Renewable Energy Policies in the UK

Results and lessons learned

Presented by Edith Pike-Biegun ska

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About RAP

RAP is a non-profit NGO providing technical and policy assistance to government officials on energy and environmental issues. RAP is funded globally by several foundations and government agencies.

RAP has worked in more than 25 nations and 50 states and provinces, and is working closely with the European Climate Foundation in Brussels.

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Learn more about RAP at www.raponline.org
Overview

1. Summary of the UK’s goals for renewable energy
2. Overview of 3 main support schemes, 1990 – present
3. Progress and lessons learned
1. The UK’s Goals for Renewable Energy
Goal: ensure that 15% of energy demand is met from renewable sources by 2020 in the most cost effective way

*In 2010, share of RES was 7.4% of gross final electricity consumption; renewable energy accounted for 3.3% of gross final energy consumption (electric, heat, transport)

30% renewable electricity by 2020 – CCC

Higher ambition = need for stronger support mechanism → EMR

Benefits of Renewable Energy

- Energy security (renewable, domestic source of supply)
- Help protect consumers from fossil fuel price fluctuations – diversifying the portfolio
- “Green growth” – drive investment in new jobs and businesses in RES sector
- CO2 reductions
- Reduce conventional air pollution
Focus on 8 Sectors

Mix with greatest potential to help the UK meet the 2020 target in a cost-effective and sustainable way, or offer great potential for the decades that follow:

- onshore wind
- offshore wind
- marine energy
- biomass electricity
- biomass heat
- ground source heat pumps
- air source heat pumps
- renewable transport
2. Support Schemes, 1990-present
3 Main Types of Support Schemes

- **Feed-in-Tariff (FiT)** a fixed guaranteed price at which power producers can sell renewable power into the electric power network.

- **Feed-in-Premium** a fixed premium that is provided on top of the market price.

- **Quota obligations (often with renewable “green” certificate trading)** a requirement that a minimum percentage of electricity sold, generation capacity installed, or electricity purchased be provided by renewable energy.
Use of support scheme types in the EU

Figure 1 summarises the types of support schemes that each Member State uses to support RES.

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Figure 1: Venn diagram of renewable support schemes in the EU. Source: Adapted from European Commission Report: "Renewable Energy: Progressing towards the 2020 target" January 2011. NB: As of 2012, it will be possible to claim FITs or FIPs in Germany.
Criteria in Choosing a Support Scheme

Primary choice should not be whether to choose a quota or fixed price. Rather, the focus should be on:

- Level of Ambition for Renewables in the Mix
- Stability in the Policy Framework
- Design Specifics (to incentivize a mix of resources, encourage competition, discourage gaming, etc.)
- Complementary Policies (interconnection standards, siting rules, energy efficiency)
UK Support for Renewables: Three Distinct Phases

1) **Non-Fossil Fuel Obligation (NFFO)** (1990-1998): competitive auctions to establish a fixed price for output from renewables under long-term contracts, up to a maximum total capacity (MW)
   - *Essentially a “competitively bid” fixed FiT of very limited scope ($)*

2) **“Renewables obligation”** (2002-present): obligation on suppliers to meet minimum % of total MWh sales from renewables, with market-determined price/contract terms

3) **Electricity Market Reform**: from 2014, will introduce new mechanisms to support RES, details under development
   - *FiT Contract for Differences + Capacity market*
# NFFO & RO – basic design characteristics

<table>
<thead>
<tr>
<th>NFFO</th>
<th>RO</th>
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<tr>
<td><strong>Obligation</strong> on 14 newly-privatised regional electricity companies (RECs) to take certain amount of nuclear and renewable electricity</td>
<td><strong>Obligation</strong> on each electricity supplier to meet increasing proportion of supply with renewables – ROCs or ‘buy-out-fund’</td>
</tr>
<tr>
<td><strong>5 rounds of auctions; overall goal increased over time</strong></td>
<td><strong>Increased annually from 3% in 2002-03 to 10.4% in 2010-2011 and 15.6% in 2015-2016</strong></td>
</tr>
<tr>
<td><strong>Payment method</strong> Winners received fixed price per kWh for all output over fixed # years</td>
<td><strong>Payment Method</strong> Price and contract terms negotiated in the electricity market; Renewable generators awarded 1 ROC for each MWh of electricity generated.</td>
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Both systems adjusted over time

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<th>NFFO auction “evolved” to include the following elements:</th>
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<tr>
<td>✓ Technology “bands” (wind; small-scale hydro; sewage gas; landfill gas; municipal and industrial waste; CHP; energy crops; and agricultural and forestry waste)</td>
</tr>
<tr>
<td>✓ Must-take electricity for 15 years</td>
</tr>
<tr>
<td>✓ No penalties for companies that won bid but did not take up the contract</td>
</tr>
<tr>
<td>✓ Subject to cost caps (limited funding)</td>
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<table>
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<th>RO evolved to include the following elements:</th>
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<tr>
<td>✓ “Guaranteed headroom” in establishing targets in response to ROC price “cliff edge” when annual RO target met or nearly met</td>
</tr>
<tr>
<td>✓ “Banding” of the RO--different # of ROCs/MWh by technology (e.g. 0.25 ROCs per MWh for landfill gas; 1.5 ROCs per MWh for regular dedicated biomass)</td>
</tr>
<tr>
<td>✓ Feed-in-Tariff introduced for projects up to 5 MW, since RO of limited benefit to smaller-scale technologies</td>
</tr>
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</table>
Transition from NFFO → RO → EMR

• **NFFO**
  - Initially served to support nuclear power after privatization and expanded to include renewables
  - For each auction, #MWhs, # years specified, with price caps and funding limits

