
CUSC AMENDMENT PANEL

Environmental Standing Group Final Report to the Panel

1. Summary and Recommendations

1. This report summarises the work and findings of the CUSC Environmental Standing Group. The Group, which includes invitees from other code panels covering the gas and electricity industry, has considered the issues affecting the assessment of carbon costs following Ofgem's guidance that such costs should be included within the assessment of Code modification proposals.
2. In summary, the Group's final conclusions are:
 - The assessment of carbon costs envisaged by Ofgem as part of the change assessment process, and detailed in Ofgem's final guidance, is achievable.
 - The carbon costs calculated should feed into any wider cost benefit analysis being undertaken as part of the assessment process.
 - A broader assessment than that envisaged by Ofgem under the 'network operation' code objective may be achievable by using the more general code objective that refers to efficient discharge of the relevant licensee's activities.
 - Whilst we have developed a number of practical examples and have identified some general principles, the assessment of proposed changes will vary on a case-by-case basis.
 - A large body of standard data and conversion factors exists, particularly on the DEFRA website, which should be utilised by the Panel and Working Groups to aid and ensure a consistent approach across the industry.
 - Finally, notwithstanding a large body of work to support the analysis, the assessment of carbon costs will be as complex as any other forecast cost benefit calculation.
 - As with all forecasts, it will be significantly affected by the assumptions made as part of the calculation.
 - These assumptions will need to be transparently set out for each assessment to ensure industry consultation on the assessment is full and effective.
3. The Group recommends that:
 - the guidance contained within or referenced by this report is used by subsequent CUSC Working Groups to help their assessment of carbon cost impacts;
 - this report is shared with other code panels for the same purpose.
 - the Group continues to meet at appropriate intervals to share best practice and review the development of guidance.

2. Background

4. This Standing Group was established in response to an Ofgem letter of the 15 April 2008 to consider the issues raised by the assessment of carbon costs and provide a body of work in relation to carbon cost assessments that would serve as guidance and advice to future modification assessment Working Groups. Further to this initial letter, Ofgem issued its final guidance in a letter of 30 June 2008.

5. Given the cross-industry need to consider these issues, the CUSC Panel, through the chair, invited other Code Panels to join the Standing Group, with the aim that a pan-industry discussion may help to avoid duplication of development work and provide a more consistent approach to carbon costing across the industry. This invitation was taken up by the Balancing and Settlement Code (BSC), the Distribution Connection and Use of System Agreement (DCUSA), the Distribution Code, the Grid Code and the Uniform Network Code (UNC).
6. The scope and objectives of the Standing Group and details of the group's membership are set out in the terms of reference contained in Appendix 2. In summary, the objective of the Group was to establish common principles and guidance on the treatment of carbon costs under the current industry code objectives. In doing this, the Group should identify the implications of Ofgem's guidance and develop practical examples of carbon cost assessment using past and present code modifications.

3. Summary of the Standing Group discussions

Ofgem's guidance and the Relevant Objectives

7. The original guidance issued by Ofgem in its letter of the 15th April 2008 raised issues and concerns which were noted by the Group. Ofgem's final guidance, issued on 30th June 2008 addressed a number of these issues and formed the main basis of the Group's discussions.
8. The Group has reviewed the implications of Ofgem's guidance of 30th June 2008. The guidance indicates that carbon costs could be considered under the 'efficient and economic operation' code objective. It should be noted that this reference refers primarily to "relevant objectives" in the BSC in electricity and UNC in gas that relate to the 'operation' of the networks. This reflects the nature of the BSC and UNC in providing rules for facilitating balancing of the system and the balancing role the System Operator takes under these codes.
9. Given that carbon costs are economic costs, the Group concluded that it was also appropriate to consider the assessment of carbon costs under other code and licence objectives that cover the activities of the relevant licensee. The BSC, CUSC and UNC all have a similar objective that covers a very broad category and which refers to the 'efficient discharge by the licensee of obligations imposed on it by the relevant licence'. For example, the carbon cost benefits derived from the early connection of renewables generation are not necessarily linked explicitly to the subsequent 'operation' of the system. Instead, the early connection of renewable generation can be considered to be more closely associated to system access and the co-ordinated planning and construction of the system rather than the subsequent operation of the system.
10. The Group considered that it may be possible to consider the impact of carbon costs under this broader code objective and, in doing so, take into account carbon costs that are not directly related to a tight definition of 'operation' of the system. Such considerations become particularly important when a balance needs to be struck between the achievements of one objective against another. This is often a characteristic of code change evaluation by Panels and Working Groups.
11. It was also noted that the guidance does not specify the type of code changes which should prompt a carbon cost assessment. The Standing Group agreed with Ofgem's guidance that it was for Panels to decide the appropriateness and scope

of carbon cost assessment to be undertaken. Panels may do this by setting the terms of reference for the analysis or by making reference to the opinion of the Working Group.

12. In summary, the key conclusions of the Group in reference to Ofgem's final guidance are:

- Ofgem's guidance of 30th June 2008 provides a clear basis from which to assess the impact of code changes on carbon costs.
- As carbon costs are economic costs, it is also appropriate to consider the assessment of carbon costs under other code and licence objectives, beyond the 'network operation' example identified in Ofgem's guidance.
- The appropriateness of undertaking a carbon cost assessment needs to be determined by the Panel when setting the terms of reference for a Working Group.

Wider Policy

13. There is a broad policy and funding framework that supports the development of renewable generation. To better understand how the costs of carbon are treated within the energy supply chain the Group has reviewed some current environmental regulatory requirements and funding mechanisms. These include Renewable Obligation Certificates, the EU Emission Trading System and other mechanisms such as Renewable Energy Guarantees of Origin.

14. The Group has identified that carbon is already priced into a number of energy costs, in particular via the EU ETS. In such cases a carbon cost can be identified and costed, but caution is required when summing these costs with other economic costs to avoid double counting the carbon costs element.

15. The Group has also reviewed Schedule 9 of the Electricity Act which contains certain environmental duties applicable to National Grid Electricity Transmission. These duties refer primarily to duties to comply with, for example, other environmental legislation and are not necessarily pertinent to a carbon cost assessment.

16. A summary of the key elements of renewable energy funding and policy was provided to the Group by Ofgem see appendix 5 for a copy of the slides.

- Renewable Obligation Certificates (ROC's) are issued by Ofgem to renewable generators. Licensed electricity suppliers are required to purchase a certain amount of renewable electricity or pay a buyout. ROC's provide a mechanism for suppliers to prove the amount of renewable electricity purchased.
- EU Emissions Trading Scheme is a Europe wide trading scheme which puts a price on carbon that businesses use and creates a market for carbon.
- Shadow Price of Carbon (SPC) values the increase or decrease in emissions of greenhouse gas emissions resulting from a proposed policy. SPC captures the damage costs of climate change caused by each additional tonne of greenhouse gas emitted, expressed as carbon dioxide equivalent (CO₂e) for ease of comparison.

- Treasury Green Book describes how the economic, financial, social and environmental assessments of a policy, programme or project should be combined.

4. General Approach to carbon cost assessment

17. The Group discussed a number of example assessments. The slides for these are provided in Appendix 1. The examples considered by the Standing Group are as follows:
 - Advancement of connection of renewable generation (as part of assessment of CAP164 “Connect and Manage”¹);
 - Changes to Grid Code minimum standards currently being developed for Reactive Power and ‘Rated MWs’;
 - Several example code changes illustrating assessments for:
 - potential impacts of micro-generation;
 - potential changes in the operation of Gas Transmission Compressors;
 - potential impacts of smart metering ;
 - A paper by E.ON Central Networks on loss comparisons.
18. The first and second of these are live changes currently undergoing or about to undergo parallel assessment under the relevant code. The others are examples based on current, recent or anticipated changes to the codes or framework.
19. Consideration of these examples highlighted the likely complexity of some of these assessments and the need to ensure that assessments focus on an appropriate and relevant level of detail and forecasting.
20. The Group discussed whether or not proposers of amendments should be required to state if their proposals have environmental implications. It was concluded that the purpose of calculating the carbon costs associated with the proposals should be on an equal footing as other associated costs, forming part of a general cost benefit analysis. Therefore, proposers of amendments would be free to mention carbon benefits when submitting their proposals in a similar manner as they would mention other relevant effects, such as the impact on customer charges. However, it would be inappropriate to prioritise the environmental implications over and above other considerations in the formal amendments process.
21. Nevertheless, the Group considered that it may be helpful if, initially, the Panel were reminded to consider whether not a carbon costing exercise was required when setting the terms of reference for a Working Group. In due course it would be expected that this would become standard procedure and that an explicit reminder would not be required.
22. The Group concluded that, as with any financial or technical assessment, there was no single standard calculation of carbon costs that should be applied. Despite this, the Group concluded that individual assessments should share a common approach, or series of steps taken. The steps identified by the Group are broadly in line with those identified in DEFRA’s guidance document on the assessment of carbon and are as follows.

¹ Website to the CUSC Amendment area
<http://www.nationalgrid.com/uk/Electricity/Codes/systemcode/amendments/currentamendmentproposals/>

Steps established by the Group

1. Establish a baseline level of carbon.
 2. Calculate how the baseline carbon profile would be altered by the amendment.
 3. Define the period of time over which the analysis should be applied.
 4. Calculate the impact of carbon dioxide emissions or other greenhouse gas emissions, where appropriate, in CO2 equivalent terms.
 5. Multiply carbon dioxide savings by Shadow Price of Carbon (SPC) and apply any relevant discounting factors*.
23. It should be noted that SPC and the discounting factors should remain constant in the assessment of the carbon impacts of code modifications based on the DEFRA information and it is the volume that will need to be assessed and established on a case by case basis.
24. DEFRA provides an extensive reference source of information for the calculation of carbon impacts. These can be found at the following link and the most important aspects (CO2 equivalent, Power station fuel type equivalents and efficiencies) are detailed in the guidance pages.

<http://www.defra.gov.uk/Environment/climatechange/research/carboncost/index.htm>

<http://greenbook.treasury.gov.uk>

25. In addition the Group also identified a number of common principles and issues which need to be applied / considered and are as follows:

Common principles

- Keep the analysis as simple as possible, focusing on realistic scenarios and probable outcomes.
- Focus on carbon dioxide impacts and ignore consequential impacts and affects i.e. the cost of carbon associated with the procurement of assets.
- Clearly state all assumptions and ensure they are applied consistently.

Common issues

26. Despite the existence of some common principles and general assessment techniques, our work on assessment examples has highlighted that the assessment of carbon costs will be as complex as any other assessment of costs resulting from a code change. The same caveats will apply to any carbon cost assessment as would apply to any form of economic assessment.
27. Careful consideration of assumptions will reduce the complexity of any assessment bearing in mind that the outcome of any analysis will depend heavily upon the assumptions made. Additionally, the longer the time period used for analysis the greater need for a larger range of assumptions to forecast possible future scenarios, which could be more contentious and open to challenge. Consequently,

all assumptions need to be tested, clearly stated and justified based upon information available at the time.

28. In addition, any carbon assessment needs to be proportionate to the issue being addressed by the amendment to ensure the benefit of the analysis does not outweigh the cost of producing that analysis.
29. In particular, given the complex nature of some of the carbon impacts and broader economic costs there are risks of double counting either the carbon benefit, in particular or as part of a broader economic assessment. For example, other mechanisms such as EU ETS may have factored in the carbon costs.

5. Conclusions and Recommendations

The Group's final conclusions are:

- The assessment of carbon costs envisaged by Ofgem as part of the change assessment process, and detailed in Ofgem's final guidance, is achievable.
- Whilst endorsing Ofgem's view that assessment should take place by reference to the 'network operation' relevant objective, a broader assessment than this may be achievable by reference to the more general code objective that refers to efficient discharge of the relevant licensee's activities.
- Whilst we have developed a number of practical examples and have identified some general principles, the assessment of proposed changes will vary on a case-by-case basis.
- A large body of standard data and conversion factors exists, particularly on the DEFRA website, which should be utilised by the Panel and Working Groups to aid and ensure a consistent approach across the industry.
- Finally, notwithstanding a large body of work to support the analysis, the assessment of carbon costs will be as complex as any other forecast cost benefit calculation.
 - As with all forecast, it will be significantly affected by the assumptions made as part of the calculation.
 - These assumptions will need to be transparently set out for each assessment to ensure industry consultation on the assessment is full and effective.

The Group recommends that:

- the guidance contained within or referenced by this report is used by subsequent CUSC Working Groups to help their assessment of carbon cost impacts;
- this report is shared with other code panels for the same purpose.
- the Group continues to meet at appropriate intervals to share best practice and review the development of guidance.

