

Project Transmit Technical Working Group

Meeting 2 – Conference Room 8, 9 Millbank – Monday 1st August 2011

AGENDA

| Item | Topic | Lead | Attachment |
|------|---|---------------------------------|---|
| | <p>9:45 - 10:00</p> <p>Tea and coffee available</p> | | |
| 1 | <p>10:00 – 10:15</p> <p>Recap and feedback</p> | Ofgem | [TOR and draft minutes from last meeting] |
| 2 | <p>10:15 – 10:30</p> <p>Objectives and overview of the day</p> | Ofgem | |
| 3 | <p>10:30 – 11:45</p> <p>Modelling</p> | Redpoint | [Redpoint slides] |
| 4 | <p>11:45 – 12:00</p> <p>Overview of Themes 1 and 2</p> | Ofgem / NGET | |
| | <p>12:00 – 12:45</p> <p>Lunch</p> | | |
| 5 | <p>12:45 – 14:30</p> <p>Theme 1: Reflecting the characteristics of transmission users</p> | Ofgem / NGET – Group discussion | |
| | <p>14:30 – 14:45</p> <p>Break</p> | | |
| 6 | <p>14:45 – 16:15</p> <p>Theme 2: Geographical/topological differentiation of costs</p> | Ofgem / NGET – Group discussion | |
| 7 | <p>16:15 – 16:30</p> | Ofgem | |

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| | Actions summary & close | | |
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Next meeting: Tuesday 9th August, Glasgow – 09:45 start

Appendix 1

Terms of reference

Consultancy support for modelling the impact of transmission charging options

Purpose

1. As part of Project TransmiT, a wide range of options have been raised for potential changes to the arrangements of allocating all the transmission costs (including costs relating to transmission assets and costs relating to system operation, such as constraints and losses) to users. We have clarified recently that Project TransmiT will focus on changes to the charging mechanism relating to electricity transmission assets (i.e. the Transmission Network Use of System or „TNUoS“ charging arrangements) that could, if appropriate, be implemented in the short term, whereas other changes need to be considered in the context of longer term developments such as European market integration.
2. We have decided that all the short term and long term options need to be fully modelled to facilitate better understanding of their impacts on various aspects that are important to consumers, including all aspects of transmission costs and security of supply, as well as environmental impacts. Such a level of understanding by Ofgem, and by the wider industry through our consultation, is important for us to make well-informed and robust decisions on the options to be adopted for the short term under TransmiT as well as of the appropriate approach to longer term developments eg what model would fit best with the European target model that is still being developed.
3. To support this work we require consultants to assess the options in a transparent and open way.
4. In September 2010, Ofgem launched Project TransmiT¹, our independent review of transmission charging and associated connection arrangements. The aim of TransmiT is to ensure that we have in place arrangements that facilitate the timely move to a low carbon energy sector whilst continuing to provide safe, secure, high quality network services at value for money to existing and future consumers. We are undertaking this project in the context of broader work on the costs of constraint management, ongoing moves to increase the level of market coupling across Europe, and the work that DECC is bringing forward under Electricity Market Reform (EMR).
5. There is a range of options emerging from our charging work on TransmiT that would require changes to the existing transmission charging arrangements. We consider there is merit in assessing all of the charging options that have emerged in the process of TransmiT discussion to assess the impact on transmission costs (including costs relating to the provision of electricity transmission assets and costs relating to system operation, such as constraints and losses) to users and the benefit to consumers.

¹ <http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=1&refer=Networks/Trans/PT>

6. The options for potential charging changes include:
 - **Socialised**: the same uniform tariff would apply to all generation users, whatever their type and wherever they are located. Another set of uniform tariffs would similarly apply to all demand users.
 - **Status quo**
 - **Improved Investment Cost Related Pricing or 'ICRP'**: consider potential improvements to the current locational TNUoS methodology.
 - **Market splitting options** (also known as Locational Marginal Pricing, or LMP): these options introduce a locational element to wholesale energy prices.

