

# RENEWABLE ENERGY POLICY COSTS

JOHN CONSTABLE

RENEWABLE ENERGY FOUNDATION

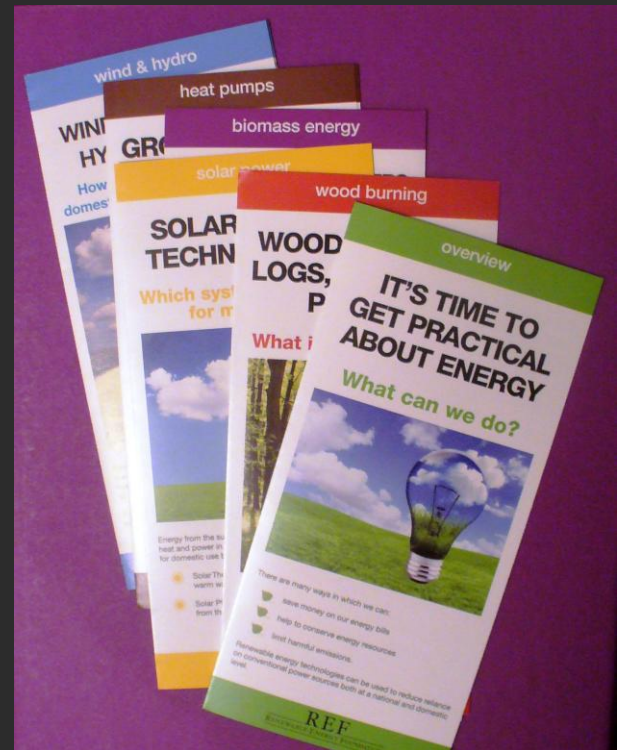
BRITISH MOUNTAINEERING COUNCIL WORKSHOP

10 SEPTEMBER 2011

# REF

RENEWABLE ENERGY FOUNDATION

- Energy think tank
- UK Charity
- Online databases
- Analysis & comment
- No political affiliation
- Private donations
- [www.ref.org.uk](http://www.ref.org.uk)



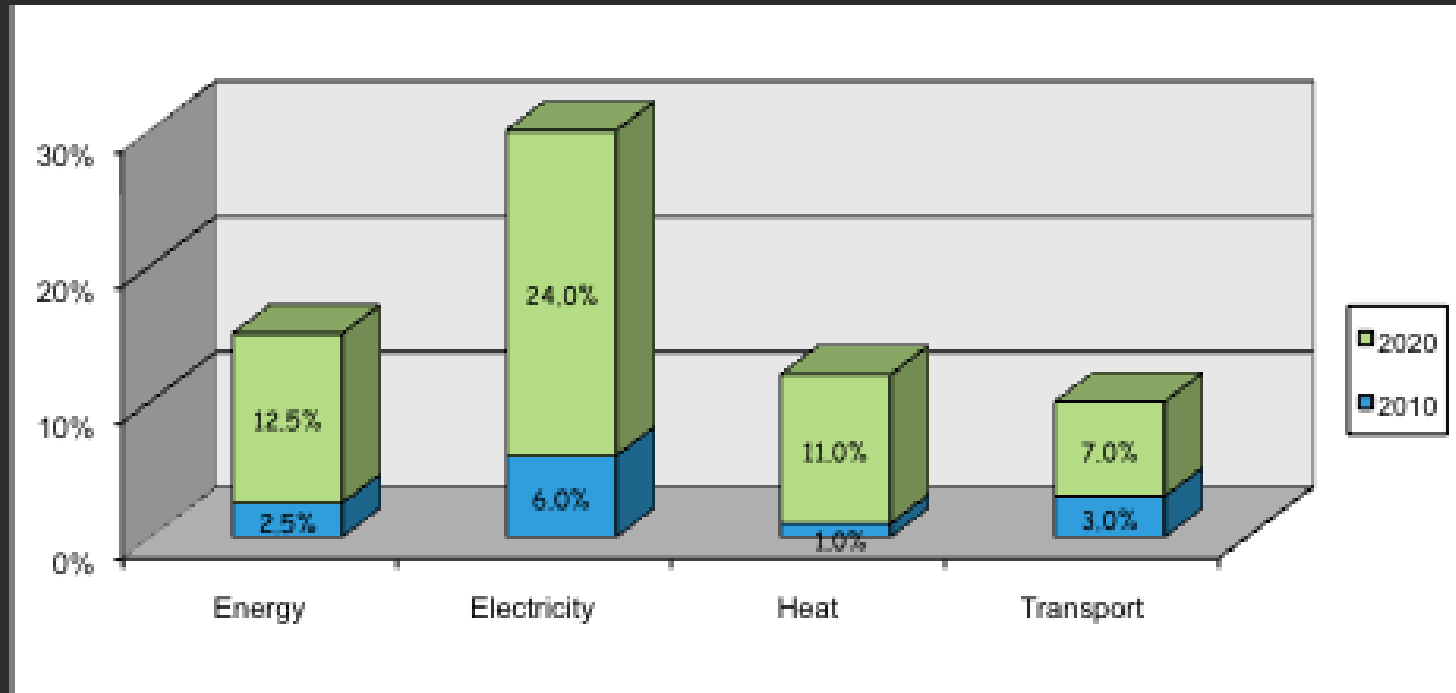
# UK Energy & Environment Policy

- Guided by EU Directives
- State mandated but mostly consumer funded
- Renewable energy dominant
- High levels of wind power (ca. 27 GW)
  - Half on-half off-shore
- $\approx 25\%$  of UK electricity (MWh)
- Currently 4GW onshore, 1.5 GW offshore

## EU 2020 Renewables Target

- EU Renewables target for the UK:
  - 15% of Final Energy Consumption (FEC)
    - UK 2010 FEC 2010: 2.5% renewable
- Current UK FEC: 150 mtoe (1,745 TWhs)
  - Govt. predicts FEC constant to 2020
- So 15% target = 22.5 mtoe (260 TWhs)
  - UK electricity generation: 390 TWhs