Appendices

1. Standing Group Presentation Examples
2. Terms of Reference of the Standing Group
3. Minutes of the meetings held on 11th July, 15th August and 8th September 2008
4. Ofgem letter's dated 15th April 2008 and 30th June 2008²
5. Presentation given to the Group on Renewables and CHP Schemes administered by Ofgem
6. Final Guidelines established by the Group

² NB: the Minutes from the 17th October 2008 are not included as the Group debated the final report. However, they are available on National Grid's website <http://www.nationalgrid.com/uk/Electricity/Codes/systemcode/>

Appendix 1 – Standing Group Examples

CUSC CAP164 – Connect and Manage



Carbon Costing for CAP164


Presentation for Environmental Standing Group



Agenda


- Background
- Basic Principles
- Stages of the process

- Next steps




Background

- CAP164 – Connect and Manage
- Present queue of generation projects awaiting transmission infrastructure reinforcements
- Under CAP164 will not have to wait for wider works and SO will have to manage constraint implications
- Purpose of CBA is to assess any carbon saving benefits against any constraint cost increases




Principles

- Be as realistic as possible, but try to keep simple
- Forecast nature of key variables means that this is not a prediction
- Would be an assessment of probable outcomes against given scenarios
- Focuses on CAP164, but may want to carry out for other amendments
- Focuses on carbon, not constraints, but need to be mindful of constraint analysis



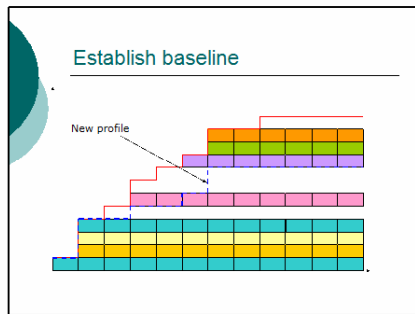
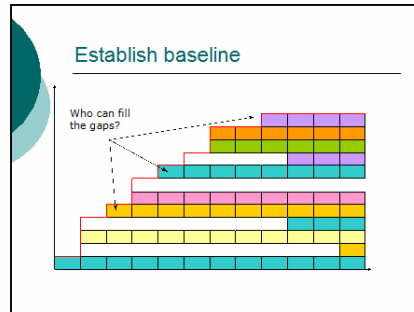
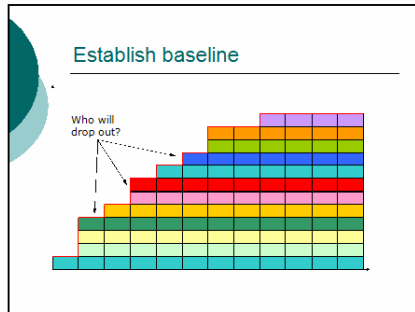
Stages of process

1. Establish baseline
2. How would profile be altered by CAP164?
3. Impacts on CO2 emissions
4. Price CO2 savings and costs



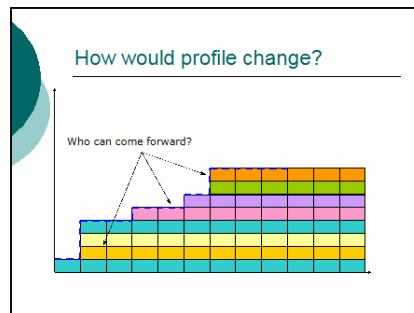
Stage 1 – Establish Baseline

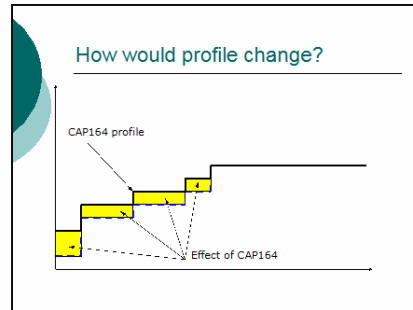
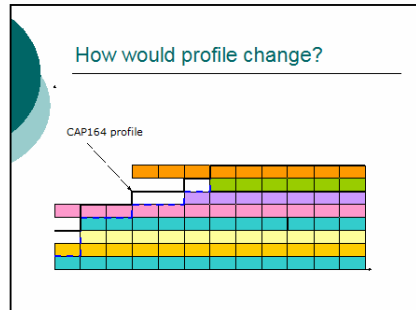
- What would connect if CAP164 were not implemented?
- Contracted background forms basis but who will commission?
- Need to estimate who will drop out (eg. due to failure to achieve planning)



- ### Establishing Baseline
- Proposal is to estimate drop out by zone taking into account local planning issues
 - Need to make assumption of effect of CAP150
 - What existing plant will close – so we can estimate fuel mix of conventional plant displaced
 - Proposed to use a number of scenarios rather than one baseline (eg to reflect possible transmission delays)?

- ### Stage 2 – How would profile change?
- What projects in background are awaiting wider transmission reinforcement and could benefit from CAP164?
 - How many of these could advance local works?
 - What proportion could bring forward their generation projects? (eg status of planning/turbine availability)





- ### How would profile be altered?
- o Proposal is to carry out analysis of who can come forward on zonal basis (same as with setting baseline)
 - o Allows assumption of local planning rates
 - o Allows assessment of role of wider transmission investment? (ie CAP164 only benefits those who are being held up by wider reinforcements)

- ### Stage 3 - Impacts on CO2 emissions
- o What amount brought forward is renewable or lower CO2 conventional?
 - o What load factor will the plant operate at? For wind this can be calculated for a zone. What to assume for new conventional?

- ### Stage 3 - Impacts on CO2 emissions
- o Displacement of marginal plant. What will this be? Looking at using a range between CCGT and Coal.
 - o Is this at NBP or by zone? If carbon costs or benefits affected by constrained running of renewable or conventional plant, maybe by zone.
 - o Proposal is to ascertain whether constraints would restrict displacement of marginal plant at NBP.
 - o Any increased emissions from part loaded plant?
 - o Need to use different CO2 values for part loading to reflect efficiency differences

- ### Losses
- o National Grid can calculate losses if know assumptions of size and location of output
 - o Assume losses require more output from marginal plant

Transmission Infrastructure

Assumption for CAP164:

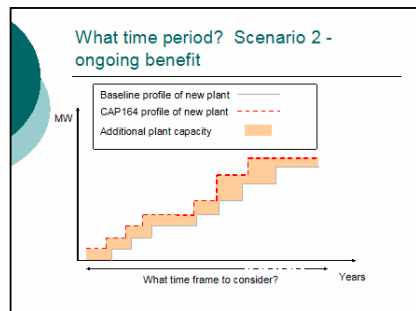
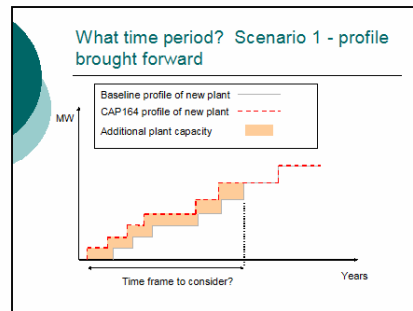
- Local works will be brought forward (SPC changes by year)
- Wider works unaffected, as needs SQSS change.
- Proposal is not to assess transmission infrastructure for CAP164

Stage 5 – Multiply CO2 effects by price of carbon

- Recommendation is to use SPC as this most likely to be the value Ofgem uses.

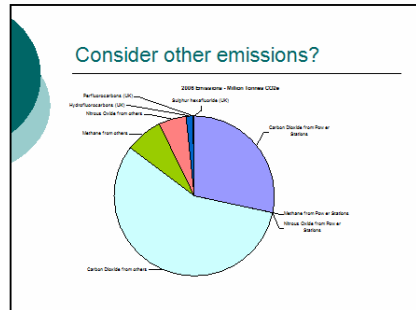
Other issues

- What time period to carry the analysis over?
- Should we consider other emissions?



What time period to carry the analysis over?

- Scenario 1 – Profile brought forward
 - When additional constraint and carbon effects cease
- Scenario 2 – Ongoing effect
 - Backstop of 2020



- ### Summary approach
- Scenarios rather than one baseline
 - Analysis carried out at zone level (can consider local planning, wind conditions, transmission reinforcements and effect on constraints and losses)
 - Use range of marginal plant between CCGT and coal for CO2/MWh (subject to effects within zones)
 - Ignore transmission investment
 - Count losses as increased marginal output
 - Use SPC
 - Only consider CO2
 - Backstop date of 2020

- ### Next Steps
- Start work on baseline
 - Then, once amendment is finalised stage 2 can commence
 - National Grid to lead this element with active input from the subgroup

Grid Code - Change in minimum standards for reactive capability (Rated MW Working Group)

(CUSC) Cross-code carbon cost standing group

Grid Code Carbon Cost example

Change in minimum standards for reactive capability (Rated MW Working Group)

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Issue

Proposal

- Examine possibility of reducing minimum reactive capability required of generating units

Possible benefits

- allow generating units to operate at higher efficiency levels for refurbished and new plant and
- increase potential real power output of existing plant with limited investment

Trade offs

- Increase TSO investment requirements for reactive equipment
- Impact on system security

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Aim and Carbon impact

- Establish a revised baseline for minimum reactive capability, thus achieving the benefits whilst minimising (or not realising) the trade offs.
- Carbon impact
 - Assume trade offs successfully avoided (no investment/security issues)
 - Main carbon impact is greater efficiency of generating units affected (i.e. more energy for the same fuel)

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Assessment of change

- Routine assessment
 - This would identify the benefit of reduced minimum reactive requirements as 'optimal' efficient trade off between:
 - meeting minimum system security standards and
 - Placing obligations on generating units
 - Would have a benefit to consumers in that it efficiently optimises required investment in the transmission system and generating plant
- Carbon Assessment
 - Change expected to increase the efficiency of generating units
 - If more efficient these units should run more
 - Generation offset likely to be less efficient and therefore net carbon benefit
 - Minimum carbon benefit can be considered to be zero

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Detailed carbon assessment

- Routine assessment
 - This would identify the benefit of reduced minimum reactive requirements as 'optimal' efficient trade off between:
 - meeting minimum system security standards and
 - Placing obligations on generating units
 - Would have a benefit to consumers in that it efficiently optimises required investment in the transmission system and generating plant
- Carbon Assessment
 - Change expected to increase the efficiency of generating units
 - If more efficient these units should run more
 - Generation offset likely to be less efficient and therefore net carbon benefit
 - Minimum carbon benefit can be considered to be zero

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Detailed carbon assessment

- Assumptions required for carbon assessment
 - Amount of less efficient generation likely to be offset
 - Carbon intensity of generation (both more efficient and offset generation)
 - Duration over which to assess impact (5years or more?)
- Basic expectation
 - Carbon assessment likely to be in line with any 'economic' assessment, as carbon cost forms a subset?

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Detailed carbon assessment

Complicating issues

- Assessment assumes more efficient generation will run in preference, however it may not be most economic and therefore would not run
- Assessment ignores any additional asset investment which would have economic and carbon cost
- Simple assumptions ignore plant efficiency complications of part-loading two-shifting etc.
 - If any of these are needed to underpin a lower security standard (i.e. more part loading of plant) then would need to be bought into the carbon assessment

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Comments/conclusions


- Assessment inevitably risks being complex
- Can be simplified with assumptions
- Same caveats apply to this as they would to any economic assessment


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BSC – Micro generation

Micro-generation and CO₂
A view from the BSC
ELEXON

Scenario

What if there were a Modification (to any Code) that sought to facilitate the increase of microgeneration? 

How might we assess the impact on greenhouse emissions? 

Areas for consideration

- Manufacturing, Installation and Maintenance effects
 - Probably quite significant today; perhaps even dominant!
 - May improve in the long-term
 - Life cycle of plant
 - Real/Live Power issues
- Offsetting other generation
 - Generation portfolio that is being replaced
 - Losses saved (both transmission and distribution)
 - Anomalous effects (e.g., increased consumption, unpredictability, interaction of different pollutants, dynamics of the CO₂ system)
- General Health Warning
 - Short-term & long-term could be very different
 - The real CO₂ system is very complex (no scope for realistic modelling)

Suggested approach

- We can adopt a simple approach to start with.
- Assumptions
 - Use existing baseline
 - The CO₂ equivalent of a unit of energy is the national average for existing generation portfolio
 - No economic growth
 - Parameters are constant in short-term
 - All Losses are saved by micro-generation
 - Use annual national average for transmission and distribution losses
 - No operational emissions from micro-generation
 - Different characteristics for wind, solar, etc.
 - Everything is nice and linear (i.e., directly proportional to micro-generation)

Sample Calculation

- Simple formulas (shown here for wind)
 - $\Delta_w \mu$ is the increase (+) or decrease (-) in wind micro-generation
 - $\Delta_w CO_2$ is the resulting increase or decrease in CO₂ emissions
- $\Delta_w CO_2 = K \cdot (\gamma_w + \beta - \alpha) \cdot (\Delta_w \mu)$
 - $\gamma_w \geq 0$ to scale CO₂ emissions up for (additional) maintenance
 - The effect of additional manufacturing, installation, replacement and maintenance activities
 - Estimates are starting to become available
 - Use temporal averages (for wind, solar etc)
 - $\beta \geq 0$ to scale up for incentives to increase consumption
 - $\alpha \geq 1$ to scale down for generation and losses avoided
 - $K \geq 0$ gives the CO₂ equivalent of a unit of energy (depending on existing generation portfolio)

Potential Data Sources

- Carbon Trust
- HM Government
- BSC Panel
- Industry Research
- Academic Research

Further complications

- To be added only if necessary:
 - Economic change (medium and long-term effects)
 - Technological innovation (medium-term and long-term effects)
 - Significant climate change? (unpredictable effects)
 - Locational effects (dependent on technology)
 - Seasonal effects (dependent on technology)
 - Various anomalies (some expected, others to be discovered with experience!)

