



Notification No:

MPRN:

APPLICATION FOR A NEW CONNECTION

EMBEDDED GENERATION FACILITIES

INTRODUCTION

This application form outlines the information ESB Networks Ltd. requires to progress an application for connection to the Electricity Distribution System. All applications must comply with the Distribution Code and ESB Networks Ltd. Conditions Governing Connection to the Distribution System. These can be found on our website, www.esb.ie/esbnetworks.

Please note that this application form only deals with LV (230/400V), 10kV, 20kV, 38kV and in some cases, 110kV connections. If a higher connection voltage is required the applicant should contact the Customer Relations Team in EirGrid, Tel: +353 1 702 6642, info@eirgrid.com.

ESB Networks Ltd. 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 ESB Networks Ltd. responsibility to determine distribution connection method. If the applicant has a specific request this will be considered and examined in this process. The selected method will be based on the overall least cost technically acceptable solution **unless the Applicant requests otherwise or ESB Networks Ltd. requires an alternative method for system reasons.**

This application form must be submitted in both **paper and electronic format** (eg. on CD). **Applications sent via email will not be accepted.** All electronic files should be approximately 2 MB or less.

Any accompanying drawings must be on A3 sized paper at most.

Definitions of terms used in this form can be found in the glossary of the Distribution Code.

When the application form is fully completed please send the form and all relevant documentation to:

Generator Application
ESB Networks Ltd.
P.O. Box 29
Garrycastle
Athlone
Co. Westmeath

If any queries arise ESB Networks Ltd. can be contacted at 1850 372 757, or DSOgenerators@esb.ie.

Please note that in accordance with the CER direction CER06145 some information from your completed application form will be published on the EirGrid website. The direction can be found on the CER website, <http://www.cer.ie>

HOW TO FILL IN THIS APPLICATION FORM

This application form is divided into five parts. Please see below to find out which parts you should fill in.

Wind farm applicants with an MEC (Maximum Export Capacity) less than or equal to 5MW:

Fill in parts 1, 2, 3 and 5.

Wind farm applicants with an MEC greater than 5MW:

Non-wind applicants: Fill in parts 1 and 5. Fill in parts 1, 2, 4 and 5

Form NC5 should be used where an applicant considers their application is eligible for processing outside of the Group Processing Approach (GPA). Form NC5A is a shortened version of this form and may be used where the applicant considers their application will be processed inside the GPA. For more detail on which is the most suitable form please refer to our web-site www.esb.ie/esbnetworks

Please note: Incomplete applications will be returned.

PART1 – ALL APPLICANTS

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant Details: | 1. Full name of the applicant: <small>[if a company or Partnership give full Corporate or Trading Name]</small> |
| | 2. Address of the applicant: <small>[in the case of a body corporate, the registered or principal office]</small> |
| | 3. Telephone Number: |
| | 4. Fax Number: |
| | 5. Email Address: |
| | 6. Contact Person: |
| Site Details: | 7. Project Name: <small>(Please note the project name will be published on www.eirgrid.com)</small> |
| | 8. Site Name & Address: |
| | 9. Site Planning Permission Status: |
| | 10. Planning Reference No.: |
| | 11. Site Substation Co-ordinates of Connection Point : Easting: Northing: <small>(For a project with the Maximum Generation Export Capacity greater than 0.2 MW the connection point will be at the customer's substation site. For all other projects please use the co-ordinates of the generator unit itself. The co-ordinates to be supplied are the Irish Grid Co-ordinates, e.g. E243,566 N050,334)</small> |
| | 12. Projected Start-Up Date: <small>(month and year)</small> |
| 13. Target Connection Date: <small>(month and year)</small> | |
| 14. Generation Maximum Generation Export Capacity (MEC) Required (MW): <small>(if extension then only the additional capacity)</small> | |
| 15. This project is an extension to an existing installation <input type="checkbox"/> Yes <input type="checkbox"/> No This project is an extension to a planned generator <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| If "yes" please provide the existing project name and the Meter Point Reference Number (MPRN): | |
| Generator Application Fees: | 16. Please note that a deposit of €7,000 (incl VAT @21%) which is part of the application fee or the full application fee if the total application fee amount is less (both non-refundable) must accompany the application. Please visit our website www.esb.ie/esbnetworks for more information. Details can be found in Generator Connections Section. Payment should be made by cheque, postal order or bank draft only payable to "ESB Networks Ltd." Applications submitted without this fee will be returned. Noted * <input type="checkbox"/> |
| Maps and Diagrams: | <p>Please provide both paper and electronic copies of the following :</p> <p>17. A 1:50,000 "Discovery Series" Ordnance Survey map, with the location of the facility clearly marked with an "X".</p> <p>18. A plan of the site (in an appropriate scale) of the proposed facility, indicating the proposed location of the connection point, generators, transformers, site buildings etc.</p> <p>19. A draft electrical single line diagram of the proposed facility detailing all significant items of plant and their values including:</p> <ul style="list-style-type: none"> -Relevant Voltage Levels -Interlocking -Earthing and Synchronising Arrangements -Relay Types -CT/VT ratios -Generator Transformer(s) -Power Factor Correction -Location of Alternative Connections (e.g. house load) -Network Connecting Transformer(s) (if applicable) <p>Please note: we will not be able to process your application without these maps/diagrams</p> |