# Meeting the 2020 Target: Required Increases



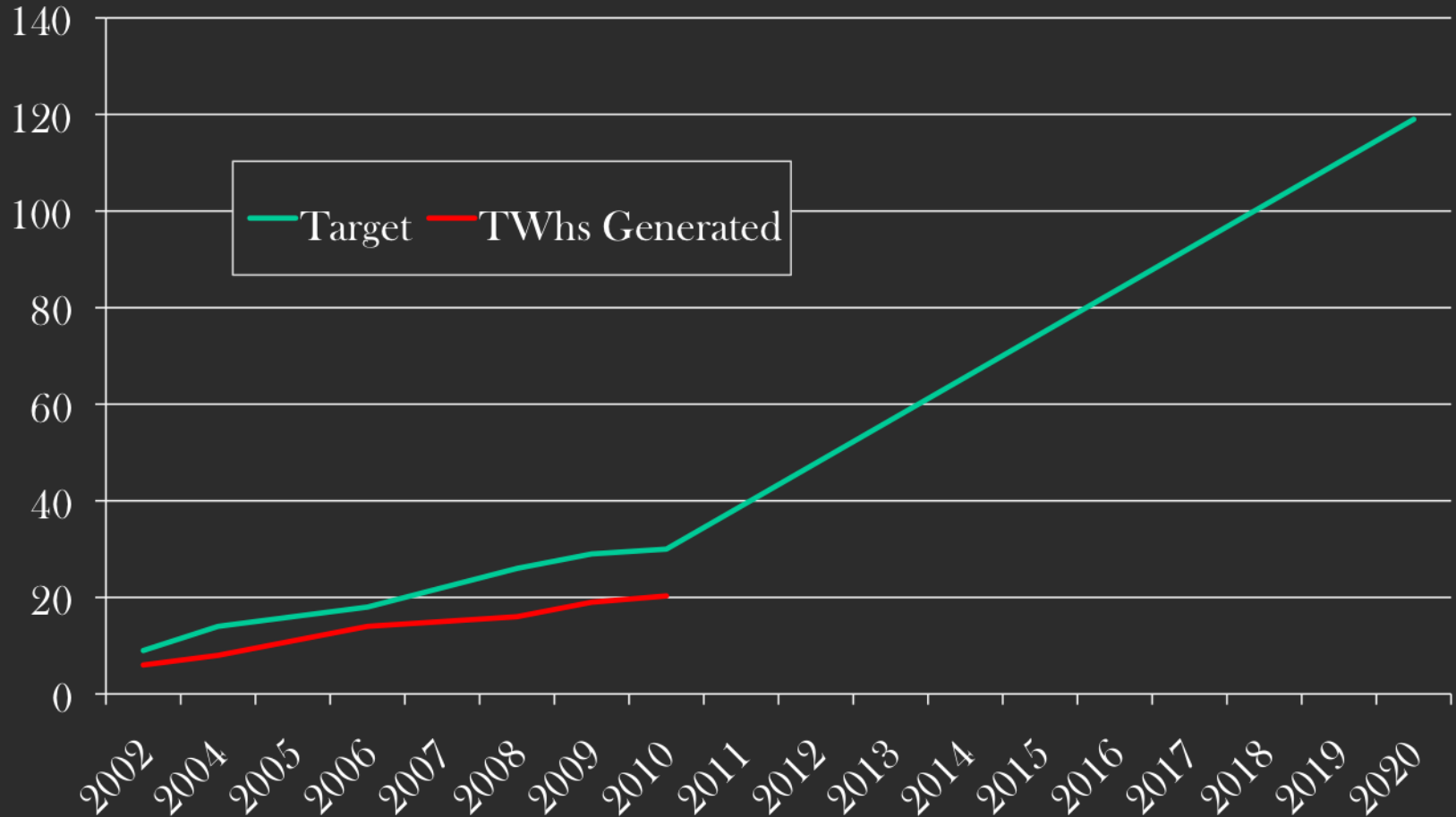
Source: DECC National Renewable Energy Action Plan (2010)  
and REF calculations (2011)