UNC – Assured pressures

<p>Assured Pressures Proposal</p> <hr/> <p>Transmission Workstream 6th March</p> <p style="text-align: right;">nationalgrid</p>	<p>Background</p> <hr/> <ul style="list-style-type: none"> ♦ NTS undertake network analysis based on the latest supply and demands required of the NTS ♦ NTS provides an annual assured offtake pressure to DNOs ♦ Actual physical system operates to assured pressure in summer and a higher pressure in winter <ul style="list-style-type: none"> ♦ Compressors need to be run to attain pressure in summer ♦ DNOs have to plan winter requirements to annual assured pressure <p style="text-align: right;">nationalgrid</p>
<p>Summary of Proposal</p> <hr/> <ul style="list-style-type: none"> ♦ Annual assured pressure is replaced with summer and winter pressures <ul style="list-style-type: none"> ♦ Winter pressure applying 1 Oct to 31 March ♦ Summer pressure applying 1 April to 30 Sept ♦ Physical system operation stays the same but commercial regime is changed to more accurately reflect the physical ♦ Summer / Winter pressures to be facilitated through OCS process, as annual assured pressure is now <p style="text-align: right;">nationalgrid</p>	<p>Impacts</p> <hr/> <ul style="list-style-type: none"> ♦ Will lead to more efficient and economic operation of the system <ul style="list-style-type: none"> ♦ Potentially lower assured summer pressures <ul style="list-style-type: none"> • Less compressor usage • Less compressor standby ♦ Potentially higher assured winter pressures <ul style="list-style-type: none"> • Allows DNOs to plan to higher pressures ♦ Associated environmental benefits ♦ Minimal impact envisaged for Shippers but views sought <p style="text-align: right;">nationalgrid</p>
<p>Next Steps</p> <hr/> <ul style="list-style-type: none"> ♦ Proposed that Mod be taken to March Mod Panel ♦ Short consultation period (12 days) ♦ Would seek a 1 June implementation in time for OCS process <p style="text-align: right;">nationalgrid</p>	

Smart Metering

(CUSC) Cross-code carbon cost standing group

Smart metering and Gas shrinkage costing examples

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Smart Metering Example

Proposal

- Assume proposal facilitates an increase in smart metering

Possible benefits

- Reduction in total electricity consumed as meter users become more energy aware
- Consumption pattern may shift, for example from peak to off peak use, reducing carbon intensity of electricity supplied
- Both of the above provide direct energy cost savings to the consumer as well as carbon benefits

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Smart metering example Carbon Assessment

- Carbon impact
 - For reduction in consumption, translate this into carbon equivalent
 - For shift in consumption, calculate the shift in relative carbon intensity
- Difficulties
 - Main difficulties not related to actual costing of carbon:
 - calculating likely increase in smart meter penetration and
 - calculating displaced or reduced volumes of energy
 - Possible other benefits for large-scale penetration such as reduced SO costs ignored.
 - Double counting: Carbon benefits sit 'within' the economic benefit to the consumer with carbon with the electricity cost at EU ETS prices

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Smart Metering Detailed carbon assessment

- Assumptions required for carbon assessment
 - Amount of consumption likely to be reduced or displaced
 - Carbon intensity of generation (both reduced and displaced generation)
 - Duration over which to assess impact (5years or more?)
- Complicating issues
 - Assessment assumes more efficient and lower carbon generation will run in preference, however it may not be most economic and therefore would not run
 - Assessment ignores any additional asset investment in smart metering which would have economic and carbon cost

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E.ON Central Networks – Loss comparison**CUSC Environmental Standing Group****Background**

The above Group was convened on the 11th July 2008 as a Cross-Codes Group primarily to consider and undertake work to provide guidance on how future modifications to the CUSC should factor in a “carbon cost” assessment as part of the normal process of assessing a Modification against the Applicable CUSC Objectives This is necessary to conform to the Office of Gas and Electricity Markets (Ofgem) requirements and Government directives.

The outcome is intended to be used as a model to provide guidance to the Secretariat of other Code Groups as required.

Although outside the remit of the Group, the following information is an example of one of many design and operational considerations that a Distribution Network Operator (DNO) must consider in meeting both their Distribution Licence and Distribution Code (D-Code) obligations.

The Distribution Code (DIN2 – Distribution Licence Duty) makes specific reference to Condition 9 of the Distribution Licence obligations and in DIN 2.1 (b) states:

(b) Is designed so as to:

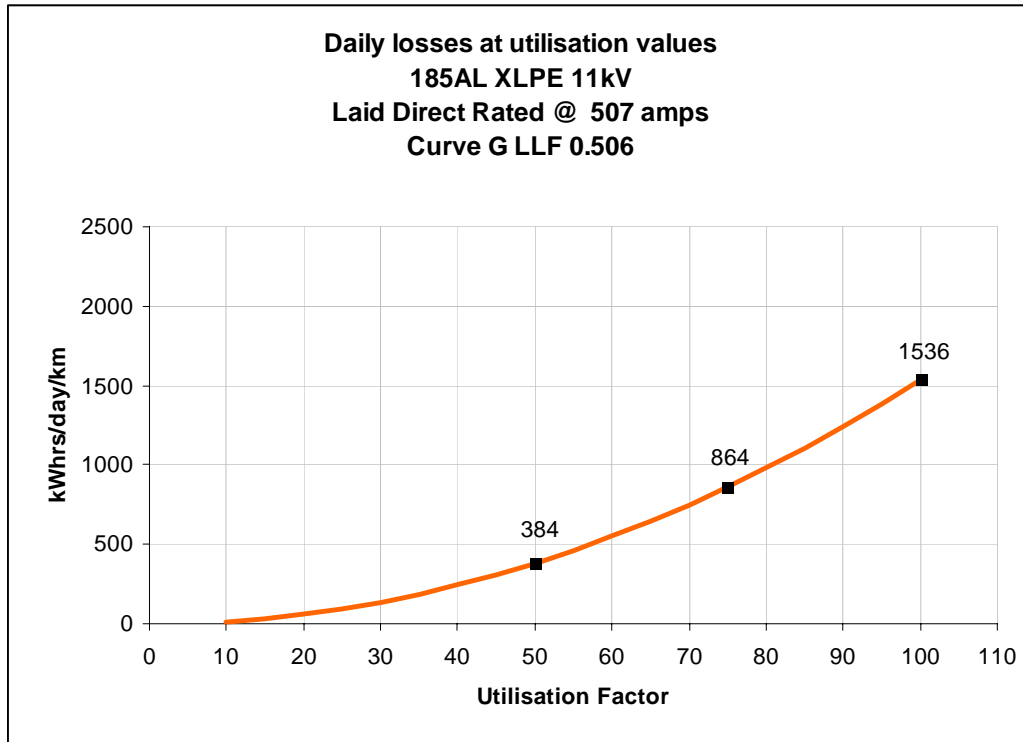
*(i) Permit the development, maintenance, and operation of an efficient, coordinated and economical **System** for the distribution of electricity.*

(ii) Facilitate competition in the generation and supply of electricity.

One important consideration is the effect of distribution losses associated with cables, plant and equipment and how this compares to the equivalent “carbon cost” as a relative measure.

DIN 7 – Publications of the D-Code makes reference to relevant Industry publications that are applicable in meeting the above obligations so any change to these documents will also impact on the environmental consideration outlined above e.g. changes to Engineering Recommendation P2/6 – Security of Supply, could directly affect the design and operational requirements applied by a DNO to their **System**.

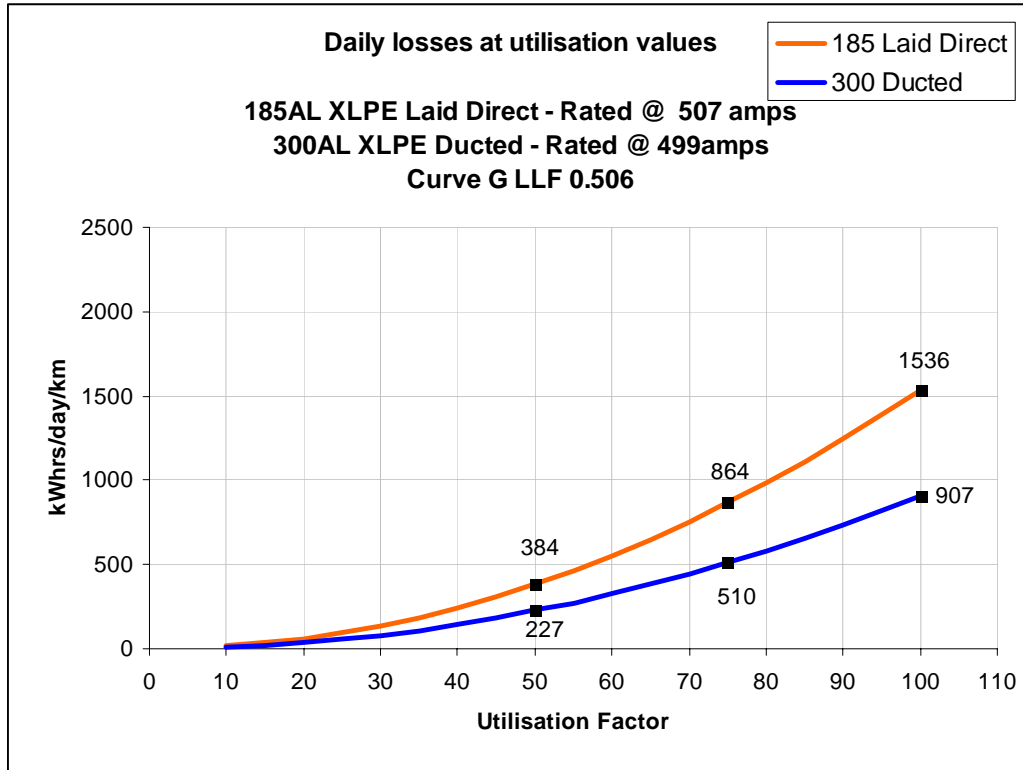
This can be explained briefly in the following tables and associated notes, which outline the effects of operating standard high voltage distribution cables at different levels of cable Utilisation.

Cable Load/Loss Comparison**Effect on Losses of Utilisation Factor**

This graph shows the relationship between utilisation factor and daily losses.

- Normally rings are run at 50% utilisation i.e. an open ring with each half running to 50% full load. During cable fault repairs the ring is closed to restore supplies and one side runs up to 100% for a number of days only.
- Note that at 50% the Laid Direct cable incurs daily losses of 384 kWhrs/km.
- At 100% it incurs 1536 kWhrs/km an increase of 400%
- Some networks run a 3 out of 4 configuration with each circuit running at 75%. During a single cable fault the remaining 3 circuits then pick up 25% each and run at 100%.
- Note that 75% utilisation incurs 864 kWhrs/km daily losses which is an increase of 225% over the 50% utilisation.
- Another way to consider this is that 75% utilisation incurs an extra 480 kWhrs losses per hour per km – enough to run 480 one bar electric fires all day and the same again applies for each additional km of cable.

Effect on Losses of Employing Ducted Cable Circuits



This graph shows the effect of using a larger cable in a duct to obtain a similar circuit rating.

- When cables are ducted they must be run at a lower current due to the poor heat dissipation of the ducts.
- To obtain a similar circuit rating to the 185AL Direct Laid cable (507amps direct), a 300AL cable must be used (499amps in ducts).
- It can be seen that the larger Ducted cable circuit runs with fewer losses than a Laid Direct circuit. E.g. at 50% utilisation the Ducted circuit incurs only 60% of the losses of a Direct Laid circuit of the same capacity.
- Again, using the one bar electric fire example – a 1 km ducted circuit at 50% utilisation saves enough in losses to run 157 one bar electric fires all day.

Summary

It can be determined from the above that the more a distribution asset cable is utilised and this would also apply to transformers etc, the more losses are incurred and hence, a greater affect on the “carbon cost” and associated environmental issues.

Keith Hodson

Connection Policy Engineer (July 2008)

Appendix 2 – Terms of Reference**CUSC AMENDMENT PANEL
Environmental Standing Group
Terms of Reference****Introduction**

1. The CUSC Amendment Panel has agreed to establish the Environmental Standing Group to consider the implications of Ofgem's open letter dated the 15th April 2008, which sets out proposed guidance on environmental issues and the code objectives.
2. Prior to the first meeting of the Standing Group Ofgem published their final clarification and guidance on the treatment of carbon costs under the current industry code objectives. Consequently, the Standing Group will now take the letter dated the 30th June into consideration.
3. This paper outlines the working arrangements and Terms of Reference for the Group.
4. The CUSC Panel has formally invited representatives from other Panels and Committees within the industry. This includes the BSC, DCUSA, Distribution Code, Grid Code, STC and UNC.

Governance

5. The Environmental Group is established as Standing Group under the CUSC Amendment Panel and shall act in accordance with Section 8.18 of the CUSC. The Environmental Group shall have regard for Core Industry Documents, other key Industry documentation and Ofgem's published clarification and guidance on the treatment of carbon costs under the current industry code objectives.

Membership

6. The Environmental Group shall comprise a suitable and appropriate cross section of experience and expertise from across the industry:
- Chair Duncan Burt
 - Technical Secretary Richard Dunn
 - National Grid representatives Pat Hynes and Emma Carr
 - Dipen Gadhia Ofgem
 - Graham Mitchell n.power
 - Bill Gunshon DCUSA Panel
 - Paul Mott EDF and CUSC Panel Member
 - Paul Jones E.ON and CUSC Panel Member
 - Barbara Vest AEP, CUSC and Grid Code Panel Member
 - Dave Wilkerson Centrica and CUSC Alternative Panel Member
 - Garth Graham Scottish and Southern Energy and CUSC Panel Member
 - Tim Davis UNC Panel Chair
 - David Jones Elexon BSC
 - Peter Roberts Distribution Code Panel
or Keith Hodson
7. Environmental Group members were nominated by CUSC Parties and Panels/ Committees within the industry.

