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# Office for Gas and Electricity Markets

Assessment of Synergies and Conflicts of Interest arising from the Great Britain System Operator Delivering Electricity Market Reform

22 April 2013

**Final Report**

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# 1 Executive summary

The Technical Update to the Electricity Market Reform (“EMR”) White Paper of December 2011 foresees a key role for National Grid Electricity Transmission (“NGET”) in the delivery and administration of the Capacity Market (“CM”) and Contract for Difference Feed in Tariff (“CfD FiT”) instruments. In November 2012, DECC and Ofgem jointly published a consultation (“the November Consultation”) containing an assessment of potential conflicts and synergies that might arise if NGET were to perform this role in delivering EMR.

NGET’s role in delivering EMR comprises three areas:

- **Analysis** – Collecting evidence and conducting analysis to underpin the delivery plan and inform Ministerial decisions on EMR implementation;
- **Administration of the CfD allocation process** – Assessing applications for CfDs and allocating CfDs accordingly; and
- **Administration of the CM** – If auctions are implemented, NG would carry out a prequalification process for participation in the Capacity Market and run the auctions.

Taking on these functions may affect NGET’s manner of operating in the UK energy market, where it would have to balance its responsibility to the Government in delivering EMR and its business objectives as part of National Grid plc (“NG”). Ofgem and DECC have identified three main sources for potential conflict:

1. **Access to information** – Through NGET, NG will have access to more information on other market participants (potential competitors), and at an earlier stage, through administering the CM and CfD FiT mechanisms.
2. **Ability to influence** – NG may be able to influence electricity market outcomes through NGET to benefit the NG business. This could occur where NGET provides information (evidence, analysis) to inform Ministerial decisions, and the ways in which NG may be able to do this include:
  - Tailoring the evidence collection process;
  - Altering underlying data or tailoring assumptions;
  - Tailoring the analysis and modelling; and
  - Tailoring the presentation of the data and analysis.
3. **Ability to exercise discretion** – NGET may possess discretionary powers through its position as administrator of both the CfD FiT and the CM instruments:
  - **CfD allocation:** NG will determine the eligibility of projects for CfD based on Government criteria;
  - **CM pre-qualification process:** NG will determine whether participants have met Government or Ofgem’s criteria;
  - **CM auctions (if implemented):** NG will procure capacity, although this is expected to be based solely on price;
  - **CM monitoring:** NG will monitor successful providers up to and during delivery year, possibly involving physical checking and audits;
  - **CM rule setting:** NG will make, recommend, or provide data to inform changes to CM rules.

Ofgem and DECC have also identified potential synergies that would arise if NGET delivered EMR, which can be summarised as:

1. **Operational/Administrative Cost Savings:** economies of scope (office, property, staff, administration) and/or cost savings from avoiding duplicate work;
2. **Better SO Outcomes:** where delivering EMR can increase the efficiency or lower the costs of the System Operator ("SO") role (e.g. lower balancing costs, efficient reserves procurement, system planning benefits, and efficient constraint management); and
3. **Better EMR Outcomes:** increased efficiency/cost savings in delivering EMR through leverage of NG's experience, including efficient CfD strike price setting, efficient demand and derated margin analysis for CM, efficient capacity procurement, fewer blackouts, diversity in generation mix, and CM auction experience.

Based on this preliminary assessment, KPMG has been engaged to assess the materiality of the identified potential conflicts of interest and synergies. KPMG has not been engaged to consider mitigation of potential conflicts identified.

## 1.1 Conflicts of interest assessment

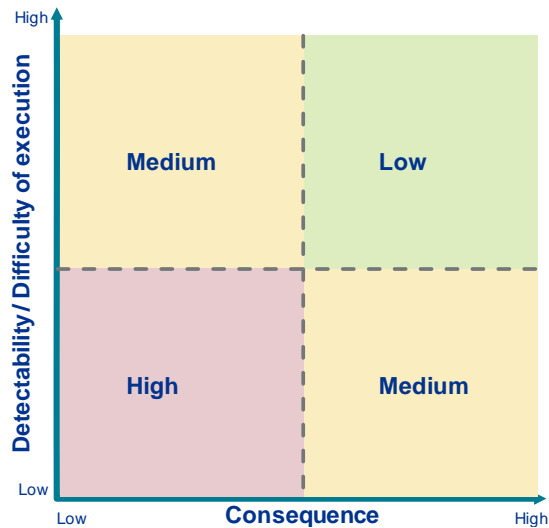
To perform this assessment, we have based our materiality analysis on:

- The probability<sup>1</sup> of NG acting on a potential conflict, given our assessment of the:
  - Ease of execution, given the type of conflict and design of the relevant EMR elements, and given the presence of existing deterrents (e.g. legal restrictions, licence conditions, and other regulatory restrictions);
  - Detectability of NG's actions if it were to act on a potential conflict; and
  - Consequences if NG businesses are found acting on a potential conflict.

Assessment of 'detectability' and 'consequence' is based on KPMG's assumption that conduct resulting in a conflict of interest would breach licences or legislation, that this would be detected, and that it would enable enforcement action to be taken, fines to be imposed, and (in some specific cases)<sup>2</sup> third parties to make claims for damages. KPMG did not undertake a legal or enforcement analysis of existing, or potential future, legislation, licence conditions, or of enforcement powers (including those specific to EMR design).

The framework used for the **probability assessment** is illustrated below. The axes that form this framework are detectability/difficulty of execution versus consequence, while there are three levels of probability: low, medium and high:

<sup>2</sup> We note that a breach of licence does not itself give rise to a third party claim for damages. However, behaviours that are deemed anti-competitive can give rise to third party claim for damages and may also constitute a licence breach. Also, if an enforcement order, imposed by the regulator to prevent an ongoing licence breach or secure compliance is not complied with, then that does give rise to a potential claim for damages by a third party who can show that the failure to comply with the order was a breach of duty owed to that person.

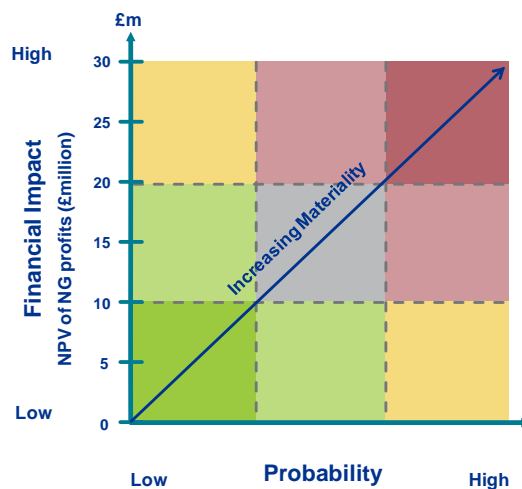


- The incentives for NG to act on a potential conflict are based on the potential profitability for the NG business(es) involved and/or for NG plc. This assessment is informed by modelling analysis using the Great Britain AURORAxmp dispatch model (“AURORAxmp”) developed by Pace Global, a Siemens Business (“Pace Global”) and, where relevant, return on capital employed (“ROCE”) on CAPEX for both NG’s regulated and competitive businesses.

The financial impact is calculated by discounting future potential profits to 2013 to give the net present value (“NPV”) of any future impact. Unless otherwise noted, values are given in 2010£ terms.

The financial impact of the conflict is then assessed jointly with the probability analysis (described above). This yields an overall approximation of the materiality of the relevant conflicts identified.

The framework used for the **materiality assessment** is illustrated below. The axes are financial impact and probability:

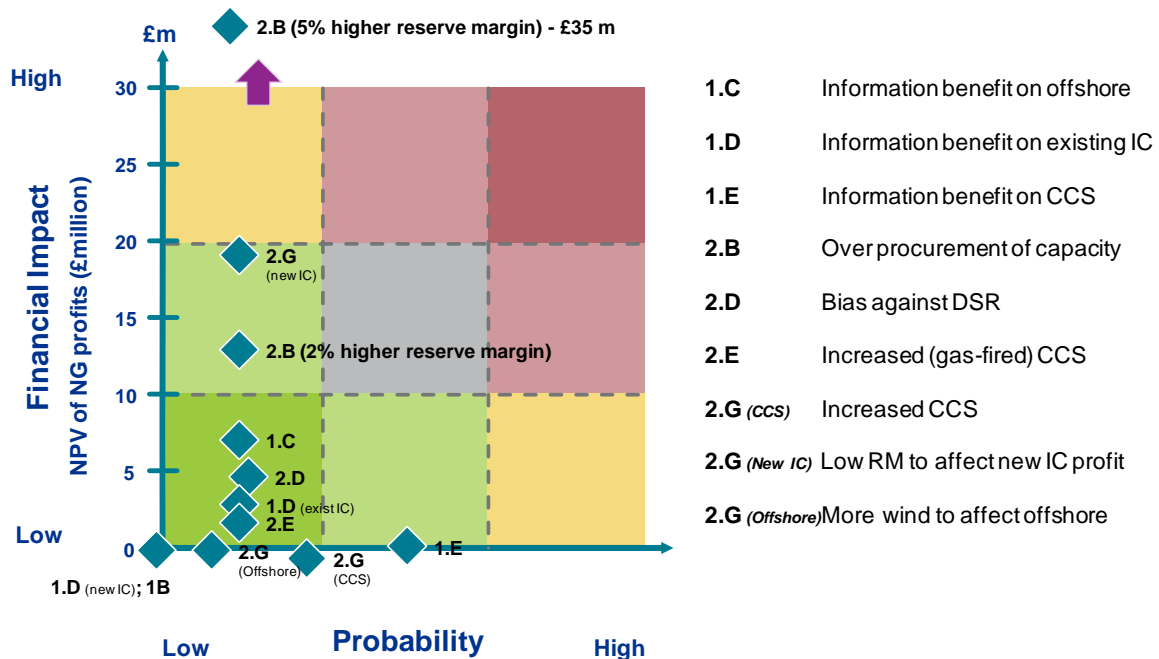


With regard to potential synergies from NG delivering EMR, we have taken a more qualitative approach. This is in large part due to the difficulty of quantifying synergies with the same

methodology employed for conflicts. In most cases, we believe that such synergies stem from the ability of NG to leverage existing skills, systems, processes, and institutional knowledge. As such, an accurate assessment of the potential size of the synergies would heavily rely on NG's view of activity costs and the potential efficiency advantages they may gain from performing the EMR delivery role.

### 1.1.1 Conflicts of interest – summary of findings

The scatter chart below plots the financial impact of each of the conflicts we have considered:



#### Probability

Our assessment indicates that the probability of most conflicts materialising is low. Although we recognise this assessment is highly subjective and open to debate, our probability framework points to two key factors that have led to our conclusion:

- Detectability and/or the difficulty of acting on conflicts are generally high. This is driven largely by the degree of oversight we understand (based on our industry knowledge, which has been further enhanced through discussions with DECC and Ofgem) DECC and Ofgem will retain on all EMR delivery functions, as well as the expected role for the Panel of Technical Experts ("PTE") and the transparency embedded in the process.
- The second factor relates to the consequences for NG if it was found to have acted on a conflict or if it did not comply with an enforcement order or penalty. These consequences could range from reputational damage to a loss of licence<sup>3</sup>. We believe that these consequences could deter NG from acting on conflicts.

<sup>3</sup> KPMG understands that the instances in which the licence can be revoked are limited (see schedule 2 of the NGET licence). The licence cannot be revoked for a breach but can be revoked if an enforcement order is not complied with or if a penalty imposed in respect of a breach is not paid.

## Financial impact

In the context of NG's total size, the scale of the impacts we have calculated is relatively small. The reasons for this include:

- The impacts reflect incremental business for NG. So, for example, if NG exercises influence that result in more generation capacity than required, the incremental business for NG is the incremental CAPEX required to support that incremental generation capacity (i.e. reinforcement/grid connection).
- Impacts are calculated as NG profit distributed to equity, not increased NG revenue.

To put the impact on NG's business into context, we have compared the impacts with NG's earnings attributable to shareholders for the year ended 31 March 2012 (£1,828 million). We have found that the most substantial impact (Conflict 2G (IC) - £20million) was equal to 1% of NG's earnings attributable to shareholders in the year to 31 March 2012.<sup>4</sup>

Our financial impact analysis has also highlighted a few important conclusions around the potential for NG to profit from the identified conflicts of interest:

- Given the proposed diversity of the EMR delivery role and the scope of NG's businesses, it is unlikely that NG would be able to successfully act on all potential conflicts. In addition to considerations around the difficulty of execution, activities that may benefit NG's competitive businesses may not benefit their regulated businesses. Similarly, activities or decisions that may benefit the gas network may negatively affect the electricity network.
- For NG's competitive businesses, the share of the market we believe NG could gain from acting on specific conflicts is relatively small. In the case of CCS, this is partly due to assumptions about technology penetration in the wholesale market. In the case of offshore wind transmission, the limited impact stems from NG's track record in this market thus far. Lastly, in the case of new interconnectors, because transmission operators are typically joint developers of new projects, we don't believe the EMR delivery role would give NG any particular advantage. The only exception to this would be if NG was able to influence the volatility of power prices in GB and the price differential between GB and interconnected countries. Based on our analysis, this would represent the biggest profit potential for NG.
- For NG's regulated businesses, the largest profit potential comes from an over-procurement of generating capacity for the system. For example, analysis to suggest that meeting a certain reliability standard requires additional gas-fired generation could represent significantly higher profits to both the electricity and gas network businesses.

<sup>4</sup> The financial impacts of each conflict are sourced from Pace Global's AURORA<sub>xmp</sub> dispatch model, which provides estimates of incremental profits (in 2010 prices) that NG can gain from acting on the identified conflicts of interest. We have compared the incremental profits gained from acting on a conflict to NG's 2012 Earnings Attributable to equity shareholders, sourced from the following document: National Grid PLC's Results for the year ended 31<sup>st</sup> March 2012. (<http://www.nationalgrid.com/NR/rdonlyres/9D9CB21C-FE5C-4BA8-92FE-249ED12875EA/53787/NGfullyearresultsstatement201112Final.pdf>)

As the NG document reports Earnings in 2012 prices, we have applied a 'deflator' of 1.067 (source: ONS) to obtain Earnings Attributable to equity shareholders in 2010 prices. This calculation enables us to calculate the relative financial impact of conflicts on a like for like basis.

The table below summarises our assessment of conflicts. For NG's regulated businesses we have shown the additional CAPEX by conflict (the last column). Since this additional CAPEX would likely be reflected in higher customer bills, this column can be viewed as an estimate of the impact on consumers of each conflict: As can be seen, the most significant conflicts in terms of NG plc profits are with the offshore and interconnector businesses and the electricity TO, and the most significant consumer impacts arise with the electricity TO.

Table 1 - Summary of Impacts and additional CAPEX for regulatory businesses

Conflict	NG business that benefits from the Conflict	Impact (Profit, £m)*	Probability of Conflict materialising	Impact as % of NG earnings attributable to shareholders (2012)	Additional regulated CAPEX spend by conflict (£m)
1.C	Offshore	7.7	Low	0.5%	
1.D (New IC)	Interconnector	-	Low	0.0%	
1.D (Exist. IC)	Interconnector	1.9	Low	0.1%	
1.E (£0.7/kW)	CCS	0.1	Med	0.01%	
1.E (£1.3/kW)	CCS	0.2	Med	0.01%	
2.B (1)	Over procurement for Elec TO	13.7	Low	0.8%	530
2.B (2)	Over procurement for Elec TO	34.9	Low	2.0%	1,347
2.D	DSR for Elec TO	5.1	Low	0.3%	186
2.E (Wind)	Mix for Gas TO (inc.Elec)	(3.1)	Low	-0.2%	(102)
2.E (CCS)	Mix for Gas TO (inc.Elec)	1.8	Low	0.1%	69
2.G (CCS)	CCS	0.07	Low	0.0%	
2.G (New IC)	IC	19.9	Low	1.2%	
2.G (Offshore)	Offshore	0.8	Low	0.1%	

Note: 'Profit' (column 3) Impacts are calculated as NG profit distributed to equity, not increased NG revenue. Additional regulated CAPEX spend' (column 6) is a proxy for consumer detriment.

