Green Supply and Additionality

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Contents

A. Ofgem Briefing Questions

Aim: **Statement of the Questions this Presentation Answers**

Ofgem Briefing Questions (1)

- **Q1a: Whether the guidelines should define**
  - which measures are eligible; or
  - just provide a high level definition of additionality and leave the accreditation body to judge which measures meet the definition
- **Q1b: Whether additionality should be based on financial contributions or emissions abated**
  - *Ofgem preferred option:* emissions abated
- ***Q2: Ofgem preferred option*: allow the accreditaton body to determine what measures could be considered to provide additionality**
  - combined with a rating of each measure/activity based on CO_2/GHG emissions abated

Ofgem Briefing Questions (2)

- **Q3: Ways in which our preferred approach could be developed into a robust and objective solution for insertion into the guidelines**
- **Q4: Possible alternative measures of additionality that could be developed into a robust and objective approach**
- **Q5: How we should treat biomass for our carbon intensity rating system, specifically, whether it should be treated consistently with the EU ETS**

B. Fundamentals of the UK Markets for ROCs and Green Electricity

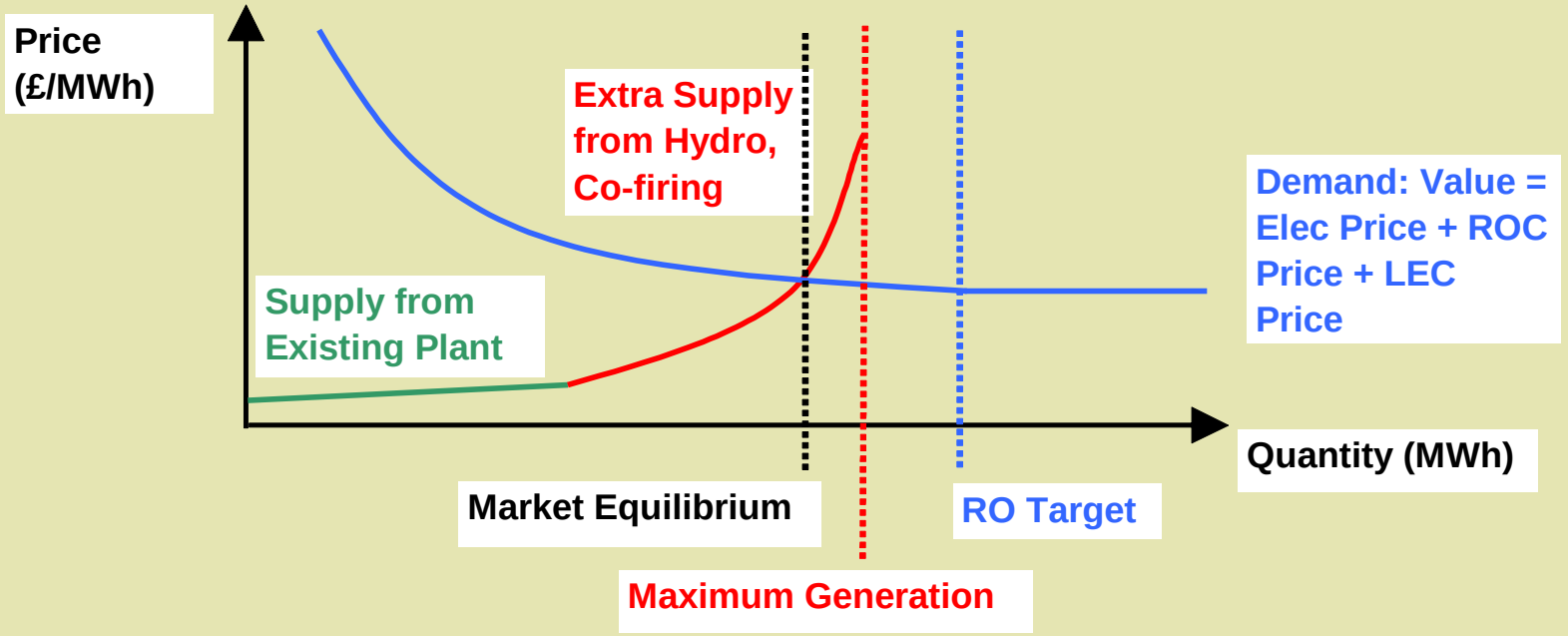
Aim: **To provide context for the discussion**

