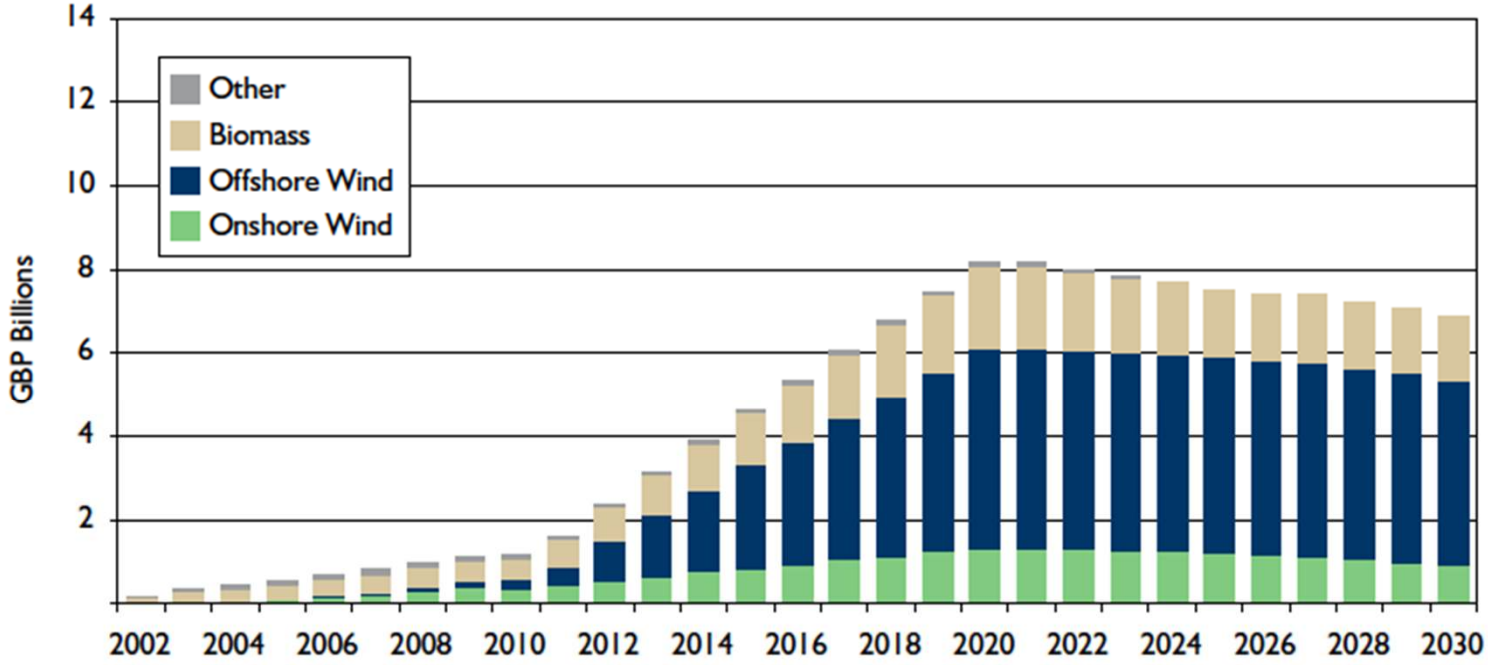


Figure 4: Projected Growth in Renewable Electricity Subsidy Costs to 2030.
Source: REF Calculations.

Wind Integration Costs

- System Operation Costs (£16 / MWh).
  - Caused by errors in the wind forecast.
- Transmission upgrades (£20 – £23 / MWh).
  - To move energy from wind farms to load centres.
- Planning Reserve (£24 – £28 / MWh).
  - Conventional plant equal to peak load plus a margin, for windless days, running at reduced load factor.

Source: Colin Gibson, “A Probabilistic Approach to Levelised Cost Calculations”, (2011).

System Cost from Consumer's Perspective

- Base cost + Subsidy + Integration
- Onshore wind: £190/MWh
- Offshore wind: £270/MWh
- Nuclear: £61/MWh
- CCGT: £66/MWh
- Coal: £60/MWh

Source: Colin Gibson (2011)

Subsidy + Integration Costs (£5bn p.a.)