## 1.2 Synergies assessment

Unlike most of the identified conflicts of interest, the synergies outlined in the consultation document stem from the potential for NG to leverage its existing institutional knowledge, utilise resources more efficiently, or save on the need for additional costs altogether (e.g. systems or data providers). Consequently, a robust analysis of the potential financial impact of the synergies will be highly dependent on information from NG. An exercise of activity-based costing could help define the true value of the synergies around 'Operational/administrative cost savings' but would need to be developed in coordination with NG. Therefore, our assessment has focused on a qualitative analysis of the potential synergies and some of the drivers behind them.

### 1.2.1 Synergies – summary of findings

Given the nature of the synergies and their reliance on leveraging existing systems, processes, skills, and institutional knowledge, the degree of separation between the SO role and the EMR delivery role will impact the extent to which these synergies materialise. Based on our qualitative assessment and given the scope of the SO's current role we find:



- **Operational / administrative cost savings:** These synergies that stem from leveraging NG's experience, resources, and institutional knowledge are likely to be significant.
- **Better EMR outcomes:** Synergies that stem from the use of the SO's skills and experience in the delivery of EMR may be significant (more robust analysis and efficient auctions, for example).
- **Better SO outcomes:** the potential size of this identified synergy (as with them all) will depend on the degree of business separation, if any, between the SO and the EMR delivery body. Irrespective of that and given the current role of the SO, overall, we think that this synergy will not be significant.

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## 2 Introduction

### 2.1 Background and purpose of this report

The Technical Update to the Electricity Market Reform (“EMR”) White Paper of December 2011 foresees a key role for National Grid Electricity Transmission (“NGET”) in the delivery and administration of the Capacity Market and CfD FiT instruments. The Technical Update pointed out that synergies exist between NGET’s role in delivering EMR and its role as System Operator (“SO”) of the GB electricity transmission network, but also that there are potential conflicts of interest vis-à-vis the commercial interests of National Grid PLC (“NG”).

In November 2012, DECC and Ofgem jointly published a consultation (“the November Consultation”) containing an assessment of potential conflicts and synergies identified, as well as potential mitigation measures.

KPMG has been engaged by Ofgem and DECC to assess the materiality of potential conflicts and synergies as an input to inform policy decisions. KPMG has not been engaged to consider mitigation of potential conflicts identified. This project has been split into two stages:

#### **Stage 1: Identification and development of modelling tests**

This stage consists of a qualitative assessment of conflicts and synergies identified in the November Consultation, as well as any additional conflicts or synergies identified. It describes how potential conflicts and synergies may manifest themselves in each of NG’s businesses based on a preliminary assessment of incentives and likelihood. This stage also identifies relevant parameters to measure the impact of potential conflicts and synergies and proposes modelling tests to quantify these impacts in stage 2 of the project.

#### **Stage 2: Analysis and quantification**

Stage 2 of this project involves quantification of potential conflicts in a series of modelling exercises. KPMG has worked with Pace Global, a Siemens business, (“Pace Global”) to model the relevant parameters in Pace Global’s Great Britain AURORAxmp dispatch model (“AURORAxmp”). Note that the quantification focuses on the impact on NG’s business only and does not include an assessment of the impact of conflicts and synergies on other market participants, though it does in some cases quantify the impact on consumers based on proxy metrics. Also, this project does not involve an assessment of proposed mitigation of potential conflicts, nor is it a legal or enforcement assessment of regulation.

### 2.2 The structure of this report

The remainder of this report is structured as follows:

- Section 3 provides a qualitative and quantitative assessment of potential conflicts identified by Ofgem and DECC in the November Consultation;
- Section 4 provides a qualitative assessment of the potential synergies identified by Ofgem and DECC in the November Consultation, supplemented by information from DECC’s January 2013 Draft working paper on EMR & SO synergies.

### 2.3 Methodology employed in assessing conflicts and synergies

We assess the materiality of potential conflicts of interest for NG based on:

- Incentives for NG to act on a potential conflict based on the potential profitability for the NG business(es) involved and/or for NG as a whole. This assessment is informed by modelling analysis in Pace Global’s AURORAxmp dispatch model and, where relevant, ROCE on CAPEX for both NG’s regulated and unregulated businesses.

- The probability of NG acting on a potential conflict, given:
  - Ease of execution, given the type of conflict and design of the relevant EMR elements, and given the presence of existing deterrents (e.g. legal restrictions, licence conditions, other regulatory restrictions);
  - Our assessment of the detectability of NG’s actions if it were to act on a potential conflict; and
  - Our high-level assessment of the consequences if NG businesses are found acting on a potential conflict.

KPMG did not undertake a legal or enforcement analysis of existing, or potential future, legislation, licence conditions, or of enforcement powers (including those specific to EMR design). Therefore, references to ‘detectability’ and ‘consequences’ are based on KPMG’s assumption that conduct resulting in a conflict of interest would breach licences or legislation, that this would be detected, and that it would enable enforcement action to be taken, fines to be imposed, and (in some specific cases<sup>5</sup>) third parties to make claims for damages.

We note, however, that in practice ‘detectability’ is subject to the asymmetry of information that exists between regulated entities and regulators and that ‘consequences’ are not only dependent on a breach of licence conditions or legislation, but also on detection of that breach, sufficient evidence of a breach, and of enforcement action being proportionate and appropriate to take in all of the circumstances of the relevant case. We also note that regulators, and the Competition Commission have powers of investigation and it is not within the remit of this report to speculate on asymmetry of information that may or may not exist in relationship to an investigation. With regard to potential synergies from NG delivering EMR, our qualitative assessment focuses on the potential impact, rather than incentive, since there is a lesser element of choice for NG (or it is absent entirely). Our assessment of the probability of potential synergies touches on the degree of business separation or restrictions placed on information flows that affect whether or not a synergy may materialise, noting this is not a legal or enforcement analysis.

## 2.4 Documents referenced for this report

In conducting the assessment of potential conflicts and synergies for NG, we referenced the following documents:

- DECC, *EMR & SO Synergies – draft working paper*, January 2013
- DECC and Ofgem, *Synergies and Conflicts of Interest arising from the Great Britain System Operator delivering Electricity Market Reform – Consultation Document*, 29 November 2012.
- National Grid – *National Grid response to the November consultation on Synergies & Conflicts of Interest arising from the Great Britain System Operator delivering Electricity Market Reform*, 29 January 2013.
- Energy UK – *Energy UK response to the DECC/Ofgem consultation on Synergies and Conflicts of Interest arising from the Great Britain System Operator delivering Electricity Market Reform*.
- *Transmission Licence Standard Conditions*.
- *National Grid Electricity Transmission PLC Special Conditions, as at 11 June 2012*
- National Grid, *Managing Risk and Uncertainty*, March 2012
- National Grid, *National Electricity Transmission System (NETS) Seven Year Statement*, May 2011

<sup>5</sup> KPMG understands that the instances in which the licence can be revoked are limited (see schedule 2 of the NGET licence). The licence cannot be revoked for a breach but can be revoked if an enforcement order is not complied with or if a penalty imposed in respect of a breach is not paid.

- Commission for Energy Regulation, *East West Interconnector Revenue Requirement Public Information Note – Information Note*, September 2012
- Scottish Development International and Scottish Enterprise, *Carbon Capture and Storage – CO2 Transport Options for Scotland*, 2010
- Ofgem- *R110-T1 Final Proposals for National Grid Electricity Transmission and National Grid Gas Finance Supporting document*, 17 December 2012.
- National Audit Office, *Offshore Electricity Transmission: a new model for delivering infrastructure*, 22 June 2012.
- DECC- *Electricity Generation Costs*, October 2012
- DECC- *Government response to the consultation on proposals for the levels of banded support under the Renewables Obligation for the period 2013-17 and the Renewables Obligation Order*, 2012
- DECC- *Parsons Brinckerhoff Report, Electricity Generation Cost Model - 2012 Update of Non Renewable Technologies*, August 2012.
- *National Grid Gas Plc – NTS Part C Special Conditions – Current Version, as at 1 April 2012.*

# 3 Conflicts of interest

## 3.1 Introduction

In the November Consultation, Ofgem and DECC sought the views of stakeholders on potential conflicts of interest for NG, originating from NGET’s role in delivering EMR. NGET’s role in delivering EMR comprises three areas:

- **Analysis** – Collecting evidence and conducting analysis to underpin the delivery plan and inform Ministerial decisions on EMR implementation;
- **Administration of the CfD allocation process** – Assessing applications for CfDs and allocating them accordingly; and
- **Administration of the Capacity Market** – If auctions are implemented, carrying out a prequalification process for participation in the Capacity Market and running auctions.

Taking on these functions may affect NGET’s manner of operating in the UK energy market, where it has to balance its responsibility to the Government in delivering EMR and its business objectives as part of NG plc. Ofgem and DECC identified three main sources for potential conflicts and synergies in the consultation:

1. **Access to information** – Through NGET, NG could have access to more information on other market participants (potential competitors), and at an earlier stage, through administering the Capacity Market and CfD FiT mechanisms:

Capacity Market		CfD FiTs	
Stage	Information	Stage	Information
Analysis	Evidence from generators e.g. generation capabilities, running costs, closure forecasts.  Foresight of Government policy intentions.	Analysis	Information on technology costs, deployment potential, whole system costs, cost of capital.  Foresight of Government policy intentions.
Pre-qualification	Commercially sensitive information including replanting, refurbishing, upgrades and closures, plans, design specifications, financing information.	Allocation	Project-specific confidential data, including consents and proof of planning permission.
Auction	Individual bids from participants, identification of successful bids, price stack of bids, prices and contract lengths, overview of entire market.		Information on successful applicants ahead of the market.
Monitoring	Information on status of projects, including whether projects are meeting milestones and are due to start providing capacity.  Information on whether providers have made capacity available at stipulated times.		

2. **Ability to influence** – NG may be able to influence EMR outcomes through NGET where NGET provides information (evidence, analysis) to inform Ministerial decisions:
  - NGET will collect evidence and conduct analyses to inform Ministerial decisions related to (amongst others), capacity to be contracted (CM and CfD FiT); the potential implementation of primary and, if needed, secondary capacity auctions for the capacity market; and the functioning and costs of the CfD FiT instrument.
  - Ofgem and DECC have identified four main ways for NG to influence Ministerial decisions:

- Tailoring the evidence collection process;
  - Altering underlying data or tailoring assumptions;
  - Tailoring the analysis and modelling; and
  - Tailoring the presentation of the data and analysis.
3. **Ability to exercise discretion** – NGET may possess discretionary powers through its position as administrator of both the CfD FiT and the Capacity Market instruments:
- Ofgem and DECC have identified five functions that allow NG to make decisions, which may or may not allow discretion for NGET:
    - **CfD FiT allocation:** NG will determine the eligibility of projects for CfD FiTs based on Government criteria;
    - **CM pre-qualification process:** NG will determine whether participants have met Government or Ofgem’s criteria;
    - **CM auctions (if implemented):** procurement of capacity, although selection is expected to be based solely on price;
    - **CM monitoring:** progress monitoring of successful providers up to delivery year, possibly involving physical checking and audits; and
    - **CM rule setting:** NG to make, recommend, or provide data to inform changes to CM rules.

The following section summarises potential conflicts of interest arising through each of these sources.

## 3.2 Overview of how the EMR role may lead to conflicts

Through our review of the functions of the EMR delivery body, it is our view that potential conflicts could arise through NG’s role in providing analysis to underpin the Delivery Plan with respect to the CM and CfDs. Our understanding is that the administrative role of the EMR delivery body should be purely mechanistic, with transparent and clearly prescribed rules. If that is the case, it is less likely to give rise to conflicts. A possible exception is the administration of auctions. Whilst NG will not influence the outcome of the auctions it does gain information that may provide it commercial insight. For example:

- **CM auctions:** In administering the CM auction, NG will have access to the supply price curve of all bidders. This information may have commercial value to the SO business in its understanding how to optimise/minimise balancing costs. However, because these costs are largely passed through to system users and ultimately consumers, this may have synergistic value from the customer’s perspective.
- **CfD auctions:** To the extent CfD auctions occur, NG will have access to the supply price curve of the CfD auction and such information could provide commercial value to its competitive businesses.

## 3.3 Assessment approach

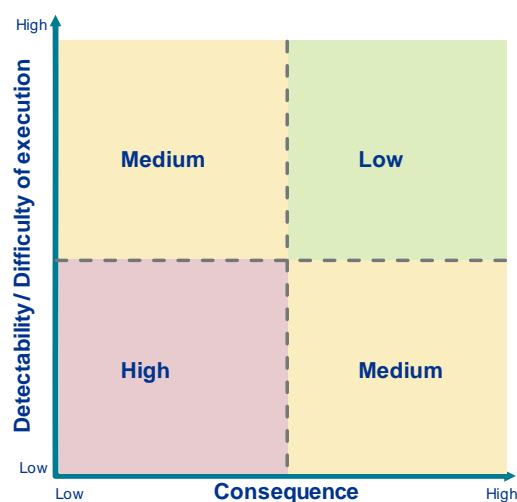
### 3.3.1 Probability assessment methodology

The qualitative methodology employed to identify the conflicts in this report involves extracting the key elements from the DECC and Ofgem Consultation regarding Synergies and Conflicts of Interest arising from the Great Britain System Operator delivering EMR.

This report has systematically assessed the relative probabilities of each conflict materialising and we have assigned a high, medium or low probability to each conflict using the following analytical framework:



Probability assessment – detectability/difficulty of execution versus consequence



**Axis Description**

**X-Axis:  
Consequence**

- Consequence is defined as the potential consequences to NG if its behaviour is detected.
- The consequences have been assessed in the following degree of severity:
  - Little or no consequence;
  - Reputational risk leading to regulatory uncertainty and potentially greater regulatory scrutiny that may result in a harder regulatory position being adopted leading to less advantageous regulatory outcomes for NG. This could have negative implications for the assessment of NG by both debt and equity investors. In turn, this may increase NG’s cost of capital, reducing shareholder returns;
  - Based on the assumptions we have used, penalties, fines and (in some specific cases) damage claims, or loss of licence (if an enforcement order is not complied with or if a penalty imposed in respect of a breach is not paid).

**Y-Axis:  
Detectability/  
Difficulty of  
Execution**

- Detectability is defined as the ease with which NG’s potential action could be detected. In practice, this would need to take into account asymmetries of information, the need for evidence, and of enforcement action being proportionate and appropriate to take in all of the circumstances of the relevant case.
- Difficulty of Execution describes the relative difficulty NG will face in acting on the conflict, given the type of conflict and the design of the relevant EMR elements.

It is important to note the qualitative and subjective nature of this probability assessment. We have not attempted to quantify the probability, as this would be highly subjective. Also, although we acknowledge that the size of the benefit (financial impact in the terms used in this report) may be a factor affecting probability<sup>6</sup>, we aimed to assess both factors independently of each other. Given the small size of the potential profits by undertaking a conflict relative to NG’s the regulatory business profits that NG would put at risk by acting on the conflict; it is our view that it is better to assess probability in terms of consequence and detectability. In addition, using detectability and consequence as our framework to assess probability allows us to isolate the uncertainty associated with the quantification of the benefit. Moreover, in most

<sup>6</sup> That is, all else being equal, the probability of a conflict occurring will increase with the size of the benefit.

cases, we believe that assessing the financial impact independently of any preliminary analysis of probability would allow the reader to make their own assumptions regarding the materiality of the conflict.

#### Description of outcomes

- Low Probability (Upper right quadrant)
  - Conflicts that are difficult to execute have a low probability of materialising as they are highly detectable and have a high consequence for NG.
- Medium Probability (Upper left and lower right quadrant, yellow)
  - Lower right quadrant: conflicts that have a high consequence but are easy to execute and have a low level of detectability.
  - Upper left quadrant: conflicts that have a low consequence but are difficult to execute and have a high level of detectability.
- High Probability (Lower left, red)
  - Conflicts that are easily executable will have a high probability of occurring as the cost of acting on such a conflict is low. This has to be weighed against the financial impact, which is discussed in the next section.