2. Modelling approach

7. For the next phase of Project TransmiT and to inform our views on the appropriate approach to potential longer term developments, Ofgem would like to look at the impact of the range of transmission charging options noted above on the electricity system.
8. In particular, Ofgem wants to develop a better understanding of the interaction between potential changes to the charging arrangements for allocating transmission costs (ie including costs relating to transmission assets and costs relating to system operation, such as constraints and losses) to users and decisions of generators in locating new plant, making retirement decisions and the impact of these decisions on transmission investment (eg. optimal constraints vs transmission investment decisions).
9. Our evaluation of the range of potential charging options will require detailed modelling work. This is a complex task. It requires the construction of a computational tool to simulate all aspects of transmission arrangements that are relevant to the allocation of all costs arising in transmission.
10. The modelling approach will therefore look at the impact of each of the potential changes on the investment (and closure) decisions by transmission and generation, with specific regional and technological differentiation within generation; it will also model the operational/despatch behaviour of system operator and generators. Key cost elements to be covered include: all generation (both onshore and offshore) resource availabilities and costs, investment in transmission assets (both local to the connection of generation and demand users, including those to distribution networks that are affected by demand and generation at distribution level), costs of transmission congestion and transmission losses, costs for purchasing ancillary services required for safe and secure operation of the transmission system.
11. The key outputs of the modelling will be an assessment across the agreed time period (up to and including 2020) of:
 - wholesale electricity price levels (to include an indication of locational energy prices under the market splitting options)
 - the adequacy of generation levels and production patterns
 - the generation capacity, mix (constrained and unconstrained) and margin
 - the costs of constraints
 - short term efficiency of the transmission system and transmission owners/operators actions to make transmission capacity available in real time
 - incremental transmission cost levels (investment, constraints, losses)

- amount of renewable generation (by region)
 - total percentage of electricity supplied by renewables
 - total carbon emission from generation (compared with regional/national targets)
12. In order to undertake effectively cost/benefit analysis of the different options, decisions on generation new build/retirement and transmission investments should be endogenous to the analytical framework.
13. Endogenous investment modelling is a non-trivial exercise and there are no “off-the-shelf” solutions, especially when combined with alternative transmission charging models. We consider for consistency reasons (i.e. comparability of results) that the software used for the modelling work is Plexos (the constraints model currently being developed by National Grid Electricity Transmission plc (NGET) for the SO Incentives project²). We envisage that Plexos will be extended to endogenise generation decisions and some form of transmission investment. In addition, we welcome the consultant to take into account prior Ofgem models, eg Project Discovery - Explorer, SO Incentives. 2
14. To achieve the above aims we require consultants to develop a modelling tool with the following main features:
- **Least cost optimisation:** subject to the two major assumptions set out below.
 - **Agent simulation:** simulates expected player behaviour under uncertainty and models how players react to various policy options with two sets of assumptions – first assuming perfect foresight and rational expectations (meaning perfect information about future outcomes, economically rational behaviour and ability to react instantly to signals); second assuming information limited by market arrangements or subject to uncertainty, some market manipulating behaviour and delay to reaction such as investment.
15. In case of the consultant developing a modelling tool that is an iterative process, Ofgem needs to have a clear understanding what are the criteria for stopping the iterative process (eg model convergence).
16. Consultants should suggest and discuss their views on the deviation from the perfect foresight assumption (eg market power issues, delays in investment, risk adversity, etc). Their views should be robust to criticism.

3. Consultancy Support

17. Ofgem requires consultancy support for the modelling exercise.
18. We have already identified four possible options approaches for dealing with transmission and generation investment decisions:
- **Socialised:** A “postalised” or “postage stamp” approach under which the same uniform tariff would apply to all generation users, whatever their type and wherever they are located. (Similarly another set of uniform tariffs would apply to demand users.) The tariff could be based upon generation capacity (MW, for generators) and maximum demand (for consumers), or upon total energy output

² This is subject to agreeing with NGET and other parties that the model can be used for other purposes.

for generators and consumption for demand users. Another set of uniform tariffs would similarly apply to all demand users.

