Wind Generation Facilities

Connection Application Form to the Transmission System

October 2015

Introduction

This application form (version 1.2) outlines the information EirGrid requires to progress an application for connection to the Transmission System. EirGrid recommends that the applicant refers to the customers section of the website [www.eirgrid.com](http://www.eirgrid.com) for further information on the application process. The website has links to other relevant documents such as the Grid Code. It should be noted that it is the applicant’s responsibility to comply with the technical, design and operational standards detailed in the Grid Code.

Please note for the purpose of this application form TSO should be interpreted as: the holder of the license to operate Ireland’s Transmission System (EirGrid).

Please note that this application form deals with HV connections only (≥ 110 kV) and that if an MV (≤< 110 kV) supply is required the applicant should first contact ESB Networks: Tel: +353 850 372 757, [www.esb.ie](http://gridshare/sites/crossfunctional/offerprog/Customer%20Documentation/Customer%20Application%20Forms%20Update%20Aug%202015/Final%20complete%20forms/www.esb.ie)

EirGrid reserves the right to request additional data if necessary and the applicant should provide such information promptly during and post the offer process.

It is EirGrid’s responsibility to determine the transmission connection method; if the applicant has a specific request this will be considered and examined in the process. The selected method will be based on the overall least cost technically acceptable solution unless the Applicant requests otherwise or EirGrid requires an alternative method for system reasons.

Definitions of terms used in this form can be found in the Glossary of the Grid Code.

The following information will be disclosed in the applications list found in the ‘Completed Generation Applications’ section on [www.eirgrid.com](http://www.eirgrid.com) once the application is deemed fully complete by EirGrid:

* Project name,
* applicant details (contact name, email address, telephone number),
* received complete date,
* status of application,
* grid co-ordinates of electrical connection point,

capacity of project (MW).

Please note that if the application is not initially deemed complete, then the received complete 1 date is recorded as the date that all necessary information has been provided to the system operator.

Please note that payment of application fees can only be made via electronic fund transfer into the following account. Cheques are not accepted.

Bank Details: Sort Code: 99-02-12

Barclays Bank Ireland Plc Account Name: EirGrid No 2 Account

2 Park Place, Account Number: 42890602

Hatch Street Swift Code: BARCIE2D

Dublin 2 IBAN: IE80BARC99021242890602

When the application form is completed please send the form to the below address, or email to OPMO@eirgrid.com

EirGrid Tel: +353 1 702 6642

Customer Relations Fax: +353 1 661 5375

The Oval, Email: [info@eirgrid.com](mailto:info@eirgrid.com)

160 Shelbourne Road,

Ballsbridge,

Dublin 4,

Ireland.

If any queries arise please do not hesitate to contact our Customer Relations Team at, [CUSTOMER.SUPPORT@eirgrid.com](mailto:CUSTOMER.SUPPORT@eirgrid.com)

More information on the Received Complete Date is available at: <http://gridshare/sites/FG/CPC/CPC%20Policy%20Documentation%20Project/Basis%20for%20calculating%20%20Received%20Complete%20Date%20-%20FINAL.pdf>

Details of Applicant

**1.** Full name of the applicant.

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**2.** Address of the applicant or in the case of a corporate body, the registered address and company registration number.

Company Registration No. (If applicable)

**3.** Telephone Number

**4.** Contact Person(s)

**5.** Email Address

**6.** Contact Address (if different)

**7.** Please nominate a preferred name for this facility.

Please Note: The TSO will take this preferred name into consideration when determining the facilities’ station name but reserves the right to change it in order to avoid any potential for confusion with other projects or stations.

Please refer to Appendix A for EirGrid’s policy on User Site/Station Naming.

**8.** Please specify the address of this Facility.

**9.** Please confirm if you have achieved planning permission for the facility.

Yes No

If yes, please confirm the planning authority reference.

If no, please confirm when you expect to achieve it. If the date of application is dependent on the connection offer date, please confirm the expected number of months to achieve planning permission for the facility.

Months

**10.** It should be noted that it is the applicant’s responsibility to comply with the technical design and operational standards detailed in the Grid Code.

Noted

**11.** Has the Applicant signed a confidentiality agreement with the TSO?

Yes No

If no, two copies have to be submitted with application form.

Confidentiality agreement templates can be found on our website, [www.eirgrid.com](http://www.eirgrid.com)

**12.** Has the Applicant previously had a pre-feasibility study regarding this facility completed by TSO?

Yes No

If yes, please specify name and the date of issue of the Pre-feasibility study(s).