# 2010 Electricity Target: 10% Renewables



Source: Renewable Energy Foundation calculations from Ofgem data

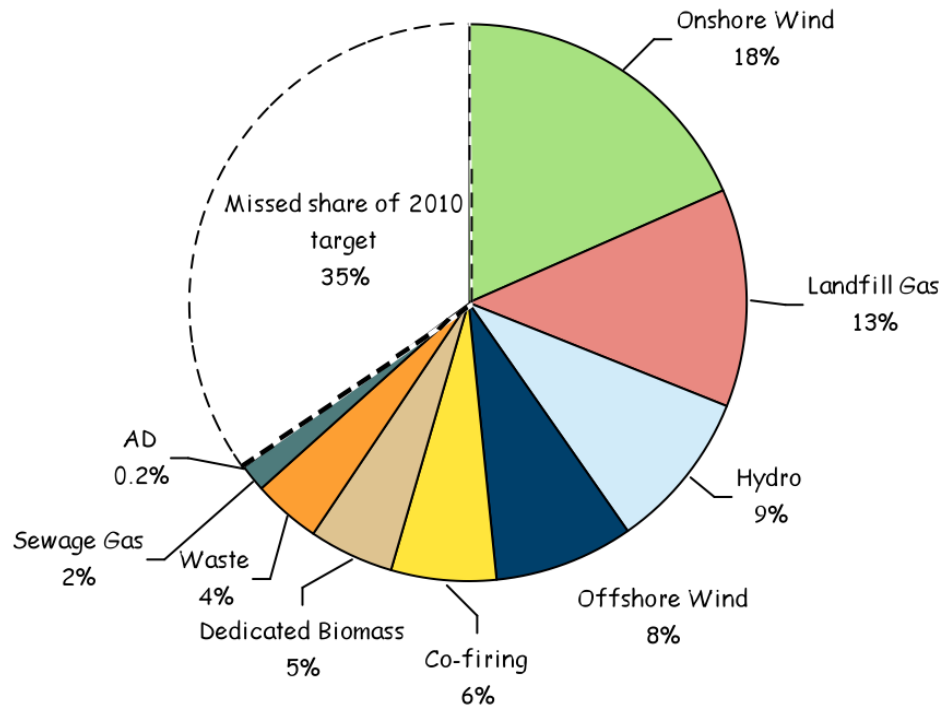
# Progress towards 2020 Targets



Source: Renewable Energy Foundation calculations from Ofgem data

# UK 2010 Renewable Electricity Target Missed

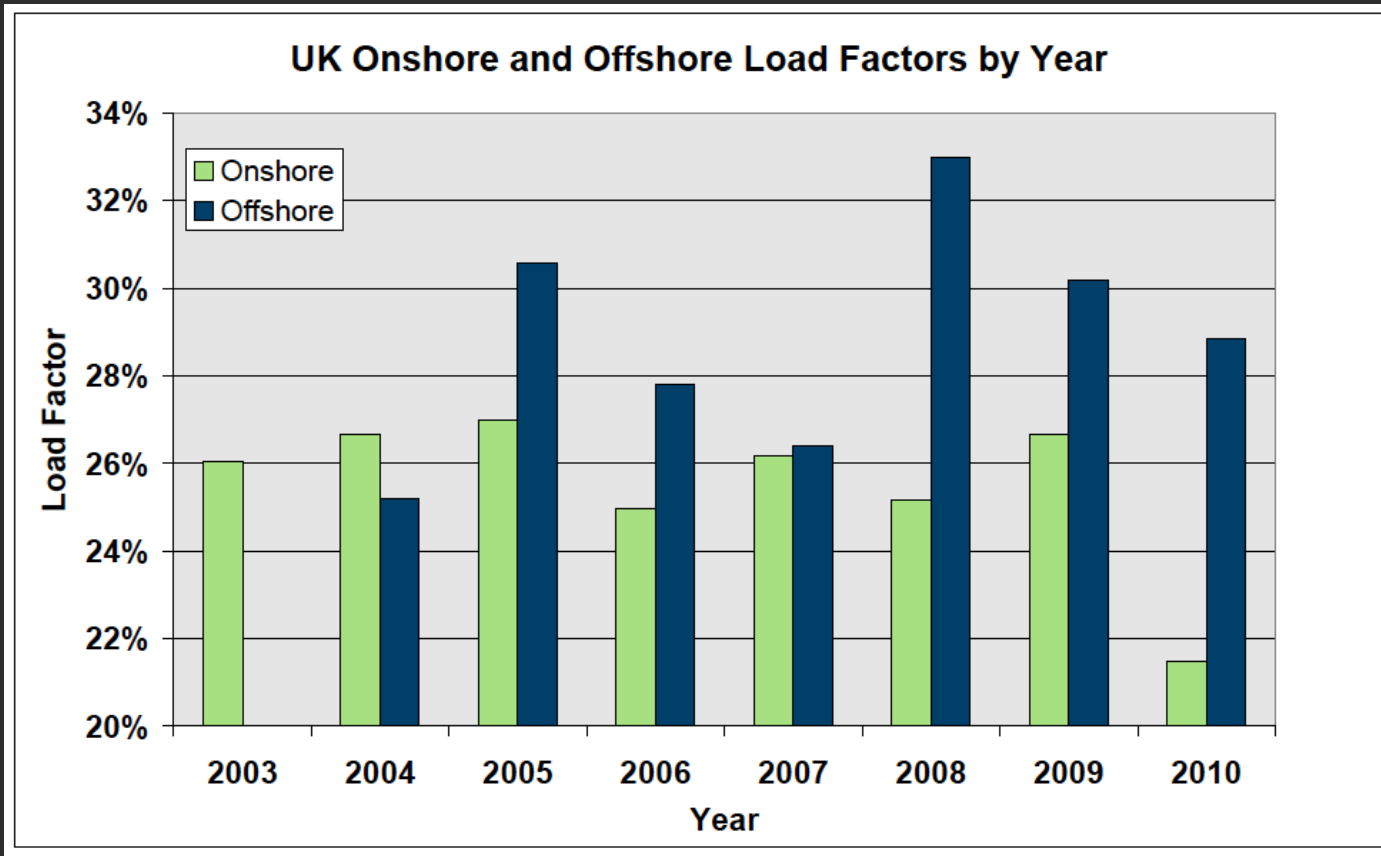
Renewable Generation Technology Share of 2010 Target