Meeting Administration

8. The frequency of Environmental Group meetings shall be defined as necessary by the Environmental Group chair to meet the scope, objectives and time-scales as defined by the Amendment Panel.
9. National Grid will provide technical secretary resource to the Environmental Group and handle administrative arrangements such as venue, agenda and minutes etc.
10. The Environmental Group will have a dedicated page under the CUSC section of the National Grid UK website. This will enable Environmental Group information such as minutes and presentations etc to be available to a wider audience.

Scope and Objectives

11. The objective of the Environmental Group is to establish common principles and guidance across the industry to implement Ofgem clarification and guidance on the treatment of carbon costs under the current industry code objectives.
12. In addition to the objective above the Standing Group shall consider and report on the following specific issues:
 - Identify the implications of Ofgem's guidance,
 - Identify issues and propose solutions within the existing framework,
 - Develop practical examples based on past and present code modifications,
 - Develop common guidance and principles, where possible, that can be presented to the industry Panels and Committees
 - Provide suggestions on how the guidance can be developed further to assist in the forthcoming Governance Review
13. The Standing Group shall prepare a final report to the Amendments Panel responding to the matter set out in the Terms of Reference and a copy will be issued to Code bodies including the BSC, DCUSA, Distribution Code, Grid Code, STC and UNC. A copy will be made available to the Authority.
14. It should be noted that, in accordance with Section 8 of the CUSC, the Environmental Group, as a Standing Group under the Amendment Panel, cannot itself propose a modification to the CUSC.

Appendix 3 – Standing Group Minutes**CUSC Environmental Standing Group**

Meeting Name	CUSC Environmental Standing Group
Meeting No.	1
Date of Meeting	11 th July 2008
Time	10:00am – 2:00pm
Venue	Elexon Offices, 350 Euston Road, London

This note outlines the key points from the first meeting of the Environmental Standing Group

Members Present:

Duncan Burt	DB	Chairman
Richard Dunn	RD	Secretary
Patrick Hynes	PH	National Grid
Graham Mitchell	GM	RWE npower
Bill Gunshon	BG	RWE npower
Paul Jones	PJ	E.on
Paul Mott	PM	EdF Energy
Barbara Vest	BV	Association of Electricity Suppliers
Dave Wilkerson	DW	Centrica
Garth Graham	GG	Scottish and Southern
Tim Davies	TD	Joint Office
Keith Hodson	KH	Central Networks
Dipen Gadhia	DG	Ofgem
David Jones	DJ	ELEXON

Apologies:

Emma Carr	EC	National Grid
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By Invitation:

Mathew Harnack	MH	Ofgem
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1. Introductions/Apologies for Absence

1. Apologies for absence were received from EC.
2. After introductions, DB explained that the Group was a cross-codes Group convened under the CUSC governance arrangements as Standing Group. Under these governance arrangements the Group would not identify a specific Modification to implement the Ofgem Guidance but should undertake work to provide guidance on how future Modifications to the CUSC should factor in the carbon cost as part of the normal process of assessing a Modification against the Applicable CUSC Objectives. A report from the Group setting out this advice would be provided to the CUSC Panel in due course. There was currently a pressing need within the CUSC to have this guidance available in order to assess the carbon cost associated with the various Transmission Access modifications (CAP161-166) currently at Working Group phase. However, mindful of the keen interest in this issue within the industry, the CUSC Panel had decided to invite representatives from other Codes to join the Group so that those Codes could also consider the output from the work of the Group and the work could be shared with all other Panels who could then consider implementing the guidance. Ofgem would like this guidance in place so that Code Panels could apply the guidance in considering modifications from September 2008.

2. Overview of Ofgem's Guidance on Environmental Issues and the Code Objectives (Ofgem Letters of 15/4/08 & 30/6/08)

3. DB explained that Ofgem had issued a letter to all Codes Panels on 15th April providing guidance on the treatment of carbon costs within the existing Code governance framework and especially on the Code objective relating to the economic and efficient network operation. Ofgem had also invited comments on its

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proposed approach explained in the letter. There was some support for the proposed guidance but also some concerns and caveats raised. The nature of and extent of these concerns and caveats were described in Ofgem's second letter on the issue dated 30th June and included the following:

- Ofgem's guidance constituted a significant change in the way that Code Panels conduct their business;
 - the proposed guidance would impose increased costs for analysis – Code Panels and the industry did not necessarily have the expertise or processes in place to give effect to it in short timescales;
 - to what extent was the guidance legally binding?
 - the treatment of the environment and the Code Objectives should be considered as part of the governance review;
 - environmental issues should be considered on a broader basis than simply under the Code objective governing efficient and economic network operation;
 - lack of understanding as to why the guidance had been limited to consideration of the financial impact of Greenhouse Gas Emissions (GHG) only;
 - providing more than one choice for calculating the cost of GHG (EU ETS cost or Shadow Price of Carbon (SPC)) could create ambiguity – Ofgem should recommend one mechanism only (respondents tended to favour the SPC) ;
 - any analysis should only assess incremental costs/benefits;
 - double counting in the context of existing incentives such as CCL and the RO would need to be avoided;
 - requests for clarification such as use of discount rates and conversion of GHGs into carbon dioxide equivalent.
4. Ofgem sought to address these comments in its letter of 30th June and had issued final clarification and guidance on the treatment of carbon costs under the current industry code objectives with the letter dated 30th June. Ofgem had asked for a counsel opinion on the final guidance before it had issued the letter dated 30th June and were satisfied that both the use of 'guidance' and the content of the guidance note were legally robust.
5. During discussion the following points were raised:
- on the legal basis for the guidance, GG believed it was important to be clear that Panels were undertaking actions that were legally permissible. DB noted that Ofgem had sought counsel opinion on the final guidance and clarification and suggested that this could be tested practically on examples that the Group should consider in due course;
 - once the physical measure of the GHG implications of a modification was calculated, the relevant Panel could decide whether to use the EU ETS or SPC measure. It might be difficult to establish a standard and it might be appropriate to use different measures in different circumstances e.g. where offsetting might apply;
 - the guidance made references to Schedule 9 of the Electricity Act 1989. The Group should be clear on the requirements of Schedule 9 and agreed to consider the Schedule at the next meeting (*post meeting note: Schedule 9 requires the preservation of natural beauty, conservation of flora and fauna, buildings of architectural interest etc by any licensee under the 1989 Act in formulating proposals for approval of works under section 36 & 37 of the Act (e.g. new power stations and new transmission lines). Published statements of how the licensee will perform these duties and consultation with relevant statutory bodies (e.g. Countryside Commission) are also required under Schedule 9). A link to the National Grid Statement is attached*

http://infonetuk/user_content/landd/online/Schedule%209%20-%20November%202006.pdf

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Action: RD

- A single party should not be able to require an assessment of the carbon cost of a modification but there should be no difficulty with a party raising a modification with a request that the relevant Panel consider carbon costing as part of the assessment of a modification subject to the particular governance arrangements of a particular Code. A single party should also not be precluded from undertaking this work itself;
- Just as with the ordinary costs and benefits of certain modifications a key difficulty will be where the environmental costs and benefits of a modification fall disproportionately on Code Parties (externality);
- Although clearly all modifications should be assessed against the current baseline, GG noted that there was the potential for double counting of carbon benefits vis a vis current modifications (e.g. CAP131 & CAP148). If double counting was prevalent it would lead to a loss of credibility for any guidelines. PJ noted that the Guidelines were just that and should not be followed slavishly if they produced inconsistent results;
- The Ofgem letter of 30/6/08 referred to Guidelines being in place by the end of August 2008. Members queried if this was practicable given that all Panels would need to ratify the Guidelines for their own Codes and there could be legal implications of accepting advice written for another Code. PJ indicated he would like a clear steer about the status of the Guidance given his responsibilities as a CUSC Panel Member. DG indicated that the Ofgem Guidance was simply that – Guidance – but Ofgem believed the end August date would be helpful as a target. DG indicated that the important issue was that the carbon impact of a modification could be measured and there was guidance from Ofgem about the circumstances in which the carbon impact should be taken into account when assessing a modification. DJ indicated that the BSC Panel had taken legal advice about the status of the guidance as a means of clarifying the interpretation of the Applicable BSC objectives. Since this advice had been received the subsequent Ofgem guidance letter had been produced and the BSC Panel has agreed that they could work with this guidance as it gave the discretion back to the Panels to consider whether the consideration of the costs of carbon were relevant to a particular Modification.. A note summarising what had been agreed at the BSC Panel meeting would be circulated to BSC Panel Members. . The Group agreed that it would be helpful if the note could be provided to this Group as well.

Action: DJ

3. Group Terms of Reference (TORs)

6. GG noted that the most difficult areas for the Group to consider provision of guidelines were probably:
 - the issue of double/multiple counting
 - Modifications that affected more than one Code
 - Interactive Modifications
7. Following discussion it was agreed that the Group should aim to produce a draft report ready by the end of August 2008 and that there should be a wider consultation on the report. Any decision to adopt guidelines that this Group developed would be for the individual Code Panels to decide but the expert representative at this Group could act as a sponsor for the work of the Group with their host Panel. The issue was raised as to whether the guidance could be adopted by Methodology Forums (e.g. TCMF) and DG agreed to provide an Ofgem view on this issue at the next meeting.

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Action: DG

8. The Working Group noted the Terms of Reference.
- 4. Background Information on ROCs - Presentation by Matthew Harnack (Ofgem)**
9. DB welcomed MH to the meeting and thanked him for agreeing to give the Group a presentation about the various support schemes for Renewable Energy and CHP currently administered by Ofgem. There were four broad support schemes:
- Renewables Obligation (RO)
 - Non Fossil Fuel Obligation (NFFO)
 - Climate Change Levy (CCL) Exemption Certificates
 - Renewable Energy Guarantees of Origin (REGOs)
10. MH explained that the RO required licensed electricity suppliers to purchase a certain amount of renewable electricity each year. This was currently 9.1% and would increase to 15.4% in 2015/16. £1 billion of certificates had been issued to 5000MW of renewable generators each year (set to double by 2015). The role of Ofgem was to:
- accredit eligible renewable generators
 - issue Renewable Obligation Certificates (ROCs) - 1 ROC = 1MW of generation
 - maintain a certificate register
 - check suppliers comply with their obligations
11. Given that the obligation was increasing each year, there was a relative shortage of ROCs at present hence ROCs were being traded at about £50/ROC rather than the original administered price of £34/ROC. Suppliers must present ROCs as proof of purchase of renewable electricity and Ofgem carried out audits of metered data to confirm the validity of the ROC as well which now also included smaller generators. BERR was currently consulting on a proposal to adopt a "banding" approach to allocate different values for ROCs for different technologies. Thus 1MW from marine or biomass sources might be equivalent to 2ROCs. The aim was effectively to reduce the subsidy for existing developed renewable technologies (e.g. wind) compared to the newer emerging technologies (e.g. marine).
12. The NFFO was a precursor to the RO. This required generators to enter into fixed price contracts with the Non Fossil Purchasing Agency (NFPA) acting on behalf of suppliers. There were currently still 700 contracts covering 3000MW of generation under the NFFO. Ofgem ensured that suppliers complied with their ongoing obligations by a variety of measures.
13. The CCL was a tax aimed at reducing greenhouse gas emissions in the non-domestic sector and was payable on non-domestic supplies of energy. The value of the CCL was currently £4.56/MWh. HMRC set the legislation and collected the levy. Supply from eligible renewable and CHP sources was exempt and Levy Exemption Certificates (LECs) were required to prove this. The CHPQA accredited CHP generators whilst Ofgem:
- accredited renewable generators
 - issued LECs and maintained a certificate register
 - allocated LECs to supply
- Ofgem issued £200m/year of LECs on 45,000GWh of generation.
14. REGOs were electronic certificates proving that electricity generated was from a renewable source. Such a scheme was a requirement under EU legislation.

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Suppliers were required to disclose the fuel mix of their electricity to customers each year. They therefore required REGOs to prove the renewable portion. REGOs had no market value. Ofgem's role was to:

- accredit generators
- issue certificates
- maintain a certificate register
- provide information for FMD compliance purposes (on request); and
- recognise EU Guarantees of Origin

15. The Group noted that although REGOs formally had no market value a market was expected to develop in due course.

5. Practical Examples Highlighting How the Guidance Could be implemented

CUSC Transmission Access – Carbon Costing for CAP164

16. PJ reprised the presentation that he had developed for the CUSC Transmission Access Working Group 1 for CAP164 (Connect and Manage). CAP164 was one of six transmission access modifications currently being considered by CUSC Working Groups to address the issue of the current queue of generation projects awaiting transmission infrastructure reinforcements. Under CAP164 a generator would not have to wait for wider works and the SO would manage the constraint implications. The purpose of the CBA was therefore to assess any carbon saving benefits from implementation of CAP164 against any constraint cost increases.

