



NETWORKS

# INFORMATION PACK FOR THE CONNECTION OF GENERATOR PROJECTS

Guidelines for Project Delivery  
Offer Acceptance to Market

Document No. DOC-040214-BQQ

**Date:** 04 February 2014

ESB Networks Dublin 2, Ireland.

**Phone** 1850 372 757 **email:** IPPDelivery@esb.ie **esbnetworks.ie**  **@ESBNetworks**

## About this document

This document is issued by ESB Networks as a guide to Developers of generation projects to give an understanding of the connection process for both Non-Contestable and Contestable Generator projects.

This document is intended as guidance only to help give an understanding of the process. It is not a contractual document in the terms applicable to any connection shall be subject to, and as set out in, an executed Connection Agreement between the Developer and ESBN.

This guidance note does not constitute legal advice and ESB Group accepts no liability for any loss or damage suffered as a result of use or reliance on the information in this document, whether as a result of any error or omission contained therein or otherwise.

## Purpose of this document

This document applies to generators who are requesting a Maximum Export Capacity (MEC) in excess of 200kW.

Abbreviations used:

Client – means the “client” for the purposes of the Safety, Health and Welfare at Work Act 2005 as amended, and any regulations issued thereunder;

Developer(s) – meaning Developer(s) of Wind Farm projects;

DSO – Distribution System Operator;

EGIP- Embedded Interface Generation Protection;

ESB –Electricity Supply Board, a statutory corporation established pursuant to the Electricity Supply Act 1927 as amended;

ESB Group – ESB and each of its subsidiary companies (where “subsidiary” shall have the meaning set out in the Companies Acts 1963 to 2013);

ESBN – Meaning ESB (acting through the ring-fenced part of its business designated for the purpose of the Distribution System Owner and Transmission System Owner businesses and known as ESB Networks), and/or ESB Networks Ltd (being the licensed Distribution System Operator) as appropriate.

NCC- Eirgrid - National Control Centre.

NDCC- Northern Distribution Control Centre.

RA – Risk Assessment.

RDT- Renewable Development Team.

SDCC – Southern Distribution Control Centre.

SLD – Single Line Diagram.

SPOC- Single Point of Contact.

TSO – Transmission System Operator.

**COPYRIGHT © ESB NETWORKS LIMITED**

ALL RIGHTS RESERVED, NO PART OF THIS WORK MAY BE MODIFIED OR REPRODUCED OR COPIES IN ANY FORM OR BY ANY MEANS - GRAPHIC, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, TAPING OR INFORMATION AND RETRIEVAL SYSTEM, OR USED FOR ANY PURPOSE OTHER THAN ITS DESIGNATED PURPOSE, WITHOUT THE WRITTEN PERMISSION OF ESB NETWORKS LIMITED.

# Contents

Contents.....	4
1.0. Connections to the Distribution System.....	6
2.0. Recognising and Minimising Project Risks.....	6
2.1 Safety Obligations.....	6
2.2 Outage Availability vs. Turbine Warranties.....	6
2.3 Planning and Legal Constraints.....	6
2.4 Technical Challenges .....	6
2.5 Pass Through Costs .....	6
2.6 Modifications .....	7
3.0 Getting Your Project Moving.....	7
3.1 Role of the Renewable Delivery Team .....	7
3.2. Contacting the RDT -Single Point of Contact .....	7
3.3. Project Kick Off Meeting .....	8
3.4 Project Program .....	8
3.5. Project Safety Management .....	8
4.0 Non Contested Works.....	8
4.1. Underground Cable .....	8
4.2. Overhead Line .....	7
4.3. MV/ HV Substation .....	7
4.4 Commissioning .....	7
4.5 Outages / Energisation .....	8
5.0. Contestable Projects.....	8
5.1 Functional (Project) Specifications .....	9
5.2. Non Contestable elements within a Contested Project. ....	9
5.3. Quality Control and Sign off of contestably built elements .....	9
5.4. Design.....	10
5.5. Material Supply .....	9
5.6. Site Construction .....	9
6.0. Transmission Connections .....	10
7.0 Staged payments.....	10
7.1 Single Stage Payment (where applicable).....	11
7.2 Financial Closure for ESNB Work .....	11
8.0.Asset Transfer and Operation .....	11
9.0 Metering and Telecoms .....	11
10.0 Operations & Protection.....	12
10.1 System Protection Settings .....	12
10.2 Dynamic Studies .....	12
10.3 Signal List .....	12