This approach would retain the single energy price for the GB market and the current uniform arrangements to recover the costs associated with System Operator activities (ie the procurement of energy and system balancing services to ensure the stable and secure operation of the National Electricity Transmission System).

- **Status quo:** retain current locational TNUoS methodology, the single energy price for the GB market and the uniform operational charging arrangements.
- **Improved ICRP:** consider potential improvements to the current TNUoS methodology (which would not necessarily result in an increase or decrease to the current locational TNUoS signal, but could improve the *accuracy* of charges). For example, changes could include (but are not limited to):
 - better reflection of the impact of generators' output pattern, such as intermittency, on the transmission system
 - potential changes to the treatment of transmission companies' residual costs, such as calculating their contribution on capacity and peak demand, or on output and consumption³
 - better reflection of the impact of generators' costs on system security through regional security factors
 - representation of new transmission technology, such as High Voltage Direct Current (HVDC) lines
 - potential changes to the revenue recovery split between generation and demand (the G:D split).

This approach would retain the single energy price for the GB market and the current uniform arrangements to recover the costs associated with System Operator activities.

- **LMP:** this option introduces a locational element to wholesale energy prices that will interact with aspects of the design of charging and wholesale market arrangements. In areas where transmission capacity is scarce and which face export or import constraints then the national market can be split into sub areas. In these individual areas, energy price can be determined by local demand and supply (ie a uniform energy price in individual areas) rather than a single price for the whole national market. Market splitting can be zonal or individual nodes.

This approach would retain the current uniform arrangements to recover the costs associated with System Operator activities but may involve changes to the boundary for the recovery of costs for shared and customer specific assets (ie deep connection charging).

³ Power based' methods generally refer to maximum power generated or consumed in the course of a year. Energy based methods take into account, at least to some extent, the variation in generation and consumption through a year.

19. In addition, transmission charges resulting from the transmission investment and operation costs (including mainly constraints and losses) under various charging models will be a key input to the generation investment and despatch decision. We expect that at least part of such charges will come from models outside Plexos (e.g. the publically available TNUoS model). Some support will be available from NGET in building transmission charging models.

20. We expect the modelling work to identify meaningful outputs regarding the generation capacity of different technologies (e.g. wind, coal, gas), demand, and transmission capabilities for the different GB boundaries for the years up to 2020⁴. For example, in one scenario increased wind capacity may be primarily located in a certain boundary in Scotland as opposed to another scenario where increased wind capacity does not materialise but increased interconnection capacity is delivered in a certain boundary in the south-east of England.

21. In addition, we expect the consultants to:

- be able to model the options that DECC is bringing forward under Electricity Market Reform and the model to be flexible.
- develop the necessary database to run those scenarios. Apart from the above assumptions regarding generation, demand and transmission, the database should include all the relevant data such as commodity prices.

22. We require the modelling to be developed and completed, and a final agreed and accepted written report summarising the impact analysis against each of the charging options to be submitted to Ofgem by 12 October 2011. The final report should be produced in a form that can be published.

23. In summary, we expect the consultants to:

- develop a modelling approach that will quantify the impact analysis for each of the above charging options that can be tailored to fit Ofgem's requirements in terms of usability, maintainability and detail of modelling as well as transparency
- design a bespoke tool to model the above charging options in the generation framework with an integrated transmission charging calculation
- develop a model that will produce the quantitative results under each charging option for the years up to 2020, eg constraint cost estimates, generation build and retirements generation investment and network charge estimates
- review the robustness of the results
- present to Ofgem their draft modelling results for each of the charging options
- submit extensive model manuals.

