20th April 2015

Re: FOI request FOI/2015/23

I refer to the request which you made under the Freedom of Information Act 2014 for records held by this body:

The request is for communications relating to the following:

   A) Documents and communications by the Department dated between 1/1/2009 and 28/02/2015 that include predictions of curtailment or capacity costs relating to wind energy installation targets as referred to by Eirgrid

I, Gerry McTiernan, (HEO) have now made a final decision to grant your request on 20th April 2015.

The purpose of this letter is to explain that decision. This explanation has the following parts:

1. a schedule of all of the records covered by your request;
2. an explanation of the relevant findings concerning the records to which access is denied, and
3. a statement of how you can appeal this decision should you wish to do so.

This letter addresses each of these three parts in turn.

1. Schedule of records

A schedule is enclosed with this letter, it shows a single record that this Department considers relevant to your request.

"Fáilteoir roimh comhfhreagra i nGaeilge"
2. Findings, particulars and reasons for decisions to deny access

I made a final decision to grant your request on 20th April 2015. If you have any queries regarding this correspondence you can contact me by telephone at 01-6782950. The record is being made available to you in paper format with this letter.

3. Rights of appeal

In the event that you are unhappy with this decision you may appeal it. In the event that you need to make such an appeal, you can do so by writing to the Freedom of Information Unit, Department of Communications, Energy and Natural Resources, Elm House, Earlvale Road, Cavan, Co. Cavan or by email to foi.unit@dcenr.gov.ie. Your correspondence should include a fee of €30 for processing the appeal. Payment should be made by way of bank draft, money order, postal order or personal cheque made payable to the Department of Communications, Energy and Natural Resources. If you wish to make payment by electronic means please contact the FOI Unit. You should make your appeal within 4 weeks from the date of this notification, where a day is defined as a working day excluding, the weekend and public holidays. However, the making of a late appeal may be permitted in appropriate circumstances. The appeal will involve a complete reconsideration of the matter by a more senior member of the staff of this body.

Should you have any questions or concerns regarding the above, please contact me by telephone on 01-6782950.

Yours sincerely,

Gerry McTiernan
Higher Executive Officer

"Fáiltear roimh comhfhreagras i nGaeilge"
<table>
<thead>
<tr>
<th>Record No.</th>
<th>Brief Description &amp; Date of Record</th>
<th>File Ref.</th>
<th>No. of Pages</th>
<th>Relevant facts</th>
<th>Findings/ conclusions (Public Interest Considerations, If applicable)</th>
<th>Grant/refuse/part-grant</th>
<th>Basis of Refusal: Section of Act</th>
<th>Record edited/Identify deletions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Presentation by P. O'Donnell (EirGrid) titled “Future constraint levels – Wind”</td>
<td></td>
<td>19</td>
<td>Dated 04/11/2010</td>
<td></td>
<td>Grant</td>
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</tr>
</tbody>
</table>
Future constraint levels for wind generation: development of scenarios

EirGrid Group Customer Conference 2010

4th November 2010

Philip O’Donnell
Manager, Generation Analysis, EirGrid
Overview of Presentation

- Introduction

- Overview of constraints modelling

- Presentation of high-level results for the period 2011 - 2022.
  - Wind curtailment/constraint results
  - When does wind curtailment occur?
  - Wind generation and interconnection flows
  - Impact on conventional generation
  - 2020 RES-E results

- Future plans

- Future scenarios
Curtailment and Constraint

For the purposes of constraints modelling/reporting, the terms Curtailment and Constraint are used to refer to changes in generator output under different specific circumstances.

Curtailment

- Changes to generator output from the most economic dispatch in order to ensure that sufficient quantities of the system services necessary to run a safe and secure electricity system are available.
- At very high wind generation levels, further reduction of wind generator output may be required if wind generation levels still exceed demand.

Constraint

- Changes to generator output from the most economic dispatch due to transmission network limitations, specifically the overloading of transmission lines, cables and transformers.
- Constraint is location-specific and can be reduced by transmission network reinforcements.
Description of Constraints Modelling

Inputs
- Demand shape
- Generator characteristics
- Wind profiles
- Fuel prices
- Operational rules
- Transmission network

PROMOD
- Chronological Unit Commitment Economic Dispatch model
- 8760 hours modelled per year
- Minimise the system cost (fuel bill/operating costs) subject to constraints such as spinning reserve, generator capabilities, transmission network limitations etc.

Outputs
- Hourly generation pattern for each generator (No. of start-ups, loading patterns etc.)
- System/Fuel cost
- Fuel consumption by fuel type
- Emission quantities
- Transmission line loadings
Draft Operational Rule-set

• A draft operational rule-set, informed by the results from the Facilitation of Renewables workstream, was used.