17. A number of principles had already been identified:

- be as realistic as possible but try to keep the approach simple
- forecast nature of key variables means that this is not a prediction
- an assessment of probable outcomes against given scenarios
- Focuses on CAP164 but could be adopted for other amendments
- Focuses on carbon, not constraints but need to be mindful of constraint analysis

18. There were four broad stages to the process:

- establish the baseline
- how would the profile be altered by CAP164
- impacts on CO2 emissions
- price the CO2 savings and costs

19. In establishing the baseline the key considerations are:

- what would connect if CAP164 were not implemented?
- the contracted background forms the basis but who will commission?
- Need to estimate who will drop out (e.g. due to failure to gain planning consent)
- The proposal then is to estimate the drop out by zone taking into account local planning issues
- There is need to make an assumption for the effect of CAP150 (Capacity Reduction)
- What existing plant will close (so we can estimate fuel mix of conventional plant displaced)
- It is proposed to use a number of scenarios rather than one baseline (e.g. to reflect possible transmission delays)

20. Stage 2 then examines how the profile might change:

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- what projects in the background are awaiting wider transmission reinforcement and could benefit from CAP164
- how many of these could advance local works
- what proportion could bring forward their generation projects (e.g. status of planning/turbine availability)

and how the profile would be altered:

- proposal is to carry out analysis of who can come forward on a zonal basis (same as with setting the baseline)
- allows assumption of local planning rates
- allows assessment of role of wider transmission investment (i.e. CAP164 only benefits those who are being held up by wider reinforcements)

21. Stage 3 then looked at impacts on CO2 emissions;

- what amount brought forward is renewable or lower CO2 conventional?
- what load factor will the plant operate at? For wind this can be calculated for a zone – what to assume for new conventional?
- Displacement of marginal plant. What will this be? Looking at a range between CCGT and Coal
- Is this NBP or by zone? If carbon costs or benefits affected by constrained running of renewable or conventional plant, maybe by zone
- Proposal is to ascertain whether constraints would restrict displacement of marginal plant at NBP
- Any increased emissions from part loaded plant?
- Need to use different CO2 values for part loading to reflect efficiency differences

22. Treatment of losses:

- National Grid can calculate losses if they know the assumptions of size and location of output
- Assume losses require more output from marginal plant

23. Transmission Infrastructure;

Assumption for CAP164:

- local works will be brought forward (SPC changes by year)
- wider works unaffected as needs SQSS change
- proposal is not to assess transmission infrastructure for CAP164

24. Stage 4 then involved multiplying the identified CO2 effects by the price of carbon – the recommendation was to use SPC on the basis that this was most likely to be the value that Ofgem uses.

25. Other issues included:

- what time period to carry the analysis over?
- Should we consider other emissions?

In the context of what time period to carry the analysis over there were two main scenarios:

- scenario 1 - the profile is brought forward until the additional constraint and carbon effects cease
- scenario 2 - there is an ongoing effect with a backstop of 2020

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In the context of considering other emissions the amounts of Methane and Nitrous Oxide from generation were tiny in the context of total emissions so the thinking was to ignore the impact of these emissions.

26. In summary the approach was:

- use scenarios rather than one baseline
- carry out analysis at zone level (can consider local planning, wind conditions, transmission reinforcements and the effect on constraints and losses)
- use a range of marginal plant between CCGT and coal for CO₂/MWh (subject to effects within zones)
- ignore transmission investment
- count losses as increased marginal output
- use SPC
- only consider CO₂
- backstop date of 2020

27. Next steps were to:

- start work on the baseline
- then once amendment is finalised stage 2 can commence
- National Grid to lead this element with active support from the subgroup

28. Points made during discussion of PJ's presentation included:

- the SYS contracted background only went to 2016. DB suggested this could be extrapolated to 2020
- Adopting the baseline could actually discourage people from connecting so are you actually saving CO₂?
- The use of more expensive generation could in itself encourage reductions in consumption
- It would be best to stick to the big ticket items as with any economic model
- ETS cashflows themselves could impact behaviour and thus the amount of CO₂ saved
- Would the replacement of older generation have happened anyway without CAP164 (e.g. through the operation of LCPD)?
- Using a single price of carbon meant that other policy effects could be disregarded
- The Group would need to work through an example that involved network investment
- The carbon cost impact of part loading of electricity generation arising from a modification would need to be taken into account
- The carbon cost impact of a modification affecting retail markets should also be considered (e.g. P218 – Microgeneration)
- The carbon cost impact of a transport modification should be considered (e.g. losses) as should a metering modification (e.g. smart metering)
- Issues associated with cross-code modifications might be better addressed as part of Ofgem's governance review
- Individual Panels could decide to seek expert external advice to supplement the guidelines that would emerge from this Group

Summary of Actions and Next Steps

29. It was agreed that Members as detailed below would undertake some assessment of the carbon cost impact of the following modifications:

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- Losses – DW
- Smart Metering/Energy Efficiency - PJ/DB to discuss
- Grid Code – National Grid
- Distribution/Microgeneration – BG
- Gas Transmission (e.g. shrinkage) – National Grid
- CAP164 – PJ etc. to continue work already in train

Action: Relevant Members

30. DB indicated that his aim was to draft the Standing Group Report in parallel with the Group's consideration of the issues and fill in the gaps as the debate reached conclusions so that a draft report could be considered as the final act of the Group. The Report should be simple and to the point.

6. AOB

31. None.

7. Date of Next Meeting

32. The next meeting of the Group will be held on Friday 15th August 2008 at Elexon's Offices commencing at 10am.

CUSC Environmental Standing Group

Meeting Name	CUSC Environmental Standing Group
Meeting No.	2
Date of Meeting	15 th August 2008
Time	10:00am – 1:00pm
Venue	Elexon Offices, 350 Euston Road, London

This note outlines the key points from the second meeting of the Environmental Standing Group

Members Present:

Duncan Burt	DB	Chairman
Richard Dunn	RD	Secretary
Emma Carr	EC	National Grid
Graham Mitchell	GM	RWE npower
Bill Gunshon	BG	RWE npower
Paul Jones	PJ	E.on
Garth Graham	GG	Scottish and Southern
Keith Hodson	KH	Central Networks
Dipen Gadhia	DG	Ofgem
David Jones	DJ	Elexon

Apologies:

Dave Wilkerson	DW	Centrica
Barbara Vest	BV	AEP
Tim Davies	TD	Joint Office

1. Introductions/Apologies for Absence

1. Apologies for absence were received from DW, BV and TD.

2. Minutes of the first meeting held on 11th July 2008**Accuracy**

2. The change marked version of the minutes were agreed as a correct record subject to the deletion of the words "... SF6 from transmission and" from the final paragraph of Minute 25.

Matters Arising

3. Minute 5 – third indent (Schedule 9 of the Electricity Act 1989) – RD circulated copies of Schedule 9 and National Grid's Statement on its Schedule 9 responsibilities to the meeting for discussion under item 4.
4. Minute 5 - final indent (Legal advice to BSC Panel Members). DJ reported that the legal advice was confidential to the BSC Panel and therefore would not be circulated more widely. However, he confirmed that the advice was that the Panel had appropriate discretion under the Ofgem guidance to consider whether the consideration of the costs of carbon were relevant to a particular BSC Modification and thus was able to discharge its duties properly under the BSC.
5. Minute 7 – final paragraph (extension of guidance to Methodology Forums). DG indicated that Ofgem did not see any reason at present why the guidance could not be extended to apply to Methodology Forums such as the TCMF but would consult on this issue in due course in the context of the Industry Codes Governance Review (ICGR).

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6. Minute 29 – (Progress on Modifications identified for potential carbon cost analysis). It was recognised that progress on the issues identified at the first meeting of the Group had generally been slow due to the holiday season. DB requested that Members who took an action to consider the carbon cost aspects of particular Modifications at the first meeting should endeavour to report back to the third meeting.

Action: Relevant Members

3. Group Terms of Reference (TORs)

7. The Group noted the final version of the TORs that the CUSC Panel had approved at its meeting on 25th July.

4. Schedule 9 of the Electricity Act 1989

8. RD indicated that Schedule 9 was mainly concerned with the preservation of natural beauty, conservation of flora and fauna, geological or physiographical features and objects of architectural, historic or archaeological interest. It was therefore difficult to detect any potential read-over to evaluation of the carbon costs of Modifications to Industry Codes from the responsibilities placed on licensees under Schedule 9.
9. PJ suggested that the Schedule 9 responsibilities were similar to the licence requirements for licensees. As such these were qualitative requirements that the licensee would endeavour to meet as part of their wider responsibilities towards the environment and therefore would not necessarily be expected to feature in any carbon cost assessment of a Code Modification.
10. DG confirmed that it was Ofgem's view that the Schedule 9 requirements were part of the wider environmental responsibilities of licensees. However, Ofgem expected Code Panels to be cognisant of these responsibilities when it came to considering the carbon cost of Modifications in the round.
11. It was agreed that Members would review the Schedule 9 material that had been circulated at the meeting and provide any further comments at or before the next meeting of the Group.

Action: All Members

5. Paper by E.on Central Networks on Losses

12. KH presented this paper and explained that the paper outlined an example (Distribution Losses) of one of the many design considerations that a DNO must consider in meeting both their Distribution Licence and Distribution Code obligations.
13. The Distribution Code contained the familiar requirements to develop, maintain and operate a coordinated and economical system for the distribution of electricity and facilitate competition in the generation and supply of electricity.
14. An important consideration is the effect of distribution losses associated with cables, plant and equipment and how this compares with the equivalent carbon cost as a relative measure. KH explained the graphs in his paper. These showed the effects of operating standard high voltage distribution cables at different levels of cable utilisation both for un-ducted and ducted cables. Daily losses for a typical 11kV un-ducted cable (185AL 507amps direct) increased at an exponential rate above a 50% utilisation factor. At a 50% utilisation factor the losses were 384 kWhrs/km whilst the losses at 100% load factor were 1536 kWhrs/km - an increase of 400%. For an equivalent ducted cable (300AL 499amps direct) there were lower losses – 227kWhrs/km at a 50% utilisation factor and 907 kWhrs/km at 100% utilisation factor although the increase at the higher utilisation rate was also exponential – again 400%.

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15. KH noted that in the current climate of "sweating the assets" the more a distribution asset cable is utilised the greater the carbon cost from the exponential increase in losses. The same sort of experience could be expected for transformers. In the Central Networks East area the optimum utilisation factors were about 50% but this tended to be higher in the Central Networks West area.
16. DB thanked KH for presenting his paper to the Group and suggested that there were a number of issues raised by KH's paper in the context of carbon cost evaluation that the Group would need to assess as part of its deliberations. Clearly the losses due to the average utilisation factor of a typical network asset would be significant over the lifetime of that asset (e.g. 25 years). Factoring this in could therefore lead to a decision to invest in new assets rather than bear a high level of losses over the lifetime of existing assets. It was generally implicit in the current CUSC Access Modifications that network assets could be subject to a higher utilisation factors in order to expedite the connection of new generation. However, that assumption would need to be tested in the context of carbon costs from the higher losses that would result from the higher utilisation factors. PJ confirmed that the Working Group evaluating the carbon cost of CAP164 was mindful of the potential adverse impact on losses on connect and manage and he had mentioned the need for such an evaluation in his presentation to the first meeting of the Group. GG noted that CAP164 would increase losses due to both a higher level of north/south flows and higher asset utilisation factors.
17. DG asked if losses presented in KH could have been considered during the evaluation of CAP149 Transmission Entry Capacity with Restricted Rights (codified the process were users are able to request an SQSS non compliant connection to the GB Transmission System) It seemed inevitable that single circuit connections would mean that the connection assets would be operating at a higher utilisation factor. PJ commented that he could not be sure that consideration of losses would have made any difference to the outcome for CAP149 which had been approved by the Authority but there were likely to have been higher losses associated with a SQSS non-compliant connection. DB commented that such losses were not taken into account in National Grid's regression model for losses since this was concerned with analysing losses arising from power transfers between zones.
18. It was agreed that there would need to be a section in the Group's final report to the CUSC Panel considering the issues raised by losses.

Action: National Grid

6. Progress on Modifications identified for potential carbon cost analysis at the first meeting of the Group

Grid Code Example – Change in Minimum Standards for Reactive Power Capability (Rated MW Working Group)

19. DB explained that National Grid had taken an action at the first meeting of the Group to analyse a Grid Code Modification carbon cost example. DB gave the meeting a presentation on a proposed change to the Minimum Standards for Reactive Power Capability. The Rated MW Working Group were currently considering a proposal for a reduction in the minimum Grid Code requirement for reactive capability for generators connected to the transmission system. The possible benefits of this proposed change would be to:
 - allow generating units to operate at higher efficiency levels for refurbished and new plant;
 - increase potential real power output of existing plant with limited investment

The Trade-offs to these possible benefits were increased TSO investment requirements for reactive equipment and the impact on system security. For

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- example a 500MW turbine could probably operate at 520-530MW producing additional power and thus improving efficiency but the unit would provide lower levels of reactive power increasing the need for investment by the TSO to make good the shortfall in reactive power and maintain system security. The aim of the proposal was to establish a revised baseline for the provision of minimum reactive capability to achieve the efficiency benefits whilst minimising the trade-offs.
20. In analysing the carbon impact the assumption would need to be made that the trade-offs were successfully avoided (i.e. no investment/security issues for the TSO) and that the main carbon impact is greater efficiency of generating units affected (i.e. more energy for the same fuel). A full economic assessment of such a change would capture the carbon cost adequately but National Grid would not normally undertake a full economic assessment of such a proposal given that there were obvious benefits.
 21. The carbon cost assessment would start from the standpoint that the change would be expected to increase the efficiency of the generating units. If those units were operating more efficiently then they could be expected to be selected to run more frequently replacing less efficient generation and thus producing a net carbon benefit. The minimum carbon benefit could be considered as zero. The assumptions necessary for this analysis were the amount of less efficient generation likely to be offset, the carbon intensity of generation (both for the more efficient and for the offset generation) and the duration over which to assess the impact (5 years or more?). The basic expectation was that the carbon assessment was likely to be in line with any "economic" assessment since the carbon cost formed a subset of such an assessment.
 22. Complicating factors were:
 - The assessment assumed that more efficient generation would run in preference but it might not be the most economic and still may not run;
 - The assessment ignores any additional asset investment which would have economic and carbon costs;
 - The simple assumptions ignore plant efficiency complications of part loading, two shifting etc. if any of these were need to underpin a lower security standard (e.g. more part loading of plant then this effect would need to be brought in to the carbon assessment.
 23. Some broad conclusion could be drawn from the analysis described above:
 - the assessment inevitably runs the risk of being too complex
 - it can be simplified with assumptions
 - the same caveats apply to carbon cost assessment as they would do to any economic assessment
 24. During discussion on the presentation PJ noted that there could be an impact on the ETS. However, logically if the ETS was working properly the correct answer for the assessment of any Modification should be wholly represented by the economic assessment. The Grid Code example could therefore be a good example of needing to be careful to avoid double counting where other mechanisms (in this case the ETS) could be expected to have factored in carbon cost already. GG agreed and mentioned that the danger of double counting was high were CAP131 and CAP148 to be implemented together. There were also issues raised from this Grid Code Modification about the impact of relative prices of different fossil fuels on the world market. GG suggested that this could be one of those complex Modifications which the Group had previously noted could benefit from analysis by an experienced external consultant to ensure no double counting and that sufficient attention was given to externalities and cross-code implications. PJ agreed but noted that there were cross-code coordination requirements already in place. He also believed it was important to make some broad assessment before any consultant was asked to do any work – there was little point in asking consultants to assess the carbon cost of

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Modifications which after initial analysis suggested that the carbon cost elements were nugatory (FLT's).