### 3.3.2 Financial impact methodology

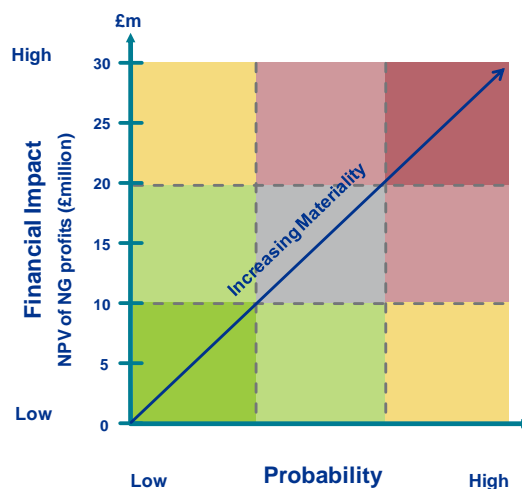
The probability analysis is then assessed jointly with the financial impact of the conflict. This yields an overall approximation of the materiality of the relevant conflicts identified. Financial impacts are obtained via Pace Global modelling and/or KPMG analysis, where relevant.

The relative financial impacts to CAPEX, revenues or profits indicated by the tests undertaken were heavily influenced by input assumptions. To facilitate this work we utilised DECC's and Ofgem's input assumptions to build the base case. The long-term "Base Case" view of the wholesale power market is driven by DECC's 100g scenario. We calculated the relative financial impact by calculating profits to NG and comparing different scenarios to the "100g scenario".

The financial impact is calculated by discounting future financial impacts to 2013 to give the net present value (NPV) of any future impact. Unless otherwise noted, values are given in 2010£ terms.<sup>7</sup> This is to maintain consistency with primary data sources used. Probabilities are then sourced from the probability assessment to define an overall Materiality Assessment.

<sup>7</sup> Discount rates used to calculate NPV values are discussed in Appendix C.

## Materiality assessment – Financial Impact vs. Probability



### Axis Description

#### X-Axis:

- Financial Impact
  - For existing businesses, this describes the financial value of any incremental profits gained by NG should they act on a conflict. For NG’s future new businesses, we have assumed market share values and calculated NG’s future share of the market (in 2010£ values). All detailed assumptions are described in the relevant sections of this report.

#### Y-Axis:

- Probability
  - Assessment based on consequence vs. detectability/ difficulty of execution as described above.

When reviewing the impact assessment provided in this report, it is important to bear in mind the following caveats:

- By their very nature, long-term assessments and scenarios are highly uncertain. Our analysis runs to 2030, but the results should only be used to assess, at a high level, the relative size of any given conflict. Changing assumptions around generating capacity expansion, retirements, CAPEX requirements, gearing, connection charges or exit charges could lead to significantly different results.
- All estimates used in this analysis are based on publicly available information. In most cases we have consulted with DECC and Ofgem on the appropriateness of the assumptions and have used professional judgment to select between different sources. While we have tried to present different scenarios where the sources pointed to significantly different numbers, there is a high level of uncertainty around all the metrics used in this analysis and the results are highly sensitive to changes in assumptions.
- Perhaps most importantly for the evaluation of the results presented in this report is the notion that the exact role of the SO in EMR analysis, design, and administration is still to be determined. In an attempt to quantify the impact, we have made several assumptions around the role the SO would play and its availability to use information, and exert influence and discretion. These issues were being actively considered by DECC at the time of this project and had yet to be fully defined.

### 3.3.3 Conflicts based on access to information

Through collecting evidence, and conducting analysis and modelling to inform key Ministerial decisions on the level of support for technologies, and review of CfD applications, NG may gain access to commercially sensitive information. Access to this information may give rise to a conflict as NG could use the information to increase the competitiveness of its businesses that operate in competitive or potentially competitive markets.

With respect to businesses operating in largely competitive or potentially competitive areas (“competitive businesses”), NG could, if it had access to project specific commercial information, increase its competitiveness in bidding and winning business, through understanding the commercial package offered by previously successful bidders for infrastructure such as OFTOs, and/or from using the information it receives to make better informed decision on future projects, than competitors.

Other areas of potential conflict may occur where NG has access to successful bidder information such as in administering CM auctions or CfD auctions. The administrator observes the supply prices curves bid into the auction and while it does not influence the auction outcome the information could for example be utilised to improve the TO / SO’s negotiating position when procuring monopoly services. (Note that this conflict could provide benefits to consumers to the extent that some or all of the cost savings are passed through to consumers. Therefore, it could be considered as a synergy from a consumer perspective. For the purposes of this report, however, it is treated as a conflict as it could distort the normal operation of the market for such services).

Of the other information gained in providing administrative functions such as pre-qualification of CM / CfD participants it is our understanding from DECC that NG’s EMR role will be a mechanistic checking role of a few simple pieces of information, rather than one in which NG has access to project specific commercially sensitive information. If that is the case, it is less likely that a conflict will arise where NG is undertaking an administrative role compared with it undertaking analysis relating to the EMR delivery plan.

### 3.3.4 Conflicts based on ability to influence and/or exercise discretion

#### a. Discretion

The November Consultation lists the following EMR activities that might grant NG an element of discretion in their execution:

##### **1. Allocation of CfDs.**

Verifying eligibility of projects for CfDs based on Government criteria, including proof of planning permission and connections agreements, is a ‘tick box’ exercise. Note, however, that the exact process is not yet set out and the mechanics for the ‘allocation round’ for CfDs has not yet been specified.

##### **2. The pre-qualification process for the Capacity Market.**

Verification of pre-qualification criteria for participants in capacity auctions, based on criteria pre-defined by Ofgem and/or DECC.

##### **3. Auction for the CM**

Administration of capacity market auctions, if implemented.

##### **4. Monitoring during the operational phase for the Capacity Market**

Monitoring of progress, up to and during the delivery year of the Capacity agreements. If implemented, this would involve physical checking and audits to gauge progress against milestones. This activity is limited to gathering and reporting on information and does not involve NG undertaking any action to CM participants, however.

## 5. Rule setting

Leverage of SO expertise to make recommendations or provide data to inform potential changes to CM rules, which affect the logistics around CM auctions. It is intended that significant changes will be made by, or at least approved by, Ofgem and/or DECC.

Assessment:

- Of the activities listed above, it is intended that the design of activities 1-3 offer no de facto room for discretion, as these activities will be based on pre-defined criteria that NG has not set out and that NG will not be able to change.
- Activity 4 involves some auditing or physical checking of capacity providers against transparent project milestones (e.g. permits, permissions, installation, and tests)<sup>8</sup> and performance requirements. Capacity providers' performance against milestones will be objectively verifiable, and in any case, NG's reports will be scrutinised by Ofgem and DECC.
- Activity 5 involves NG exercising discretion only on minor rules around the CM auctions, as the consultation document states that 'significant' changes in rules lie with Ofgem and/or DECC. In the absence of further detail on precisely which rules NG might be able to change, we assume that they do not include rules that can benefit NG specifically, and in any case, we expect that changes will be heavily scrutinised by Ofgem and DECC and will need to satisfy defined criteria.
- Given the assumptions we are making, all of the activities 1-5 are highly likely to result in appeals by 'victims' that NG is exercising discretion in an unreasonable way. This may increase the likelihood of NG's behaviour being detected ex-post, depending on the design and accessibility of the appeals process.

### b. Influence

The November Consultation lists the following EMR activities that might allow NG to influence EMR related decisions:

- Collecting evidence
- Conducting analysis
- Present analysis to Government.

All of these actions broadly serve the following purposes:<sup>9</sup>

- a) To inform CM volumes to be contracted
- b) To inform CfD strike prices
- c) To analyse CM auction outcomes
- d) Report on the volume and cost of CfD contract allocated

It could influence these by;

- a) Tailoring the evidence collection process
- b) Altering underlying data or tailoring assumptions
- c) Tailoring the analysis and modelling
- d) Tailoring the presentation of the data and analysis.

<sup>8</sup> See for example Annex B, table 5, p30.

<sup>9</sup> November consultation para 73, p31

#### Assessment:

- a) This is based on SO analysis, which may involve recommendations, regarding the amount of capacity to procure and/or 'optimal' generation mix. By the same reasoning, this is also recognised as a potential source of synergy. It is possible that NG will use the synergy argument to tailor analysis to benefit other NG businesses. As the November Consultation indicates<sup>10</sup>, NG's behaviour will be heavily scrutinised by Ofgem and DECC so NG will have to come up with explanations when required. Nevertheless, detection is unlikely to be perfect in practice.
- b) From Annex B<sup>11</sup>, CfD strike prices are informed by existing mechanisms or programmes, such as the RO Banding review process, CCS Commercialisation programme, and FID Enabling programme. These mechanisms have a degree of transparency, which allows for objective verification of outcomes (by Ofgem, DECC, and CfD participants), that will limit the scope for exercising influence by NG and provide a benchmark for detection.
- c) The outcome of each CM auction is intended to be based on the price alone. Analysing CM auctions should therefore be a relatively straightforward process. Potential 'victims' of any influencing by NG will be able to compare their true bid with the auction outcome and establish whether or not their bid was accurately reflected in the process.
- d) As this is the same activity as activity (4) in the 'exercising discretion' section, see above.
- e) NG reports on volumes and cost of allocated contracts, but does not allocate CfD contracts. The reporting is partly based on market data (prices) which are observable, and data that is measured or collected by NG (volumes). This allows for potential exercise of influence. However, this is known to Ofgem and DECC, so there will be scrutiny in this area. It is unlikely, however, that the potential for exercising influence in this area can be entirely avoided.

### 3.4 Other factors affecting probability

In the course of our assessment, we have identified two factors of particular importance that merit separate discussion here.

#### 3.4.1 Special Licence Condition C1

Both the November Consultation and NG's response to the Consultation mention Special Condition C1 'Prohibited Activities of Conduct of the Transmission Business', which prohibits the licensee (NGET) to conduct its transmission business in a way that gives itself or its affiliates *"unfair commercial advantage including, in particular, any such advantage from a preferential or discriminatory arrangement, being, in the case of such an advantage accruing to the licensee, one in connection with a business other than its transmission business."* Provisions in the Utilities Act 2000 and Competition Law may also be relevant. While we do not provide a legal or enforcement interpretation of these legal constraints or other licence conditions, we assume that NGET's transmission licence stops NGET from providing information, influencing, or exercising discretion under EMR for the benefit of itself or its other businesses. We assume that where any breach of a licence condition or legislation is detected and proven that this would lead to enforcement action fines being imposed, and (in some specific cases) third parties making claims for damages. This may also lead to reputational damage for NGET as a result.

#### 3.4.2 Treatment of CAPEX under RIIO

A number of potential conflicts are based on the motivation to provide NG's network businesses with reasons to undertake additional capital expenditure (mainly to connect new generation to the gas

<sup>10</sup> Para 75, p32

<sup>11</sup> Table 1, p5

transmission network or electricity transmission network) in order to increase regulated revenues. NG has informed us that under RIIO regulations there is a disincentive to undertake capital expenditure above the CAPEX baseline, as the incentive mechanism is designed to encourage spending less than the allowed CAPEX baseline. This view, while correct, does not take into account baseline adjustments that can occur through the RIIO uncertainty mechanisms.

From our discussions with Ofgem, we understand that there can be adjustments through the uncertainty mechanism to the CAPEX allowance under RIIO to allow for additional (unforeseen) investments by NG to accommodate additional generating capacity or gas entry and exit capacity which Ofgem assess as being economic and efficient investments. Where appropriate, we have incorporated such adjustments in our modelling. Since any additional CAPEX spend that alters the baseline through the uncertainty mechanism will be added to NG's Regulated Asset Value ("RAV"), it follows that the RAV will be higher in periods after the current price control period. Therefore, financial benefits that NG obtains from this additional CAPEX spend will arise in periods beyond the current price control period.

We have not modelled any potential underperformance or outperformance of NG against its baseline CAPEX allowance. Moreover, the need to define uncertain, but measurable events that would have specific impact on the network would make analysing the impact of this mechanism highly speculative and inaccurate. Therefore, we have not included any potential financial impact of the incentive mechanism in our quantitative analysis, though we note that such impacts have the potential to be significant.

### 3.5 Materiality assessment

The following sections provide an overview of the materiality assessment of conflicts of interest, combining our qualitative assessment of probability as described in Section 3.3.1 above, with the results of the quantitative assessment based on Pace Global's AURORAxmp dispatch model and our assumptions on financial parameters. Appendices A to C provide full details on the Pace Global's modelling, the parameters and metrics underlying the profitability analysis, and the assumptions made in calculating the NPV of profit streams.

The approach we have adopted relates to estimating the impact of conflicts arising due to changes in the CAPEX of either regulated businesses or businesses in largely competitive areas. These CAPEX assumptions have then been used to estimate the profits to NG's businesses, both regulated and competitive. Note that where relevant, we have also highlighted the underlying change in CAPEX for the regulated businesses. This number can be used as a proxy to calculate *consumer impacts*. All assumptions and materiality estimates are in **2010£** unless stated otherwise.

Conflicts that could provide benefits relating to an improved ability to meet incentives or improvements to NG's negotiating position as a monopoly buyer cannot be quantified using this type of modelling.

Furthermore, we do not consider that alternative modelling techniques exist that could provide a reliable quantitative result.

### 3.5.1 Potential conflicts based on access to information

Conflict 1A: Advance knowledge of potential generating sites allows the Transmission Operator (“TO”) to acquire land and subsequently sell it at a profit.

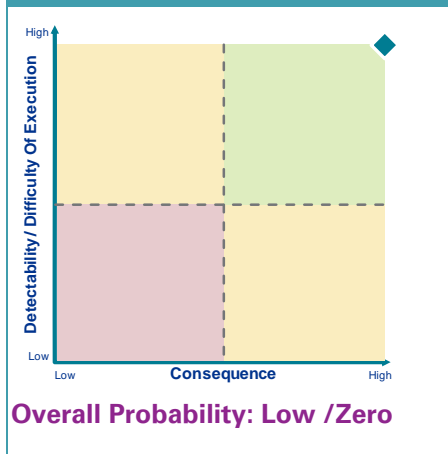
- The scope for this conflict to materialise is very limited for a number of reasons:
  - Potential generating sites that have location benefits due to system constraints and network entry pricing, are known to NG currently.
  - There is transparency of information regarding locational benefits of potential generation sites in documentation such as the Seven Year Statement, network charging methodology, and balancing market reports. Given that this information is publicly available, the incremental benefit to NG TO from the EMR role is likely to remain low.
  - Barriers to entry in the real estate ‘market’ are low, which ensures potentially advantageous sites are likely to be either heavily contested or influenced by other factors not related to NG/EMR information. It is possible that other property developers are as or more likely than NG to speculatively purchase this land.
- Given that the marginal benefit of having access to information with respect to acquiring potential generation sites is low or negligible, we conclude there is a very low probability of this conflict of interest materialising.
- **Overall probability: Low**



Conflict 1B: Access to business privileged information on likely future gas build benefits NG electricity and gas network businesses and may give TO businesses an advantage in the CAPEX baselining process under RIIO.

Analysis of CfDs and requirement for gas capacity gives TO information on new investments in gas generation that require connection to the gas and power grid. This may give NG an advantage in the setting of the CAPEX baseline under RIIO.

### Probability Assessment



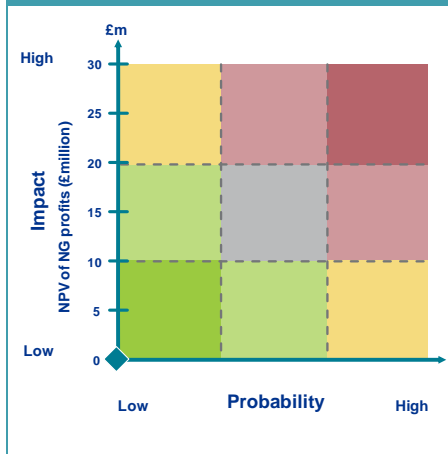
■ **Detectability/executability:**

- If there was information that provided NG an advantage, then detectability would be high since Ofgem has access to the same information on EMR as NG.
- As NG is not currently an investor in upstream or downstream assets (other than LNG regasification, which is addressed below), the use of information to derive additional profits relates to the ability to adjust agreed TOTEX. This can be adjusted either through the uncertainty mechanism or at each eight-year price review, which would then occur via the existing TO/SO price review process with Ofgem.

■ **Potential consequence if detected:**

- If EMR provided information that was an advantage in respect to this potential conflict then the likely consequences of detection may include reputational damage, fines and penalties. The damage to NG’s relationship with Government would be severe.