- Total cost in 2020: £13bn per year in 2020
- Total Cost 2002-2030: ca. £175bn

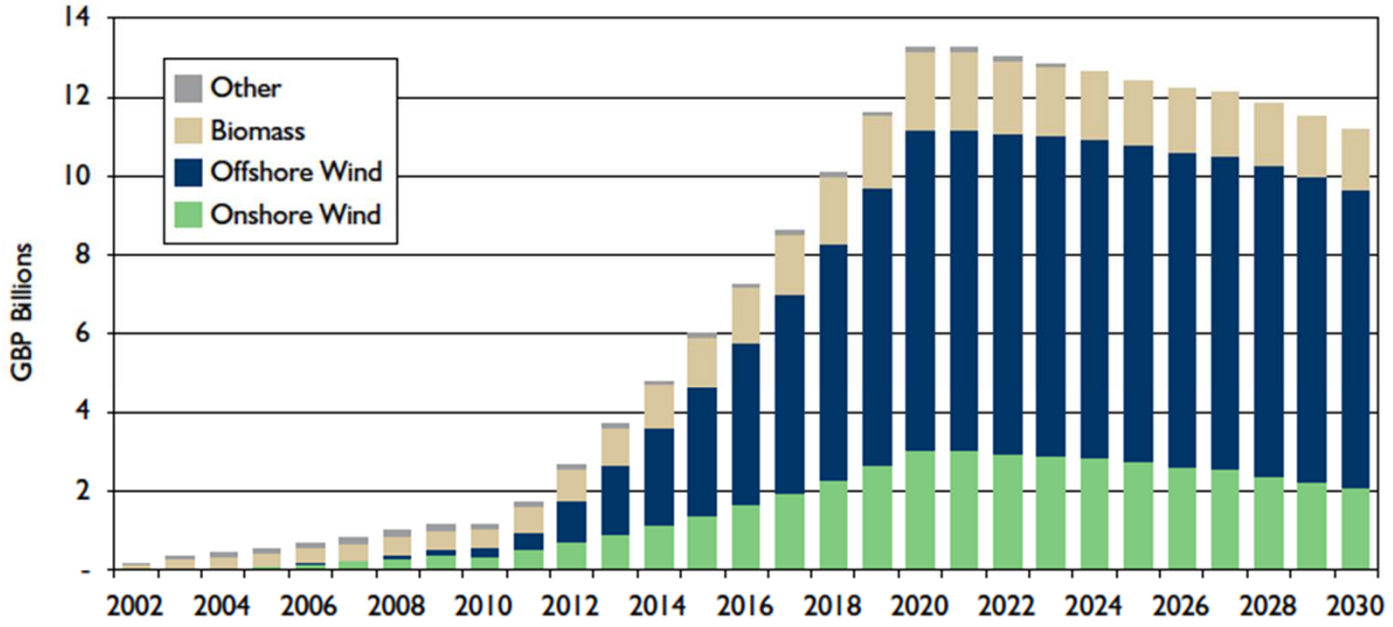
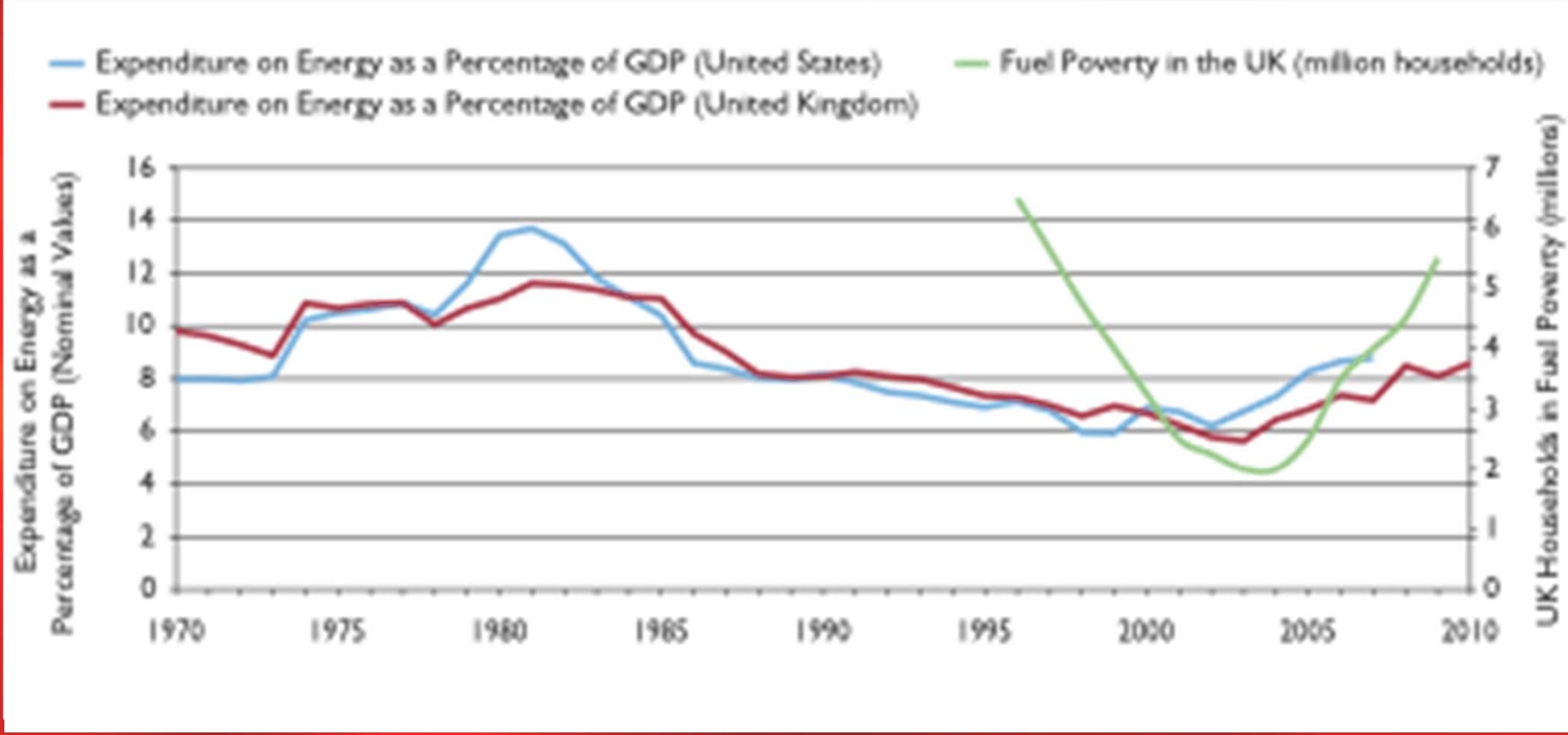