Fundamentals of the UK Markets for ROCs and Green Electricity

- **Understanding additionality requires an understanding of the markets for ROCs and for Green Electricity**
  - and whether/how they are linked
- **Following 2 slides are based on a continuing situation where RO-eligible generation is significantly lower than the RO target**
  - likely to persist unless there are radical changes to the RO rules or targets and/or the planning system
  - indicative value: 1 ROC + 1 LEC = £50/MWh

ROC Market – Short-Term Equilibrium

- **Little flexibility to alter quantity of renewables electricity generated in the short term (~1 year)**
  - can increase co-firing, refurbish/reclassify hydro



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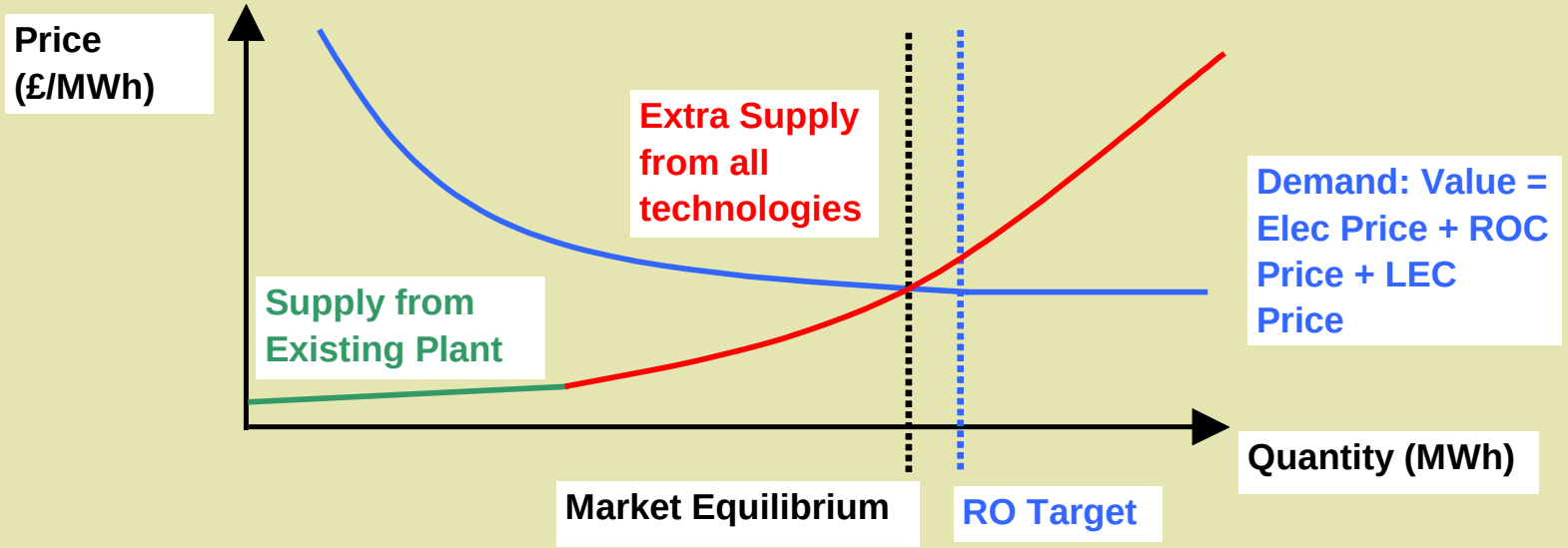
ROC Market – Long-Term Equilibrium

- **Long term allows incremental generation from all renewables technologies**
  - market equilibrium could be closer to RO target



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The Market for Green Electricity – Overview (1)