• The rule-set covers:
  • Minimum conventional generation requirements
  • Operating reserve requirements
  • North-South Interconnection power flows
  • Limits on the instantaneous wind penetration

• Dispatch rule-set used is being consulted on by the SEM Committee.
Limits on the Instantaneous Wind Penetration

- **T1** is dependent on the system's ability to absorb the variability of wind generation.
- **T2** is a factor of the system's ability to manage the variability within the grid.
- **T3** and **T4** indicate the system's ability to handle extreme weather conditions in a redundant manner.

![Graph showing limits on instantaneous wind penetration](image-url)
Scenarios

- Four scenarios were examined for each study year for the period 2011 through 2022.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Gate 3 Wind (33%, 66%, 100%)</th>
<th>Fuel Price (Base Case, Alternative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1 (SN1)</td>
<td>100%</td>
<td>Base Case</td>
</tr>
<tr>
<td>Scenario 2 (SN2)</td>
<td>66%</td>
<td>Base Case</td>
</tr>
<tr>
<td>Scenario 3 (SN3)</td>
<td>33%</td>
<td>Base Case</td>
</tr>
<tr>
<td>Scenario 4 (SN4)</td>
<td>100%</td>
<td>Alternative</td>
</tr>
</tbody>
</table>
Installed Wind Capacity

- All IE generation added based on an estimate of shallow connection leadtimes
PGOR System Wind Curtailment Results

Ireland Wind Curtailment Level - Scenarios 1, 2, 3 & 4
Wind Curtailment: Time of Day?

Generated and Curtailed Wind Energy: 2020 Scenario 1

Energy (GWh)

Hour of Day

- Generated
- Curtailed
Wind Curtailment: Time of Year?

Generated and Curtailed Wind Energy: 2020 Scenario 1

- Energy (GWh)
- Months: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
- Bars represent energy generated and curtailed.
Exports on East-West and Moyle

- At hours of excess wind generation, the East-West (530MW) and Moyle (80MW) Interconnectors are used to export wind generation that would otherwise be curtailed, up to their combined capacity of 610MW.
- At all other hours, zero flow on the interconnectors is assumed.
PGOR System Wind Constraint Results

Ireland Wind Constraint Level - Scenarios 1, 2, 3 & 4

%  
20  18  16  14  12  10  8  6  4  2  0

Year  

- Scenario 1  - Scenario 2  - Scenario 3  - Scenario 4
PGOR System Wind Curtailment + Constraint Results

Ireland Wind Curtailment + Constraint Level - Scenarios 1, 2, 3 & 4

- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 4
<table>
<thead>
<tr>
<th>Scenario</th>
<th>2020 Total Start-Ups</th>
<th>2011 Total Start-Ups</th>
<th>100% Gate 3 Wind</th>
<th>66% Gate 3 Wind</th>
<th>33% Gate 3 Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4,179</td>
<td>2,529</td>
<td>2,534</td>
<td>2,557</td>
<td>2,054</td>
</tr>
</tbody>
</table>

Impact on Conventional Generation
# Indicative IE 2020 RES-E Energy

<table>
<thead>
<tr>
<th>Indicative IE 2020 RES-E Energy</th>
<th>2020 SN1 (100% Gate 3 Wind)</th>
<th>2020 SN2 (66% Gate 3 Wind)</th>
<th>2020 SN3 (33% Gate 3 Wind)</th>
<th>2020 SN4 (100% Gate 3 Wind)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed Wind Capacity (GW)</td>
<td>6.6</td>
<td>5.2</td>
<td>3.9</td>
<td>6.6</td>
</tr>
<tr>
<td>Available Wind Energy (TWh)</td>
<td>18.5</td>
<td>14.7</td>
<td>10.9</td>
<td>18.5</td>
</tr>
<tr>
<td>Max Possible Wind Penetration (%)</td>
<td>55%</td>
<td>44%</td>
<td>33%</td>
<td>55%</td>
</tr>
<tr>
<td>Max Possible RES-E Penetration (%)</td>
<td>60%</td>
<td>48%</td>
<td>37%</td>
<td>60%</td>
</tr>
<tr>
<td>Wind Curtailment &amp; Constraint (%)</td>
<td>13%</td>
<td>7%</td>
<td>3%</td>
<td>14%</td>
</tr>
<tr>
<td>Resulting Wind Penetration (%)</td>
<td>48%</td>
<td>41%</td>
<td>32%</td>
<td>48%</td>
</tr>
<tr>
<td>Resulting RES-E Penetration (%)</td>
<td>53%</td>
<td>45%</td>
<td>36%</td>
<td>52%</td>
</tr>
</tbody>
</table>
Future Plans

- The Possible Generator Output Reductions (PGOR) report for a Gate 3 Area will be published when all offers in an area have been issued.
  - Area K, Area D and Area H2 PGOR reports have already issued.
  - Workshops on curtailment/constraint levels will be held to answer more detailed queries on Area results.