Source: Renewable Energy Foundation calculations from Ofgem data

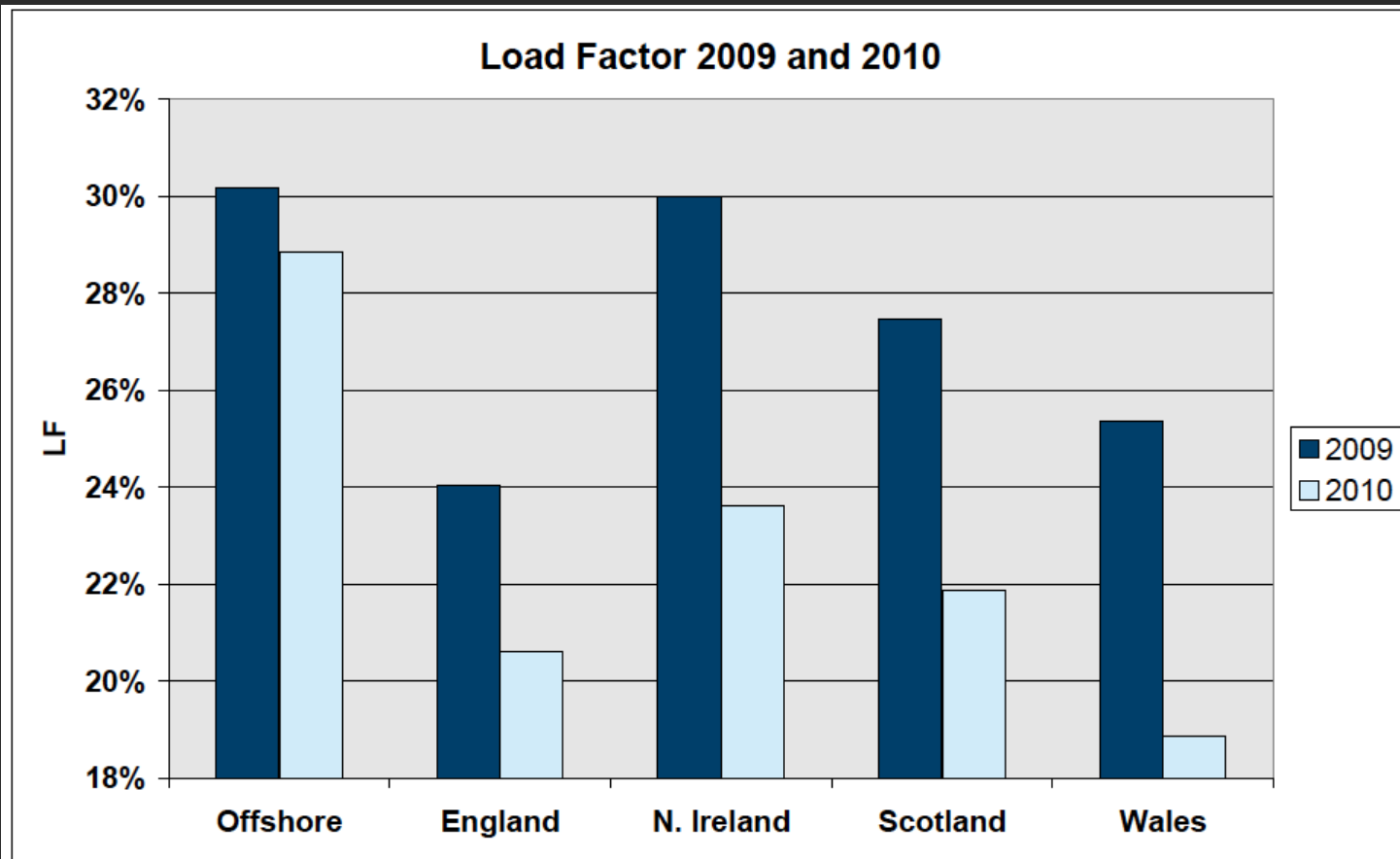


# Variations in UK Wind Load Factor



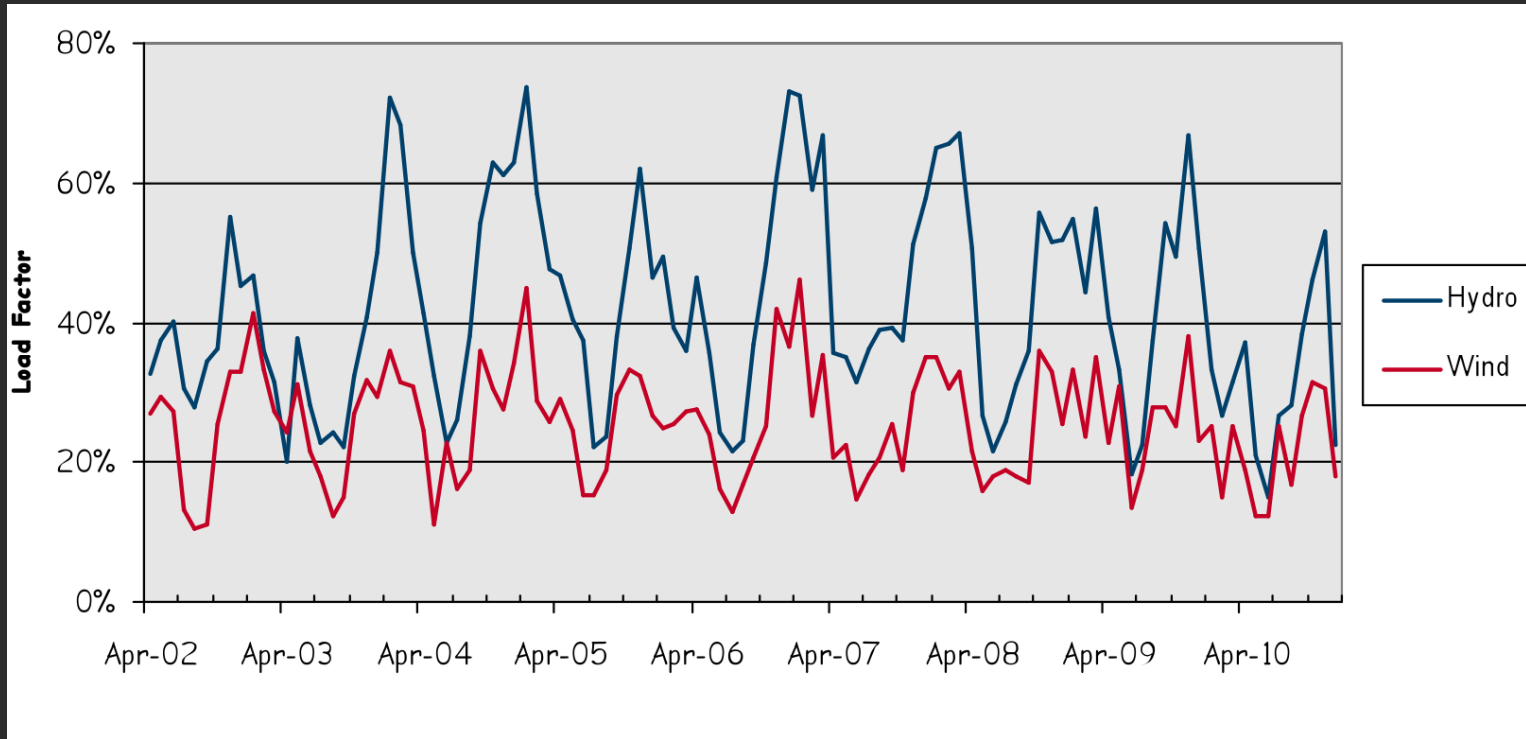
Source: Renewable Energy Foundation calculations from Ofgem data