10.4 Operations Planning & Energisation.....	12
10.5 Records and Documentation .....	13
10.6 Re-enforcement works.....	13
11.0 Energisation to Market.....	13
11.1 Post Energisation Operations .....	14
11.2 Grid Code Compliance Testing .....	14
11.3 Post Project Review.....	14

## 1.0. Connections to the Distribution System

Offers are typically issued grouped around a hub HV station. Offers may be accepted by different developers within that group, at different times. Once an offer is accepted by a Developer, the group is assessed as to the feasibility of build out of the hub station. Once this is done and the original connection method is deemed optimal, each offer is formally approved by ESNB (Asset Management) and the project is then given to the Renewable Development Team (RDT) in ESNB, to progress the design and construction. This team also manage various aspects of the project ranging from technical, financial through to legal, and co-ordinate works with the various parties involved such as Generator Developer and EirGrid.

## 2.0. Recognising and Minimising Project Risks

ESBN fully acknowledges the importance of timely delivery of connections. In order to minimise the risk it is important that contact is made with ESNB at an early stage and that unrealistic commitments are not made by the Developer in relation to programme. Gate 3 projects are being developed in an environment where there is rigorous scrutiny and targets set in terms of achieving financial closure. There are technical challenges in the development of a Smart Network to cope with the level of wind penetration. There is an unprecedented level of Network and Grid development to meet EirGrid's Grid 25 programme which is happening in parallel. All of this means that there are some unique considerations that need to be taken into account in order to ensure that projects are not delayed. At a minimum, Developers need to take the following factors into account in terms of an overall Project Risk Assessment.

### 2.1 Safety Obligations

The Generator Developer as Client is reminded of the responsibility enshrined in safety legislation to allow the designer sufficient time to design the works.

### 2.2 Outage Availability

The connection of generation developments to the system is subject to outage availability. Please note that continuity of supply to existing customers and public safety takes precedence over any other work on the Electrical Networks. Transmission and Distribution Outages are planned on an annual basis. It is imperative that the Developer allows adequate time for the design and construction of the works, as missing an outage may delay the final energisation of the plant.

### 2.3 Planning and Legal Constraints

Pursuant to statute and licence obligations, ESNB is effectively obliged to construct and maintain electricity networks for connected customers. Restrictive planning permission conditions, such as time limited planning permission conditions, which could potentially prevent ESNB from meeting its obligations, are unacceptable. The energisation of works is subject to full compliance with the legal requirements set out or referred to in the Connection

### 2.4 Technical Challenges

Ireland is unique in terms of the level of wind farm development on an island. This poses particular and in some cases unique technical challenges. Notwithstanding these challenges each installation connecting to the Distribution system is required to comply, at a minimum, with the limits set out in the applicable Distribution Code. However more stringent limits may need to be applied by ESNB to an individual installation depending on the particular circumstances of the connection.

### 2.5 Pass Through Costs

ESBN recognises that Developers need as much certainty as possible in regard to Project costs and aims to contain costs, where possible. Proper project planning and quality control are key to cost control. ESNB will advise costs where known in advance. Some costs however, are difficult to assess in advance. These will be advised to the Developer once known.

## 2.6 Modifications

Modifications to the connection method need to be assessed as to their impact and may result in a revised offer. Site work may have to be suspended in certain situations, so it is important to ensure that any modification needs are determined prior to project start wherever possible.

## 3.0 Getting Your Project Moving

### 3.1 Role of the Renewable Delivery Team (RDT)

The RDT schedule and resource the project for connection of the Developer's project, and this includes stages of:

- a. Scope, design and costing of non-contestable works for the entire connection and for the non-contested elements of contestably built projects.
- b. Compile and issue a work package of functional specifications for contestable connections. This will include transmission specifications from EirGrid where applicable.
- c. Determine a delivery programme timeline based on ESBN construction activities, IPPs delivery programme, commissioning and outage scheduling.
- d. Obtain planning permission for ESBN installations.
- e. Prepare stage payment invoices to allow detailed design and construction proceed (2nd stage – 55%) and 3rd and/or 4th stage payments at energisation.
- f. Obtain ESBN financial approvals to proceed with design and construction resourcing and materials procurement. Depending on the cost of the project, Board approval may be required.
- g. Co-ordinate ESB and contractor resourcing for construction of the connection across ESB business units.
- h. Monitor project delivery, safety, programme, costs, etc. throughout construction, advising the developer of any changes or cost implications.
- i. Schedule Commissioning resources and outage planning based on ESBN construction works programme and Developers delivery programme.
- j. Engage through ESBN (Operations) for signal lists, Grid Code testing, energisation conditions.
- k. Close out the project with as built records and O&M documentation and post project review covering safety, technical and financial performance.
- l. Ensure legal & commercial conditions are progressed by Developer.