CUSC Modification CAP167

25. EC explained how the CAP167 Working Group had approached the carbon cost evaluation for CAP167. CAP167 was proposed by National Grid and sought to amend the CUSC to provide definitive clarification in the assessment of whether a small embedded power station development (or the aggregate effect of multiple projects) had a significant impact on the transmission system and thus should be subject to a request for a Statement of Works process. At present this was left to the discretion of the DNO who may not (in the opinion of National Grid) have access to the necessary information to assess accurately what impact such developments might have on the transmission system. The Working Group had developed a proposal where by National Grid will produce a methodology and MW Thresholds per GSP in accordance with criteria and a process within the CUSC. Consequently, the Thresholds will have an impact on the potential number of small embedded power stations that are be able to connect without requiring a Request for a Statement of Works. To assess the carbon cost the following approach has been proposed, firstly establish a baseline for each DNO area (the Group is likely to focus only on Scotland and Northern England. Identified MW thresholds as the trigger for the Statement of Works based on high, medium and low. For example in SHETL's area it is proposed for the assessment thresholds is 2.5MW, 5.0MW and 7.5MW (large power stations in SHETL's area began at 10MW). The Group was focussing only on Scotland and Northern England.
26. The threshold would determine the amount of generation that would be subject to Statement of Works process. The next stage was to work out the % of renewable generation falling into specific thresholds and the carbon cost saving/loss (using SPC) resulting from the renewable generation being brought forward or put back by exclusion or inclusion from the requirement for a Statement of Works.

DCUSA Modification

27. BG reported that the DCUSA Panel had not been able to identify an appropriate Modification that would necessitate a carbon cost evaluation and would be content to consider implementation of the guidelines developed by the Standing Group.

7. Next Steps

28. It was agreed that relevant Members should report back to the next meeting on their consideration of the carbon cost assessment of Modifications relating to Losses (BSC), Smart Metering/Energy Efficiency (BSC), Gas transmission (UNC). DJ agreed to provide some evaluation of the recent Microgeneration Modification in the BSC (P218) and PJ agreed to report further on carbon costs of CAP164.

Action: Relevant Members

29. DB indicated that his aim was still to draft the Standing Group Report in parallel with the Group's consideration of the issues and fill in the gaps as the debate reached conclusions so that a draft report could be considered as the final act of the Group.

Action: DB

8. AOB

30. None.

9. Date of Next Meeting

31. The next meeting of the Group will be held on Monday 8th September 2008 at

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Elxon's Offices commencing at 10am. KH tendered his apologies for the next meeting.

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Meeting Name	CUSC Environmental Standing Group
Meeting No.	3
Date of Meeting	8 th September 2008
Time	10:00am – 12.00pm
Venue	Elexon Offices, 350 Euston Road, London

This note outlines the key points from the third meeting of the Environmental Standing Group

Members Present:

Duncan Burt	DB	Chairman
Emma Carr	EC	Secretary National Grid
Barbara Vest	BV	AEP via telephone
Bill Gunshon	BG	RWE npower via telephone
David Jones	DJ	Elexon
Graham Mitchell	GM	RWE npower
John Bradley	JB	Joint Office – alternate for Tim Davis
Paul Jones	PJ	E.on

Apologies:

Dave Wilkerson	DW	Centrica
Dipen Gadhia	DG	Ofgem
Garth Graham	GG	Scottish and Southern
Keith Hodson	KH	Central Networks
Paul Mott	PM	EDF
Pat Hines	PH	National Grid
Richard Dunn	RD	National Grid
Tim Davis	TD	Joint Office

1. Introductions/Apologies for Absence

1. Apologies for absence were received from DW, DG, GG, KH, PM, PH, RD and TD.

2. Minutes of the second meeting held on 15th 2008**Accuracy**

2. The minutes of the second meeting were approved subject to minor amendments.

Matters Arising

3. Minute 11 – All members would review Schedule 9 of the Electricity Act 1989 material and provide any further comments.
4. Minute 18 – It was agreed that the debate on losses would be included in the Group's final report. Action on National Grid.
5. Minute 28 – Relevant members to report back to the next meeting on their consideration of the carbon cost assessment of modifications relating to Losses (DW), Smart metering/energy efficiency (DB and PJ), Gas transmission (TD and National Grid) and Micro-generation (DJ).
6. Minute 29 – DB to draft and circulate an interim report

3. Schedule 9 of the Electricity Act 1989

7. No further comments on Schedule 9 of the Electricity Act, therefore action on group members complete.

CUSC Environmental Standing Group**4. Carbon cost analysis examples**

8. DJ presented a set of slides to the group on the type of carbon assessment that could be undertaken if a modification was raised that sought to facilitate the increase of micro-generation. DJ informed the group that the presentation utilised various information sources, however the group should note that a number of sources did provide conflicting evidence.
9. DJ explained the factors that need to be taken into account when considering such an assessment. Firstly micro-generation poses significant costs in terms of building and maintenance and this may change over time with technology or mass production. Therefore this would affect the accuracy of any assessment over a longer timescale as such costs are likely to change.
10. Increased micro-generation may offset other generation, if you assume it will be exporting. BV questioned how would the working group take into account the displacement of other generation? DB suggested that assumptions would have to be made but any assessment needs to remain within the remit of the working groups abilities. DJ informed the group that there is information available and working group would be able to undertake an assessment but this could be open to challenge, as it will depend heavily on the assumptions made.
11. PJ suggested that this may impact the physical nature of the network and could impact reactive requirements. It was also noted that losses could be reduced.
12. DJ highlighted an interesting fact that overtime often energy usage increases due to behaviour changes. DJ ran through the suggested approach and calculation slides.
13. The group agreed that the areas for consideration from the slides, would impact the assessment depending on which time horizon was used. The longer the time period the more assumptions and is likely to be more contentious. BV highlighted the fact that any assessment will need to clearly state all assumptions and apply them consistently. All agreed.
14. BG stated that impacts and effects of 3rd or 4th order should be ignored as this would add to the complexity of the assessment. In addition, BG suggested that government policy in this area could have a huge impact.
15. The group thanked DJ for his presentation and agreed that common areas are developing which will need to be captured in the final report and guidance. For example clearly stating assumptions and where a working group should draw a line in terms of consequential impacts and effects, i.e. the cost of carbon associated with procurement of assets.
16. JB presented slides with an example regarding assured pressures. JB explained the background, assured pressure is an annual assured offtake pressure for DNOs but in reality actual physical system operates to assured pressure in summer and higher in the winter. As a consequence compressors need to run in the summer to attain the pressure, but this is not physically needed when demand is lower. The modification aimed to introduce two pressures one for summer and another for winter.
17. This would result in a reduction in the energy used to run compressors in the summer, the level of carbon saving would depend upon the type of compressor, gas or electricity powered.
18. DB explained that he had prepared a similar example to JB regarding flex. DB decided not to run through his slides but provided the group with a brief overview. For example, introduction of flex could lead to a change in compressor usage and therefore a change in energy requirements and methane vented. Any change could pose an increase/decrease in carbon. As with JB's example, the proportion of gas

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and electricity powered compressors would have to be factored into the assessment.

19. DB presented slides on a smart metering example. The introduction of smart metering could result in a reduction or displacement of demand, which could lead to a direct energy cost saving that includes the EU ETS price. DB highlighted the potential for double counting in such an example.
20. The group debated the complexities surrounding an assessment were the demand level remained the same but supply would be displaced. DB stated that if a shift occurred from peak to another time, the fuel mix at each time may be different. For example oil or gas at peak and gas or coal at off peak. Depending on the scenarios applied this may or may not provide a carbon benefit.
21. PJ stated that if demand profiles changed, generators would need to change their profile which would require them to operate their plant differently. Again depending on the scenarios applied this may or may not provide a carbon benefit. In addition PJ informed the group that if consumers were to chase prices this could impact the stability of the system and require more reserve.
22. The group debated the issues surrounding the time period of an assessment. A number of the group believed that assessments could only be undertaken over a shorter time period, 5 years. BG suggested that it is possible to forecast over a long period of time as long as assumptions are stated clearly. GM believed that the key to these assessments is to keep it simple. PJ stated that each issue needs suitable analysis based on information available at the time. All agreed.
23. Following this DJ highlighted the importance for Ofgem to make decisions as soon as possible as the analysis could go out of date quickly in some cases. All agreed.
24. PJ believed that it would be possible for pricing and discounting to remain constant in the assessments and it is the volume that needed to be assessed and established on a case by case base.
25. DB informed the group that DW had emailed him regarding losses. High level principles were debated and it was agreed that a reduction in losses could provide a carbon benefit. BG asked if there is a baseline for generation which working groups could use? PJ questioned what the baseline would look like at the moment due to the queue for access? It was agreed baselines could be established to aid the assessment process.
26. PJ provided the group with a verbal update on CAP164 assessment. The group are currently considering the baseline and what drop out rate should apply to the queue, which is proving difficult. PJ informed the group that the CAP148 Impact Assessment looks at the impact on wholesale price and ROCs. CAP167 working group will not undertake this assessment as ROCs are likely to change overtime. DJ highlighted the importance of Ofgem feedback on the approaches to assessment.

5. Review of interim report and final report

27. DB requested views on the draft interim report circulated prior to the meeting. DJ asked if we needed to undertake a consultation period. The group debated this issue and agreed that it would be provided to all the Panels and published on each code's website.
28. JB informed the group that TD had provided comments to DB via email. Members provided DB with additional comments. DB agreed to update the report to be issued for final comment by the end of this week.
Action: DB
29. DB requested views on the final Standing Group report. PJ stated that the final report should not replace the detailed documents published by Defra. All agreed. The

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group debated an outline of a strawman and agreed the following:

- * Background and policy
- * Relevant objectives
- * Set out an approach
- * Highlight difficulties

30. BG suggested that the reports are supported with presentations at each of the Panels. BV suggested that this is also presented at the ops forum, to capture as many people as possible. All agreed to this approach.
31. DJ suggested that the group meets again in 6 to 9 months to undertake a review. All agreed.

6. Next Steps

32. The group agreed to meet again in 5 weeks time in mid October to discuss the final report prior to submission to the relevant panels. DB to draft final report.

Action: DB

7. AOB

33. None.

8. Date of Next Meeting

34. The next meeting of the Group to be arranged.

Appendix 4 – Ofgem letters

Industry Participants, Customers
and other interested parties

Promoting choice and
value for all customers

Direct Dial: 0207 901 7437
Email: mark.feather@ofgem.gov.uk

15 April 2008

Dear Colleague

Proposed Guidance - Environmental Issues and the Code Objectives

This letter sets out Ofgem's proposed guidance to code panels, administrators and industry participants on the treatment of carbon costs within the existing code governance framework, and in particular, in relation to the code objective governing economic and efficient network operation within the industry codes.

The energy sector is a significant contributor to the production of greenhouse gases and has a key role to play in tackling climate change and delivering more sustainable and secure energy markets. Member States have committed to targets to reduce significantly the overall level of greenhouse gas emissions and to increase significantly the contribution of renewable energy, both by 2020.

Ofgem clearly has a key role to play in this rapidly changing policy environment. It operates within a statutory framework within which it makes complex judgements balancing social, economic, environmental and other considerations. Recent examples of where environmental considerations have been at the heart of Ofgem's policy include:

- *setting new incentives for National Grid to reduce emissions of greenhouse gases associated with its networks;*
- *proposing new incentives on the gas distribution networks to cut their emissions of greenhouse gases through gas that is lost in the process of transportation;*
- *possible extension of gas networks; and*
- *revision of the guidelines on Green Supply Offerings which are deals offered by most major energy suppliers to customers who want to use energy generated from renewables.*

However, it is not only for regulators and governments to tackle the challenges posed by climate change and moving to a low carbon energy system. Industry and market participants also have a critical role to play and will need to evolve their commercial thinking to embrace these challenges.