| | |
|-----------------|---------------------------------------------|
| Site Load Data: | 20. Maximum Import Capacity Required (kVA): |
|-----------------|---------------------------------------------|

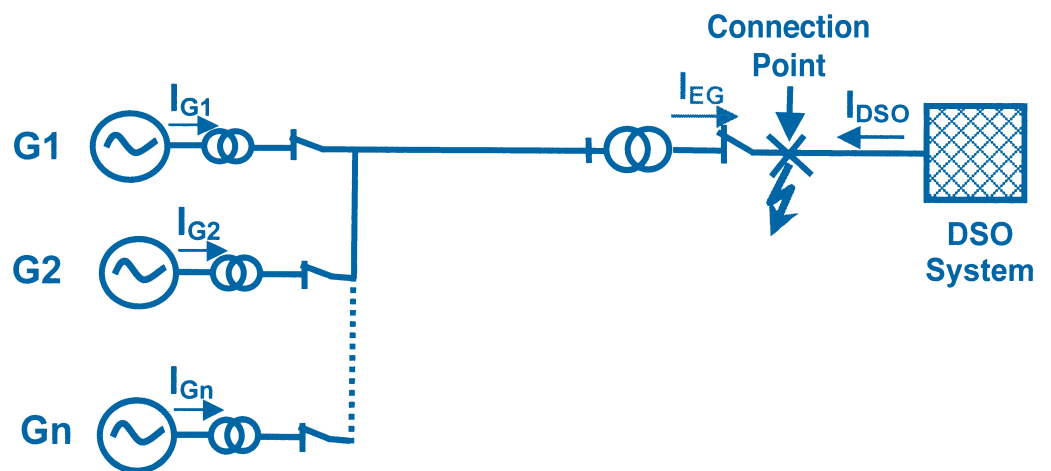
| | | | | |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|
| Technical Details | Unit and Plant capability data | | | |
| | 21. Number of generation units: | | | |
| | 22. <u>For thermal plant only</u> : please provide a functional block diagram of the main plant components, showing boilers, turbines, heat recovery boilers, alternators, any heat or steam supplies to other processes etc. indicating e.g. whether single shaft or separate shaft Please note: we will not be able to process your application without this. | | | |
| | | Unit 1 (or Type 1) | Unit 2 (or Type 2) | Unit 3 (or Type 3) |
| | 23. Type of Generation Plant: <small>[combined cycle combustion turbine, steam turbine, wind generator, etc]</small> | | | |
| | 24. Make/Version of Generator: | | | |
| | 25. Type of Generator: <small>[synchronous, asynchronous, converter connected, etc.]</small> | | | |
| | 26. Number of generators of type: | | | |
| | 27. Normal Maximum Continuous Generation Capacity (MW): | | | |
| | 28. Normal Maximum Continuous Export Capacity (MW): | | | |
| | 29. Maximum (Peaking) Generating Capacity (MW): | | | |
| | 30. Maximum (Peaking) Export Capacity (MW): | | | |
| | 31. Minimum Continuous Generating Capacity (MW): | | | |
| | 32. Minimum Continuous Export Capacity (MW): | | | |
| | 33. Generator Rated MVA: | | | |
| | 34. Normal Minimum Lagging Power Factor: | | | |
| | 35. Normal Minimum Leading Power Factor: <small>(Power Factor capabilities will be in accordance with The Distribution Code)</small> | | | |
| | 36. Generator Voltage (kV): | | | |
| | 37. Please provide details of the expected running regime: <small>(i.e. continuous/peak lopping/peak shaving)</small> | | | |
| | 38. Please provide a <u>calculation sheet</u> (in addition to the fault current figures requested in Table 1) showing the fault current available (r.m.s. value of the a.c. symmetrical component) from the Embedded Generation Facility due to a fault at the Connection Point when all generating sets are operating in parallel with the Electricity Distribution System. | | | |