Study 1: (D/M/Y)

Study 2: (D/M/Y)

Maps and Diagrams

**13.** Please provide a 1:50,000 “Discovery Series” Ordnance Survey map, with the location address of the facility clearly marked. The electrical connection point must be clearly marked with an “X”.

Name of OS map attachment:

Grid co-ordinates of the electrical connection point of your site (In appendix A an example is shown of how to correctly specify the grid co-ordinates):

Easting

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |

Northing

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |

**14.** Please provide a site plan in an appropriate scale. This site plan should be submitted in soft copy only and indicate:

* the proposed location of the connection point,
* generators,
* transformers,
* site buildings and
* meteorological masts etc.

Note that the connection point is normally at the HV bushings of the grid connected transformer. Space for the transmission compound will have to be clearly marked on the site plan. The exact size of the compound will depend on the connection method defined in the connection offer.

Name of site plan attachment.

**15.** Please provide an electrical Single Line Diagram (SLD) of the proposed facility in soft copy only detailing all significant items of plant and their values.

• Relevant voltage levels,

• generator transformer(s),

• power factor correction devices,

• location of alternative connection for house load (if applicable) and

• grid connected transformer(s).

Name of the SLD attachment soft copy;

Technical details required.

**16.** Maximum Export Capacity (MEC) required in MW.

This is the amount of exporting transmission capacity that will be provided for in the connection offer and is the maximum capacity that can be exported onto the transmission system.

MEC (MW)

**17.** State the number of connecting circuits to the Transmission System (e.g. one, two etc.) the applicant requires for technical and/or security reasons.

Please also state any specific connection method requests e.g. the use of underground cabling or connection to a specific station etc.

Please note that while underground cabling may be quicker to build than overhead line, however it is more expensive and in certain areas of the country the use of underground cabling can have impacts on the Transmission System. For example amplification of background harmonic distortion, that would require additional equipment to be installed to mitigate their impact.

Where the possibility of harmonic amplification exists more detailed studies are required during the process leading to the issuance of a Connection Offer which may not be possible to complete within the standard 90 business day timeframe. Please also note that customers pay for 100% of the least cost connection method. Customer requested connection methods above and beyond the least cost connection method are fully chargeable to customers.

Further information on this aspect of charging policy is available at:

<http://www.eirgridgroup.com/customer-and-industry/general-customer-information/connections-and-contracts/>

**18.** Confirm whether you wish the connection offer to issue on a contested or a non-contested basis and broadly outline the works the customer wishes to contest.

Further information on contestability is available at:

<http://www.eirgridgroup.com/site-files/library/EirGrid/Contestability-and-Connection-Assets.pdf>

Wind Turbine Generator (WTG)

Type 1 Type 2 Type 3

|  |  |  |  |
| --- | --- | --- | --- |
| **19.** Manufacturer of wind turbine |  |  |  |
| **20.** Model and type of above turbine |  |  |  |
| **21.** Number of generators of type |  |  |  |
| **22.** Rated power output of each turbine (MW) |  |  |  |
| **23.** Wind turbine generator rated MVA |  |  |  |
| **24.** Wind turbine generator voltage (kV) |  |  |  |

**25.** Please provide a power curve approved by the WTG manufacturer and specific to the WTG(s) specified above.

Submitted

Name of attachment:

**26.** Please provide a power quality test report in accordance with,

IEC (61400-21:2001).

Submitted

Name of attachment:

Wind Turbine Generator (WTG) Transformer

All impedances in % on transformer MVA base.

Type 1 Type 2 Type3

|  |  |  |  |
| --- | --- | --- | --- |
| **27.** Rating of WTG transformer (MVA) |  |  |  |
| **28.** WTG transformer voltage ratio MV/LV (kV) |  |  |  |
| **29.** WTG transformer positive sequence resistance (R1%) |  |  |  |
| **30.** WTG transformer positive sequence reactance (X1%) |  |  |  |
| **31.** WTG transformer zero sequence resistance (R0%) |  |  |  |
| **32.** WTG transformer zero sequence reactance (X0%) |  |  |  |
| **33.** WTG transformer vector group |  |  |  |

Wind Farm Site

**34.** Please state the power factor ranges of the generators at the specified active power percentages and then specify the equivalent MVAr capability.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | 35% | | 100% | |
| Ind. | Cap. | Ind. | Cap. |
| Type 1 | Equivalent MVAr |  |  |  |  |
| Type 2 | Equivalent MVAr |  |  |  |  |
| Type 3 | Equivalent MVAr |  |  |  |  |

**35.** Number of inductive devices.

Indicate for each device the inductive MVAr capability. If the device has more than one stage please indicate the number of stages and the MVAr capability switched in each stage.