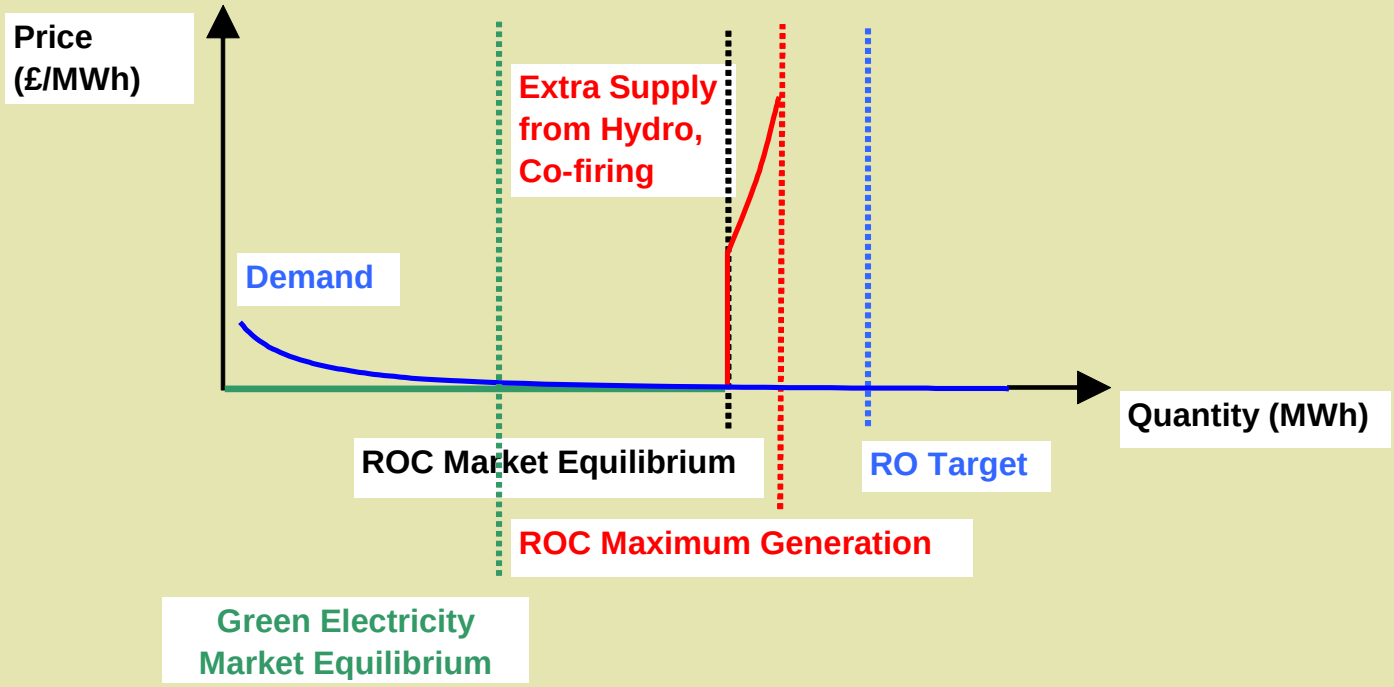
- **2002 Ofgem guidelines to "incorporate an element of additionality" have (largely) not been followed**
  - Market essentially unregulated - hasn't spawned a common/agreed approach to additionality
    - Green offerings driven by marketing rather than standards
- **Customers' understanding of what they are buying is often radically different from the reality**
  - additionality is a key component of this – customers think they are making "an additional and positive contribution"
    - generally believe that every kWh of green electricity they buy is from 1 kWh of additional renewables generation
  - ERM experience: consumers find it difficult to understand the concept of additionality
    - very few then understand how it can be quantified
- **Transparency won't solve this problem – need guidance and/or rules**

The Market for Green Electricity – Overview (2)

- **The market for green electricity is categorised by**
  - consumers who wish to spend a small premium on electricity which they consider ‘green’ or in some way ‘greener’ than the alternatives
    - relatively few consumers willing to pay a significant premium for green electricity
  - (majority of suppliers) “slicing and dicing” their generation to sell on their RO-eligible generation to consumers who demand green electricity
    - and are willing to pay a small premium for it

Market for Green Electricity - Short-Term Equilibrium

- **Market has generally settled below RO-eligible generation quantity**
- **Price far lower than cost of generating additional renewables**
  - Could be step change if demand > supply of RO-eligible generation
- **ROC and Green Electricity Markets are essentially separate**
  - links between them indirect at best