### 3.2. Contacting the RDT -Single Point of Contact

There are many aspects that need to be co-ordinated throughout the design and construction phases of the project. It is important therefore that all queries and requests be requested through a single point of contact to ensure response. A Generic email address exists for this purpose. This is actively monitored and tracked to help ensure that timely responses can be given. The email address for ESB Networks **IPP Delivery Team** is: [IPPDelivery@esb.ie](mailto:IPPDelivery@esb.ie). This is primarily a central address to ensure that all correspondence is tracked and responded to. Queries to [IPPDelivery@esb.ie](mailto:IPPDelivery@esb.ie) should reference the appropriate project, (including the relevant DG or TG reference as detailed in the offer), and section of works relating to the query i.e. cable, line or station etc.

A member of the RDT is nominated as the **Single Point of Contact- (SPOC)** - to interface with the Generator, co-ordinate the delivery of ESB construction work, and interface on the contestably constructed elements.

### 3.3. Project Kick Off Meeting

A Kick Off Meeting is arranged to develop a common understanding of the needs of all parties with a view to developing realistic best fit timelines for delivery of all aspects, taking the Developer's financial closure, construction timelines etc. into account.

### 3.4 Project Programme

This should set realistic timelines that can be achieved. A project programme must be completed and the dates agreed by both Generator and ESN usually after the initial kick off meeting with ESN. It is important that sufficient time is allowed for the works given the system outage requirements.

### 3.5. Project Safety Management

These projects are complex and there are many interfaces along the way and these can and do change during the course of the project. It is essential that these interfaces are clearly defined and understood by all and that all understand their roles and responsibilities accordingly.

The following items must be defined at project kick –off and included in the Safety File.

- Client
- PSDP (Project Supervisor Design Stage)
- PSCS (Project Supervisor Construction Stage)

## 4.0 Non Contested Works

### 4.1. Underground Cable

Cables are installed typically along roads. ESN nominate the route and will work in conjunction with the Developer to deliver the most favourable route. Where this involves deviating from the public roadway onto private property, it will be necessary to get wayleaves and easements. The costs are passed through to the Developer.

### 4.2. Overhead Line

ESN select the route, obtain planning permission (if required) and obtain legal entitlement to erect the line through the statutory wayleave process. ESN complete the detailed design and construct the lines.

### 4.3. MV/ HV Substation

The substation site at the wind farm is provided by the Developer and contracts for the transfer to ESN prior to energisation. Where an MV substation building is required at the Developers site, this is constructed to ESN Specification and provided free of charge by the Developer. Electrical installation work at this site and at the remote ESN station is designed and built by ESN.

### 4.4 Commissioning

ESN is responsible for the final commissioning of all ESN plant.

### 4.5 Outages / Energisation

These are planned significantly in advance and are subject to the limitations referred to in section 2.2 above.

## 5.0. Contestable Projects

The connection works can be built contestably by Developers. However portions of the works are not contestable such as the remote end elements. In cases where a group of Developers contest a project- a Lead Developer is required to develop the shared elements (eg. Hub station). The appointment of the Lead



Developer and the internal arrangements associated with this is a matter for the group of Developers involved. ESNB deals with the Lead Developer for the design build and warranties in accordance with the offer for the shared works, and the individual developers for their portion of the work. The Lead Developer is also responsible to arrange the transfers of that portion of the asset to ESNB

## 5.1 Functional (Project) Specifications

Functional Specifications are issued including:

- Site Specific
- Materials Specifications
- Quality Control Requirements.
- General Specification for HV stations, lines and cables
- Civil Specification
- Metering
- Telecoms
- Substation Materials Specs & Technical Schedule
- Cable materials and Functional Specifications
- OH Lines Materials & Functional Specifications
- Pre-Commissioning
- General Requirements
- Transmission Specifications

Note: The Functional Specifications are subject to ongoing development and revision. The issuing of the specifications should relate to the timing of the construction works and energisation date. They are ESNB property, project specific and are not to be used for any other purpose or project.

## 5.2. Non Contestable elements within a Contested Project.

The following elements of a project are non contestable.