MVAr steps

MVAr steps

**36.** Number of capacitive devices.

Indicate for each device the capacitive MVAr capability. If the device has more than one stage please indicate the number of stages and the MVAr capability switched in each stage.

MVAr steps

MVAr steps

**37.** Please indicate the MVAr contribution of the internal wind farm structure (i.e. 20 kV cable)

MVAr

**38.** Please provide a reactive capability curve for the wind farm site as measured at the lower voltage side of the grid connected transformer. The capability curve should specify MVAr vs MW for the entire range of MW output. The curve should be consistent with the answers given in the questions above.

Please note that the wind farm must be in compliance with Grid Code WFPS.1.6.3.

Name of the attachment:

**39.** Please provide test results demonstrating fault ride through capability in accordance with Figure WFPS1.1 in the Wind Grid Code ref: WFPS1.4.1.

Name of the attachment:

Internal Wind Farm Network Structure

**40.** Please describe how the wind farms internal network structure (collector network) will be laid out. The description should include a breakdown of how the individual turbines are connected together as well as how they are connected back to the wind farm substation. Please specify different cable sizes and individual lengths of cable.

Name of internal network structure attachment:

Type 1 Type 2 Type3

|  |  |  |  |
| --- | --- | --- | --- |
| **41.** Conductor cross sectional area per core (mm2) |  |  |  |
| **42.** Conductor type (Al, Cu, etc.) |  |  |  |
| **43.** Type of insulation |  |  |  |
| **44.** Total length of Cable Type (km) |  |  |  |

Grid Connected Transformer Data

There are many types of transformers. This application form specifies Two Winding Transformers. All impedances should be stated in % on transformer rated MVA base.

Please note that the connection voltage is determined by EirGrid in accordance with normal standards, as detailed in the Grid Code, taking into account the particulars of each development. If the connection voltage differs from that specified in this application, EirGrid will request new data corresponding to the new voltage level. An appropriate connection voltage will initially be examined as part of the application check.

Please note the Grid Connected Transformer specified must be compliant with section WFPS1.6.5 of the Grid Code.

Two Winding Transformers

Transformer 1 Transformer2

|  |  |  |
| --- | --- | --- |
| **45.** Rating of Transformer (MVA) |  |  |
| **46.** Transformer voltage ratio HV/ LV (kV) |  |  |
| **47.** Transformer positive sequence resistance (R1%) |  |  |
| **48.** Transformer positive sequence reactance (X1%) |  |  |
| **49.** Transformer zero sequence resistance (R0%) |  |  |
| **50.** Transformer zero sequence reactance (X0%) |  |  |
| **51.** Transformer vector group |  |  |

**52.** Please provide details of tap changer.

Nature of tap changer off load/on load/off circuit)

Transformer 1: Tapped voltage winding

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | kV | + | Steps | - | Steps |  | % Step Size |

Transformer 2: Tapped voltage winding

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | kV | + | Steps | - | Steps |  | % Step Size |

For Three Winding Transformers, please complete Appendix B.

Station Data

**53.** Please specify the Maximum Import Capacity (MIC) required in MVA. This is the amount of import capacity that the site will require during start up and will be provided for in the connection offer.

MIC (MVA)

**54.** Please specify the House Load required for the site under normal operating conditions.

MW MVAr

**55.** Please state if a separate transmission connection is required to supply House Load.

Yes No

If required please submit details.

Name of attachment:

Generation Data for Fault Studies (Short Circuit)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | IK" – Initial symmetrical short circuit current |  |  |  | | IP – Peak short circuit current |  |  |  | | Ib100 – Short circuit breaking current at 100ms |  |  |  | | Ib80 – Short circuit breaking current at 80ms |  |  |  | | IK – Steady state short circuit current |  |  |  |   **56.** Please provide the following currents for each type of wind turbine generator used in the wind farm.  Type 1 Type 2 Type3 |

**57.** Please provide a short circuit decrement curve (current vs. time) that represents each type of wind turbine generator used in the wind farm.

Name of attachment(s):

Dynamic Simulation Data

For EirGrid to be able to carry out dynamic simulations the applicant needs to submit dynamic simulation information appropriate to their facility at least 12 months in advance of their connection.