Technical Details

| Short Circuit Current Contribution from Embedded Generation Facility IEG [kA] [RMS] | Fault types applied at Connection Point | | |
|-------------------------------------------------------------------------------------|-----------------------------------------|----------------|---------------------------|
| | Three-Phase | Phase-to-Phase | Single-Line to-Ground (*) |
| t = 0.00s | | | |
| t = 0.02s | | | |
| t = 0.04s | | | |
| t = 0.06s | | | |
| t = 0.08s | | | |
| t = 0.10s | | | |
| t = 0.12s | | | |
| t = 0.14s | | | |
| t = 0.16s | | | |
| t = 0.18s | | | |
| t = 0.20s | | | |
| t = 0.30s | | | |
| t = 0.40s | | | |
| t = 0.60s | | | |
| t = 0.90s | | | |
| t = 1.30s | | | |
| t = 1.70s | | | |
| t = 2.00s | | | |
| t = 3.00s | | | |

(*) Not necessary for connections at 10kV or 38kV.

Table 1



Legend:

I_{EG} : Fault Current Contribution from Embedded Generation Facility

I_{DSO} : Fault Current Contribution from DSO System

I_{Gn} : Fault Current Contribution from Individual Generation Unit

Figure 1 Embedded Generation Facility and Fault Current Contributions

Network Connection Transformer Data (if applicable):

There are many types of transformers. This application specifies two winding transformers. All impedances should be stated in % on transformer rated MVA and kV.

Please note that the connection voltage is determined by ESB Networks Ltd. in accordance with normal standards, as outlined in the Distribution Code, taking into account the particulars of each application. If the connection voltage is different to that assumed in the application, ESB Networks Ltd. will request new data corresponding to the new voltage level and the process will stand suspended until such reasonable data is obtained.

39. Please note that a full manufacturers test report may be required at a later stage.

Noted

40. State number of transformers proposed at the network connection point
(at the connection voltage level i.e. **not transformers associated with individual generators**):

41. Transformer Rated MVA:

42. Transformer Voltage Ratio HV/LV [kV]:

43. Transformer Winding Configuration:

44. Transformer positive sequence resistance (R_1 %)

45. Transformer positive sequence reactance (X_1 %)

46. Transformer zero sequence resistance (R_0 %)

47. Transformer zero sequence reactance (X_0 %)

48. Please provide details of Tap Changer. Nature of tap changer (off load/on load/ off circuit)

Tapped Voltage Winding _____kV + _____Steps - _____Steps _____% Step Size

Generator Transformer Data (i.e. transformers associated with individual generators):

| | Unit 1 (or Type 1) | Unit 2 (or Type 2) | Unit 3 (or Type 3) |
|--------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|
| 49. Generator Transformer Rated MVA: | | | |
| 50. Generator Transformer Voltage Ratio HV/LV kV: | | | |
| 51. Generator Transformer Winding Configuration: | | | |
| 52. Generator Transformer positive sequence resistance (R_1 %) | | | |
| 53. Generator Transformer positive sequence reactance (X_1 %) | | | |
| 54. Generator Transformer zero sequence resistance (R_0 %) | | | |
| 55. Generator Transformer zero sequence reactance (X_0 %) | | | |
| 56. Please provide details of Tap Changer. Nature of tap changer (off load/on load/ off circuit) | _____ | | |
| Tapped Voltage Winding _____kV + _____Steps - _____Steps _____% Step Size | | | |

| Generator Data for dynamic simulation: | | Unit 1 (or Type 1) | Unit 2 (or Type 2) | Unit 3 (or Type 3) |
|----------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|
| | 72. Generator Quadrature Axis Transient Reactance (unsaturated): (pu on machine MVA base) | | | |
| | 73. Generator Sub-transient Reactance (unsaturated): (pu on machine MVA base) | | | |
| | 74. Armature Leakage Reactance | | | |
| | 75. Generator Direct Axis Transient open circuit Time Constant: (pu on machine MVA base) | | | |
| | 76. Generator Direct Axis Subtransient open circuit Time Constant: (pu on machine MVA base) | | | |
| | 77. Generator Quadrature Axis Transient open circuit Time Constant: (pu on machine MVA base) | | | |
| | 78. Generator Quadrature Axis Subtransient open-circuit Time Constant: (pu on machine MVA base) | | | |
| | 79. Inertia of complete turbogenerator (MWsecs /MVA): (pu on machine MVA base) | | | |