The written report should provide a clear, factual description of:

⁴ The assumptions used for these will be plant characteristics (eg generation capacity per technology, plant efficiencies, technical capabilities, transmission technologies with expansion cost assumptions, etc).

- all relevant inputs and assumptions and modelling approach
- the impact on all aspects of transmission arrangements that are relevant to the allocation of all costs arising in transmission (eg both short term efficiency of the transmission system and long term efficiency of relevant parties' investment decisions onshore and offshore).

4. NGET's involvement

24. NGET will be involved throughout the project and will take responsibility for supplying the necessary data (e.g. Gone Green generation capacity and demand, transmission boundary limits, zonal generation and demand mapping) in time for the development of the impact analysis and the model. NGET is also expected to give feedback throughout the project.
25. We expect consultants in conjunction with NGET to form assumptions about the transmission boundaries that capture the key characteristics of the GB transmission system. In addition, we expect the transmission boundary flow capabilities to reflect NGET's planned future investment and the information provided under the transmission price control.
26. The models developed by the consultants and the associated reports and model manuals should be flexible, adaptable to change, auditable, robust, and understandable. The product of the consultancy work will be owned by Ofgem.

5. Ofgem's role

27. Ofgem will be leading the development of TransmiT options, with support from the industry particularly NGET. Ofgem will therefore be the main interface with the consultant specifying key parameters of the charging options to be modelled.
28. Ofgem will provide the consultants with the information needed for the modelling exercise. In particular, we will identify all the different transmission charging arrangement options to be analysed. Ofgem will also specify the key assumptions of longer term options such as LMP to be modelled.
29. In addition, Ofgem may also set up a liaison meeting between the consultant and NGET on support that can be provided by the latter on transmission investment and charging models.
30. Ofgem expects to engage with industry in the course of the modelling work, potentially seeking views on appropriate inputs and/or assumptions, and sharing results as appropriate. The consultant may be requested to attend stakeholder events if appropriate.

6. Further detail on level of support requested

31. We anticipate that the consultancy support will include the following stages encompassing key milestones and deliverables:

- a) Initial briefing/scoping meeting between Ofgem and the consultants. This kick-off meeting will set the options that Ofgem will look at for Project TransmiT and the conceptual framework – (by week commencing 23 June 2011);
- b) Interim meeting for the consultants to update Ofgem on progress and resolve issues that may arise – (early July 2011)
- c) Initial workshop. Consultants will present an update to Ofgem/NGET on the development of the model – (end July 2011)
- d) Second workshop. Consultants will present a further update to Ofgem/NGET on the development of the model– (10 August 2011)
- e) Primary Results Workshop. Consultants will present to Ofgem/NGET the model development and testing period results together with the main assumptions used. A short written report describing the models and the results should be ready for that meeting - (by 24 August 2011);
- f) Ofgem/NGET to provide feedback/questions for further clarification to the consultants - (by end August);
- g) Consultants to provide response to Ofgem/NGET requests for further clarification - (by early September);
- h) Draft final results workshop. Consultants present to Ofgem their draft modelling results for each of the charging options. Submit a short written draft report summarising these results (end September 2011)
- i) Ofgem/NGET to provide feedback/questions for further clarification to the consultants - (by 6 October 2011);
- j) Sign-off meeting: Consultants present to Ofgem their final modelling results and submit a short final written report and model manual (by 12 October 2011).

31. The key deliverables will be:

- **Primary results workshop** – presentation and short written report summarising the model development and testing period results. The report should set out the consultant’s initial results.
- **Final results workshop** – presentation and short written report summarising the modelling results of the TransmiT policy options. A short report should set out the consultant’s analysis, results and initial conclusions. This report will allow us to understand how far and to what extent we can rely on the analysis performed.
- **A publishable final Report by 12 October 2011** – this written report should summarise key information from the modelling exercise in a form which is fit for publication and does not contain any confidential information and is factually correct and accurate.