One of the fundamental aspects of the energy market, and in which industry has a crucial role, are the codes¹ governing key commercial relationships between market participants.

¹ The term codes includes the Balancing and Settlement Code, the Connection and Use of System Code, the Uniform Network Code, the Distribution Use of System and Connection Agreement, the System Operator Transmission Owner Code, the Uniform Network Code for Independent Gas Transporters, Supply Point Administration Agreement, Master Registration Agreement, the Grid Code, and the Distribution Code.

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Industry has an important role in overseeing and conducting the process of analysis for modifications to these codes. In this context, we have been considering the role of the industry in the codes process and how this fits in with the climate change and sustainable development agenda.

We touched upon these issues in our open letter to the CUSC Panel Chairman, on 17 April 2007². This letter was also forwarded to the panel chairs of all the other industry codes, since the issue is relevant across all of the codes that govern the industry.

Codes Governance Review

Since publishing our 17 April 2007 letter, we have initiated the Industry Codes Governance Review ('the governance review') which is considering, amongst other things, whether the current objectives for the industry codes need to be aligned with the statutory duties of the Gas and Electricity Markets Authority and, as part of this, whether additional objectives are needed to supplement the existing code objectives.³ For example, we may consider it appropriate to add additional objectives to address issues such as the environment.

Our recent consultation on the scope of the governance review concluded in late January. Since then we have held a Powering the Energy Debate (PED) event on the governance review which addressed, amongst other things, sustainability and the code governance arrangements. We are now giving consideration to the scope of the governance review, including whether to address issues relating to the scope of the code objectives.

On 17 March we issued a letter to industry participants and customers which provided an update on the governance review.⁴

Guidance on carbon costs

Having given more thought to the issues raised in our letter of 17 April 2007, we consider that it would be appropriate to issue further guidance to industry participants, code panels and code administrators on the treatment of greenhouse gas emissions within the existing code objectives. Further clarification of the interpretation of the code objectives, which we set out below, could assist in providing increased certainty to the industry and should aid in ensuring that the greenhouse gas impacts of code modification proposals are fully assessed.

This clarification is intended to assist industry participants under the current code arrangements. However, it does not prejudice the outcome of any further discussions and consultation on this issue that may arise out of the governance review.

Some modifications to the codes will have an impact on the level of greenhouse gases that are released into the environment and we consider it is important that when assessing whether a code modification is more economic and efficient than the status quo and any other modification proposal against which it is being assessed, the financial impacts of greenhouse gas emissions are factored into the analysis.

Going forward therefore, we consider industry needs to assess, where relevant, the financial impact a code modification may have in terms of its ability to increase or reduce the levels of greenhouse gases emitted into the environment.

The introduction of policy instruments such as the EU Emissions Trading Scheme (ETS) in 2005 has meant that a market value can now be placed on the cost of greenhouse gas emissions including carbon and that this value can be used to assess the environmental

² The letter can be viewed at:

<http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=43&refer=Licensing/ElecCodes/CUSC/Amend>

³ *Review of industry code governance*, Ofgem, 28 November 2007

⁴ This update can be viewed at: <http://www.ofgem.gov.uk/Licensing/IndCodes/CGR/Pages/GCR.aspx>

costs of code modification proposals. In addition, the Government has issued guidance on the shadow price of carbon which can also be used to assess environmental costs.⁵ The shadow price of carbon is intended to represent society's willingness to pay for carbon abatement. It is noted that in its March 2008 Revised Guidance for Impact Assessments, Ofgem indicated that it will use the new guidance on the shadow price of carbon wherever appropriate⁶. In view of these developments, we consider that code panels should also take these measurable costs into account in assessing code modification proposals.

Proposed guidance

"In practical terms, all code panels should take the following steps in considering the impact of a code modification proposal on greenhouse gas emissions, and in particular, the costs of these emissions:

1. *The panel should consider whether a code modification is likely to have an impact on the efficient and economic operation of the network (in accordance with the relevant objective as set out in the code under which the modification has been raised).*
2. *If the panel reaches the view that the code modification will have such an impact, then the panel should consider whether the modification, in so far as it impacts upon efficient and economic network operation, is likely to have an impact in either reducing or increasing greenhouse gases.*
3. *If the panel reaches a view that such an impact will occur or is likely to occur, the financial consequences of this impact should be quantified in terms of greenhouse gas costs. This may require the panel to employ the relevant expertise to undertake such measurements.*
4. *Any measurement should assess the economic costs and benefits of greenhouse gas increases or reductions associated with the modification proposal. In undertaking these measurements we consider that the code panels should:*
 - a. *quantify the impact on greenhouse gas emissions in terms of tonnes of carbon equivalent⁷; and*
 - b. *develop a range of cost scenarios using both the price of carbon under the EU ETS, as well as the shadow price of carbon. We recognise that going forward, other mechanisms to measure the commercial costs of greenhouse gases may be developed and this letter should not be interpreted as precluding the use of any such mechanisms.*
5. *Having measured the economic costs of greenhouse gas emissions, the code panel should use the results of this analysis to inform its assessment of the relevant modification against the efficient and economic network operation objective of the relevant industry codes."*

By taking these steps, we consider that the code panels can take the costs of greenhouse gas emissions into account within the existing code objectives.

In proposing this guidance, we recognise that there are potentially wider impacts on the environment beyond the cost of greenhouse gas emissions that may need to be assessed

⁵ This guidance has been issued by DEFRA and is available on <http://www.defra.gov.uk/Environment/climatechange/research/carboncost/index.htm>

⁶ *Guidance on Impact Assessments*, Ofgem, March 2008 at paragraph 6.25.

⁷ Quantification of greenhouse gas emissions in terms of tonnes of carbon equivalent can be undertaken using the guidance provided by DEFRA at <http://www.defra.gov.uk/Environment/climatechange/research/carboncost/index.htm>

by code panels⁹. Further, we recognise that the Authority has wider statutory duties governing sustainability and the environment that it needs to consider in assessing code modification proposals. Whilst this letter does not offer guidance on any other assessments that need to be made by code panels or the Authority's interpretation of its statutory duties, we nevertheless consider that the proposed guidance set out above would increase the degree of alignment between panel assessments of code modifications and the Authority's own analysis.

In order to take account of the views of interested parties in introducing the guidance, we welcome written submissions. We request that any such responses are provided by 30 April 2008. Subject to those, we propose that panels should take account of the guidance from 19 May 2008.

If you have any questions regarding this letter, please contact me on the above number.

Yours sincerely



Mark Feather
Director, Industry Codes and Licensing

⁹ For example, the relevant objectives of the CUSC refer to the "efficient discharge by the licensee of its obligations...under the [Electricity Act]". Schedule 9 of the Electricity Act contains certain duties relating to the environment which are applicable to National Grid Electricity Transmission. Therefore, the CUSC panel may need to assess other impacts on the environment when considering CUSC modification proposals.



Industry participants, code
administrators, customers and
other interested parties

Promoting choice and
value for all customers

Direct Dial: 020 7901 7437
Email: mark.feather@ofgem.gov.uk

Date: 30 June 2008

Dear Colleague

Ofgem Guidance - Environmental Issues and the Code Objectives

On 15 April 2008, Ofgem issued an open letter consulting on what was described as proposed guidance on the treatment of carbon costs within the existing codes governance framework.

Ofgem received 14 responses. Several respondents indicated that they were supportive of the proposed guidance. Other respondents indicated that whilst they were supportive of the principles underlying the proposed guidance, they nevertheless had concerns or caveats around it.

In this letter we summarise the views of respondents and set out our conclusions.

Timing and Interactions with the Industry Codes Governance Review

Respondents' Views

Many of the responses mentioned that the proposed guidance constitutes a significant change in the way code panels conduct their business. Concerns were raised that the proposed guidance would impose increased costs for analysis and that code panels and the industry do not necessarily have the expertise or processes in place to give effect to it in such short time frames. Some respondents questioned the extent to which the guidance was legally binding, and as such the role of the date from which the proposed guidance is to take effect. Some respondents suggested it would be more appropriate to consider the question of the treatment of the environment and the code objectives as part of the Code Governance Review project as opposed to issuing separate guidance at this stage.

Ofgem's View

The proposed guidance, as set out in our letter of 15 April 2008, indicated that it is now possible - due to the existence of the shadow price of carbon and the price of carbon under the EU ETS - to place a financial value on greenhouse gas emissions and that this value can be used to assess the economic impact (in cost and benefit terms) of these emissions when assessing a code modification proposal.

With this in mind, the proposed guidance was intended to do two things. First, it was intended to state clearly that we consider it is possible to take account of these economic costs and benefits, in the same way that we (and the code panels and industry) would consider other economic costs and benefits when assessing a modification proposal against

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the relevant code objective governing efficient and economic network operation¹. The second thing which the proposed guidance was seeking to do was to set out what we considered this clarification means in practical terms.

The final clarification and guidance

Given the developments referenced above, we think it is important to make code panels and industry aware that, going forward, we will be considering, to the extent relevant, impacts on greenhouse gas emissions of any code modification proposal when assessing that modification proposal against the relevant code objectives. As indicated in the proposed guidance, our view is that the "efficient and economic operation of the system" objective is the most appropriate objective against which to do that.

In view of this, we would expect code panels and industry to adopt the same approach when assessing modification proposals. This position is reflected in our Final Clarification and Guidance, which we have set out in the attachment to this document. The Final Clarification and Guidance sets out our view that some of the economic costs of greenhouse gas emissions can be relevant to the code objectives as they currently stand. In particular, it sets out our view that we would expect relevant impacts on such costs to be taken into account by the code panels and industry participants when assessing a modification proposal against the relevant code objective governing efficient and economic network operation. It also sets out guidance on some of the practical measures concerning how panels might approach the task of assessing the greenhouse gas impacts which a particular code modification proposal might have.

We note the comments received from some respondents that the various code panels and industry will need to develop processes and ways of working to enable them to take account of our Final Clarification and Guidance. We accept these comments, and with this in mind, have decided that it would be appropriate to give panels and industry some time – until the end of August 2008 – to develop ways of working and processes such that they are able, by that time, to take account of the Final Clarification and Guidance.

In this respect, we welcome the initiative taken by the CUSC Panel to establish a group to develop examples for the evaluation of carbon impacts. We would encourage others to adopt similar approaches to developing their thinking and processes.

In terms of the practical measures which are set out in the guidance, these are intended to provide an indication of how we consider the clarification and guidance could be applied in practice. It is for industry to develop processes that enable them to perform their responsibilities appropriately.

The Industry Codes Governance Review

As noted above, some parties have questioned whether it would be more appropriate to address these issues in the context of the Industry Codes Governance Review.

We have today separately issued the Authority's conclusions on the scope of the Industry Codes Governance Review². As part of the Industry Codes Governance Review we intend to consult on whether there is merit in building on the Final Clarification and Guidance to explore whether code panels and industry participants should have wider responsibilities to assess environmental impacts.

In considering these issues we intend to explore whether to expand the scope of the existing code objectives or alternatively introduce a new general environmental objective

¹ We recognise that the precise wording of the relevant objectives varies from code to code, but that all of the codes which are relevant to the accompanying clarification and guidance contain an objective which can broadly be described as relating to the "efficient and economic operation of the system".

² <http://www.ofgem.gov.uk/Licensing/IndCodes/CGR/Pages/GCR.aspx>

which may encompass more than an assessment of greenhouse gas impacts. Our consideration of these matters is likely to raise complex issues. For example, it might entail a consideration of how Ofgem and code panels/industry should address trade-offs between efficiency and the attainment of broader environmental goals and how such an objective would relate to the general licence and statutory duties of network owners. Such issues will need to be considered through a comprehensive consultation process.

We do not however consider that it would have been appropriate for us to delay issuing the Final Clarification and Guidance in order to await the outcome of the Industry Codes Governance Review. The Final Clarification and Guidance relate to the existing code objectives and are not in any way inconsistent with our considering the issue of code objectives more broadly in the context of the Industry Codes Governance Review. Further, they do not preclude any such wider consideration.

In the meantime, we expect code panels and industry, as part of the normal industry-led modification proposals procedure, to assess the measurable and quantifiable economic costs and benefits of greenhouse gas emissions impacts to the extent appropriate in the context of the existing code objectives.

Scope of guidance

Respondents' views

Some respondents indicated that environmental issues should be considered on a broader basis than simply under the code objective governing economic and efficient network operation. Some respondents did not understand why the guidance had been limited to consideration of the financial impact of greenhouse gas emissions only.

Ofgem's view

The purpose of the Final Clarification and Guidance is not to limit the assessment which a code panel and/or the industry might consider it would be appropriate for them to undertake when assessing a modification proposal against the relevant code objectives; it is intended to clarify and provide guidance in relation to one aspect of that assessment only – namely the assessment, in relevant circumstances, of the quantifiable economic costs and benefits on greenhouse gas emissions under the code objective governing efficient and economic network operation.

We would also reiterate the point set out in our letter of 15 April, that there are potentially wider impacts on the environment beyond the cost of greenhouse gas emissions that may need to be assessed by industry and/or code panels based on *existing licence or statutory obligations* (for example, under CUSC³). We do not consider it necessary or appropriate to provide any clarification or guidance on these wider impacts or their assessments at this stage.

EU ETS or shadow price of carbon?