Figure 6: Projected Growth in Total Cost of Renewable Electricity Programme (Subsidy + Ancillary Costs).
Source: REF Calculations, Gibson 2011.

Climate Change Policy Impacts on Households

- Direct
  - Increases in bills caused by levies to provide subsidies to selected industries or sectors.
- Indirect
  - System cost increases caused by the adoption of policy selected technologies.
  - VAT charged on direct costs and other indirect costs.
  - Increase in non-energy cost of living.
- Macroeconomic
  - Reductions in employment and incomes caused by the impact of direct and indirect costs on businesses.

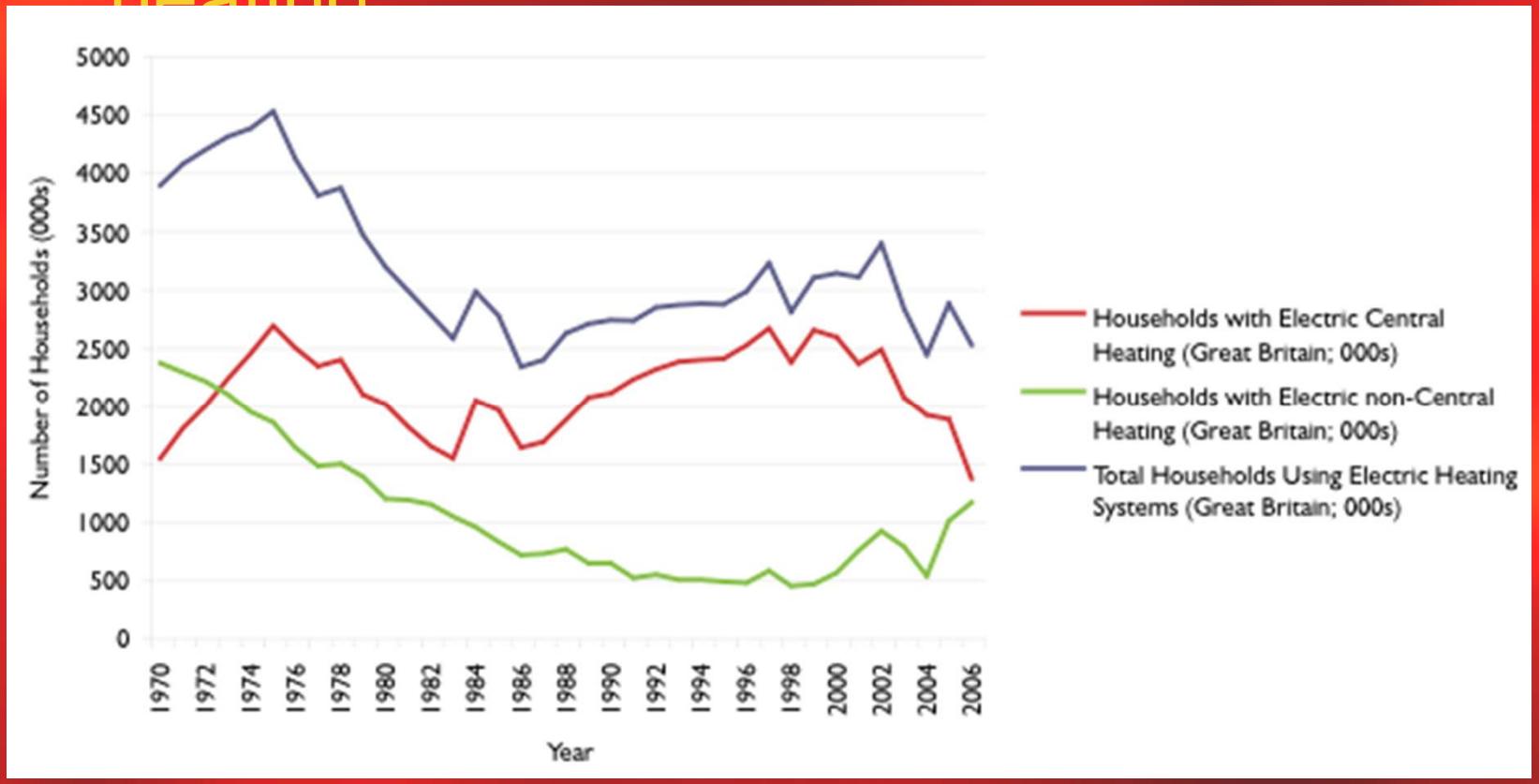
Energy Expenditure / GDP



- Red line: UK energy spend / GDP
- Blue line: US energy spend / GDP
- Green line: Numbers in “Fuel Poverty” (current definition)

Electric Heating in Great Britain

- 2.5 million households use electric heating



The “Green Economy”: Political Enthusiasm

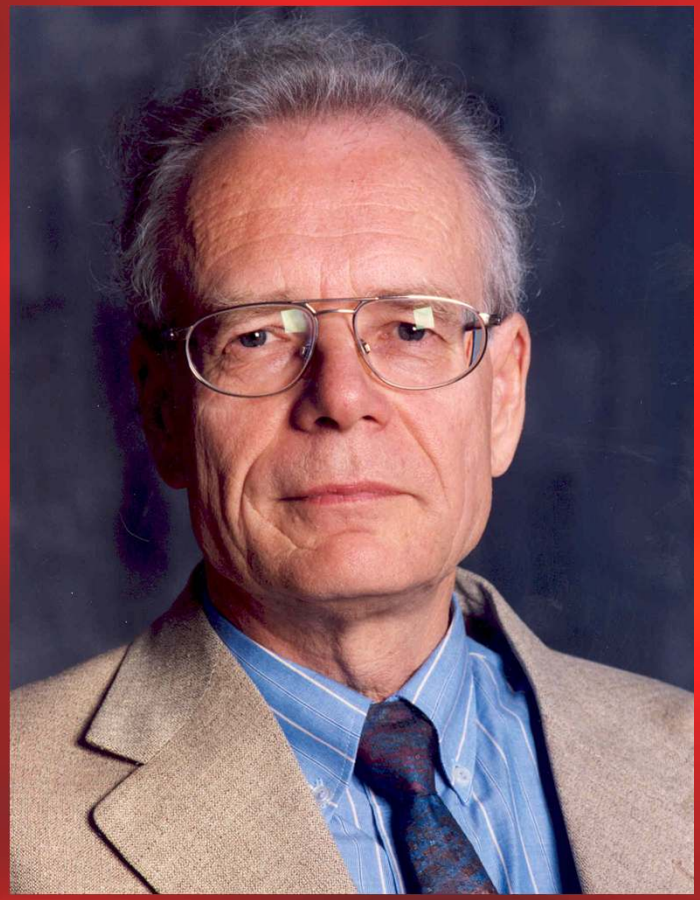
“It’s a triple win. It will help secure our energy supplies, protect our planet, and the Carbon Trust says it could create 70,000 jobs.”