END OF PART 1

PART 2 – ALL WIND FARMS ONLY

| | |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Independence of Contiguous Wind Farms | <p>A Wind Farm Power Station will be deemed to be unrelated to and independent of the other Wind Farm Power Stations already present in a Contiguous Wind Farm Site ("Independent Wind Farm Power Station") if:</p> <ul style="list-style-type: none"> the Applicant, where a body corporate, is not a related undertaking of another Wind Farm Power Station already present in the Contiguous Wind Farm Site or in respect of which an application for a Connection Agreement has been made to the DSO or the TSO; no person or body corporate holding 50% or more of the equity or voting rights in the Applicant is a person connected with any person or body corporate holding 50% or more of the equity or voting rights in another Wind Farm Power Station present in the Contiguous Wind Farm Site ("Connected Person"). |
| | 80. The Wind Farm Power Station is/will be independent from Contiguous Wind Farms |
| | <input type="checkbox"/> Yes <input type="checkbox"/> No |

| | | | | |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|
| Generator Data for Fault Studies (short circuit): | 81. Please provide the below specified currents or submit a short circuit current decrement curve (current vs time) representing your generators: | Type 1 | Type 2 | Type 3 |
| | I_k'' - Initial symmetrical short circuit current | | | |
| | I_p - Peak short circuit current | | | |
| | I_k - Steady state short circuit current | | | |

END OF PART 2

PART 3 – WIND FARMS WITH AN MEC LESS THAN OR EQUAL TO 5MW

| | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Wind Turbine Generators: | 82. State the wind turbine generator type: <small>(fixed speed stall regulated; fixed speed pitch regulated; fixed speed pitch regulated with variable rotor resistance; variable speed with doubly-fed induction generator; variable speed with synchronous generator and fully-rated converter or other specified type)</small> | |
| | Unit 1 (or Type 1) | |
| | Unit 2 (or Type 2) | |
| | Unit 3 (or Type 3) | |
| 83. Please provide the approved power curve (MW vs wind speed) Please note: we will not be able to process your application without this | | |

| | | | | |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|
| Dynamic Simulation Data: | In the connection offer process the dynamic impact of the wind farm on the transmission and distribution systems is examined. To be able to carry out dynamic simulation the applicant needs to submit the electrical data in questions 84-107 below. | | | |
| | If the requirements in questions 84-107 are being met by the provision of a dynamic model, then the applicant does not need to answer questions 84-107. All necessary parameters and data must accompany the model. The dynamic model should be available from the manufacturer and should be suitable for software program PSS/E and specific to the type of turbine to be installed. | | | |
| | Further, if the appropriate model has already been provided to EirGrid by the manufacturer then the same model does not need to be provided again as long as the applicant explicitly advises the following for the model in question: | | | |
| | 84. The version number of the model | | | |
| | 85. The sender (i.e. name & company) of the model: | | | |
| | 86. The (EirGrid) recipient of the model | | | |
| | 87. Specify by what method the model was sent (e.g. email, CD etc): | | | |
| | 88. The date the model was sent to EirGrid | | | |
| | Questions 89-110 are only to be filled in if the applicant is not submitting a dynamic model | | | |
| | Generator | Type 1 | Type 2 | Type 3 |
| | 89. Base voltage (kV) | | | |
| | 90. Base MVA | | | |
| | 91. Maximum power (MW) | | | |
| | 92. Minimum power (MW) | | | |
| | 93. Stator Resistance (pu)* | | | |
| 94. Stator Inductance (pu)* | | | | |
| 95. Magnetising Reactance (pu)* | | | | |

| Dynamic Simulation Data (Continued): | | Type 1 | Type 2 | Type 3 |
|--------------------------------------|------------------------------------------------------------|---------------------------------------------------|--------|--------|
| | | Frequency Protection Scheme (if it exists) | | |
| | 96. Rotor Resistance (pu)* | | | |
| | 97. Rotor Inductance (pu)* | | | |
| | 98. Inertia constant H of the entire drivetrain [MW.s/MVA] | | | |
| | Voltage protection scheme (if it exists) | | | |
| | 99. Under voltage limit (pu) | | | |
| | 100. Under voltage pick up time (seconds) | | | |
| | 101. Under voltage breaker time (seconds) | | | |
| | 102. Over voltage limit (pu) | | | |
| | 103. Over voltage pick up time (seconds) | | | |
| | 104. Over voltage breaker time (seconds) | | | |
| | 105. Under frequency limit (pu) | | | |
| | 106. Under frequency pick up time (seconds) | | | |
| | 107. Under frequency breaker time (seconds) | | | |
| | 108. Over frequency limit (pu) | | | |
| | 109. Over frequency pick up time (seconds) | | | |
| | 110. Over frequency breaker time (seconds) | | | |

END OF PART 3

**Internal Wind Farm
Network Structure and
Corresponding Data**
(Continued):

124. Please provide reactive power capability curve for the windfarm site as measured at the LV 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 Questions 125 to 130. Please note that the windfarm site must comply with the Distribution Code.