Respondents' Views

Some of the responses considered that providing more than one possible choice for the cost of greenhouse gas emissions will just create ambiguity and that Ofgem should clarify and apply only one mechanism to determine this price. Some respondents also commented on which price should be used and those that did favoured, at least in the short term the shadow price of carbon, considering the price determined under the EU ETS scheme would undervalue the financial impacts of greenhouse gas emissions.

³ For example, Schedule 9 of the Electricity Act contains certain duties relating to the environment which are applicable to National Grid Electricity Transmission.

Ofgem's View

Ofgem's Guidance on Impact Assessments specifies that in quantifying environmental impacts we will use the Government Guidance on the shadow price of carbon, *wherever appropriate*. However, we recognise that there may be circumstances where alternative mechanisms for evaluating the price of carbon, such as EU ETS may be appropriate.

We do not (and have no basis to) prescribe which of the available mechanisms industry and code panels should use. We consider that it is for industry to decide how best to provide a proper analysis of the impact of a modification proposal taking account, where appropriate, of the presence of both the shadow price and the EU ETS price. That said, we consider that this type of analysis would be more transparent if it were to take account of both frameworks. Indeed, to restrict the analysis to one particular carbon price scenario might inappropriately result in otherwise valid measurements of carbon costs being excluded. Therefore, to the extent that industry and/or code panels favour a particular mechanism for evaluating carbon emissions, we would expect them to set out clearly and transparently in any modification report to the Authority the reasons as to why that approach has been adopted.

Incremental Changes and double counting*Respondents' Views*

A number of respondents noted that any analysis that is carried out should only assess incremental benefits/costs. They noted that there already existed a number of incentives promoting environmentally beneficial changes such as the CCL, RO etc and it was important that such benefits were not double counted.

Ofgem's View

It is important to ensure that in assessing the effects of any modification proposal, care is taken to avoid double counting of costs and benefits. We would note that the attached Final Clarification and Guidance makes no change to the requirement that a modification proposal should be assessed against the existing baseline (which includes, for example, the RO). Therefore, the assessment which the Final Clarification and Guidance envisages is concerned with quantifying, where appropriate, the *incremental* impact of a modification proposal on volumes of greenhouse gas emissions, and establishing a cost for that impact using EU ETS and/or the shadow price of carbon, as appropriate.

Minor changes to the guidance

A number of respondents have commented on particular aspects of the proposed guidance and have sought additional clarity in some areas (e.g. use of discount rates, conversion of greenhouse gas emissions into carbon dioxide equivalent). The Final Clarification and Guidance, which is attached, takes account of some of these comments.

Next Steps

The attached document clarifies our position as to the scope of the existing code objectives. It also contains some guidance as to how we consider this clarification could be applied in practice. As noted above, in recognition of the fact that industry may need to develop processes that enable them to take account of this position, we have decided to give them some time – until the end of August 2008 – within which to do so.

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The Office of Gas and Electricity Markets
9 Millbank London SW1P 3GE Tel 020 7901 7000 Fax 020 7901 7066 www.ofgem.gov.uk

We consider initiatives such as those instigated by the CUSC Panel will go some way to overcoming the issues identified by some respondents and would encourage other panels to accept their invitation or to start similar initiatives, whilst keeping in mind developments that take place elsewhere.

Yours sincerely



Mark Feather
Director, Industry Codes and Licensing

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The Office of Gas and Electricity Markets
9 Millbank London SW1P 3GE Tel 020 7901 7000 Fax 020 7901 7066 www.ofgem.gov.uk

Ofgem Final Clarification and Guidance on the treatment of carbon costs under the current industry code objectives**1. Introduction**

- 1.1 The clarification and guidance contained in this document relate to the following codes: the Balancing and Settlement Code, the Connection and Use of System Code, the Uniform Network Code, the Distribution Connection and Use of System Agreement, the System Operator Transmission Owner Code, the Uniform Network Code for Independent Gas Transporters, the Grid Code and the Distribution Code.
- 1.2 These codes govern many aspects of the electricity and gas markets arrangements. It is a feature of all of these codes that they are capable of being modified in accordance with industry led modification procedures. Under these modification procedures code panels and/or other industry parties need to assess proposed modifications against certain objectives. While the precise objectives vary from code to code, they all contain an objective relating, broadly, to the efficient and economic operation of the relevant system.
- 1.3 This document sets out our position on the scope for considering carbon costs within the existing code governance framework. It also contains some guidance to code panels, administrators and industry participants as to how they could take account of this clarification in practice.

2. Relevant, recent developments

- 2.1 The introduction of policy instruments such as the EU Emissions Trading Scheme (ETS) in 2005 has meant that a market value can now be placed on the cost of greenhouse gas emissions including carbon. In addition, the Government has issued guidance on the shadow price of carbon which can also be used to assess environmental costs and benefits.⁴ The shadow price of carbon is intended to represent society's willingness to pay for carbon abatement.
- 2.2 These developments mean that it is now possible to place a financial value on greenhouse gas emissions and that this value can be used when assessing the impact on these emissions of proposed code modifications.

3. Significance of developments within existing code arrangements

- 3.1 Due to the above developments, we consider it is possible to take account of these economic costs and benefits, in the same way that we (and the code panels and industry) would consider other economic costs and benefits, when assessing a modification proposal against the relevant code objective governing economic and efficient network operation.
- 3.2 In view of this, we would expect such costs and benefits to be taken into account (where relevant) by the code panels and industry participants when assessing a modification proposal against the relevant code objective governing efficient and economic network operation.
- 3.3 In practical terms, therefore, we expect industry and/or code panels (as appropriate) to take the following steps:
 - (a) When assessing a modification proposal against the relevant code objective governing economic and efficient network operation, if the relevant industry

⁴ This guidance has been issued by DEFRA and is available on <http://www.defra.gov.uk/Environment/climatechange/research/carboncost/index.htm>

participant and/or code panel consider that the impact of a modification will or may be to reduce or increase greenhouse gases then, to the extent that this impact will or might affect their assessment of the modification against the code objectives, the financial consequences of this impact should be assessed in terms of greenhouse gas costs. The likely level of impact will no doubt influence how the industry participant and/or the code panel go about this assessment. They may, for example, consider it appropriate to make enquiries of the relevant network operator. In addition, or alternatively, the relevant industry participant and/or code panel may decide it would be appropriate to employ the relevant expertise to undertake such assessment.

- (d) Where they have measured the economic impacts on greenhouse gas emissions, the relevant industry participant and/or code panel should use the results of this analysis to inform its assessment of the relevant modification against the efficient and economic network operation objective of the relevant industry codes.

3.4 Where an industry participant and/or code panel undertake an assessment of greenhouse gas emissions, it would be helpful if the relevant industry participant and/or code panel undertaking the analysis could, where that assessment is of a level that would warrant it:

- (a) quantify the impact on greenhouse gas emissions in terms of tonnes of carbon dioxide equivalent using the guidance provided by DEFRA. This guidance includes greenhouse gas global warming potentials which can be used to convert greenhouse gases to carbon dioxide equivalent⁵;
- (b) develop a range of cost scenarios using both the price of carbon under the EU ETS, as well as the shadow price of carbon. We recognise that going forward, other mechanisms to measure the commercial costs of greenhouse gases may be developed and this clarification and guidance should not be interpreted as precluding the use of any such mechanisms; and
- (c) include scenarios using both a social discount rate and a commercial discount rate. In calculating the social discount rate, it would be helpful if the relevant industry code participant and/or code panels could have regard to the guidance in the Treasury Green Book.⁶

4. Other considerations

4.1 Ofgem notes that there are potentially wider impacts on the environment beyond the cost of greenhouse gas emissions that may need to be assessed by code panels based on *existing licence obligations* (for example, in the case of CUSC modification proposals, panels would need to consider, where relevant, the extent to which a proposal impacts on the discharge of National Grid's duties relating to the environment under Schedule 9 of the Electricity Act). This document does not offer guidance on these assessments or the interpretation of the Schedule 9 duties.

⁵ The DEFRA guidance concerning quantification of green house gas emissions in terms of tonnes of carbon dioxide equivalent can be found at <http://www.defra.gov.uk/Environment/climatechange/research/carboncost/index.htm>

⁶ <http://greenbook.treasury.gov.uk>

Appendix 5 - Presentation given to the Group on Renewables and CHP Schemes administered by Ofgem

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Renewables and CHP Schemes Administered by Ofgem

Matthew Harnack
11 July 2008

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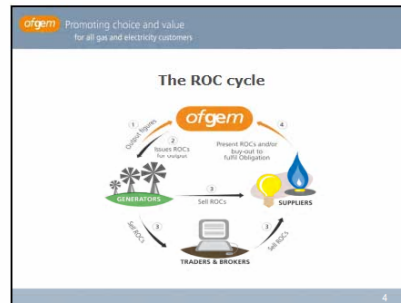
Ofgem Administers the UK Governments' Key Support Schemes for Renewable Energy and Combined Heat and Power (CHP)

- Renewables Obligation
- Non Fossil Fuel Obligation
- Climate Change Levy Exemption Certificates
- Renewable Energy Guarantees of Origin

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Renewables Obligation

- Requires licensed electricity suppliers to purchase a certain amount of renewable electricity each year, or pay a buyout amount
- Currently 9.1%; will be 15.4% in 2015/16
- £1 Billion of certificates issued to 5000MW of renewable generators each year (set to double by 2015)
- Value of a ROC is around £50/MWh
 - Made up of buyout price (indexed to inflation) and buyout redistribution amount (depends on portion of obligation met with ROCs)
- What we do:
 - Accredite eligible renewable generators
 - Issue Renewable Obligation Certificates (ROCs)
 - Maintain a certificate register
 - Check suppliers comply with their obligations



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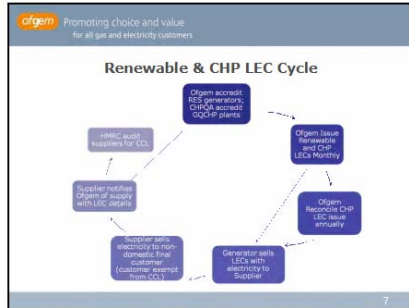
Non Fossil Fuel Obligation

- Precursor to the RO
- Fixed price contracts between Non Fossil Purchasing Agency (on behalf of suppliers) and generators
- 700 contracts current covering 3000MW of generation
- We ensure suppliers comply with ongoing obligations
 - Suppliers must ensure NPPA is enforcing contracts
 - We review requests for contract amendments
 - We review requests for termination of contracts on economic grounds
 - We ensure RO projects not built on NFFO sites

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Climate Change Levy (CCL)

- A tax aimed at reducing greenhouse gas emissions in non-domestic sector
- Payable on non-domestic supplies of energy
- Currently £4.55/MWh
- HMRC set the legislation and collect the levy
- Supply from eligible renewable and CHP sources is exempt
 - Levy Exemption Certificates (LECs) needed to prove this
- CHPQA accredit CHP generators
- What we do:
 - accredit renewable generators.
 - issue LECs and maintain a certificate register.
 - allocate LECs to supply
- We issue £200M/y of LECs on 45,000 GWh of generation



- Renewable Energy Guarantees of Origin (REGOs)**
- REGOs are electronic certificates proving that electricity generated is from a renewable energy source
 - Required under EU legislation
 - Suppliers are required to disclose the fuel mix of their electricity to customers each year – need REGOs to prove the renewable portion
 - REGOs have no market value
 - What we do:
 - Accredite Generators
 - Issue Certificates
 - Maintain a certificate register
 - Provide information for FMD compliance purposes (on request)
 - Recognise EU Guarantees of Origin



Appendix 6 – Summary Guidelines for the Assessment of Carbon Costs Associated with Code Amendments

1. Initially the relevant Code Panel should consider whether and to what extent a carbon analysis is appropriate when setting the Terms of Reference for a Working Group tasked with assessing a proposed amendment to a Code. However, this should not preclude such a Working Group from concluding otherwise in light of further analysis undertaken as part of the assessment process.
2. The costs determined should be used as part of any wider cost benefit analysis being undertaken to assess the effects of the relevant amendment.
3. The extent of the assessment to be made should be tailored to the circumstances of the proposed amendment and the relevant Code. There is no one-size-fits-all approach.
4. Be sure not to double count any costs that are already internalised in the market through other mechanisms such as EU ETS, Renewables Obligation etc.
5. Focus should be on the primary effects of the proposal wherever possible. It is possible to get caught up in calculating secondary and third order effects, but there should be a limit to the analysis. This also helps reduce the chances of double counting.
6. All assumptions should be clearly stated to ensure industry consultation on the assessment is full and effective.
7. When carrying out the impact of an amendment in cost of carbon terms the principles set out by DEFRA in its [guidance](#) on carbon costing should be followed. This can be summarised as:
 - Focus on the incremental effect which the amendment that is being assessed would have on emissions. Be careful not to double count any effects that may already be expected for other reasons.
 - Develop your baseline profile of greenhouse gas emissions.
 - Estimate the effect that the amendment would have on the profile of greenhouse gas emissions and convert greenhouse gas emissions into carbon equivalent.
 - Determine the appropriate length of time over which the effects should be measured.
 - Estimate the total change in emissions in each year of your assessment and express in CO₂ equivalent terms (conversion tables for other greenhouse gases can be found on the DEFRA website).
 - Multiply the CO₂ equivalent changes for each by the relevant value of the Shadow Price of Carbon. The current value to be used in each year can be found on the DEFRA website.

- Discount the costs in each year by the appropriate discount rate. The use of both social and commercial discount rates is recommended, although it is generally considered is that a social discount rate is more appropriate for the cost of carbon.