David Cameron
25.10.10

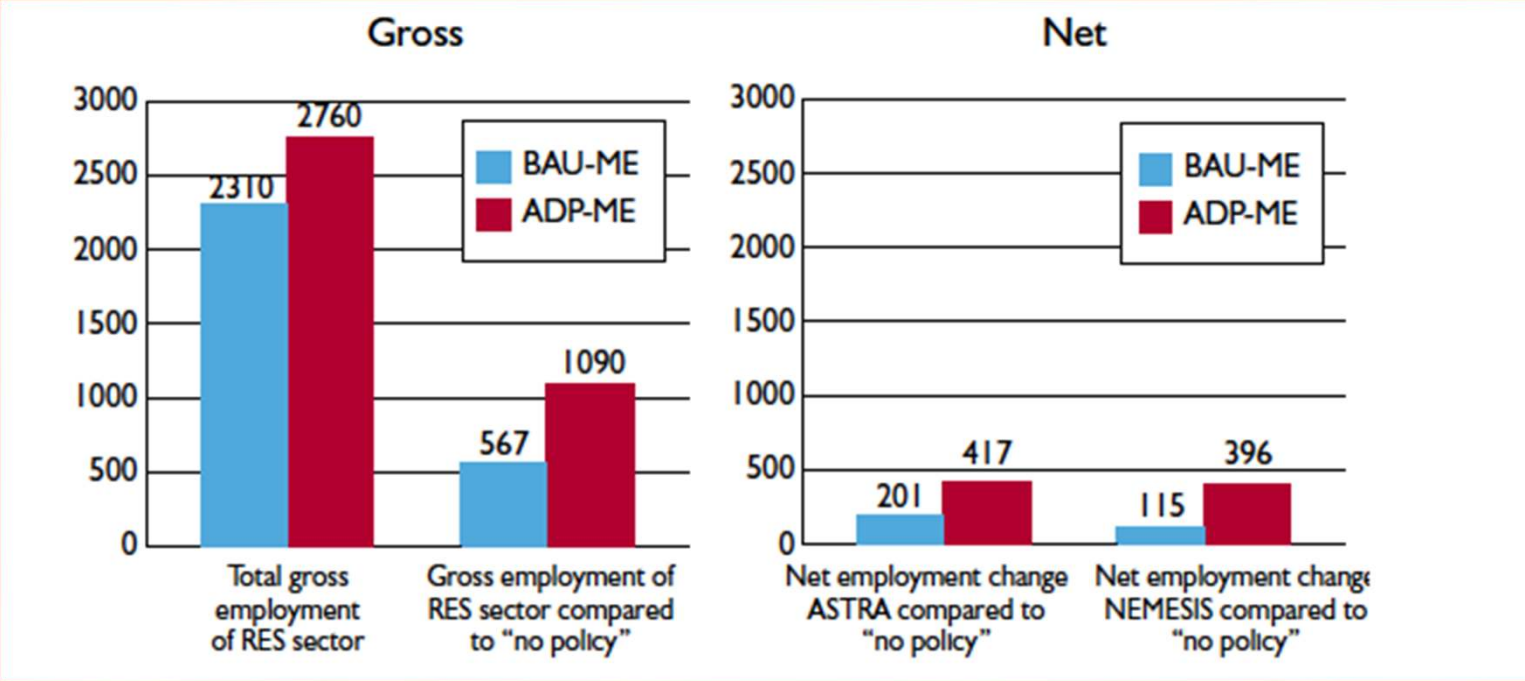
Technical Doubts…

"Whereas the gross effect of spending money on renewables is always positive, the net effect may be negative."