- If the final dispatch rules differ from the draft set employed => Re-run of constraints model is required.

- Possible re-run of constraints model starting in Q3 2011.
Future Scenarios

• Potential additional scenarios to be studied could cover:
  • Take-up of connection offers
  • Windfarm build-out rate/timing
  • Treatment of non-controlled wind farms
  • Changes to timing of network roll-out
  • Multi-year wind profiles
  • Further interconnection

• Potential additional scenarios to be studied will be discussed at the Gate 3 Liaison Group. The dependencies are:
  • Whether a re-run is required due to a change in dispatch rules
  • Resources
Questions?

Philip O’ Donnell

Philip.odonnell@eirgrid.com

www.eirgrid.com
Date: 18/3/2015

Decarbonisation Policy Division,
Department of Communications, Energy
and Natural Resources,
29-31 Adelaide Road,
Dublin 2.

Email: gerald.mctierman@dcenr.gov.ie
Tel: 01-6782950
Fax: 01-6783209

FOI Request Reference: FOI/2015/23

Dear ,

I refer to your FOI request under Section 7 of the Freedom of Information Acts, 1997 and 2003, received in this office on 5/03/2015.

The request is for communications relating to the following:

A) Documents and communications by the Department dated between 1/1/2009 and 28/02/2015 that include predictions of curtailment or capacity costs relating to wind energy installation targets as referred to by Eirgrid

In considering your request it has become necessary to engage in third party consultations under Section 29 of the Acts (copy attached). The Acts provide for an extension to the time limit for such consultations to be undertaken.

This extension means that you can now expect to receive your decision by the 23/04/2015.

Yours sincerely,

Gerald McTiernan
Decarbonisation Policy Division
Tel: 016782950

"Fáiltear roimh comhshreagras i nGaeilge
16/03/2015

FOI Request Reference: FOI/2015/23

Dear

I refer to your request which was received by this office on 05/03/2015 which you have made under the Freedom of Information Act 2014 for records held by this FOI body. Your request sought:

Documents and communications by the Department dated between 1/1/2009 and 28/02/2015 that include predictions of curtailment or capacity costs relating to wind energy installation targets as referred to by Elrgrid.

The decision maker handling your request is Mr Gerald McTiernan, Decarbonisation Policy and Coordination Division, Department of Communications, Energy and Natural Resources, 29-31 Adelaide Road, Dublin 2 and they can be contacted at 016782950. A final decision on your request would normally be sent to you within 4 weeks, where a week is defined as 5 working day excluding the weekend and public holidays. This means that you can expect a decision letter to issue not later than 07/04/2015.

There are some limited situations under the FOI Act which could mean that the period for a final decision may be longer than this 4 week period. If this occurs in the case of your request, you will be advised promptly in writing setting out the reason and the new decision date.

Should our final decision not reach you on time, please feel free to contact the decision maker named above to discuss any problems that may have arisen. If you have not heard from us once the allotted time has expired, you are automatically entitled to appeal for a review of the matter. This review proceeds on the legal basis that the initial request is considered to be refused once the specified time for responding to it has expired. The review is a full and new examination of the matter carried out by a more senior member of staff.

In the event that you need to request such a review, you can do so by writing to FOI Unit, Department of Communications, Energy and Natural Resources, Elm House, Earlsvale Rd, Cavan, Co Cavan or alternatively by sending an e-mail to FOI.UNIT@deenr.gov.ie. You should state that you are seeking this review because an initial decision was not sent to you within the time allowed for a response. In that event, you would normally have 4 weeks (after the initial decision should have been sent to you) in which to make the appeal. Consideration will be given to late applications in appropriate circumstances.

Should you wish to discuss the above, please contact me by telephone at 01 6782902.

Yours sincerely,

Carmel Conaty
FOI Unit
4th March 2015

Dear Sir / Madam,

I would like to make an application for information under the FoI Act.

I'd like to request access to documents containing the following information:

Documents and communications by the Department dated between 1/1/2009 and 28/2/2015 that include predictions of curtailment or capacity costs relating to wind energy installation targets as referred to by Eirgrid. Example of most up to date wind energy target, although older ones may be different: "It is estimated that this will need to rise to between 3,200 and 3,800 MW by 2020 to meet the 40% target. Source: http://www.eirgrid.com/media/Eirgrid_Generation_Capacity_Statement_2015-2024.pdf"

Kind regards