# Variations in National Wind Load Factors



Source: Renewable Energy Foundation calculations from Ofgem data

# Wind & Hydro are Correlated



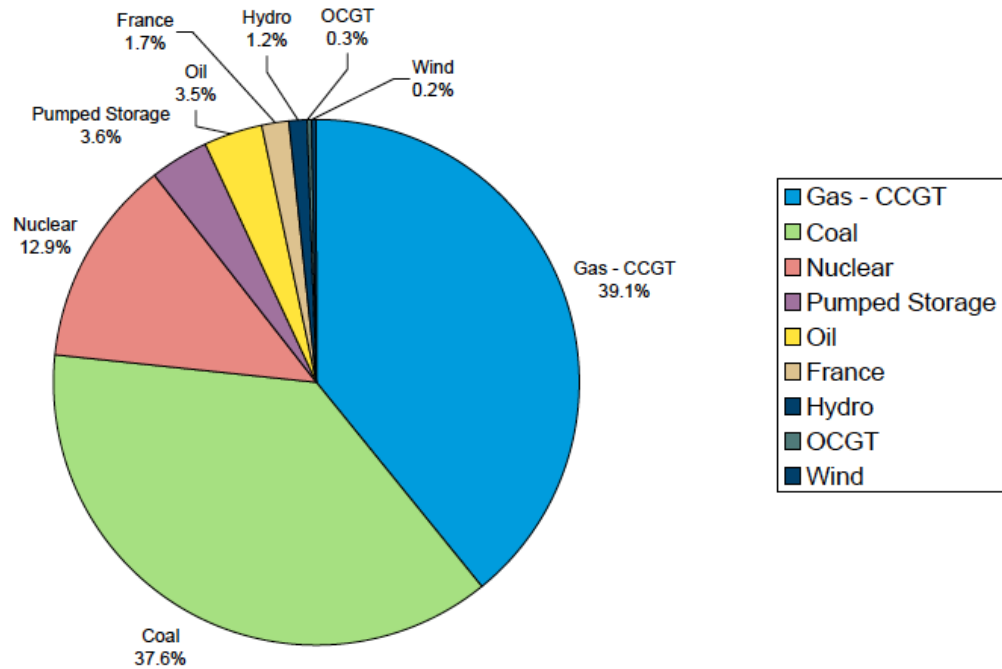
Source: Renewable Energy Foundation calculations from Ofgem data

# UK WIND, 7 DECEMBER 2010

- Very high load in the UK: 60,050 MW
  - 4<sup>th</sup> highest recorded on the GB system
- 2,430 MW of (TS) wind produced 133 MW
  - 2.8 GW of invisible embedded wind
- Est. total wind output: 300 MW / 5,200 MW
  - LF = 5.8%
  - 0.5% of total load
- Eg: Whitelee: 5 MW / 322 MW
  - 1.6% LF at peak load

# UK Plant Mix at Peak: 07.12.10

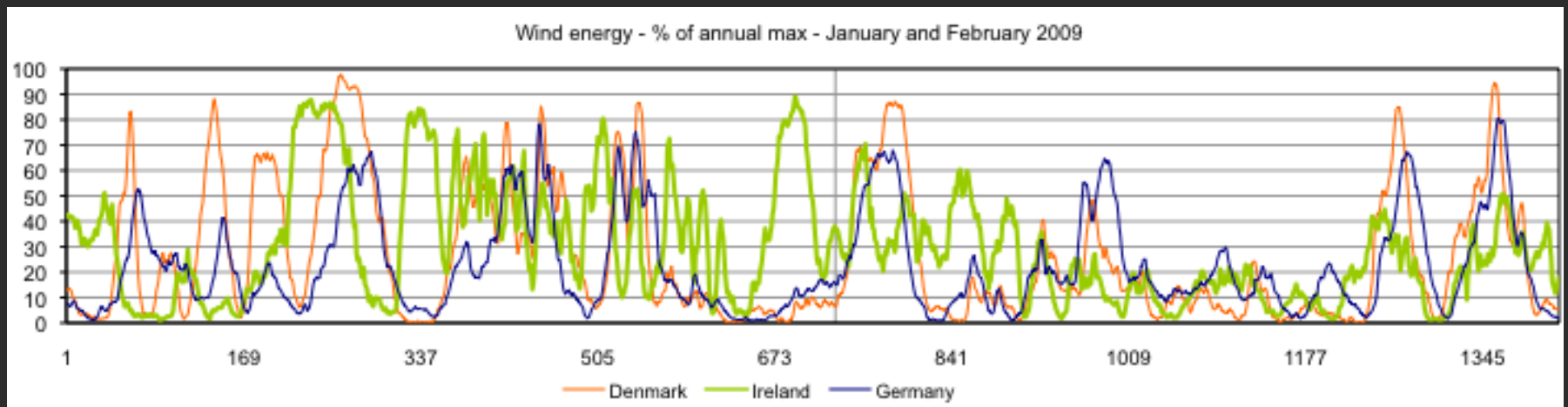
Fuel Used to Generate Grid Electricity at 5 - 5:30 pm on 7 December 2010