- Revenue Metering
- Protection schemes
- Telecoms for SCADA systems

## 5.3. Quality Control and Sign off of contestably built elements

It is important that a Quality Control plan is rigorously implemented to ensure that the Developer's contestably built works are fully fit for purpose and to ensure that issues do not arise during commissioning, thereby necessitating costly remedial works and risking the loss of a previously assigned outage slot. Given the number of projects currently in development, ESNB may reassign commissioners to other projects and re program the works and outage to a later date.

Details are as indicated in the Quality Control Functional Specification. The Developer will be required to detail the following before work proceeds:

- A Project Risk Assessment (**RA**) – design and construction.
- Details of and basis for selection of Competent Designers, constructors, and Commissioners (to the extent that Developers commission their own contestably built works).
- A Quality Control Plan.
- Design Submission programme.
- A Construction Programme detailing when key RA elements are being worked on.
- Sign off on all works by the designer (on construction) and Developer on pre-commissioning prior to Commissioning.

## 5.4. Design

The design of contestable elements is the responsibility of the Developer.

- a. Design work is subject to design review by ESBN and EirGrid.
- b. This will be co-ordinated through a separate SPOC nominated at the initial kick off meeting.
- c. ESBN will comment on the design submission but will not necessarily check all calculations involved in the design .Please note that this is a review and not an approval.
- d. The quality of and timely delivery of design is paramount in terms of minimising project risk.
- e. Design review must be carried out prior to construction commencing.
- f. Issues raised are logged and tracked to closure before the start of Commissioning.

## 5.5. Material Supply

ESBN do not supply materials for contestably built elements. Material for contestably built elements is subject to compliance with the technical requirements of ESBN product and project Specifications. Some materials may require factory testing and verification, witnessed by ESBN.

## 5.6. Site Construction

The overall quality control is the duty of the Developer. ESBN will overview the application of the quality control system. However, ESBN will directly verify certain elements such as foundation and earth grid installation.

## 6.0. Transmission Works

- a. TSO Connections. The customer contact for is with EirGrid. The RDT link up with and co-ordinate the Network aspects of EirGrid connections via the EirGrid Project Management team.
- b. DSO Connections. The customer contact is directly with the RDT. This includes the Transmission elements of distribution projects.

## 7.0 Staged payments

Staged payments are based on the connection agreement and these vary. The detail is typically set out in Clause 5 of the Quotation Letter. The first stage payment is payable at offer acceptance stage. This payment

covers preliminary design and consent including Planning Permission. The project proceeds to detailed design, material procurement, construction and energisation, on payment of the second and subsequent stage payments.

**Note:** In case of offer based on 3 stage payments 100% of the capital contribution must be paid prior to Energisation

## 7.1 Single Stage Payment (where applicable)

For developments where the connection works involved are minimal, e.g. metering only, and no pass through costs are envisaged a single stage payment may be used to ensure connection is expedited. This will be payable at offer acceptance stage and will be outlined in the Connection Agreement.

## 7.2 Financial Closure for ESN Work

The connection of a specific Wind Farm may involve significant investment by ESN over and above that provided by the Developer. All investment in ESN is subject to financial approval and Governance procedures.

## 8.0. Asset Transfer and Operation

ESN operates and maintains the distribution system. In the case of contestably built distribution network, ESN commences operation and maintenance once [title transfers and?] the plant is energised. Contestably built elements (assets) are transferred to ESN, subject to legal and technical requirements being met. These aspects include:

- Health and Safety File.
- Substation Site Transfers and the associated access routes.
- Network line/ cable route wayleaves/ easements.
- Warranties, Handover Agreement.
- Planning Permission.
- Road Opening Licences.
- Environmental Compliance.

Early engagement in this is advisable

### The following points are of note:

1. A Developer may be granted authority by CER to serve statutory wayleaves directly on landowners for contestably built lines. Statutory wayleave notices must be correctly served. The rights obtained must be transferred to ESN by Deed.
2. ESN will not accept limitations to use of access routes or overhead line/underground cable capacity.

## 9.0 Metering and Telecoms

- The conditions and installation requirements for ESN metering are covered in the 'National Code of Practice for Customer Interface'.
- ESN meters are installed in the Generator's substation control room.