The Market for Green Electricity – Customer Requirements are Changing

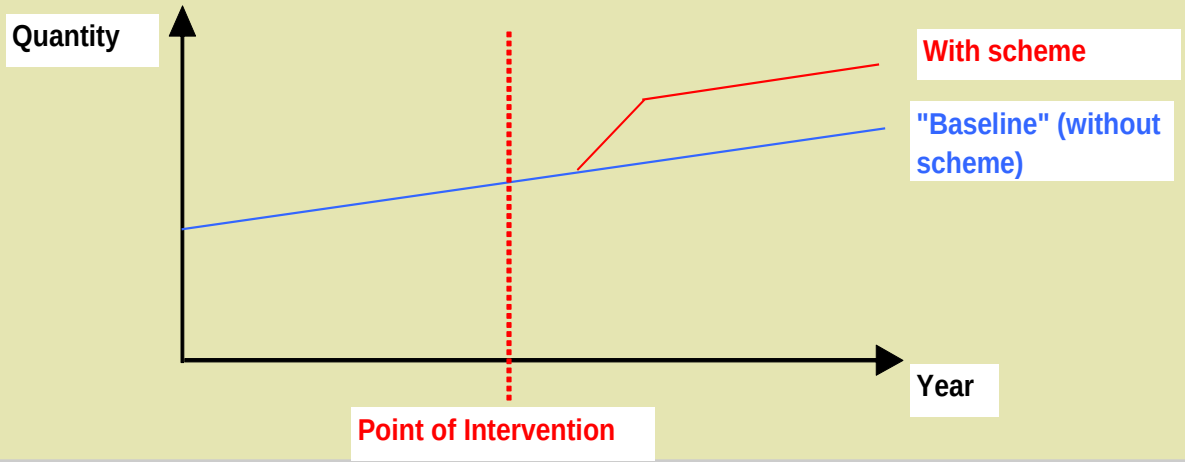
- **Now seeing a supply shortfall in the green electricity market**
  - suppliers are reacting by limiting supply rather than radically increasing the prices they charge
- **Market is sustained/driven by Corporate Social Reporting and "carbon neutral" claims**
  - Defra allows purchase of green electricity to attract zero emissions
    - electricity is the key GHG emissions source for many organisations
- **Some customers are increasingly questioning what they are getting from buying green tariffs**
  - becomes very clear when they compare the costs of developing their own capacity with the cost of buying green tariffs
- **Various stakeholders becoming much more sophisticated in their understanding and wish to see real additionality**
  - e.g. local and regional authorities
  - Advertising Standards Agency has ruled against some green claims

C. Economic Approach to Defining Additionality

Aim: **Can a precise definition be derived from economic principles?**

Definitions of Additionality

- **Views widely held that there are 3 indicators of additionality**
  1. incremental renewable generation
  2. incremental investment in renewable capacity
  3. incremental other environmental benefits
- **Need to know period over which additionality would occur**
  - probably starting one or more years in the future
- **As with all analogous issues, defining the baseline is difficult**



Fundamental Questions

- **Additionality recommendations are extremely high profile**
  - likely to be subjected to rigorous challenge from certain stakeholders
  - an objective, evidence-based analysis preferable
- **There are two fundamental questions to be answered**
  1. **Short-Term**: On what basis can consumers claim that the electricity they buy from the existing set of electricity plants is sourced from a specific subset of plants?
     - What are the opportunities for customers to change the mix of existing plants used?
  2. **Longer-Term:** How do today's purchasing decisions change tomorrow's generating mix? By how much? When?

Short-Term Considerations

- **Current contracting arrangements for electricity purchase directly link production source(s) to consumer**
  - REGO system formalises the arrangement
- **However there is little opportunity for extra renewables generation in the short term**
  - whatever the price signal or demand from the market
  - only co-firing and hydro refurbishment/ reclassification offer significant, short-term incremental generation
- **The longer term is the key timescale for changing the generation mix**

Longer-Term Considerations

- **Need to ascertain what additional impact premia for green electricity would have on the generation mix**
  - compared to a “business as usual” baseline
    - which includes the RO
- **Only viable approach is to use power system planning**
  - which projects what set of plants should meet electricity demand in the future, subject to a set of constraints and inputs including
    - lowest system cost
    - system reliability level
    - policy (economic and environmental)
    - GDP, energy prices and carbon regulation/market(s)
- **Very significant uncertainties at all points in the analysis**
  - and these uncertainties increase as we look further into the future

Conclusions

- **There is no economic approach which will allow us to define additionality to any reasonable level of precision**
- **Implies we need something practical and workable**
  - theoretical gives guidance only
  - thus we are looking at a second best solution
- **One key aspect is that the approach must give scale**
  - if I buy 1 kWh of ‘green’ electricity would 1 kWh of additional green electricity be generated? Or 0.1? Or 0.01? Or 0?