# EUROPEAN COMPARISONS: 17.30, 07.12.10

- EU Wind at UK peak:
  - United Kingdom:
    - 300MW / 5,200 MW (5.8%)
  - Ireland:
    - 261 MW / 1,425 MW (18.3%)
  - Germany:
    - 830 MW / 25,777 MW (3.2%)
  - Denmark:
    - 142 MW / 3,500 MW (4%)

# PAN EUROPEAN CORRELATIONS: JAN- FEB 2009



Source: Data from public sources, calculations by Paul-Frederik Bach  
for Renewable Energy Foundation 2010

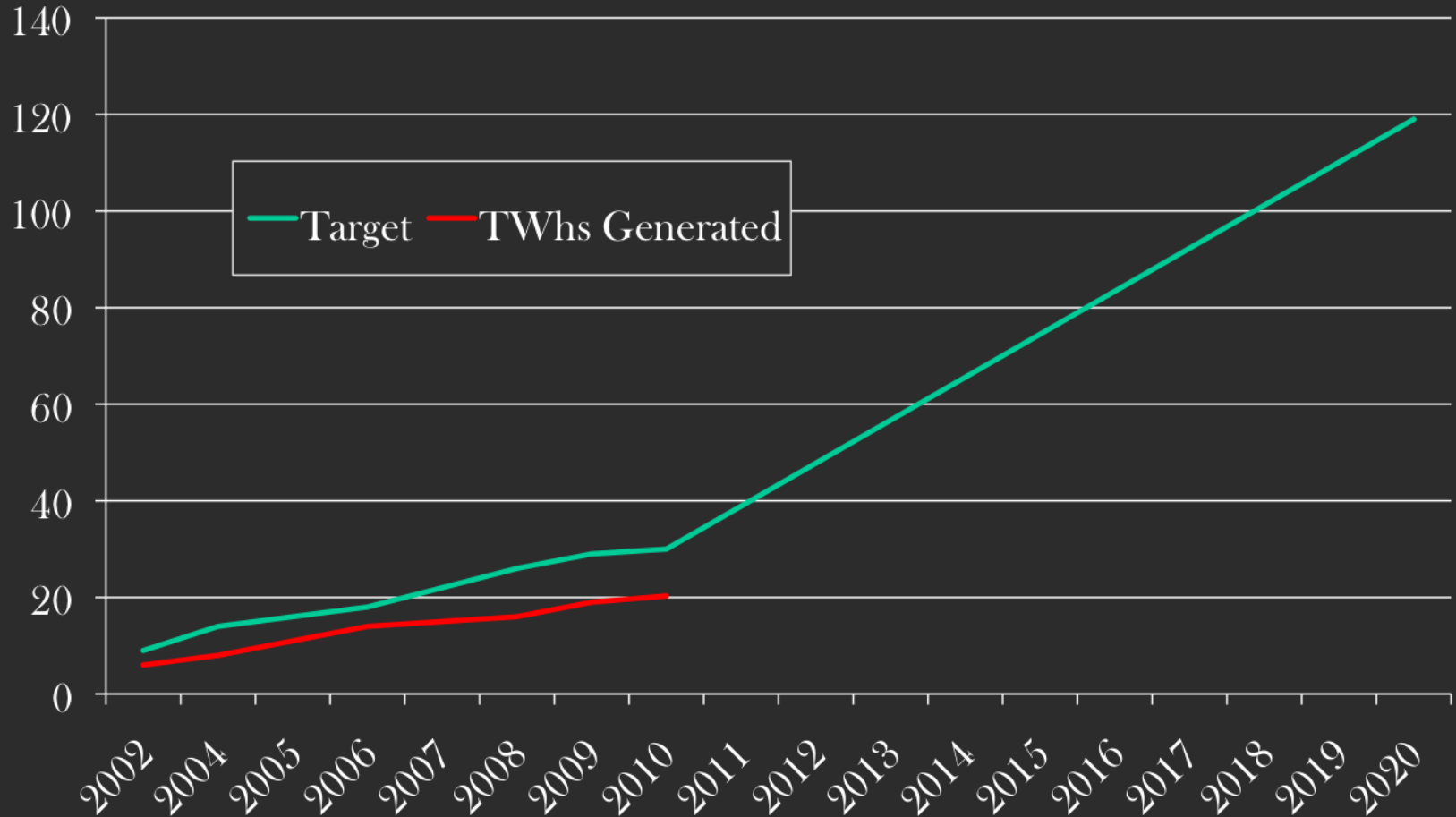
# Relative Costs of CO<sub>2</sub> Reduction: £/tCO<sub>2</sub>