• **RO deployed to**
  - Overcome delivery problems of NFFO
  - Continue to use competition to deliver least-cost solutions
  - Be “technology neutral” (this changed)
  - Require renewables to fully participate in electricity market, albeit with a form of subsidy (reflected in higher energy prices)

• **EMR designed to address the following**
  - Only reasonably well-developed technologies have benefitted from RO, few new entrants into market, and targets/expectations not met
  - Results to date fall short (by about 1/3) of RO targets
  - Renewables today = 7.4% of total electricity sales (2010);
  - Renewable energy: 15% by 2020; 30% of electricity could come from RES by 2020
EMR - Status

• White paper released – July 2011
• Technical update – Dec 2011
• Proposed legislation expected second ½ 2012
• Legislation by spring 2013
• First low-carbon projects supported by 2014
EMR proposals – a four point plan

**Carbon price support**

- Year: 2010–2020
- **£/tCO₂**

**Long term contracts for low carbon generation**

- **Electricity price £/MWh**
- **Annual electricity price**
- **CfD payment**
- **Monthly electricity price**

**Emissions performance standard**

- **Option 1**: EPS set at a level equivalent to 450g CO₂/kWh with specific exemptions for plant forming part of UK's CCS Demo programme

- **Option 2**: EPS set at a level equivalent to 600g CO₂/kWh

**Targeted capacity mechanism**

- **De-rated capacity margin, %**
- **Tendered capacity, %**

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In More Detail

• **Long-term Ks through FiT CfD**
  - Sets price
  - If wholesale elect. price < agreed-upon price, generator will receive top-up payment to cover the difference
  - If wholesale elect. price > agreed-upon price, generator pays surplus back

• To be managed by System Operator
Capacity Market

- Designed to ensure sufficient reliable capacity is available to ensure security of supply in times of stress
- Contracts to ensure reliable capacity is available when needed
- Could include **both generation and non-generation capacity** (e.g. demand response and storage)
Other RES support policies

• FIT for smaller-scale electric generation (April 2010)
• Connect-and-manage – to facilitate connection of renewable electricity to the grid
• Green Investment Bank – offshore wind and biomass likely to be priority sectors
• Possible Renewable Heat Incentive
3. Progress and Lessons Learned
Criteria in Choosing a Support Scheme

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• Complementary Policies (interconnection standards, siting rules, energy efficiency)
Where to from here?

EMR

• UK has significantly raised its ambition for RES, in accordance with EU 2020 targets.
• This has required a fundamental review of RES support mechanisms to determine what’s needed to get to 30% by 2020. Trading ROCs is not excluded as an option.
• It is also important to secure capabilities of system to support higher RES penetration.
• EE is the key to cost containment.
RES Consumption grew 15% between 2008-2009; needs to grow 17% per annum to reach 2020 target.
Extra Slides
Phase-out of RO scheme

Figure 12: Renewables Obligation transition timeline

DECC, *Planning our electric future: technical update*, Dec 2011
Energy Market Reform

• Response to:
  • ambitious decarbonization and RES goals
  • ~1/5 of supply closing over next decade
  • rising demand for electricity with increased electrification of heat and transport
  • prices expected to rise
• “All of these factors give rise to a major investment challenge... The Government is committed to reducing the impact on consumers by making sure that the necessary investment happens in the most cost-effective way. We do not believe that the current market arrangements will be able to achieve this.”

DECC, Planning our electric future: technical update, Dec 2011
*Fuelled sector includes ROCs issued against electricity generated from Biomass, anaerobic digestion, and co-firing

*All under 0.06 percent
How NFFO Design “Evolved” Over Time

- NFFO #1: Essentially cost-plus, each project assessed separately; contract term 8 years or less
- NFFO #2: Contracts awarded on the basis of competitive bidding in technology bands; “strike” or marginal price paid to each contract in the band
- NFFOs #3 to #5: Contracts awarded their bid price, rather than strike price within band, contract term extended to 15 years, “out clauses” introduced

See: The British Electricity Experiment, John Surrey editor (1997), Chapter 8 and The Political Economy of Sustainable Energy, Catherine Mitchell (2010), Chapter 5
Technology Breakdown of 2020 RES Target

Figure 2: Technology breakdown (TWh) for central view of deployment in 2020

<table>
<thead>
<tr>
<th>Technology</th>
<th>Central range for 2020 (TWh)</th>
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<tbody>
<tr>
<td>Onshore wind</td>
<td>24-32</td>
</tr>
<tr>
<td>Offshore wind</td>
<td>33-58</td>
</tr>
<tr>
<td>Biomass electricity</td>
<td>32-50</td>
</tr>
<tr>
<td>Marine</td>
<td>1</td>
</tr>
<tr>
<td>Biomass heat (non-domestic)</td>
<td>36-50</td>
</tr>
<tr>
<td>Air-source and Ground-source heat pumps (non-domestic)</td>
<td>16-22</td>
</tr>
<tr>
<td>Renewable transport</td>
<td>Up to 48TWh</td>
</tr>
<tr>
<td>Others (including hydro, geothermal, solar and domestic heat)</td>
<td>14</td>
</tr>
<tr>
<td>Estimated 15% target</td>
<td>234</td>
</tr>
</tbody>
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UK Renewable Energy Roadmap, July 2011
Figure 4: Estimated levelised cost ranges for electricity technologies in 2010

UK Renewable Energy Roadmap, July 2011
Figure 5: Projected levelised cost ranges for electricity technologies in 2020

UK Renewable Energy Roadmap, July 2011
Generation, by technology

- Solar PV, wave and tidal
- Offshore wind
- Onshore wind
- Hydro
- Thermal renewables (including co-firing)

UK Renewable Energy Roadmap, July 2011
About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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