Please select one of the following ways for providing the dynamic simulation data:

1. The applicant can submit a softcopy of a PSSE Dynamic Model representation of the generation facility connected to a simple grid system. Please see the EirGrid website for general details on how to prepare a sample PSSE model of a connection: <http://www.eirgrid.com/customers/gridconnections/generatorconnections/winddynamicmodelling/>
2. The applicant can specify the use of a specific dynamic simulation model(s) already included on the dynamic model register on the EirGrid website:

<http://www.eirgrid.com/customers/gridconnections/generatorconnections/winddynamicmodelling/>

Please note that exact information and parameters regarding generation facility will be required at the time of commissioning and failure to produce this may result in a delay in energisation of the facility.

Appendixes

Appendix A:

EirGrid’s policy on Station Naming:

* Station name must be unique and pronounceable for all stations,
* station name must be geographically accurate and descriptive,
* station name should be as local as possible to provide for future proofing for other stations that may locate in the same area,
* station names should be identified in the following order;
* town land it is situated in,
* nearby town land,
* adjacent landmark, i.e. a mountain.
* station names should not be named after a company, any individual supplier or manufacturer as this is liable to change,
* station name must not start with the letter X as this is reserved for ETSO.

Note: Station name above applies to both the transmission station name and the user’s site name.

EirGrid will also assign a unique 3 character code to each generation unit which are used by various software for modelling purposes and dispatch purposes. This 3 character code is based on the user site name and the number of generators at that site.

Appendix B:

Three Winding Transformers

Transformer 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | HV winding | LV1 winding | LV2 winding |
| **B1.** Transformer rated MVA |  |  |  |
| **B2.** Transformer rated voltage (kV) |  |  |  |
| **B3.** Transformer vector group |  |  |  |

Transformer 2

|  |  |  |  |
| --- | --- | --- | --- |
|  | HV winding | LV1 winding | LV2 winding |
| **B4.** Transformer rated MVA |  |  |  |
| **B5.** Transformer rated voltage (kV) |  |  |  |
| **B6.** Transformer vector group |  |  |  |

Clearly specify the MVA base (in space provided between brackets) which the measured impedances below are related to:

Transformer 1 Transformer 2

|  |  |  |
| --- | --- | --- |
| **B7.** Transformer positive sequence resistance (R1HL1%) between HV/LV1: | ( ) | ( ) |
| **B8.** Transformer positive sequence reactance (X1HL1%) between HV/LV1: | ( ) | ( ) |
| **B9.** Transformer zero sequence resistance (R0HL1%) between HV/LV1: | ( ) | ( ) |
| **B10.** Transformer zero sequence reactance (X0HL1%) between HV/LV1: | ( ) | ( ) |
| **B11.** Transformer positive sequence resistance (R1HL2%) between HV/LV2: | ( ) | ( ) |
| **B12.** Transformer positive sequence reactance (X1HL2%) between HV/LV2: | ( ) | ( ) |
| **B13.** Transformer zero sequence resistance (R0HL2%) between HV/LV2: | ( ) | ( ) |
| **B14.** Transformer zero sequence reactance (X0HL2%) between HV/LV2: | ( ) | ( ) |
| **B15.** Transformer positive sequence resistance (R1L1L2%) between LV1/LV2: | ( ) | ( ) |
| **B16.** Transformer positive sequence reactance (X1L1L2%) between LV1/LV2: | ( ) | ( ) |
| **B17.** Transformer zero sequence resistance (R0L1L2%) between LV1/LV2: | ( ) | ( ) |
| **B18.** Transformer zero sequence reactance (X0L1L2%) between LV1/LV2: | ( ) | ( ) |
| **B19.** Transformer positive sequence resistance (R1HL1L2%) between HV/(LV1+LV2): | ( ) | ( ) |
| **B20.** Transformer positive sequence reactance (X1HL1L2%) between HV/(LV1+LV2): | ( ) | ( ) |
| **B21.** Transformer zero sequence resistance (R0HL1L2%) between HV/(LV1+LV2): | ( ) | ( ) |
| **B22.** Transformer zero sequence reactance (X0HL1L2%) between HV/(LV1+LV2): | ( ) | ( ) |

**B23.** Please provide details of tap changer.

Nature of tap changer (off load/on load/off circuit):

Transformer 1 : Tapped voltage winding

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | kV | + | Steps | - | Steps | % | Step Size |

Transformer 2 : Tapped voltage winding

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | kV | + | Steps | - | Steps | % | Step Size |

Appendix C:

Checklist:

* Application form completed in full,
* application fee,
* two signed copies of confidentiality agreement (if applicable),
* OS map,
* site plan - soft copy SLD,
* power curve –soft copy,
* power quality test report,
* reactive power capability curve,
* fault ride through capability test results,
* internal network structure details,
* station data (if applicable),
* short circuit decrement curve and
* suitable dynamics model.