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



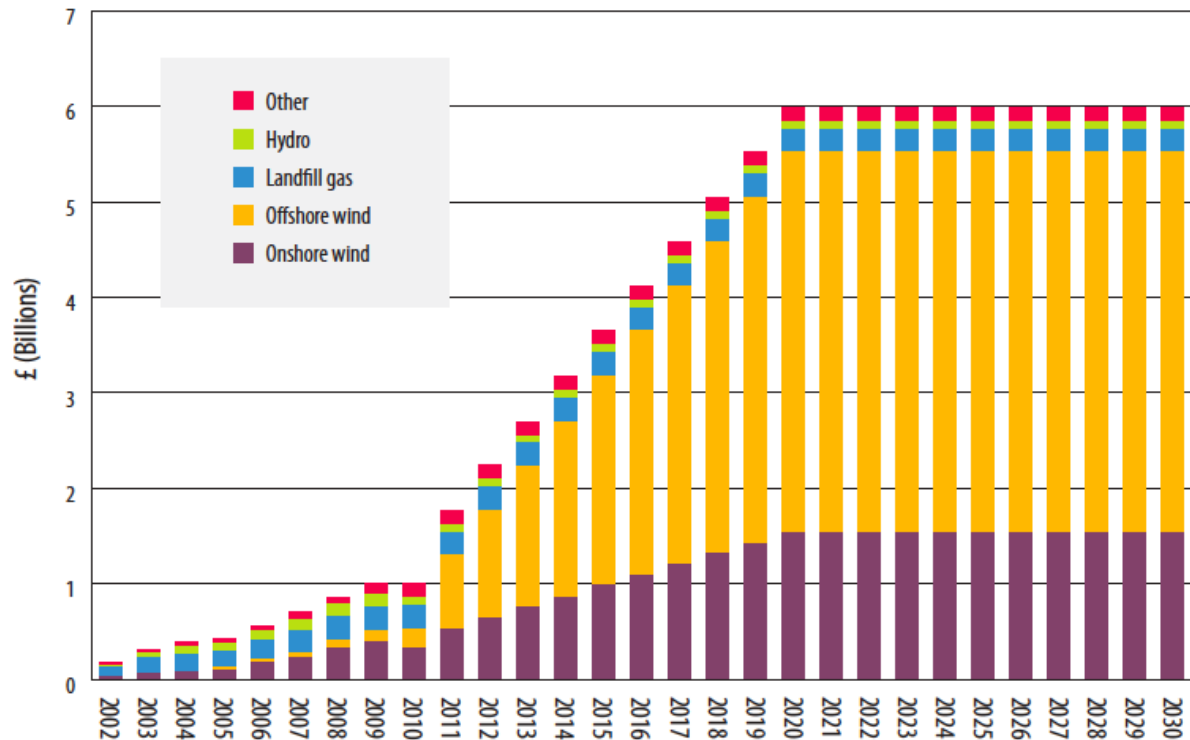
# Progress towards 2020 Targets



Source: Renewable Energy Foundation calculations from Ofgem data

# Cost of Renewable Subsidies: > £6bn a year

Figure 9:2  
Cost and projected cost of the Renewables Obligation to UK consumers



Source: REF calculations from empirical Ofgem data. Projected costs assume a ROC price of £50

Source: John Constable, *The Green Mirage* (Civitas: London, 2011)

## Renewables Obligation: Costs and On-costs

- 2002–2010: £5bn
- 2010–2020: ca. £35bn
- 2020–2030: ca. £60bn
- Total: 02–30: ca. £100bn
- Other system costs... grid expansion, system balancing, support plant at low load factor...

# National Benefits of the Green Economy

“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.”