D. Review of Ofgem's "Measures to Define Additionlity"

Aim: **Individual discussion of 6 Options before drawing analysis together in next Section**

Measures to Demonstrate Additionality – General Comments

- **Ofgem Briefing Note to Consultants includes 6 measures**
- **All are underpinned by the need to define and quantify additionality**
  - without this, there is no real means of comparison
- **Other key principles (must-haves; all measures)**
  - transparency
  - good, tightly-defined guidance
- **Need to bear in mind that we are talking about renewables only**
  - as soon as other effects (e.g. carbon offsets) are linked in, the picture becomes confused for both the customer and for policy
    - UK climate policy is a series of initiatives which are essentially designed to act separately and contribute to a whole

Measures (1): ROC Retirement

- **Does provide some long term incentive to developers of RO-qualifying schemes**
  - But *marginal* in nature – the incentive is already very strong to develop such schemes and is constrained by planning, site availability, technology availability, etc.
  - Clearly uncertain (no guarantee that ROC retirement now will continue in the future)
    - but many other elements of the market (e.g. price of ROCs) also exhibit major uncertainties
- **Banding makes very little difference – novel technologies are a tiny fraction of RO generation**
  - the RO is not an effective instrument for Research, Development and Demonstration for novel technologies
    - other support (e.g. capital grants) are needed
- **ROC Retirement should be seen simply as a gesture of good faith with very little, if any, contribution to additionality**

Measures (2): Centrally Administered 'Green' Fund

- **Note that a centrally administered green fund exhibits many similar properties to the RO**
  - i.e. all consumers pay to increase renewables generation
  - if it only invested in schemes cost-effective under the RO, how would it differ from the RO?
- **If it concentrates only on additional activities it could become more of a novel technology seeder**
  - interesting as the RO doesn't do this very effectively
- **Setting up and running such funds is at a relatively early stage and much is unproven**
  - would be difficult to scope the fund and to pick one organisation to run it

Measures (3): Decentralised 'Green' Funds

- **There are already several of these in the market**
  - they vary widely in scope and in additionality
- **No reason why their performance could not be subject to the same additionality assessment criteria as direct investments in renewables**
  - a fund is just investment one step removed
  - would need to give predicted impacts at beginning of fund and move to recorded impacts as fund matures
- **Funds allow easy inclusion of other environmental benefits**

Measures (4): A transparency option

- **Attractive as it is a minor deviation from the current RO scheme/green electricity market**
  - essentially we are just adding in (much) better guidance for consumers
- **Customer demand for better, common information a key driver**
  - was originally supplied by Friends of the Earth (League Table) and now by Energywatch
  - Much better if it came from Ofgem directly
    - control of factors, their discussion and weightings between them
- **No reason why the additionality concept needs to be absent**
  - Ofgem could stipulate that there must be transparency to include a minimum set of criteria, one of which is additionality
- **Transparency must be included whatever measure is selected**

Measures (5): The Hybrid approach

- **A very firm measure – price control has not been part of Ofgem's green market activities at all to date**
- **Many procedural difficulties**
  - importantly to define a premium we must define a baseline (no premium) cost
    - the baseline is subject to interpretation
    - and relies on information and judgements which only the supplier has/will ever have full access to
- **If additionality is defined, seems better to allow the customer to decide how much they are willing to pay for it**

Measures (6): Other measures

- **The majority shown include links to other methods of carbon abatement in some form**
- **While it is clearly attractive for the UK to "join up" carbon abatement policy, the RO could become significantly distorted**
  - RO prime aim is to develop renewables, not to abate carbon
    - also contributes to security of supply, sustainable development, etc
  - RO is UK response to various EU targets which are specific to renewables
- **How the RO should play a role in UK Climate Change policy is a discussion that should take place outside the RO**
  - not by an internal, indirect discussion by allowing other forms of carbon abatement into the scheme
- **No reason why suppliers could not market their schemes on the basis of carbon abatement from technologies other than renewables**
  - noting that their additionality in this case would be zero

E. Responses to Ofgem Briefing Questions

Aim: **Responses, focusing on practical additionality measures and pros and cons**