### Materiality Assessment (2010£)



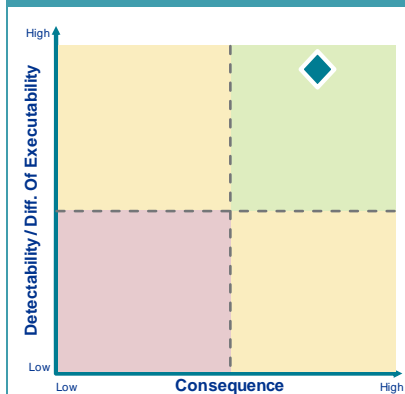
■ **Impact (£0 million)**

- It seems very unlikely that the EMR delivery role will give the TO any additional information it does not already have.
- All prospective generation that will be connected to the transmission system will have to apply to the TO for a connection agreement and this application will need to be made at an earlier stage than any bid for CfD or CM contracts. We understand that even distribution-connected generation requires a connection application and is required to inform the TO of any significant applications.
- EMR information will not enable NG to favour its transmission businesses over that of the Scottish TOs as in its role as TO it already has access to information on prospective generation connections.
- NG would have the information on future generation build required to adjust the RIIO TOTEX through the uncertainty mechanism under its role as TO, even if it was not performing the EMR role. Therefore, the EMR role would not confer any information advantage to NG with respect to this conflict. Consequently the impact of this conflict is **£0**.

Conflict 1C: NG Offshore Transmission business has access to offshore capacity procurement information that can give it a first mover advantage.

Analysis to inform CfDs as part of the delivery plan may provide NG with commercially sensitive information from offshore generation projects and other bidders for offshore transmission assets. NG could then use this information to improve the competitiveness of its future bids for offshore transmission.

### Probability Assessment



Overall Probability: Low.

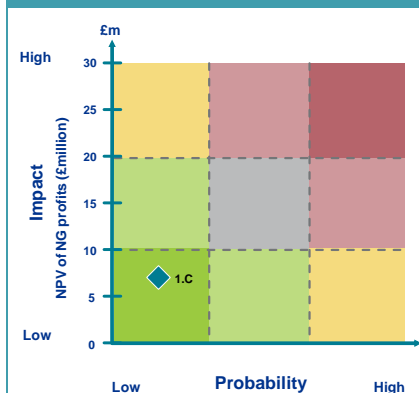
#### ■ Detectability/executability:

- Because NG would have the same information as other bidders for Offshore Transmission Owner (“OFTO”) licenses (albeit a little earlier), there is little or no first mover advantage from having advance information.
- However, access to commercially sensitive information available to NG in conducting analysis to underpin the CfD delivery plan may allow NG (or a consortium NG is part of) to bid more competitively.
- Forensic analysis could make step changes in NG bidding behaviour detectable, but subtle changes over time would be less so.
- NG Offshore Ltd, which is the potential bidder for OFTO licences, is already legally separated (and is required to be operationally and managerially independent) from NGET and NGGT. This would increase the difficulty of execution.

#### ■ Potential consequence if detected:

- If this conflict occurred and was detected, it could result in reputational damage to NG.
- Based on our assumptions on regulation and enforcement, this conflict could also result in NG incurring fines, penalties and damage claims.

### Materiality Assessment (2010£)



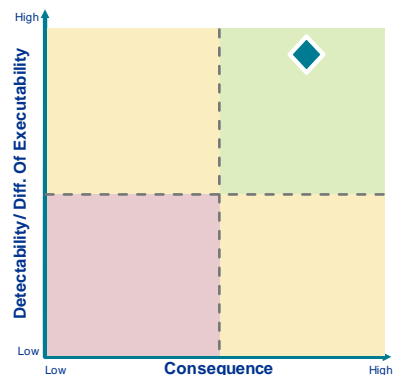
#### ■ Impact (£8 million)

- Based on DECC’s 100g scenario assumptions for offshore wind capacity through to 2030 (~14 GW) and an assumed average profit of £8.05/kW for offshore transmission, the NPV of total market profits in the period through to 2030 is £54 million (for the transmission element of offshore wind).
- To allocate a portion of this profit to NG, we have reviewed publicly available information on offshore transmission licence bids. On the basis that NG Offshore has not yet successfully bid for an OFTO project, we are assuming a starting point of 0% market share.
- We assume that having access to information under EMR might allow NG to join the group of shortlisted candidates (6 now) and obtain a 14% market share (making it 1 of 7) (See Appendix B for more detail).
- A 14% market share of a £54 million market would give NG a profit of £8 million.

Conflict 1D: NG Interconnector business can benefit from early access to EMR information around the CM and CfD, providing NG with price volatility information.

Access to information that provides an insight into future price and price volatility in the UK market (if greater price volatility results in increased spreads between the UK and the connected market, the value of the interconnector increases) may enable NG to make more informed investment decisions with respect to interconnectors than its competitors, giving it a first mover advantage or greater ownership share.

### Probability Assessment



**Overall Probability: Low.**

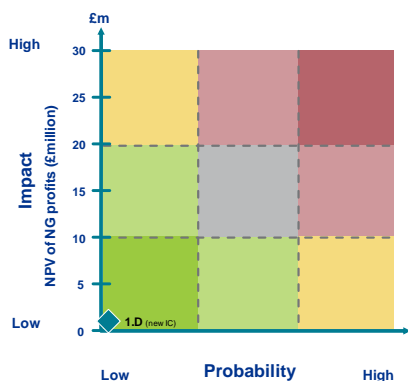
■ **Detectability/executability:**

- The benefit of having advance information to benefit the interconnector business is marginal as interconnector capacity is sold in a prescriptive manner to the market through JV entities, which reduces NG’s ability to sell capacity on a discretionary basis. Therefore, NG is unlikely to extract any value from additional information it has.
- This conflict could be detectable as commodity price information is available, and there are increased reporting requirements under REMIT and EMIR. This could be analysed to see if NG had acted on the basis of advance information. However, as in financial services, it is not always straightforward to detect or prove the use of private information.

■ **Potential consequence if detected:**

- Based on our assumptions, potential consequences may involve fines and penalties and damage claims for the interconnector business. Therefore, the consequence to the interconnector business could be high.
- In addition, this conflict could result in reputational risk to the regulated transmission business and therefore have a high impact on NGET

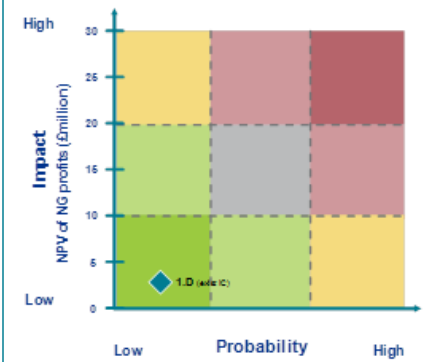
### Materiality Assessment (2010£)



■ **Impact – £0 for new Interconnector**

- There is considerable project risk associated with developing interconnectors. Developing interconnectors in a consortium with the TO of the interconnected market considerably reduces this risk as the two key operational stakeholders in the project (the respective TOs) commercial and operational interests will be aligned.
- Any consortium developing an interconnector would sell down the capacity to market participants that are willing to take merchant price risk in a manner that is consistent with the relevant regulation. This is likely to be undertaken via a transparent process, which would preclude NG from acting on this conflict.
- We also note that NG has had a 50% participation in previous interconnectors (Brit-Ned and France). If NG were to build a new interconnector, we consider that the other host nation transmission operator would also have an equal ownership share to NG, as demonstrated in the past. Therefore, we have assumed that NG would have a 50% participation in any new interconnector and the other TO would own the remaining 50%. Therefore, regardless of access to additional information NG’s share would still likely remain at 50%, and as a

result the conflict would have no impact<sup>12</sup>.



■ **Impact – £2 million for existing Interconnectors**

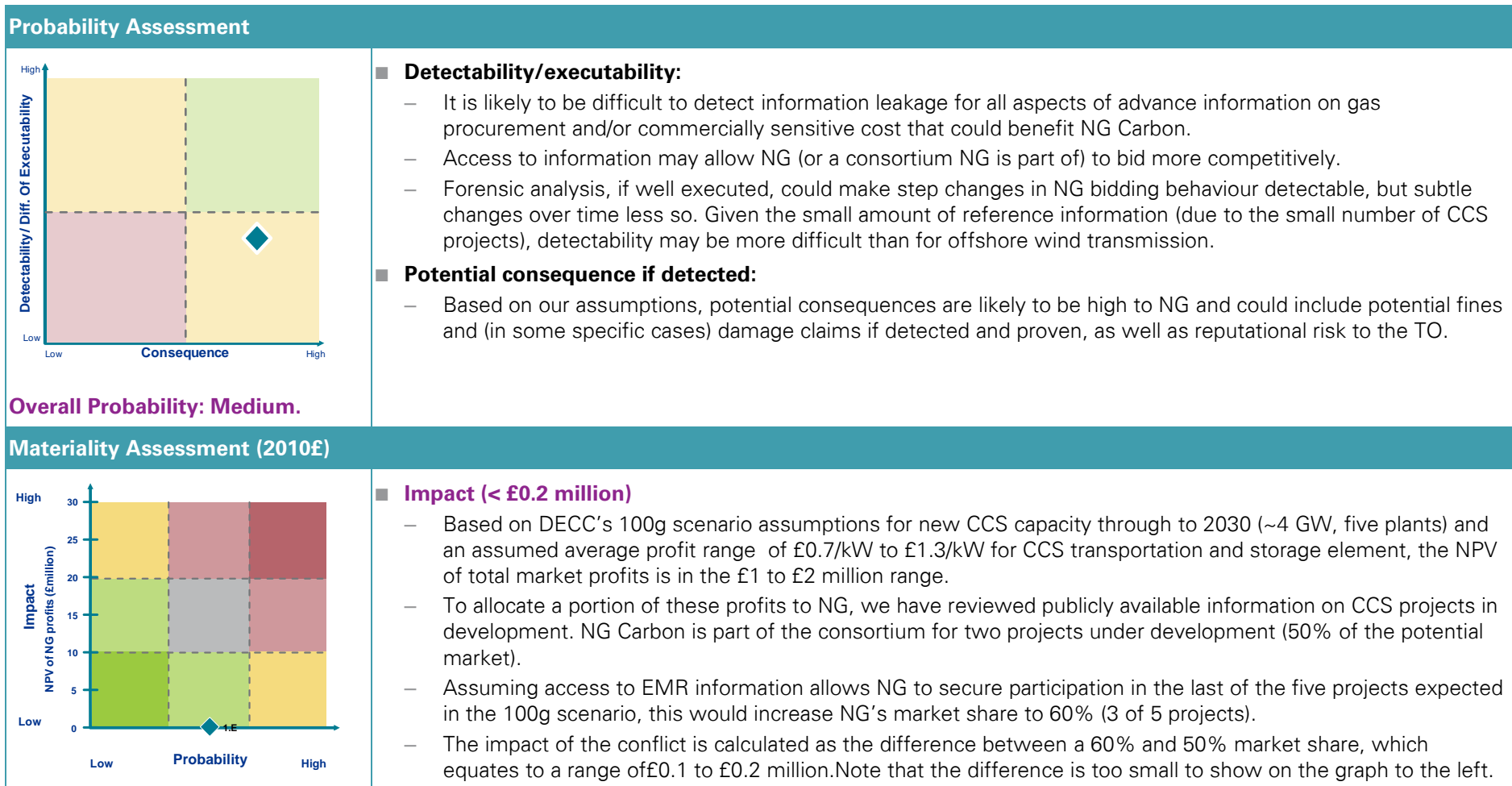
- To assess the potential impact of this conflict, we have assumed that NG has some discretion to change the size of the capacity blocks it sells under long-term contracts in the existing interconnectors. To the extent NG has advance information on potential changes in the price differential between countries, there are additional profits to be made if capacity is sold on a longer-term before price differentials between countries decline.
- We reviewed the current size of blocks sold under long-term contract on the England-France interconnector and assumed that the seasonal blocks of 150MW could potentially be replaced by an annual auction. For the England-France interconnector this represents 8% of the overall capacity.<sup>13</sup>
- Assuming an additional 8% of total interconnector capacity is sold long-term post 2020 through the Brit-Ned interconnector and post 2027 for the England-France interconnector, the NPV of additional NG profits is £2 million.

<sup>12</sup> Our analysis for interconnection profits was based on the product of the price differential between two countries and the assumed usage of a new interconnection line (theoretically, the maximum achievable profit). Based on assumed costs and simulated usage and profits for new interconnectors, our analysis indicates that a new IC to France would yield a total profit to the owners of £293 million in NPV terms (based on our analysis, a new Netherlands-England interconnector would not be profitable). This number assumes that owners would only realise 80% of the profit potential with the remaining 20% going to users of the line. This assumption is meant to represent the fact that the developers of the line would not be able to realise the maximum of the “achievable profit”, because the bidding behaviour of users of the line would push capacity rates on the interconnector down, allowing some profit to the users of the line.

<sup>13</sup> We recognise that this assumption is open to debate, but found no publicly available information that could better substantiate a different number. To evaluate the impact of this assumption, we have run an alternative case assuming that an additional 15% of overall capacity could be sold under a longer term contract to exploit advance information on changing price differentials. The impact of this is estimated at £4 million.

Conflict 1E: NG CCS business benefits from advance information when taking part in the CfD analysis and allocation process and the capacity market administration run by the SO.

Access to information available to the SO through the CfD allocation process or capacity market may give NG's CCS business activities an advantage over competitors. This potential conflict arises either through advance information of the Government's plans to procure gas-fired generation through the Capacity Market delivery process (analysis and auction administration), giving it a first mover advantage, or through access to commercially sensitive information from direct CCS competitors through the CfD delivery plan analysis and allocation process.



Conflict 1F – NG’s Gas LNG business may benefit from advance information on the potential future demand for gas, given likely EMR outcomes (e.g. CfD strike prices).

Advanced knowledge of capacity market outcomes and CfD strike prices may give NG’s LNG business an information advantage on the relative economics of gas-fired generation and, therefore, gas demand in the market. This information could be used by NG to make informed LNG pricing decisions ahead of its competitors.

■ Incentive is low or marginal for the conflict:

- NG’s LNG business model is to build and release long term capacity to LNG regasification capacity holders on receipt of an investment signal from shippers purchasing the primary capacity. **Primary capacity at Grain LNG does not become available until 2025.**
- NG’s LNG business model has been to sell long term capacity. Post 2025, subject to the application of third party access (“TPA”), it is likely that NG will seek to continue to sell long term capacity such that it minimises its exposure to merchant energy risk. It is therefore unlikely that access to EMR privileged information would benefit Grain LNG capacity sales. This is partly due to timing and partly due to excess supply of regas capacity in GB and NW Europe (which is likely to reduce the ability of NG to gain additional rents above the market value for the provision of that capacity).
- NG could release new LNG capacity at Grain LNG Phase 4. In the past NG has not built capacity speculatively, rather it builds capacity based on third parties’ requirement for long term capacity. Therefore, it is unlikely that additional information due to EMR would change revenues from any new build capacity that occurs.

■ **Overall Probability: Low**

### 3.5.2 Potential conflicts based on ability to influence and/or exercise discretion

Conflict 2A – Influence or discretion by the EMR team to over-procure capacity in the CM or favour a flexible generation mix through the CM or CfD mechanisms to facilitate meeting license obligations (e.g. balancing the system).

In its role as EMR delivery body, NG has the potential to increase generation capacity on the system above what is efficient from a security of supply perspective. This potential excess capacity may allow the SO to reduce its annual operating costs. As such, the SO may achieve its RIIO operational efficiency targets without having to provide any additional operational efficiency (this may also make it easier to meet or beat targets associated with SO external incentives where relevant).

Pace Global's AURORAxmp modelling gauges the incremental CAPEX for the TO related to new investments in generation capacity. Neither AURORAxmp, nor Ofgem's RAV models consider the impact of this incremental CAPEX to the SO incentive mechanism under RIIO.

#### ■ **Detectability/executability:**

- Detectability is expected to be higher for large variances and lower for small variances.
- Executability is expected to be low, given that EMR rules will have the intention of limiting the scope for influencing or exercising discretion by making the CM and CfD processes transparent and subject to oversight.