- The Connection Agreement specifies the type of communication to be provided for the ESBN metering
- Distribution & Transmission Remote Terminal Units (RTUs) may be required for control and protection interface with the Developer. These are needed to allow communication with both EirGrid's National Control Centre (NCC) and ESBN's Distribution Network Control Centre

## 10.0 Operations & Protection

### 10.1 System Protection Settings

These are project specific and need to be sought 12 weeks before energisation

- Non Contestable projects- RDT will compile the necessary information for non contestable elements of the work.
- Contestable Projects – The preparation of the protection settings request is the responsibility of the Developer, the required documentation will be made available with the functional specifications.
- The standard of protection (eg EGIP) will be advised to the Developer in the connection conditions.

### 10.2 Dynamic Studies

Dynamic Studies are undertaken by EirGrid to determine the effect of the proposed Generators on the system. These studies must be completed before energisation. The details listed below must be received at least 12 months before the expected energisation date. If the submitted turbine details are changed or the connection application was made on "assumed data", a modification will required 12 months ahead of energisation to allow for revised Dynamic Studies. Where these details are submitted late, this may delay energisation. In addition a modification fee will apply for late submissions

The following details are required.

- Connection Method, including connection type for Wind Farms
- Final Developer Installation SLD referencing generator output information
- Turbine details, Met masts, etc.

### 10.3 Signal List

ESBN and EirGrid need the following details in order to prepare the required SCADA signal 12 months in advance of the proposed energisation date:

- Connection Method, including connection type for Wind Farms
- Final Developer Installation SLD referencing generator output information
- Turbine details, Met masts, etc.

These details must be received at least 12 months before the expected energisation date.

### 10.4 Operations Planning & Energisation

The Developer is required to provide the following details to EirGrid's NCC for transmission connections, or SDCC, NDCC (as appropriate) or the local Customer Service organisation for distribution connections.

- SLD of the Developers installation
- Commissioning Documents

- Operators Details

The Developer is required to provide details of competent operators to ESBN to interface on operations switching. Difficulties contracting operators could result in protracted outages or delays in switching operations for the Renewable Generator.

ESBN Operations:

- Develop an energisation instruction to detail the overall operations sequence before energisation
- Agree an Operations Procedure with the Developer, setting out how the new plant is connected to the ESB system.
- Coordinate/plan a suitable power outage date to connect to local network.

## 10.5 Records and Documentation

A Safety File must be prepared and given to ESBN. This should be fully compliant with law and without limitation address aspects such as the following:

- As-builts (fully marked up post commissioning of the works) – Cable ducting and cable, Overhead line, ESB Networks substation adjacent to the Generator substation.
- Details of Utilities and services
- Emergency and General Access detail
- Operation training and site familiarization for ESB Networks staff
- Generator wind farm operators.
- Operation procedures and manuals
- First Aid
- Certs as required for the ESBN sub station installation.  
e.g. ETCI certificate for the LV services of the substation
- Windfarm Specific Hazards and risk mitigation measures.
- Site Security
- Contestable build Quality sign off, Handover Agreement, Warranties

## 10.6 Reinforcement works

Certain re-enforcements may be required on the existing transmission and distribution networks to facilitate the full maximum export capacity of the generation plant as follows:

1. Reinforcement works on the Distribution System
2. Reinforcement works on the Transmission System, but associated with Short Circuit Levels
3. Reinforcement Works on the Transmission System, associated with load flow known as Associated Transmission Works

Distribution reinforcements and transmission reinforcements for short circuit levels (1 & 2 above) must be completed prior to energisation. A Developer may apply to connect on a non-firm basis in advance or reinforcements associated with Load Flow (3 above). Firm Access details- where available - are provided with the Developer's Connection Agreement.

## 11.0 Post Energisation

## 11.1 Post Energisation Operations

- Transmission Connected Generators are managed by EirGrid's NCC.
- Distribution Connected 110kV and 38kV Developments will be managed via ESN Distribution Control Centres, (NDCC or SDCC).
- MV Connected Generators will be managed via the local Customer Services organisation.

## 11.2 Grid Code Compliance Testing

Grid code compliance and dispatch testing is required for developments after energisation. The following details are needed:

- Energisation dates
- Turbine Installation date.
- Turbine Commissioning

It is the Developer's responsibility to arrange through ESN appropriate times to complete Grid Code testing within 12 months of energisation to avoid delays in obtaining their Operational Certificate. In many cases achievement of the Operations certificate is a requirement prior to the release of the Capacity Bond.

## 11.3 Post Project Review

The connection of Generators to the network is a complex process. ESN is constantly trying to improve on the level of service given. Each project, once completed, is reviewed internally with all parties involved. ESN very much welcomes and invites inputs from Developers accordingly.