125. Number of inductive devices

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

_____ MVar in _____ steps

_____ MVar in _____ steps

_____ MVar in _____ steps

127. Number of capacitive devices

128. 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 in _____ steps

_____ MVar in _____ steps

_____ MVar in _____ steps

129. Please indicate the inductive Mvar contribution of the internal wind farm structure (i.e. 20kV cable)

130. Provide details of start-up regime. (Number of simultaneous starts, use of control system etc.)
TECHNICAL DETAILS REQUIRED

**Dynamic Simulation
Data:**

In the connection offer process the dynamic impact of the wind farm on the transmission and distribution systems is examined. To be able to carry out dynamic simulation the applicant needs to submit a dynamic model of their wind turbine.
This dynamic model should be available from the manufacturer.

131. Please submit a dynamic model and all data and parameter values required for the dynamic model. The dynamic model should be suitable for software program PSS/E and specific to the type of turbine to be installed. This should be submitted in electronic version.

Please note: we will not be able to process your application without this.

However, if the appropriate model has already been provided to EirGrid by the manufacturer then the same model does not need to be provided again as long as the applicant explicitly advises the following for the model in question:

132. The version number of the model:

133. The sender (i.e. name & company) of the model:

| | |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dynamic Simulation Data: (continued) | 134. The (EirGrid) recipient of the model: |
| | 135. The date the model was sent to EirGrid : |
| | 136. Specify by what method the model was sent (e.g. email, CD etc): |
| | 137. Please submit a written statement, preferably from your manufacturer, detailing confirmation of commitment to “meaningful engagement” to progress the level of modelling to an appropriate validated model. “Meaningful engagement” shall be interpreted as: <ul style="list-style-type: none">a. commitment on the part of the applicant to deal with and respond to issues raised by EirGrid with regard to the wind turbine generator and wind farm modelling in a timely manner andb. the applicant providing details of a specific contact(s) to deal with issues and queries relating to the performance and modelling of the wind turbine generator, the overall performance and modelling of the wind farm and the operation of the PSS/E dynamic model. <p>Please note: we will not be able to process your application without this.</p> |

END OF PART 4

PART 5 - ALL APPLICANTS

Landowner Consent Confirmation:

1. Mobile _____ 2. Landline _____

I (Name in Block Capitals) _____

Position _____

on Behalf of (Company Name in Block Capitals as specified in Applicant Details of this application form)

confirm that all necessary landowner consents are in place for the substation at the coordinates as specified in Site Details of this application form and the generation site.

Signed _____ Date _____

and witnessed

by Solicitor (Name in Block Capitals) _____

Date _____

Solicitors Address _____

Please note the application will be returned to the applicant if submitted without a **solicitor's stamp**.

Signature of Applicants:

I/We accept ESB Networks Ltd. General Conditions relating to the connection and all amendments, which ESB Networks Ltd. may make from time to time. I/We agree to grant ESB Networks Ltd. all necessary access to bring the network to the premises. I/We acknowledge that ESB Networks Ltd. shall be entitled to connect other customers to the network.

Signature of Applicant _____ **Date:** _____

If signing on behalf of a Partnership, Limited Company, or other Legal Entity, or as a duly Authorised Agent.

Full Name (BLOCKS): _____ Capacity: _____

[ESB Networks Ltd. may require the signatory to produce evidence of authority to bind the applicant by his/her signature].

Signature of Witness: _____ **Date:** _____

Address of Witness:

Note: ESB Networks Ltd. reserves the right to request additional data if necessary and the applicant agrees to provide such information promptly. The connecting party will be required at the relevant time to comply with Connection Agreement and the Distribution Code and provide information in accordance with these documents. ESB Networks Ltd. regrets it cannot accept responsibility for delays or mistakes if this application is completed incorrectly. If this application is incomplete the form will be returned to you.

END OF PART 5