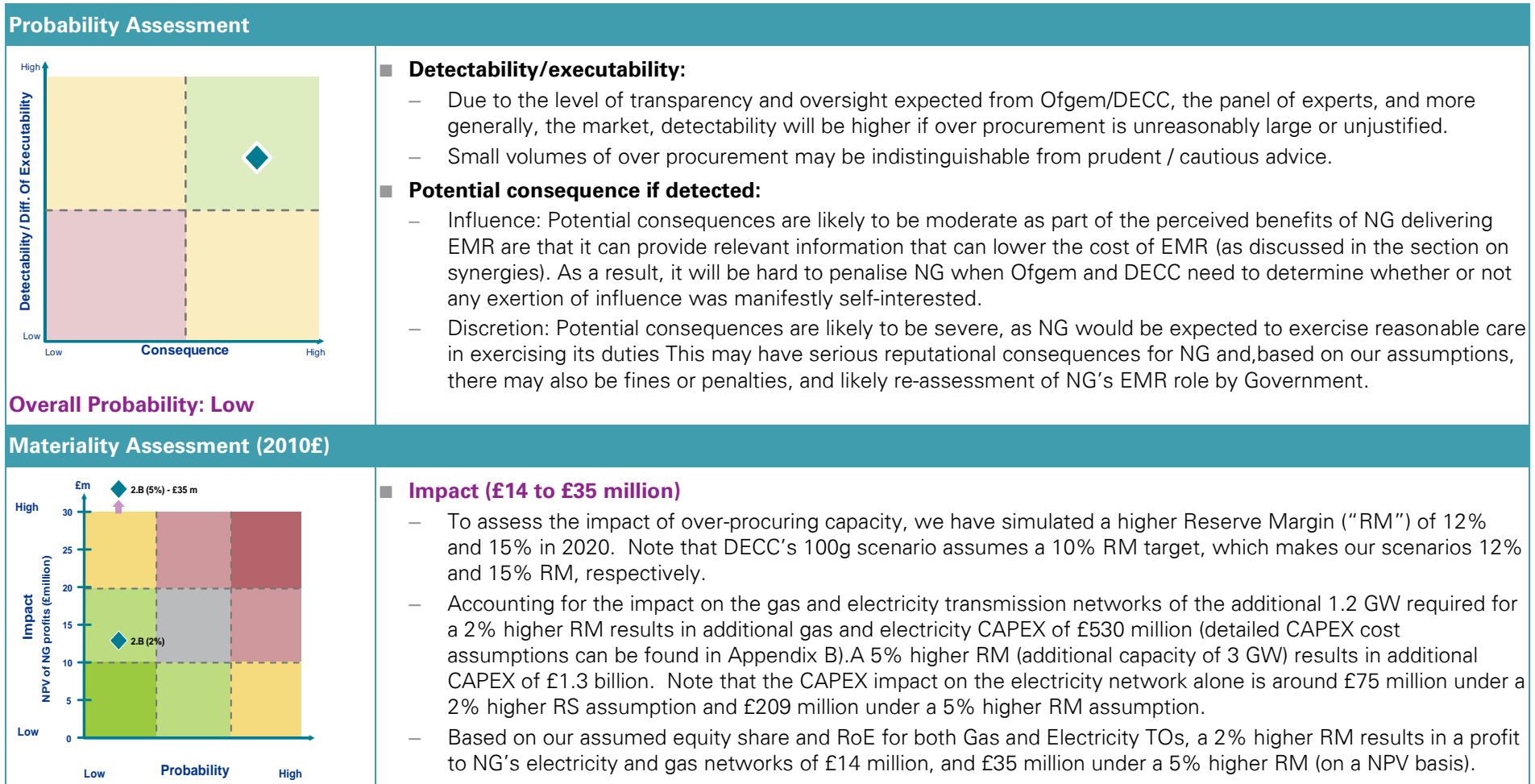
#### ■ **Potential consequence if detected:**

- Influence: Potential consequences are likely to be dependent upon whether the influence exerted fell within reasonable bounds. If influence was exerted unreasonably, particularly through the misrepresentation of data or data that NG knew to be false, then, based on our assumptions, the consequences are likely to be high. Reasonable influence could be synergistic if the perceived benefits of NG delivering EMR are that it can provide relevant information that can lower the cost of EMR and also lower the defined TOTEX of delivering RIIO.
- Discretion: Potential consequences are likely to be more severe, as NG would be expected to exercise reasonable care in exercising its duties (for instance by informing the relevant panel of experts or oversight committee on any debatable or highly uncertain assumptions). Hence, this is more likely to have serious reputational consequences. Based on our assumptions, if NG was proven to have acted on this conflict and that could be shown to be a breach of a licence condition, this could lead to penalties. Government may also consider a re-formulation of the EMR role assigned to NG.

#### ■ **Overall Probability: Low.**

Conflict 2B(1): Influence or discretion by the EMR team to over-procure capacity for the benefit of NG's electricity and gas TO.

In its role as the EMR delivery body, the SO may have an incentive to overprocure capacity for the benefit of NG's electricity and gas networks. For example, this could be done through the CM analysis role by overstating the amount of capacity needed to meet a target reliability standard.





Note that the impact on the profits of the electricity network alone would be around £2 million under a 2% higher RM assumption and around £6 million under a 5% higher RM assumption (on a NPV basis)<sup>14</sup>.

<sup>14</sup> Pace Global's experience indicates that planning targets across various jurisdictions are within a 3-4% range, so a 2% increase would be more reasonable to justify. However, a move from a 10% to a 15% target would not be outside the levels used in other markets, so this represents a plausible eventuality.

## Conflict 2B (2): Influence or discretion by the EMR team to lower notional efficient TO costs under RIIO.

Through exercising influence/discretion the EMR delivery body may be able to reduce the cost base of their activities in a way that could make it more difficult in the short term to assess efficiency and allow projects to come in under the level anticipated in RIIO as other than as driven by true efficiencies.

### ■ Detectability/executability:

- Due to the level of transparency and oversight expected from Ofgem/DECC, the panel of experts, and more generally, the market, detectability would be high if the over procurement is unreasonably large.
- Small volumes of over procurement may be indistinguishable from prudent / cautious advice.
- The delivery body role would not confer the ability to influence the location of generation or DSR; therefore, to the extent locational generation assets were selected this would be highly detectable.

### ■ Potential consequence if detected:

- Influence: Potential consequences are likely to be dependent upon whether the influence exerted fell within reasonable bounds. If influence was exerted unreasonably, particularly through the misrepresentation of data or data that NG knew to be false, then the consequences could be high if detected and proven. Reasonable influence could be synergistic if the perceived benefits of NG delivering EMR are that it can provide relevant information that can lower the cost of EMR and also lower the defined TOTEX of delivering RIIO.
- Discretion: Potential consequences are likely to be more severe, as NG would be expected to exercise reasonable care in exercising its duties (for instance by informing the relevant panel of experts or oversight committee of debatable or highly uncertain assumptions). Hence, this is more likely to have serious reputational consequences, both to NG and to Ofgem/DECC. Based on our assumptions, it may also result in penalties and may lead to the re-assessment of NG's EMR role by Government.

### ■ Overall Probability: Low.

### ■ Impact: Low /Zero

As this aspect of the conflict would materialise through NGET and NGGT's TO/SO incentives, we have not modelled this aspect for the reasons explained section 2.4.2 (the modelling approach adopted does not make it possible to model any potential underperformance or outperformance of NG against its RIIO TOTEX baseline).

We have assumed that Ofgem will have access to the same information as NG regarding the difference between actual TOTEX and TOTEX in the baseline, which should result in an appropriate adjustment to the RIIO baseline. Therefore, based on the assumptions we have made, we believe this would result in no impact from the conflict.

### Conflict 2B (3): Influence or discretion by the NG EMR team to locate CfD and CM capacity in England and Wales rather than Scotland (or Northern Ireland (CfDs only))

The EMR delivery body is, through exercising influence/discretion, able to locate CM or CfD capacity in England and Wales rather than Scotland to the benefit of NG's TO businesses.

#### ■ Detectability/executability:

- **CfD capacity:** Nature and economics determine the suitability of CfD sites. These sites are known, and NG has no ability to affect this. Furthermore, criteria for allocation of CfDs are non-discretionary during the 'first come, first served' stage and the Government has stated that in the case of budgetary constraint for CfDs, allocation would be determined by an objective methodology.
- **CM capacity:** We understand that CM auctions are determined by price alone. Therefore NG has no ability to influence the location of any capacity procured through the auction.
- Consequently, we consider that NG has no ability to execute the conflict outlined.

#### ■ Potential consequence if NG were able to execute this conflict and if it was detected:

- Influence: If NG as the delivery body was able to exert influence that could determine the location of new build generation capacity, the potential consequences are likely to be dependent on the source of the influence. If influence was exerted unreasonably, particularly through the misrepresentation of data or data that NG knew to be false, then the consequences could be high.
- Discretion: Potential consequences could be severe if detected and proven, as NG would be expected to exercise reasonable care in exercising its duties. Based on our assumptions, this is therefore more likely to have serious reputational consequences, both for NG and DECC and may also result in penalties and may lead to the re-assessment of NG's EMR role by Government.

#### ■ Overall Probability: Zero.

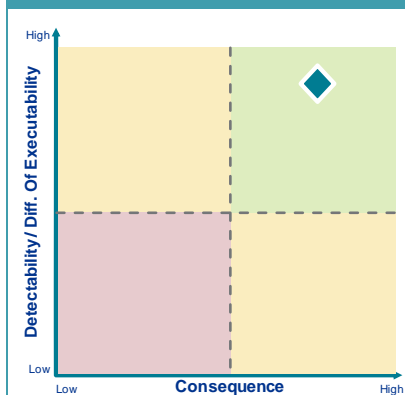
#### ■ Impact

- To appropriately assess the impact of favouring England and Wales-sited capacity over capacity sited in Scotland, it would be necessary to undertake location-specific modelling exercises. This would involve simulating Scotland as a separate market to assess how much capacity would be sited there under a "base case" and making assumptions around how much of that would then be located in England and Wales if the EMR delivery body was to exert influence. Consistent with DECC's EMR assumptions, our modelling exercise does not break out Scotland from England and Wales, making the quantification of this impact difficult under the current assumptions.

Conflict 2C: Influence or discretion by the EMR team to favour technologies that offer better opportunities for TO profits.

The EMR delivery body may influence or exercise discretion on decisions that favour technologies that represent a larger profit potential for the gas and electricity TOs. This can include favouring larger plants connecting to the electricity network as opposed to embedded generation or favouring plant that have higher connection costs or also represent a benefit to the gas TO.

## Probability Assessment



**Overall Probability: Low**

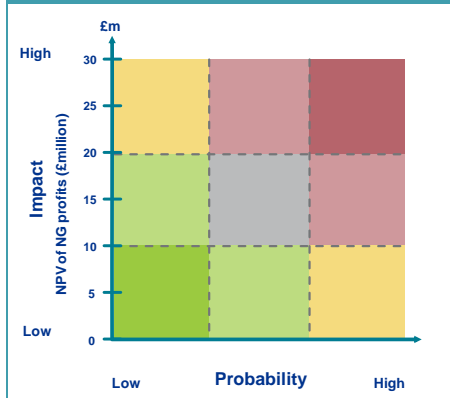
### ■ Detectability/executability:

- Detectability is high and it is difficult to execute, since EMR rules limit the scope for influencing or exercising discretion as the CM and CfD processes are transparent and subject to oversight.
- Investors in technologies who are affected by this conflict may appeal the CM outcome, if a higher price bid is accepted and their lower price bid is not. Because the CM auction will be based solely on price, any unexpected outcomes would be highly detectable.
- It is our understanding that the NG delivery body has no discretion in the award of CfD's by technology, therefore NG does not have the ability to execute this conflict.

### ■ Potential consequence if detected:

- Influence: Potential consequences are likely to be severe if NG is detected to have influenced or exercised discretion for its benefit with likely serious reputational consequences for NG and potentially resulting in penalties, fines, (in some specific cases) damage claims, and a re-assessment of NG's EMR role.
- Discretion: Potential consequences are likely to be severe, as NG would be expected to exercise reasonable care in exercising its duties. This conflict may, therefore, have serious reputational consequences to NG. Based on the assumptions about regulation and enforcement we have made, it may also lead to penalties, fines, damage claims and a reassessment of NG's EMR role by Government.

## Materiality Assessment (2010£)



### ■ Impact (not quantifiable given available information)

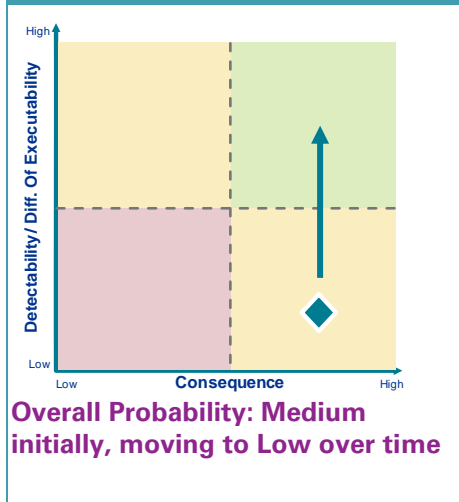
- Given the unavailability of data with which to estimate CAPEX expenditure by technology and location, we have been unable to quantify the impact of this conflict.
- We have attempted to use differences in the connection and UoS charges by technology as a way of quantifying technology differences. After further analysis, however, we believe this difference is not truly representative of the CAPEX assumptions for NGET made in other conflicts, and have therefore excluded that analysis from the materiality assessment<sup>15</sup>.

<sup>15</sup>Note that our analysis using connection and UoS charges as a proxy shows a potential profit to NGET of £0.5 million of shifting from gas to more costly technologies like nuclear. However, taking into account the reduction in CAPEX associated with NGGT, there is a net loss to NG of acting on the conflict. Additional assumptions are detailed in Appendix B.

Conflict 2D: Influence or discretion by NG's EMR team to favour generation solutions over demand side reduction ("DSR") to benefit the TO.

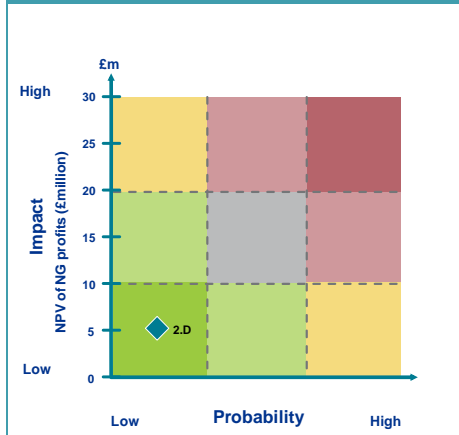
The EMR delivery body can exert influence or discretion to favour generation solutions over DSR. Because generation solutions require network use and are likely to result in increased capital expenditure for both the electricity and gas networks, favouring generation over DSR can increase NG's regulated business profits. Influence, for example, could be exerted through analysis that under-estimates DSR potential and leads to over-procurement of supply-side resources.

**Probability Assessment**



- **Detectability/executability:**
  - Excluding what can be considered reasonable, detectability is high and the conflict is difficult to execute, since EMR rules severely limit scope for influencing or exercising discretion. However, what is deemed reasonable in initial years may provide some scope for NG to act over cautiously.
  - The initial role of DSR in terms of its full potential is unclear in a pre EMR/DSR world. Therefore, DSR may take time to build up a track record; and as such, detectability is weaker at the outset of the EMR period. At the same time, because there is so much uncertainty about DSR and its ability to cope with emergency situations, it would be extremely difficult to isolate any undue preference for supply-side resources from an unbiased concern about the reliability of the grid without enough peaking capacity.
- **Potential consequence if detected:**
  - Potential consequences are likely to be severe if NG is detected to have influenced or exercised discretion to benefit the TO beyond the bounds of reasonableness potentially result in serious reputational consequences to NG. It could also potentially lead to penalties, fines, damage claims and a re-assessment of NG's EMR role by Government.