Professor Wolfgang Pfaffenberger, Bremer Energie Institut, 2006.



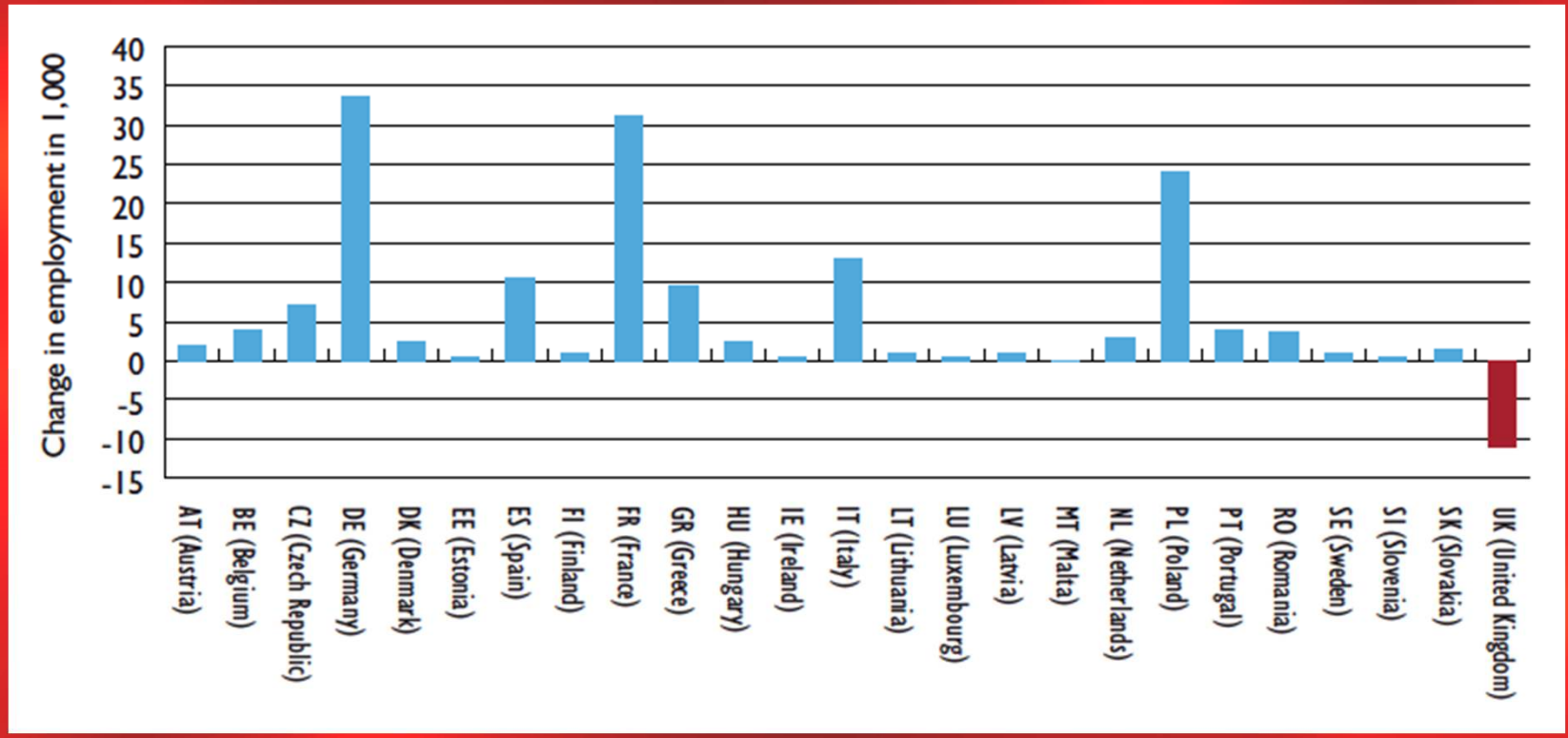
EU, *EmployRES* (2009): Employment Effects



Gross and Net Employment Effects from EU Renewables Polices Jobs (1,000s).

Source: *EmployRES* (2009), re-drawn by REF.

Employment Effects: EU 27 in 2020



Gross and Net Employment Effects from EU Renewables Polices Jobs (1,000s).
Source: Redrawn from *EmployRES* (2009).