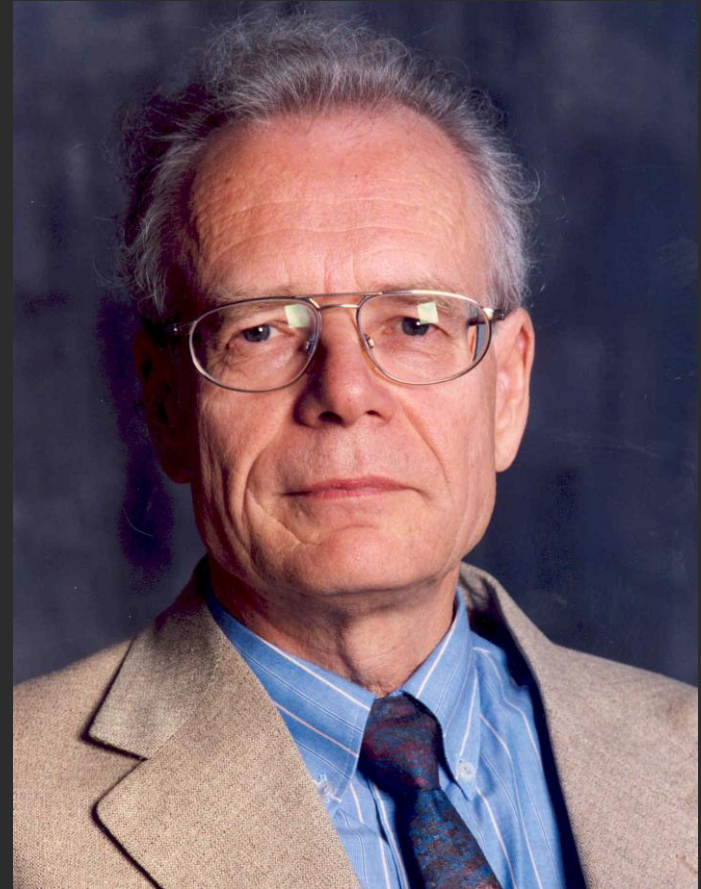
David Cameron  
25.10.10



## 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.



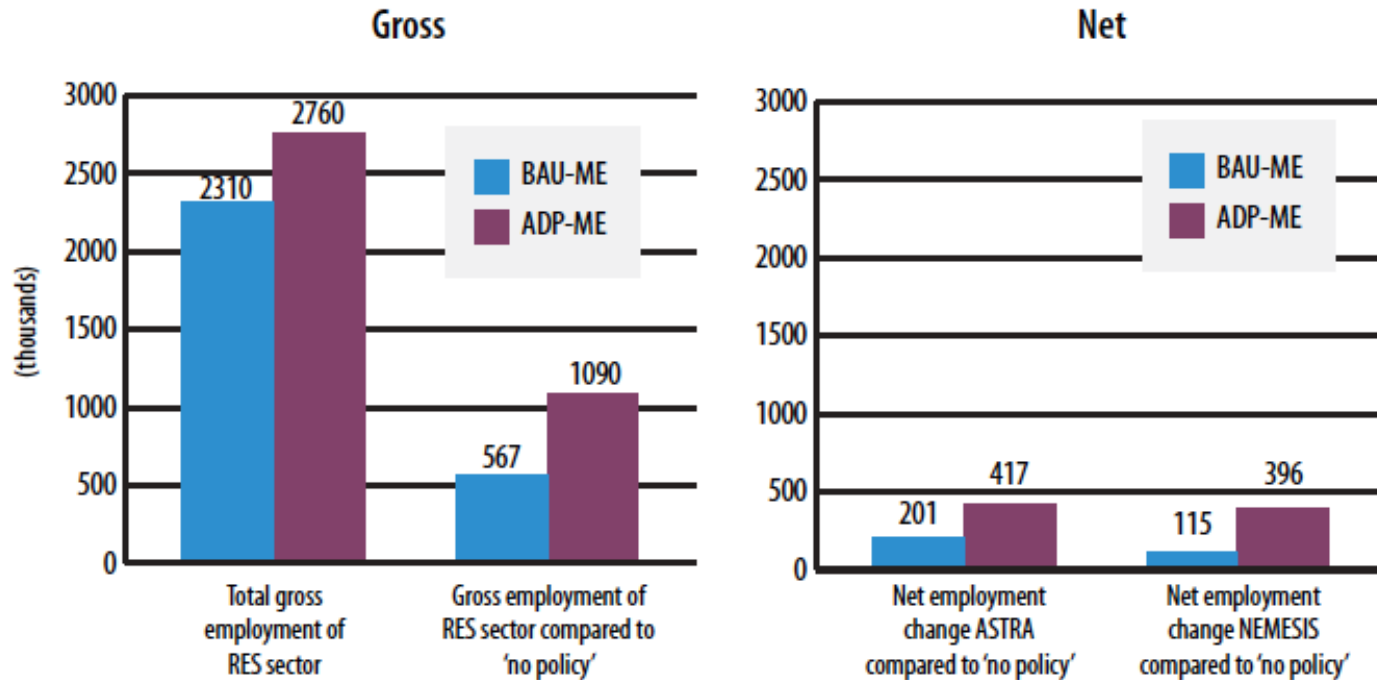
# EU Analysis of the Low Carbon Economy

Fraunhofer ISI, et. al.,  
*EmployRES: The Impact of  
Renewable Energy Policy on  
Economic Growth and  
Employment in the European  
Union*

(27 April 2009)



# Estimated Employment Effects

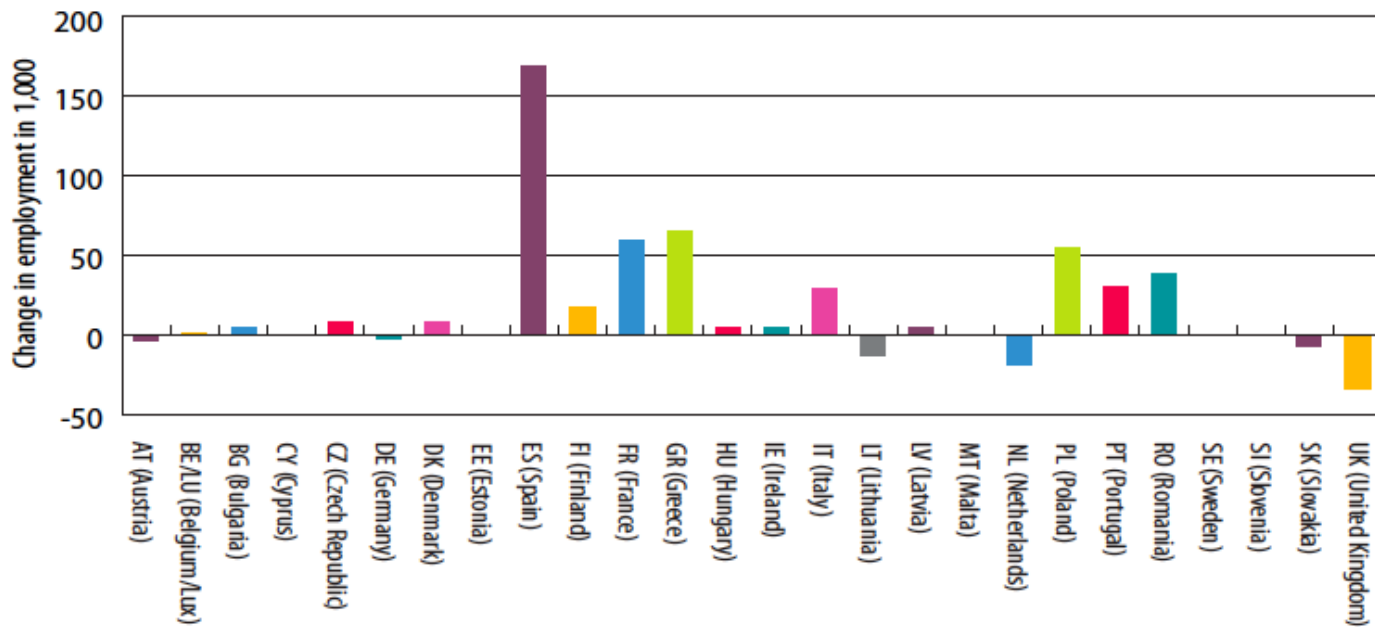


Gross and Net Employment Effects from EU Renewables Policies  
Jobs (1,000s). Source: *EmployRES*(2009)

# Employment Effects on the EU 27 in 2020

Figure 3:7

ASTRA: Change in Employment: Accelerated Deployment Policies and Optimistic Exports (ADP-OE) compared to No Policy, 2020



Source: *EmployRES*<sup>25</sup>



# Subsidy Cost of Wind Industry Jobs in the UK

- RO cost 2002–2010:
  - £5 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)

# Prospects for a Green Economy

- We need lower renewable energy costs and better renewable energy technology
- Mandates and subsidies keep costs high and remove incentive for invention and innovation
- Green economic planning is creating a low productivity energy sector with consequent wealth destruction

# *THE GREEN MIRAGE*

*WHY A LOW-CARBON  
ECONOMY MAY BE  
FURTHER OFF THAN WE  
THINK*

(CIVITAS: LONDON 2011)

## The Green Mirage

John Constable