**Materiality Assessment (2010£)**

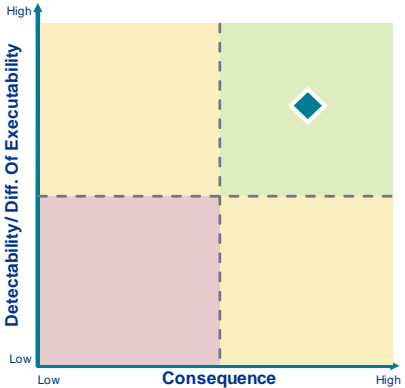


- **Impact (£5 million)**
  - To assess the impact of favouring generation solutions over DSR, we assumed a 2% increase in peak demand to be covered by (additional) peaking generation capacity.
  - This 2% assumption implies that under DECC's 100g scenario, the CM administrator would have ringfenced around 1,500 MW of capacity demand for DSR for delivery in 2017, and an additional 350 MW for delivery through to 2030.
  - We estimate the impact of the additional 1.9 GW generation capacity needed to replace the DSR not procured on the allowed CAPEX of NGET and NGGT to be around £186 million (in NPV terms). (Note that the impact on the electricity TO accounts for £160 million of this.)
  - Given our ROE and equity share assumptions, this translates into a profit to NG of £5 million on an NPV basis. (Note the that the calculated profits to the electricity TO account for £4.5 out of a total of £5.1 million.)

Conflict 2E: Influence or discretion by the EMR team to benefit NG's gas businesses (storage, TO, SO) through over-procurement of capacity, or encouraging a focus on gas-fired generation.

The EMR delivery body can exert influence or discretion to benefit NG's gas business. This can be done through influencing the analysis around CfDs or the CM to benefit gas-fired solutions (including CCS) over other technologies. For example, bias in the CfD delivery analysis could result in a larger portion of the overall budget being allocated to CCS. Similarly, an assessment of the reliability of wind during times of system stress could lead to additional gas-fired back-up capacity being procured in the CM. Such influence or discretion could also be exercised to keep existing gas-fired generation from closing to affect both gas usage (for the storage business) and large capital investments for refurbishment or maintenance of the gas network.

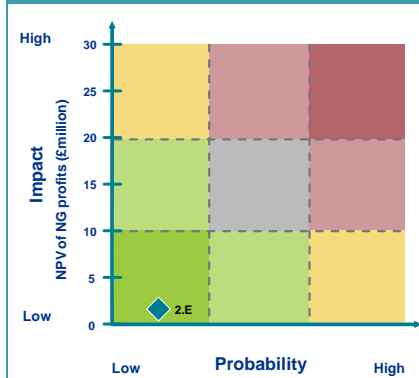
**Probability Assessment**



**Overall Probability: Low**

- **Detectability/Executability:**
  - Detectability is high and it is difficult to execute, since EMR rules severely limit the scope for influencing or exercising discretion given that the CM and CfD processes are transparent and subject to oversight by the expert panel .
  - Detectability is also high because an attempt to benefit from this conflict requires an adjustment to the baseline TOTEX under RIIO, which in turn would require opening up a new process with Ofgem. However, it is likely that where a new generator signals demand for exit capacity at a certain point , this would trigger the Exit capacity uncertainty mechanism which would provide for additional allowances to build the required capacity. So, no adjustment is required to baseline totex allowances and this would not be easy to detect.
- **Potential consequence if detected:**
  - Influence: Potential consequences are likely to be dependent upon whether the influence exerted fell within reasonable bounds.If influence was exerted unreasonably, particularly through the misrepresentation of data or data that NG knew to be false, then the consequences could be high. Reasonable influence could be synergistic if the perceived benefits of NG delivering EMR are that it can reduce costs for consumers by lowering the cost of EMR and lowering the defined TOTEX of delivering RIIO.
  - Discretion:Potential consequences are likely to be more severe, as exercising discretion implies failure to adhere to the transparent, prescriptive rules set out by Government. Because of this, if detected, exercising discretion to the benefit of NG may have serious reputational consequences to NG, and potentially, based on the assumptions about regulation and enforcement we have made, penalties, fines and a re-assessment of NG'sEMR role by Government.

## Materiality Assessment (2010£)



### ■ Impact (£2 million)

- To assess the impact of favouring gas-fired solutions, we have considered two cases: a lower wind generation case - which adds around 575 MW of gas-fired capacity to replace around 2 GW of wind; and a higher CCS case - which adds an additional 350 MW of CCS to the overall mix.
- Our analysis indicates that lowering the wind capacity results in an overall loss in revenues to the regulated business (the additional CAPEX for NGGT is more than offset by the reduction in CAPEX for NGET).<sup>16</sup>
- Increasing the amount of CCS capacity adds around £69 million to the CAPEX of the regulated businesses, which results in a profit to NG of £2 million.
- We note that an alternative, less conservative, approach to modelling this impact could have been to consider NG exerting influence to delay the retirement of existing gas plant rather than exerting influence to prompt new gas builds. However, incremental capital expenditure on the gas network in the form of refurbishments, major maintenance, or ongoing capital expenditure needed to keep older plants operational would likely be lower than the one needed for new builds. Therefore, we consider it reasonable to assume that the financial impact under this scenario would be lower than the £2 million calculated above.

<sup>16</sup>Note that if we only accounted for the increased NGGT CAPEX increase, the 'lower wind' case, we would see an increase in NGGT's profit of £2.7 million



## Conflict 2F: Influence to raise the cost of capital used in EMR analyses to benefit regulated businesses.

In the analysis of the delivery plan for CfD and CM, NG maybe in receipt of cost of capital assumptions from market participants in both the CfD and CM projects. NG may try to utilise this data in benchmarking the cost of capital estimates it seeks to apply to its regulated businesses in the hope it will achieve a higher cost of capital allowance in subsequent price control reviews.

### ■ **Detectability/executability:**

- Executability of this conflict is low given that the WACC under RIIO is determined by Ofgem. The WACC determination process is well defined and has a considerable track record. There is no reason to suspect that Ofgem would change its approach to incorporate analysis of the capital costs for power generators to determine the cost of capital for regulated network businesses.

### ■ **Potential consequence if detected:**

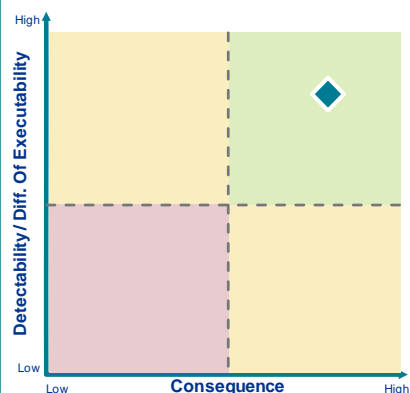
- To our knowledge, the EMR delivery body role does not offer scope for NG to influence analysis or exercise discretion to alter the cost of capital of CM or CfD projects as the underlying attractiveness of investment secured by CfD and CM is not determined by the EMR delivery body. In addition, due to the transparency and expected oversight from DECC and Ofgem over the EMR role, it is unlikely that the NG EMR delivery body will act to increase market risk above that of an EMR standalone entity.

### ■ **Overall Probability: Low.**

Conflict 2G: Influence or discretion by the EMR team to place weight on technologies to favour new or existing business (CCS/IC/Offshore) in CM or CfD instruments.

The EMR delivery body could exert influence or discretion across its activities under the CfD and CM administration roles to benefit technologies that fall under NG's competitive businesses. This could involve analysis that results in a bias towards CCS, favourable treatment for offshore wind generation under the CfD, or decisions that increase the potential profits for a new interconnector.

### Probability Assessment



**Overall Probability: Low**

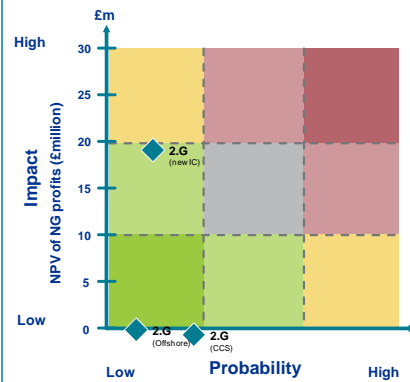
#### ■ Detectability/executability:

- Detectability is higher for discretion and it is difficult to execute, since EMR rules limit the scope for exercising discretion as the CM and CfD processes are transparent and subject to oversight.
- Investors in technologies who are affected by this discretion conflict may appeal the CM outcome, if a higher price bid is accepted and their lower price bid is not.
- It is our understanding that the NG delivery body has no role in the award of CfDs by technology during the “first come, first served” stage, therefore NG does not have the ability to execute this conflict.
- The CfD strike price will be determined by Ministers based on analysis by NG and CfDs are allocated by NG according to tick box criteria. Therefore analysis that may favour a particular technology should be exposed as flawed in the process that sets the CfD strike price (by the Panel of Technical Experts for example).

#### ■ Potential consequence if detected:

- Influence: Based on our assumptions about regulation and enforcement, if NG is proven to have influenced or exercised discretion to benefit the TO, it would likely lead to reputational risk, penalties, damages, and a reassessment of NG's EMR roles.
- Discretion: Potential consequences are likely to be severe, as NG would be expected to exercise reasonable care in exercising its duties. Consequences might, based on the assumptions about regulation and enforcement we have made, include fines, penalties, and (in some specific cases) damage claims.

## Materiality Assessment (2010£)



### ■ Impact (CCS: <£0.1 million, IC: £20 million, Offshore: £1 million)

- To assess the impact of favouring different capacity mixes to benefit NG's competitive businesses, we have run:
  - CCS: a case with 350 MW of increased CCS capacity<sup>17</sup>,
  - IC: a case where less overall capacity is contracted in a Capacity Market to assess the impact on profitability of a new interconnector. (Note we also ran a case with lower wind, but observed negligible impact on the interconnector profits.)
  - Offshore: a case with 10% higher wind capacity (an additional 1.4 GW of offshore wind).
- Based on the assumed profits (outlined in Appendix B) for each business, we estimate the highest profit potential to be in the development of a new interconnector. With lower reserve margins in GB, the increased price differential between GB and France results in an additional £20 million of additional profits to a new interconnector (assuming 50% share).
- The increase in profits to the offshore business has been estimated at £1 million (assuming a 14% market share).
- The impact on the CCS business was negligible (approximately <£0.1 million).

<sup>17</sup> Given that this constitutes around a 10% increase on the base case assumptions, we believe this is a reasonable scenario. We believe a much larger expansion over what is assumed in the base case would be difficult given the relative maturity of the technology and the timeframe for this analysis.

# 4 Synergies

## 4.1 Introduction

Ofgem and DECC have identified three types of potential synergies that would arise if NG delivered EMR:

1. **Operational/Administrative Cost Savings:** economies of scope (office, property, staff, administration) and/or cost savings from avoiding duplicate work.
2. **Better SO Outcomes:** delivering EMR might increase the efficiency (or lower the costs, which are largely passed through to users of the system and ultimately consumers) of the SO role. For example this might be evidenced through lower balancing costs; more efficient reserve procurement; system planning benefits and more efficient constraint management.
3. **Better EMR Outcomes:** there may be increased efficiency/cost savings in delivering EMR through leverage of NG's experience. This could include more efficient CfD strike price setting; more efficient demand and reserve derated margin analysis for the CM; more efficient capacity procurement and fewer blackouts; more diversity in the generation mix; and a more efficient CM auction experience.

While we agree these synergies exist, having undertaken qualitative analysis and having obtained the opinions of NG, Ofgem and DECC, we have determined that these synergies cannot be quantified using the modelling capabilities available to us (Pace Global's AURORAxmp dispatch model and Ofgem's RAV models).

Moreover, inherent to the nature of the synergies, the data and information required to measure their potential size are available only to NG (for the same reason that the synergies can only be realised if EMR is delivered by NG) and perhaps, to some degree, Ofgem (as NG's regulating body). In the absence of another organisation whose activities and experience are comparable to that of NG, and which is tasked with delivery of a project similar to EMR, quantification of the potential synergies relies on the input of NG to provide relevant data and information, and qualitative insights into its activities and the potential efficiencies that might arise as a result of its EMR role.

Section 4.2 below provides our qualitative assessment of potential synergies, including a potential approach that could be undertaken to quantify the synergy. The qualitative assessment also considers the interaction of the synergies with the potential degree of business separation and/or information restrictions that might be required of NG as set out in Annex C of the November Consultation (which affect the potential impact ("incentive") of a synergy). We assume that the SO's current role remains as it is presently.

## 4.2 Synergies and qualitative assessment

### 4.2.1 Operational/administrative cost savings

One efficiency benefit is that the SO's current activities provide learning benefits for the activities associated with the delivery of EMR. There is organisational intelligence and expertise in place, facilitating knowledge sharing and faster turnaround of analysis required for the EMR role. A cost saving occurs here since a new organisation would have to learn from scratch and invest in setting up systems, acquiring data, establishing processes, etc.

There will also be cost savings through the avoidance of duplication of work. This would occur since SO staff already performs some of the analysis required for the EMR role (for instance, SO analysts already forecast future capacity and generation mixes to inform NG's network build). Integrating staff into a single EMR/SO capacity would remove the need for this analysis to be performed twice.

To the extent that NG's existing property, equipment and other administrative expenses (including HR, IT, data services, and legal) can be used for its EMR role, the costs under these categories would represent a saving compared to the start-up costs of an alternative administration and delivery body.

#### 4.2.1.1 Approach to modelling operational/administrative cost savings

At a high level, the upper limit value of the operational cost synergy that might accrue could be calculated as the difference between the EMR function costs that would be incurred by NG and those that would be incurred by an alternative entity.

This calculation would require outlining all the EMR function activities, and then estimating total function costs (including overheads) if the role was performed by NG leveraging (to the extent possible) the staff, equipment, and data services of the SO; and the same cost categories if the role was performed by another entity. An activity-based costing exercise could be appropriate for this calculation. This would allow NG to estimate the true costs of all the specific activities required by the EMR delivery role and could account for different levels of required separation.

Activity-based costing is typically a complex exercise that requires all business activities to be broken into their discrete components and it is an exercise that should only be done where costs relate to a discrete activity. For example, the administration of the CM could be broken into discrete components ranging from loss of load probability analyses and wind availability studies, to the settlement of the capacity auction and subsequent communication with bidders. Breaking down activities to this level of detail would allow Ofgem and DECC to more easily quantify the benefits of common staff, systems, and established processes for the delivery of all EMR activities, as well as the loss of synergies from different levels of separation.

#### 4.2.1.2 Qualitative assessment of operational/administrative cost savings

Cost savings that could occur as a result of this synergy occur in two distinct forms:

- A one-off cost saving that arises due to additional learning and set-up costs that the alternative delivery body would have to incur to perform the role; and
- Ongoing cost savings that would accrue through the avoidance of duplicate work and other ongoing administrative costs.

The magnitude of the potential synergy will therefore depend on the magnitude of set-up and learning costs for a new entity and on the extent to which NG already has (due to its SO role) the capacity to fulfil the EMR function. Given NG's institutional knowledge, established processes and systems, the likely steep learning curve for staff new to technical roles, and NG's established presence in the market, it is likely that the size of the synergy (as a percentage of the costs associated with setting up a new entity as the delivery body) would be significant.

#### 4.2.2 Better SO outcomes

NG will have a larger evidence base and perform more analysis if it is undertaking both the EMR and SO role than it will if it is undertaking only the SO role. Consequently, if undertaking both roles, NG will have more accurate information from a greater number of sources.

Use of this information could improve some of the forecasting functions performed by NG, which would result in better SO outcomes. For example, enhanced market intelligence can help NG provide a more realistic assessment of future network build requirements. Similarly, a more certain assessment of the future generation mix and better information around when plant will come online

could improve system planning and reduce constraint costs. The cost of operating the system (balancing the system and managing constraints) was £886m in 2011/12.<sup>18</sup>

This increased knowledge could facilitate more efficient procurement of reserves to ensure short term balancing in terms of volume, flexibility and location. In this way, the SO's balancing costs could be reduced.

#### 4.2.2.1 Approach to modelling synergies through better SO outcomes

As discussed further below, the ability to quantify the impact of this synergy is partly dependent on the influence the SO has on the location, timing, and type of capacity expansion. In theory, the size of the impact could be simulated by estimating system balancing costs under a range of scenarios from one in which the SO has no planning influence to a scenario in which there is a centrally planned system with absolute discretion on defining the location, timing, and type of new capacity builds. However, these scenarios would not capture the limitations that the SO has on affecting these decisions. For reference only, an illustration of a potential analysis is outlined in the table following this section.