Subsidy Cost of Wind Jobs in the UK

- RO cost 2002-2010:
  - £5.6 billion
- Employees (FTE) in 09/10:
  - 9,200
- Subsidy per worker 2002-2010:
  - £230,000
- Subsidy per worker in 09/10:
  - £54,000 (twice median income in either public or private sector)

Relative Costs of CO_2 Reduction: £ / tCO_2

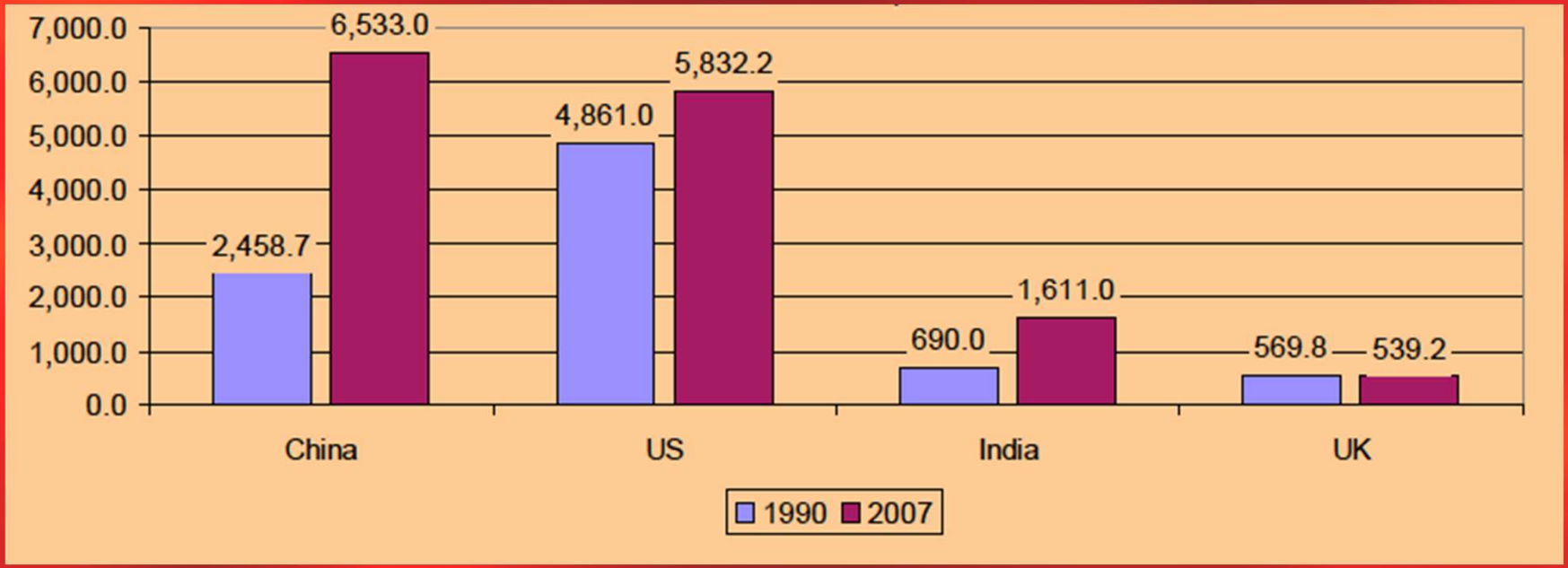
EU Emissions Trading Scheme cost: €12 / tCO_2

Technology	Large Scale	Small Scale
RO: Biomass co-firing	£46	
RO: Onshore Wind	£93	
RO: Offshore Wind	£185	
FiT: Anaerobic Digestion	£174	£224
FiT: Hydro	£167	£387
FiT: Wind	£167	£671
FiT: Photovoltaic	£167	£803

Grid average emissions factor assumed

Emissions in the Developing World

Emissions 1990 and 2007 (Millions of tonnes)



Source: Martin Wolf, “Living within limits”. Annual Lecture Grantham Institute, Imperial College, 3 November 2011

Conclusions

- EU Renewables targets are infeasible and unaffordable (but legally binding)
- Current renewables subsidies pose a macroeconomic threat to the UK
  - No realistic prospect of a green economy
- Clear signs that HM Treasury is determined to reduce, and perhaps ultimately withdraw, subsidy