Q1a, Q2 - Overview

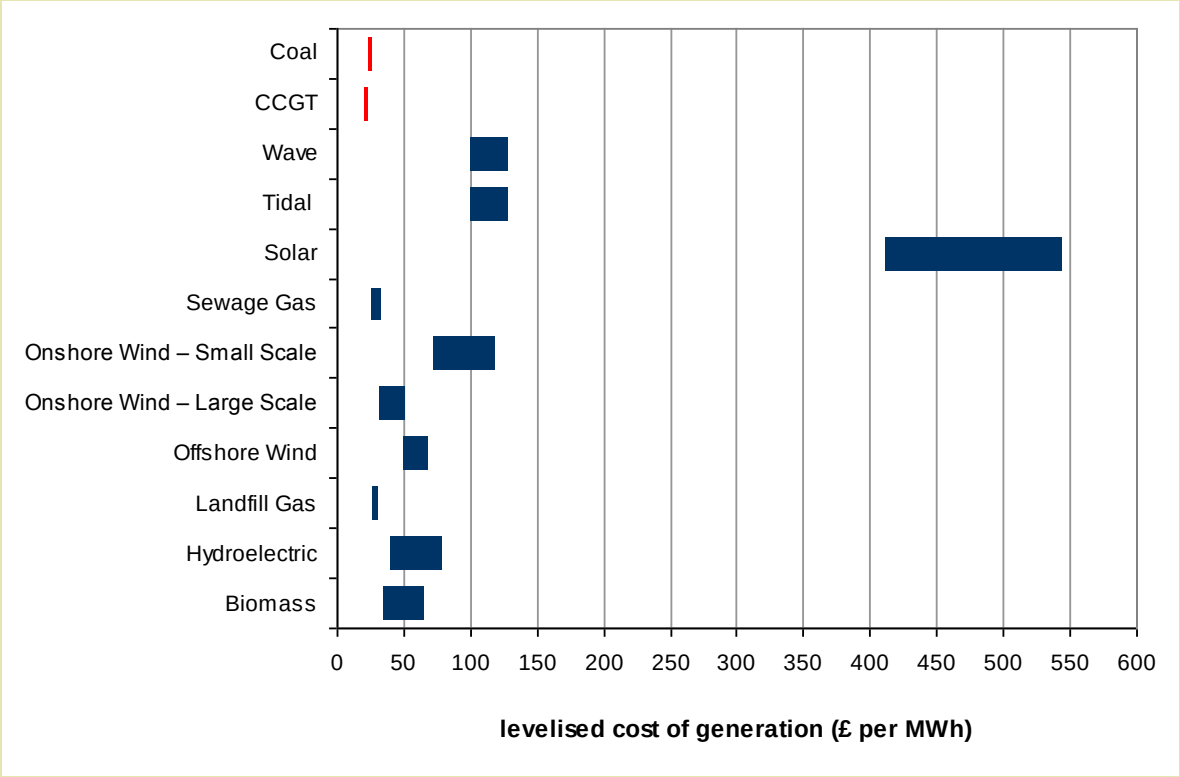
- **Q1a: Whether the guidelines should define**
  - which measures are eligible; or
  - just provide a high level definition of additionality and leave the accreditation body to judge which measures meet the definition
  - *Q2: Ofgem preferred option*: allow the accreditaton body to determine what measures could be considered to provide additionality
    - combined with a rating of each measure/activity based on CO_2/GHG emissions abated
- **General ERM Reponses:**
  - Q1a: who decides what is additional is not the key issue – the more fundamental issue is how additionality will be quantified
  - Q2: the quantity of additional renewables generated is the key metric
    - without life cycle assessment, all renewables are carbon neutral
      - » see response to Q5 for detailed Biomass considerations

Possible Quantification of Additionality

- **The incentive provided to renewables generation by the RO dominates UK renewables**
- **Simplest definition of additionality is incremental renewables generation above what would have happened under the RO**
  - noting that this will be low in scale compared to RO-eligible generation
    - almost certainly in the range 0-10%
- **ERM recommend a very simple approach**
  - technologies which are not cost-effective under the RO are additional
  - technologies which are cost-effective under the RO are not additional
- **This approach was developed for ERM clients wishing to make their electricity supply more additional**

Levelised Costs of Renewables Generation

- **Simple, relatively uncontroversial analysis shows cost-effective technologies**
  - those with generating costs < £80/MWh
    - = £30/MWh for wholesale electricity + £50/MWh for ROC + LEC



Source: ERM, Oxera, Enviros, various

Note: capital costs refer to on-site costs only; requirements for grid connection and reinforcement, etc. are not included.