#### 4.2.2.2 Qualitative assessment of better SO outcomes

Because of the enhanced market intelligence that the delivery of EMR would provide the SO, it seems likely that SO costs will be higher than they would otherwise be if there are strict limits on the information flow from the EMR delivery body to the SO. For the same reason, the potential impact on better SO outcomes will depend on the extent to which business separation and information restrictions between the SO and EMR functions exist. The greater the degree of separation, the smaller the benefit of potential synergies from a joint role.

In assessing the potential size of this synergy, it is important to keep in mind the extent of the SO's current discretion in shaping the location, timing, and type of capacity additions and network improvements. While it is true that the delivery of the EMR role may provide the SO with better information, the value of this is limited to the extent that the TO would have this information anyway, as potential capacity additions via EMR would have had to begun to negotiate network connection agreements with the TO. Because of this, the impact of this synergy is not expected to be significant.

#### 4.2.3 Better EMR outcomes

The factors that lead to better SO outcomes as a result of a combined SO and EMR function can also result in better EMR outcomes (i.e. increased efficiency and cost savings in delivering EMR). For example, leveraging existing NG skills and experience may result in more efficient strike price setting through the SO's experience in coordinating with stakeholders, performing analysis, and managing information flows. Similarly, a joint role could provide NG with a more accurate assessment of energy demand, system constraints, and the resulting capacity requirement for system reliability. This improved information base could facilitate more informed, and therefore efficient, procurement of capacity under the CM.

NG has experience designing and running capacity auctions for the Short Term Operating Reserve ("STOR") service<sup>19</sup>. This experience could better enable it to design and manage a system that ensures appropriate market participation in the CM and enables it to perform the required checks to ensure reliable capacity comes forward. This may increase the reliability of capacity procured through

<sup>18</sup> Synergies and Conflicts of Interest arising from the Great Britain System Operator delivering EMR Consultation Document, page 28.

<sup>19</sup> STOR is a service for the provision of additional active power from generation and/or demand reduction to ensure security of energy supply.

the auction and would likely reduce the costs of running the auctions both for consumers and participants.

More generally, NG has experience of operating and designing a number of processes in which industry participates. This experience could result in more efficient and less onerous participation from industry.

#### 4.2.3.1 Approach to modelling synergies through better EMR outcomes

Similar to the first synergy ('Operational/administrative cost savings'), some EMR outcomes involve cost savings through leveraging NG skills and experience:

- Analysis provided by NG enables Ministers to be better informed on the level of financial support required for low carbon technologies. This would improve the price discovery of the administratively set CfDs;
- Analysis provided by NG enables Ministers to be better informed on the capacity margins required to maintain the system level of security
- NG is more cost effective at providing the analysis required than an independent EMR delivery body;
- NG is more cost effective at providing and delivering the administrative elements than an independent EMR delivery body and NG has a track record in delivering similar tasks already.

The quantification analysis undertaken for potential conflicts was based on assessing the variance to investments in NG's capital expenditure. Synergies relate to cost/efficiency in undertaking EMR tasks and processes. We consider that potential synergies in undertaking these activities would be better quantified through an activity-based costing exercise. The starting point of this analysis would involve estimating the costs of NG of performing these activities, focusing on metrics like elapsed time for the activity, time required from individual market participants, transparency for stakeholders, and time elapsed to deal with participant's questions or concerns.

Other synergies through better EMR outcomes involve cost savings through efficient SO performance, similar to the second synergy ('Better SO outcomes'). These include:

- Efficient capacity procurement,
- Fewer blackouts;
- Diversity in the generation mix.

In theory, the impact of these synergies could be assessed through scenarios that consider the benefits of the SO influencing the type, location, and timing of new builds (see table ')

Potential methodology to quantitatively assess better SO outcomes – for reference only). However, it is important to consider the SO's limited scope for affecting such decisions (discussed above).

#### 4.2.3.2 Qualitative assessment of better EMR outcomes

As with the synergies above, the potential impact of NG performing a joint role on EMR outcomes will depend on the extent to which business separation and information restrictions between the SO and EMR functions exist. The greater the degree of separation, the less the synergistic benefit of the joint role.

Also as with the synergies above, the cost savings from leveraging NG's skills and experience may be significant. These cost savings occur primarily as a result of improved efficiency and communication with industry. The total impact is not only smaller, but also much harder to quantify than those associated with the synergies considered above. However, given the importance of transparent and efficient communication, adequately run auctions, and robust and efficient analysis to the overall success of EMR, these benefits may be significant.

On the other hand, the benefits associated with savings through improved SO performance greatly rely on the SO affecting in one way or another the outcomes of EMR (at least when it comes to location and timing). Given the limitations the SO currently has to affect such decisions, the impact of this potential synergy is considered very small.

#### 4.2.4 More aligned network planning

An additional synergy may result through the increased visibility that the EMR delivery role would provide NG for network planning purposes. Currently NG sets its revenue requirements under RIIO based on NG's own analysis and expectations about network requirements to support renewable and fossil-fired generation developments over time. The EMR delivery role would provide NG with better information and clearer expectations about future generation build that would better inform NG's capital expenditures under RIIO. This may result in more efficient (lower) capital expenditure and enable NG to identify improvements and upgrades required to deliver NG's outputs earlier. However, as discussed in the previous section, while this could be seen as a synergy it could also be seen as a conflict to the extent that NG keeps the unwarranted incentive benefits provided by virtue of its EMR role. The extent of this would depend on how incentives are aligned.



Potential methodology to quantitatively assess better SO outcomes – for reference only<sup>20</sup>

Synergy type	Relevant parameters	Strawman analysis	Qualitative assessment	Modelling and scenarios
<p><b>Better SO Outcomes:</b> delivering EMR can increase the efficiency (or lower the costs of) the SO role. For example by lowering balancing costs, more efficient reserve procurement, system planning benefits and more efficient constraint management.</p>	<ul style="list-style-type: none"> <li>■ Total costs of specific SO activities (consolidated or activity specific, e.g. balancing costs, constraint management costs).</li> <li>■ Assumed MW of capacity built by generation type under EMR.</li> </ul>	<ul style="list-style-type: none"> <li>■ Define balancing and constraint management cost baselines over the next ten years in coordination with the SO.</li> <li>■ Provide the SO with an estimated number of MW by capacity type to be built over the next ten years.</li> <li>■ Using the SO’s planning system or methodology, request the total balancing cost of the system under:                             <ul style="list-style-type: none"> <li>– An optimal allocation of all intermittent and firm capacity.</li> <li>– A second scenario in which generation is located at random (without any regard to system constraints).</li> <li>– A third scenario in which NG is asked to suggest improvements with respect to the second scenario to the amount, type and location of new capacity build over the next ten years with a view of optimising SO performance.</li> </ul> </li> <li>■ Calculate SO outcome synergy as the system cost range defined by the difference between scenario 1 and 2, relative to the cost difference between scenario 1 and scenario 3.</li> </ul>	<p><b>Incentives/Potential impact:</b></p> <ul style="list-style-type: none"> <li>■ Potential impact unclear:                             <ul style="list-style-type: none"> <li>– The potential impact is dependent on the degree of business separation and information restrictions between the EMR function and the SO function.</li> </ul> </li> </ul> <p><b>Probability:</b></p> <ul style="list-style-type: none"> <li>■ The probability of the synergy arising is inversely related to degree of business separation and information restrictions. There is a high probability if the EMR function is integrated and information transfer is unrestricted.</li> </ul>	<ul style="list-style-type: none"> <li>■ Analysis to be carried out by Ofgem and DECC in coordination with NG as an indication of the maximum size of the benefit. As mentioned above, the true impact is limited by the influence the SO has on the type, location, and timing of new capacity builds.</li> </ul>

<sup>20</sup> We have not performed a quantitative assessment for the purposes of this report. The methodology above is included to illustrate how such an assessment might be conducted.

## Appendix A Modelling Approach and Results

Pace Global, a Siemens Business, ("Pace Global") has performed a quantitative analysis of key UK power market drivers in order to facilitate a review of the potential conflicts of interest associated with NG's EMR role. For these exercises, Pace Global deployed a chronological hourly dispatch model developed by EPIS<sup>21</sup> ("AURORAxmp") to simulate the operations of the UK power market. The development of estimates for key power market drivers, including capacity and generation by fuel type, electricity demand, and commodity pricing, are consistent with DECC's 100g Scenario.<sup>22</sup>

We received DECC's latest "100g Scenario" on 30 January 2013, and have labelled it the "Base Case." Henceforth, for the purpose of this report, we refer to this as the Base Case or DECC's 100g Scenario. With this Base Case established, Pace Global performed various modelling tests to help measure potential financial impacts on NG of its EMR role.

### Market input assessment

In developing the Base Case power market conditions, the following inputs were developed in coordination with DECC:

- Plant-level detail for existing and expected new plant, including operational efficiency and availability;
  - a) Retirement expectations for coal (Large Combustion Plant Directive ("LCPD")), nuclear, and other plant
  - b) New builds consistent with annual DECC expectations
- Load growth expectations;
- Fuel cost projections (gas, coal, biomass, oil);
- Emissions costs, including representation of the carbon price floor for UK plant; and
- Interconnector capacity with full representation of bordering regions.

### Output tracking

For this exercise, key outputs were focused on elements of NG's regulated and competitive businesses, including the electric and gas system operator role, as well as businesses associated with interconnectors, offshore wind, and CCS. Pace Global reported key power market indicators for each of these business lines to be used for the profit calculations under Base Case conditions and under different scenarios that alter market outcomes. The key outputs that were tracked include:

- New capacity by year and by type entering the system;
- Natural gas consumption for the power sector, with a focus on new plant operations; and
- Interconnector usage and profit opportunities, driven by energy price differences between the UK and neighbouring countries.

<sup>21</sup><http://epis.com/>

<sup>22</sup>We have used the DECC base case load growth and capacity expansion/retirement plan, as well as DECC's de-rated factors for various technologies. As we have maintained all major DECC inputs, the case reflects the reliability standard implicit in DECC's reference case.

## A1. Explanatory text – conflict-by-conflict description of modelling exercises

The following subsections briefly outline the quantitative power market indicators that Pace Global provided based on its modelling of the UK power market for each of the potential conflicts considered.

### Sensitivity analysis

All sensitivity tests are focused on the DECC Base Case (aside from the comparisons in conflict 1B). As many of the scenarios measure deltas, we assessed the relative impacts associated with incremental changes for NG. The following section briefly summarises the key metrics recorded under each conflict assessment.

### Conflict 1B – Access to business privileged information on likely future build benefits NG electricity and gas network businesses.

In order to test the impact associated with various future builds for this exercise, the power market inputs include the new capacity expansion plan and resulting gas consumption across three scenarios: DECC's 100g Scenario; an earlier case developed by DECC in 2012; and NG's Gone Green scenario.

Since a different amount of capacity enters the market in each scenario, the number of new plant additions also varies between them. Note that because the Gone Green scenario has significantly more wind capacity entering the market, more plants are expected to come online.

### Conflict 1C – NG Offshore Transmission business has access to offshore capacity procurement information that can give it a first mover advantage.

For this exercise, the goal is to quantify the additional profit NG could earn by having advance information on the offshore wind capacity expected to be built. The power market input is the amount of new offshore wind capacity added each year in the Base Case.

### Conflict 1D – NG Interconnector business can benefit from early access to EMR information (CM, CfD) providing NG with price volatility information.

For this exercise, the goal is to quantify the profit that NG could earn by having advance knowledge of the amount and timing of low-cost generation entering the market and be able to take advantage of forward contracting opportunities across its interconnectors. The power market inputs are the all-hours pricing deltas between France and the UK; and the Netherlands and the UK; and import volumes from these countries in the Base Case.

Points where the pricing deltas dropped off between years were identified to show where NG could potentially exploit advance knowledge in signing a forward contract.

### Conflict 1E – NG CCS business benefits from advance information to commercially sensitive information when taking part in CfD allocation process run by the SO

For this exercise, the objective is to quantify the profit that NG could earn by having advance knowledge of the CCS capacity entering the market. The power market input is the amount and timing of CCS capacity entering the market in the Base Case.

Conflict 1F – NG’s Gas LNG business may benefit from advance information on the potential future demand for gas, given likely EMR outcomes (e.g. CfD strike prices)

For this exercise, the power market input is Base Case power sector natural gas demand.

Conflict 2B – Influence or discretion by the EMR team to over-procure capacity for NG’s electricity TO

For this scenario, the goal is to determine the incremental profits that NG can realise by influencing the over-procurement of new grid-connected capacity. Pace Global developed power market inputs for three different cases: the Base Case; a case in which an additional 1,200 MW of capacity entered the market to raise the reliability standard by roughly 2%; and a case in which an additional 3,000 MW of capacity enters the market to raise the reliability standard by roughly 5%.

Pace Global’s general opinion is that a 2% reliability standard increase is most likely. Pace Global’s experience is that planning targets across various jurisdictions are within a 3-4% range, so a 2% increase would be more reasonable to justify. However, a move from a 10% to a 15% reliability standard target would not be outside the levels used in other markets, so a 5% higher reliability standard represents a plausible eventuality.

This new capacity was assumed to be natural gas-fired. Since NG can also earn a profit from the exit charges, the gas consumption from new plants was also tracked and reported.

Conflict 2C – Influence or discretion by the EMR team to over-procure capacity (CM) or favour a flexible generation mix (CM, CfD) to facilitate meeting license obligations e.g. balancing the system.

For this exercise, the goal is to quantify the profits that NG can realise by influencing the type of new capacity that enters the market. The power market inputs included a Base Case capacity expansion plan as well as an alternative expansion plan focused on technologies that are more expensive to connect to the grid. Gas generation is also tracked.

Conflict 2D – Influence or discretion by NG’s EMR team to favour generation solutions over demand side reduction (DSR) to benefit the TO

For this exercise, the goal is to quantify the profits NG can realise by influencing the system operator to opt for generation solutions over demand side reduction to maintain reliability. The power market inputs included the number of new grid-connected plants (new natural gas-fired peakers) entering the system as well as the total gas consumption from new plants. The incremental gas demand in the No DSR case is low because the peaking capacity that is added in place of demand side reductions has a very low capacity factor.

Conflict 2E – Influence or discretion by the EMR team to benefit NG’s gas businesses (storage, TO, SO) through over-procurement of capacity or encouraging a focus on gas-fired generation.

For this exercise, the goal is to quantify the profits that NG can realise by influencing the construction of gas-fired generation plant. The power market inputs include new plant gas consumption across three scenarios: the Base Case; a scenario in which wind capacity is decreased by 20% and replaced with gas-fired capacity; and a scenario in which additional CCS capacity enters the market. Note that when wind capacity is decreased in favour of natural gas capacity, the total number of new MW on the system declines, due to the different peak availability attributes of the two technology types. This change in capacity impacts the electric business.

Conflict 2G – Influence or discretion by the EMR team to place weight on technologies to favour particular new or existing business (CCS/IC/Offshore) in CM or CfD instruments.

For this exercise, the goal is to quantify the profits that NG could realise by 1) influencing the addition of more CCS capacity in the market, 2) affecting the price delta and import volumes on their interconnectors, and 3) influencing the addition of more offshore wind capacity to drive more energy price volatility. The power market inputs for part one include a comparison of Base Case new CCS capacity entering the market with a case where an additional CCS unit comes online in 2022.

For parts two and three of this exercise, power market inputs include pricing deltas and interconnector usage between the UK and France and the UK and the Netherlands under various scenarios. Aside from the Base Case, there was a scenario in which the UK's reliability standard was decreased by two percent, and a scenario in which gas-fired capacity was removed and replaced with wind capacity.

## Appendix B Modelling parameters and profit metrics

This appendix provides an overview of the methodology we have used to calculate the impact of potential conflicts of interest (where relevant), including a description of the relevant profit or revenue metric used to translate the outputs of Pace Global's AURORAmp model into financial values. This allows us to calculate the potential profits to NG arising as a result of the conflicts. Unless noted otherwise, all numbers are in 2010£.

### Conflict 1C – Access to information gives NG Offshore Transmission a first mover advantage

1. The average offshore transmission cost for one MW of installed capacity is estimated between £600 and £700/kW<sup>23</sup> (we have calculated that, on average, this represents a 2012£ based on the assumed financial close date of all projects used for the calculation)
2. Reports from Infranews and the National Audit Office ("NAO"), both 2012, suggest the equity rate of return required by bidders for OFTO assets is around 9-11% in post-tax nominal terms. On this basis we assume equity investors on average require a 10% post-tax nominal ROE. This represents a real ROE of around 7.84%.
3. KPMG has obtained information on gearing for a number of recent OFTO projects through subscription-based data services (Infranews, Inspiratia) that indicate that the share of debt of total capital is on average 84%.
4. Based on the following definition:  $RoE = \text{Net Income} / \text{Shareholders Equity}$ , we derive net income or profit of £8.05/kW (7.84% RoE x £642/kW x 16% equity)

We have also made the following assumptions with regard to NG Offshore's potential market share:

NG Offshore has not, as yet, won any OFTO project. The 2012 NAO report shows that as of 2012, only two companies of six shortlisted candidates have been awarded an offshore transmission licence. In the absence of reference information, we assume that without access to specific information, NG would continue to be unsuccessful in its bids for OFTO projects (and therefore retain a 0% market share). Our AURORA modelling indicates significant growth in offshore wind capacity, making it likely that more OFTO licences would be awarded. We have assumed that having access to advance information under EMR might assist NG to join the group of shortlisted candidates and eventually obtain a 14% market share (1 of 7 shortlisted candidates).

### Conflict 1D – Access to information gives NG Interconnector business a first mover advantage

We have based our assumptions on information on the East-West Interconnector Revenue Requirement Public Information Note as published by the Commission for Energy Regulation on 7 September 2012.<sup>24</sup>

1. Based on an overall capital requirement of €601 million for the 500MW East-West Interconnector, CAPEX per MW comes to £1.05 million/MW.
2. The CER approved a real return on equity of 7.51%, equivalent to a WACC of 5.75%.
3. Using Aurora, we have calculated the expected revenues for a new France-GB interconnector and a new Netherlands-GB interconnector using the following methodology:
  - a) We assume a new 1,500 MW interconnector between France and GB and a new 1,500 MW interconnector between the Netherlands and GB;
  - b) We calculate the price difference between the countries with the assumed new interconnector in place;

<sup>23</sup>Based on OFTO list of the size (i.e. connected MW) and either final or indicative cost for transmission.

<sup>24</sup><http://www.cer.ie/en/electricity-transmission-network-interconnection.aspx?article=aae42598-5462-4a2e-b38b-89cd6909a232>

- c) We calculate the usage for both interconnectors in GWh for each year from 2017 through to 2030;
- d) We calculate the total revenues for both interconnectors (usage x price difference);
- e) We calculate the NPV of revenues (based on a 5.75% WACC) and compare against the assumed costs of £1.6 billion (£1.05 million/MW x 1,500 MW);
- f) If NPV revenues > costs, then we assume the interconnector gets built;
- g) We have assumed that NG would have a 50% participation in any new interconnectors, as it currently has in BritNed and the England-France interconnector.

Based on this methodology, our analysis indicates that only a new France Interconnector would be profitable.

### Conflict 1E – Access to information gives NG Carbon (CCS) a competitive advantage

1. Piping costs for the infrastructure to transport the CO<sub>2</sub> are in the range £0.4 million<sup>25</sup> – £1<sup>26</sup> million per km (£0.6 to £1.6 million per mile).
  - a) Based on the Carbon Capture and Storage report published by Scottish Development International and Scottish Enterprise, the distance of new pipelines needed for CCS projects ranges from 16 km to over 300 km, with a large number of projects below 100 km<sup>27</sup>
    - Assuming a 50km pipe, the investment costs would be £20-£50 million
    - Assuming a 600 MW plant, the average cost would range from £31.25/kW (£0.6m/mile) to £83.33/kW (£1.6m/mile) (2012£)
2. Based on Pace Global’s estimates, the compression infrastructure at the plant site is about £30/kW. For this analysis, we will assume that this is part of the CCS infrastructure.
  - a) For both 1) and 2), this gives a total ‘CAPEX’ range of £61.25/kW to £113.33/kW (2012£)
    - Assuming a 7.84% real RoE (consistent with the expected RoE for offshore transmission companies) and 16% equity, this gives a profit range of £0.79/kW to £1.42/kW in 2012£, or £0.74/kW to £1.33/kW in 2010£.
3. Our assessment of the potential future market share for the CCS business is based on the following analysis:
  - a) In October 2012, DECC announced that four bidders for CCS projects have been shortlisted for the next phase of the UK’s £1 billion Carbon Capture and Storage (CCS) competition. Although none of these projects have reached the final investment decision stage, and none has received funding under the EU’s NER300 programme, we have assumed that these four projects make up the relevant market for CCS currently.
  - b) On the basis that NG is part of two of the four bidding consortia (Captain Clean Energy Project and White Rose Project), we assume that in the underlying market for CO<sub>2</sub> transport, NG has a market share of 50%. Modelling results from AURORA predict that by 2030, five CCS projects will be online, i.e. an increment of one project (assuming the current shortlisted consortia are successful in their bids). We have assumed that having access to advance information might allow NG to bid successfully for the fifth CCS project and obtain a 60% market share.

<sup>25</sup>Based on Pace Global’s market intelligence and proprietary research. A primary source of information is the US Department of Energy report titled, “Cost and Performance Comparison of Fossil Energy Power Plants.”

<sup>26</sup>Page 10 and Page 12 “Scenario Summary” tables: <http://www.scottish-enterprise.com/~media/SE/Resources/Documents/ABC/CO2-Transport-Options-for-Scotland.ashx>. Note that we have assumed that the reported costs apply only to the transportations and sequestration component of the plants and have included all new, existing, onshore, and offshore pipelines in our calculation of costs per km.

<sup>27</sup>Page 14: <http://www.scottish-enterprise.com/~media/SE/Resources/Documents/ABC/CO2-Transport-Options-for-Scotland.ashx>

### Conflict 1F – Access to information gives Grain LNG a competitive advantage

1. There are three operational phases at Grain LNG. A fourth is currently planned, but no FID (final investment decision) has been made yet.
2. The fourth phase comprises a further development of the Terminal, involving a new jetty and unloading facilities, additional vaporisers and ancillary equipment and potentially additional storage capacity, increasing potential throughput by up to a further 5mtpa of LNG.
3. Currently, however, NG has no direct access to the capacity in its terminal until 2025. Therefore, we believe the impact of this conflict is extremely low, or 0% on a NPV basis.

### Conflict 2B1 Influence or discretion by the EMR team to over-procure generation capacity for NG's Electricity TO.

1. Gas Network
  - a) Ofgem has provided us with data on CAPEX undertaken for exit capacity for connecting gas power plants and we have calculated an average CAPEX value for such purposes. The average CAPEX is: 0.86 pence/KWh/year.
  - b) To account for capacity provided via exit substitution and contracts, we have reduced the overall CAPEX calculation by 15%. This is consistent with data provided by Ofgem28.
  - c) In calculating potential profits to NG's gas businesses, we apply the financial assumption from Appendix C below to determine the share of CAPEX that is equity financed (37.5%), on which investors earn the ROE (6.8%).
2. Electricity Network
  - a) The average connection CAPEX per MW of new installed capacity into the system will be calculated based on NG's RIIO-T1 'Managing Risk and Uncertainty' publication (all numbers are in 2010£)
    - i) Substation Costs: £23/kW
    - ii) Within-zone Costs: £19.75/kW (average of zonal range of £2.7/kW to £36.8/kW)
    - iii) Overhead lines: £1.2 million/cct km<sup>29</sup>
    - iv) Cables: £16.1 million/km (average of £10.9 million to £21.2 million range)<sup>30</sup>
3. We have assumed the average distance to the transmission network for new connections is 2 km, so that the total costs of Overhead and Cables comes to £34.52 million for a newly connected power plant. For completeness, we have also analysed the case where we assumed the average distance to the transmission network for new connections is 4 km, so that the total costs of Overhead and Cables (2010£) comes to £69.04 million. Based on the assumptions under DECC's 100g Scenario, doubling the average distance to 4 km would result in an additional profit to NG of £72.5 million (NPV terms).

### Conflict 2C – Influence or discretion by the EMR team to favour (onshore) generation build to benefit the TO.

- As we noted in the main body of the report, KPMG does not have access to technology-specific information for gas and electricity network connection costs. We have noted technology-specific differences based on the Connection and UoS charges shown below (sourced from Parsons Brinkerhoff report and DECC), and have done some secondary analysis based on these numbers.
- The analysis performed was based on the following assumptions:



1. Using DECC's 100g Scenario, we calculated the total CAPEX required for both the electricity and gas network:
  - a) For the gas network we used the assumptions outlined above in 2B1
  - b) For the electricity network we used the costs by technology outlined in the tables below (on a £/KW/year basis)
  
2. To assess the potential magnitude of the conflict, we assessed the difference in total CAPEX between the 100g Scenario and a case that considered a shift towards coal IGCC and nuclear, two of the technologies with higher Connection and UoS charges in the non-renewable technology table below. This case considered the replacement of 4.6 GW of gas technology with 4.6 GW of coal CCS and nuclear technology.
  - a) For the gas network we used the assumptions outlined above in 2B1
  - b) For the electricity network we used the costs by technology outlined in the tables below (on a £/KW/year basis)
  
3. This analysis indicates that this shift would increase NGET's profit potential by £0.5 million. However, taking into account the reduction in CAPEX associated with NGGT, there is a net loss to NG of acting on this particular conflict. It is important to note, however, that because it is unclear what the numbers in Parsons' report include or how they were calculated, we are unable to make any definite conclusions on the potential size of the conflict or assess any additional sensitivities with any degree of certainty. Moreover, given the 'OPEX' nature of these costs, we don't believe these numbers would represent a like-for-like comparison with the metrics used to analyse other conflicts in this report.

#### Non-Renewable Technologies – Connection and UoS Charges

Pg No.	No	Technology Type	First of a Kind (£/kW/yr)	Nth of a Kind (£/kW/yr)
40	1	Gas CCGT	3.07	3.07
41	2	OCGT	1.88	1.88
42	3	Gas – CCGT with post comb. CCS	3.07	3.07
44	4	Gas – CCGT with pre comb. CCS	3.07	3.07
45	5	Coal – ASC with FGD	4.51	4.51
47	6	Coal – ASC with post comb. CCS	4.51	4.51
49	7	Coal – ASC with oxy comb. CCS	4.32	4.32
50	8	Coal – IGCC	4.32	4.32
51	9	Coal – IGCC with CCS	4.32	4.32
53	10	Nuclear	4.51	4.51
57	11	CCGT CHP	3.07	3.07

*Source: Parsons Brinckerhoff Report, Electricity Generation Cost Model - 2012 Update of Non Renewable Technologies, August 2012.*

## Renewable Technologies – Connection and UoS Charges

Pg No.	No.	Technology Type	Connection and UoS charges at Financial Close (£/kW/yr)				
			2010	2015	2020	2025	2030
154	1	<50 MW biomass	1.58	1.54	1.51	1.50	1.49
154	2	>50 MW biomass	1.36	1.32	1.30	1.29	1.28
155	3	Onshore wind > 5MW	9.91	9.65	9.46	9.38	9.30
156	4	Onshore wind < 5MW	8.26	8.28	8.29	8.31	8.33
156	5	Offshore wind R2	50.61	41.18	35.68	32.59	30.26
157	6	Offshore wind R3	62.20	54.66	46.21	41.52	38.14
160	7	Biomass Conversion	16.85	16.90	16.95	17.00	17.05

Source: DECC- Government response to the consultation on proposals for the levels of banded support under the Renewables Obligation for the period 2013-17 and the Renewables Obligation Order 2012

### Conflict 2D – Influence or discretion by the EMR team to favour generation solutions over demand side reduction (DSR) to benefit TO.

The methodology for this conflict is based on the same underlying data/method relevant to the Electricity Network as in Conflict 2B1 above.

### Conflict 2E – Influence or discretion by the EMR team to benefit NG’s Gas businesses

The methodology for this conflict is based on the same underlying data/method relevant to the Gas Network as in Conflict 2B1 above.

### Conflict 2G – Influence or discretion by the EMR team to benefit NG’s Competitive businesses (Offshore/CCS/IC)

The methodology for these conflicts is based on the same underlying data/method as conflicts 1C, 1D and 1E above.

## Appendix C Assumptions on gearing, ROE and WACC

The following summarises our assumptions in calculating potential profits, as well as the NPV of such profits, for each of NG's businesses.

### NG's Regulated Businesses

In calculating the NPV of potential profits to NG's regulated businesses, we have applied the assumptions regarding the WACC, ROE, and Gearing for NG under RIIO. The following table provides the relevant figures from the Final Proposal document for RIIO.<sup>31</sup>

**Table 3.1: Summary of allowed return proposals**

	NGET (TO and SO)	NGGT (TO and SO)
Cost of equity (post-tax real)	7.0%	6.8%
Cost of debt (pre-tax real)	iBoxx 10-year simple trailing average index (2.92% for 2013-14)*	
Notional gearing	60%	62.5%
Implied vanilla WACC*	4.55%	4.4%

\* The value of the cost of debt index may vary during the price control period. Any changes would be reflected in the WACC.

### NG's Competitive Businesses

#### a) Offshore Transmission

In calculating the NPV of potential profits for NG's Offshore we have assumed a 7.84% real, post-tax return on equity (ROE) and a gearing ratio of 84%.

##### ■ Return on Equity

Reports from Infranews and the National Audit Office (NAO), both 2012, suggest the equity rate of return requested by bidders for OFTO assets is around 9-11% in post tax nominal terms. On this basis we assume equity investors on average require a 10% post-tax nominal ROE. In real terms this equals 7.84%.<sup>32</sup>

Source	High	Low	Average
Infranews (2012)	10%	9%	10%
NAO (2012)*	11%	10%	11%
Average	10.5%	9.5%	10%

\*\*RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas Finance Supporting document

<sup>32</sup>Infranews (2012), UK OFTOs: The Challenges of Meeting the Sectors GBP 17bn CAPEX requirements, 30/03/2012; and: NAO (2012), Offshore Electricity Transmission: A new Model for Delivering Infrastructure, NAO (2012), p29.

■ Gearing

We have based our assumption on the relevant gearing ratio for NG's offshore business by reference to gearing ratios observed for recent comparable OFTO projects (as reported by Infranews and Inspiratia, two subscriptions based infrastructure data providers).

<b>OFTO Project</b>	<b>Senior Debt (£m)</b>	<b>Gearing</b>	<b>Source:</b>
Robin Rigg	£65.10	84%	Inspiratia website
Gunfleet Sands 1 & 2	£50	85%	Infranews website
Walney 1	£105	85%	Inspiratia website
Barrow	£35	81%	Infranews website
Average		84%	

**b) NG Carbon (CCS)**

We have assumed the same underlying financial parameters as those underlying NG's Offshore business, i.e. a 7.84% real, post-tax return on equity (ROE) and a gearing ratio of 84%, for the following reasons:

- the lack of valid, current reference information on the financing of CCS projects in the UK;
- the similar nature of a CCS project relative to an offshore transmission project, both of which should provide investors with a stable revenue stream, given that the transmission infrastructure is built as part of a consortium for a larger project involving (essentially) a captive user of the infrastructure.

**c) NG Interconnector Businesses**

We have based our assumptions on information the East-West Interconnector Revenue Requirement Public Information Note as published by the Commission for Energy Regulation on 7 September 2012. The CER approved a real return on equity of 7.51% equivalent to a real WACC of 5.75%.

We have investigated the business case for constructing a new interconnector by comparing the NPV of the potential revenues for a hypothetical new interconnector to the estimated cost of constructing it (more details on this approach in Appendix A above). To calculate the NPV of potential revenues we have applied the real WACC of 5.75% as the relevant discount factor.

We have also investigated the potential profits to existing interconnectors from having advance access to information (a first mover advantage) on pricing volatility, for which we applied the 7.51% real ROE to discount future annual profits predicted by AURORAxmp.

## Contact us

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