Technology	Sub-Category	Included in DTI's Official UK Energy Statistics?	Eligible under the EC Renewables Directive?	Generate REGOs?	Eligible under Renewables Obligation?	Generation likely to be Additional under RO?
Solar PV		✓	✓	✓	✓	✓
Wind[1]	Micro (1-10 kW)	✓	✓	✓	✓	✓
	Small (10-50 kW)	✓	✓	✓	✓	✓
	Medium/Large (>=50 kW)	✓	✓	✓	✓	×
	Total	✓	✓	✓	✓	✓/×
Wave		✓	✓	✓	✓	✓
Hydro[2]	Small-Scale	✓	✓	✓	✓	✓
	Large-Scale – refurbished	✓	✓	✓	✓	×
	Large-Scale – unrefurbished	✓	✓	✓	×	×
	Total	✓	✓	✓	×	×
Geothermal		✓	✓	✓	✓	✓
Biomass	Sewage Gas	✓	✓	✓	✓	×
	Landfill Gas	✓	✓	✓	✓	×
	Co-Firing	✓	✓	✓	✓	×
	Other	✓	✓	✓	✓	×
	Total	✓	✓	✓	✓	×
Energy from Waste	Biodegradable fraction only	✓	✓	✓	×	×
	All Waste input	×	×	×	×	×
	Total	×	×	×	×	×
CCL-exempt imports[3]		×	✓	✓	×	×
TOTAL						

- **Small list of technologies additional**
  - Solar PV
  - Micro/small Wind
  - Wave/Tidal
  - Small-scale Hydro
  - Geothermal
  - Some advanced Biomass/Waste

1 Definitions for Wind Sizes taken from London Renewable Energy Toolkit, Faber-Maunsell for GLA
2 Large-scale Hydro defined as >20 MW DNC Capacity (Renewables Obligation definition). Definition of 'Refurbished' should also be consistent with the Renewables Obligation
3 Understood to be currently only French hydro, imported via the inter-connector
4 Renewable Guarantee of Origin certificates, from the Electricity (Guarantees of Origin of Electricity Produced from Renewable Energy Sources) Regulations 2003 (implemented by the UK in response to EU Directive 2001/77/EC)

Key Issues

- **The technology-based approach can be applied to any measure of additionality**
  - e.g. does a fund ultimately invest in the additional technologies or not?
- **The other key additionality issue is whether certain activities could claim additionality for options cost-effective under the RO if they made additional sites available for renewables schemes**
  - simplest answer is “no”
    - it is a market issue and RO already provides incentives
    - and planning system change is outside the scope

Other Ways to Quantify Additionality

- **Difficult to think of ways to quantify additionality other than the technology approach**
  - a simple, but less convincing, alternative is to calculate the funding going into a supplier's scheme and divide it by a given value to ascertain additionality
    - e.g. if an incentive of £50/MWh is needed to incentivise extra generation, divide fund income by £50 to calculate additionality
  - There are standards and protocols (e.g. Eugene) but these do not adequately take account of the specifics of the UK scheme (domination of the RO)
    - such standards can also be difficult to implement practically

Q1a, Q2: Summary of ERM Responses

- **Q1a: Ofgem should provide the definition of additionality**
  - much preferred if this is based on a definitive, quantifiable approach (e.g. *"technologies not cost-effective under the RO"*) than on something more high level (e.g. *"additional to renewables generation which would have occurred under the RO"*)
  - accreditation body would then "turn the handle" to perform mechanistic verification against Ofgem's criteria
- **Q2: No need to rate CO_2/GHG abatement**
  - assume all renewables are carbon-neutral until outside world decides otherwise - RO not the instrument for change
    - see response to Q5

Q1b (1)

- **Whether additionality should be based on financial contributions or emissions abated**
  - *Ofgem preferred option:* emissions abated
- **ERM Response – Neither; the key measure is the quantity of renewable electricity generated**
  - this is the core purpose of the RO
    - any movement away from this core purpose will reduce economic efficiency
  - unless we use life cycle analysis then renewables are homogenous (they are all carbon-neutral) so there is no need to include emissions

Q1b (2)

- **Issues relating to carbon abatement were reviewed in the discussion of the "Other Measures" Ofgem option**
  - this slide is repeated as the next slide
- **Difficult to support financial contributions - their additionality impact is so uncertain**
  - see earlier reviews of ROC retirement
  - see also the idea of dividing financial contributions by some value (e.g. £50) to get a rough indication of potential additionality
    - a very blunt instrument at best

Copy of Measures (6): Other measures

- **The majority shown include links to other methods of carbon abatement in some form**
- **While it is clearly attractive for the UK to "join up" carbon abatement policy, the RO could become significantly distorted**
  - RO prime aim is to develop renewables, not to abate carbon
    - also contributes to security of supply, sustainable development, etc
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- **How the RO should play a role in UK Climate Change policy is a discussion that should take place outside the RO**
  - not by an internal, indirect discussion by allowing other forms of carbon abatement into the scheme
- **No reason why suppliers could not market their schemes on the basis of carbon abatement from technologies other than renewables**
  - noting that their additionality in this case would be zero

Q3, Q4 (1)

- **Q3: Ways in which our preferred approach could be developed into a robust and objective solution for insertion into the guidelines**
- **Q4: Possible alternative measures of additionality that could be developed into a robust and objective approach**
- **Earlier response to Q1a stated that ERM's experience was that a technology-based approach was the best way forward**
  - this would be very easily developed into a set of transparent guidelines
- **ERM believe all other solutions are both less effective and more difficult to define/implement**

Q3, Q4 (2)

- **Whatever solution is chosen, must be transparent with detailed guidelines. Key characteristics to include**
  - fuel mix of electricity supplied
    - in as much detail as possible, e.g. size of wind scheme, type of biomass consumed
    - must define those sources which are RO-eligible but which some consumers do not wish to support
      - » particularly imported electricity, co-firing, large hydro
      - » the RO's definition of what qualifies as renewables is at odds with some consumers' wishes

Q3, Q4 (3)

- **Whatever solution is chosen, must be transparent with detailed guidelines. Key characteristics to include (continued)**
  - a series of FAQs (Frequently Asked Questions), e.g.
    - what is the RO and how does it work?
      - » it dominates the UK market
      - » all customers pay for it through their electricity bills
        - › and are thus already making a significant contribution to developing the UK's renewable generation capacity
      - » targets already considered by many to be ambitious
      - » how do suppliers benefit from the RO?
      - » does the RO support novel technologies?
    - how will my signing up to this tariff affect what renewables are generated now and in the future?
      - » i.e. additionality expressed in less esoteric terms
    - what is 'green' electricity and how does the market for it work?

Q3, Q4 (4)

- **Note that any definition of additionality will almost certainly be applicable to only a very small fraction of renewables generation going forward**
  - Enforceable additionality rules could radically alter the green electricity market
    - but this would not appear to be a problem of any import
  - Would readily allow like-for-like comparisons to organisations considering building their own renewables generation
- **A radical alternative would be to prohibit sales of green electricity**
  - and argue that all customers could claim the share of RO-eligible generation in the UK mix
  - would lead consumers to focus on getting higher RO limits/ implementation if they want renewables generation to increase

Q5: Biomass and Carbon Intensity (1)

- **ERM firmly against the use of life cycle analysis emissions factors for biomass**
  - if use LCA for one fuel source, must use it for all
    - note for example emissions from land use (e.g. peat) disturbance and deforestation for some wind farms, PV production energy inputs, hydro reservoir GHG behaviour all very complex
  - there are no robust, recognised emissions factors for full life cycles
    - there is no off-the-shelf Protocol
      - » WBCSD has plans to start development of a Protocol but this is several years from finalisation
    - there is also significant site/scheme variation within a technology type
      - » e.g. distances of fuel collection, processing technology

Q5: Biomass and Carbon Intensity (2)

- **Analysis suggests only project-specific GHG emissions assessment would be robust**
  - i.e. with similarities to the Clean Development Mechanism (CDM) of the Kyoto Protocol
    - note that the CDM Executive Board has ruled on what renewables it considers to be carbon-neutral
  - such a project-based method would be highly burdensome
    - in terms of monitoring, verification, administration
- **It is not possible to do apply 'simple' biomass life cycle emissions factors**
  - choice is rather to either do a full, project-specific analysis or to use direct emissions factors only

Q5: Biomass and Carbon Intensity (3)

- **The current debate on life cycle emissions for biomass is centred on biofuels for transport**
  - Importantly, it includes issues relating to competition between biomass growth, food production and land use
- **Biomass for electricity generation has not yet been fully included in this debate, but could be**
- **Nevertheless, ERM do not believe that the RO is an appropriate forum to play out the debate in the UK**

Q5: Biomass and Carbon Intensity (4)

- **European policy is in general very supportive of biomass for all uses**
  - e.g. January 2008 revisions to the EU ETS Monitoring & Reporting Guidelines retained biomass' carbon-neutral status and added more forms to the biomass list
- **This does not mean that REGOs and ROCs have to follow exactly the same definition**
  - e.g. there are differences in treatment of organic/inorganic mixtures
- **ERM recommend that biomass emissions factors are based on direct emissions only and conform as closely as possible to EU definitions**
  - but that fuel mix disclosure is as detailed as possible
    - consumers are already/will wish to make decisions on what they consider to be 'good' and 'bad' biomass