

Offer of Terms to Connect a Synchronous Condenser in Northern Ireland

Application Form for Connection
to the All-Island Transmission System

August 2022



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1 Introduction

System Operator for Northern Ireland (SONI) is the **Transmission System Operator** for Northern Ireland. It is authorised to participate in the transmission of electricity by means of a Transmission Licence issued by the Department for the Economy (the “Department”), under Article 10(1)(b) of the Electricity (Northern Ireland) Order 1992 (the “**Order**”). It is regulated by the Utility Regulator for Northern Ireland (the “**Authority**”).

Under its Transmission Licence SONI is responsible for the planning and operation the **Transmission System** in Northern Ireland in a safe, secure, efficient manner.

SONI is the only party in Northern Ireland entitled to offer terms to connect, or to modify an existing connection, to the **Transmission System** in line with Condition 25 of its Licence. Such terms are offered following receipt by SONI of an application containing all such information as SONI may reasonably require to prepare the terms of the offer.

SONI shall offer terms as soon as practicable and, except where the **Authority** consents to a longer period, not more than 3 months after receipt by SONI of a fully completed application containing all the information that SONI deems is required (including the relevant Application Fee). Please note that the user application date from which the 3 months period will apply can only be determined when all the information that SONI deems is required to formulate an offer for connection is provided with the application.

SONI has prepared a Transmission Connection Charging Methodology Statement (TCCMS) in line with Condition 30 of its Licence which sets out the basis upon which charges will be made for connection to the **Transmission System**. This TCCMS provides details of the relevant connection application fees which must accompany the connection application form. The TCCMS is available on SONI website at www.soni.ltd.uk.

Please note that it is preferable that the payment of the application fee is made via electronic fund transfer into the following account:

Bank Details:

| | | |
|-----------------------|------------------------|-----------------------------|
| Barclays Bank PLC | <u>Sort Code:</u> | 20-05-94 |
| Donegall House, | <u>Account Name:</u> | SONI Limited |
| Donegall Square North | <u>Account Number:</u> | 20956007 |
| Belfast | <u>Swift Code:</u> | BARC GB22 |
| BT1 5GB | <u>IBAN:</u> | GB67 BARC 2005 9420 9560 07 |

Cheques are also acceptable and should be made out to “SONI Limited”.

It is SONI’s responsibility to determine the transmission connection method. The selected method will be based on the overall Least Cost Technically Acceptable (LCTA) solution unless the applicant requests otherwise or SONI requires an alternative method for system reasons (see Section 6 of the TCCMS).

SONI shall not be obliged to offer to enter or to enter into any **Connection Agreement**:

- (a) if to do so would involve SONI:
 - i. in breach of its duties under Article 12 of the **Order**; or
 - ii. in breach of any regulations made under Article 32 of the **Order** or of any other enactment relating to safety or standards applicable in respect of the **Transmission System**; or
 - iii. in breach of the conditions of its Transmission Licence;
 - iv. in breach of the **Grid Code**; or
- (b) if the person making the application does not undertake to be bound by such parts of the **Grid Code** and to such extent as the **Authority** shall from time to time specify in directions issued to SONI for the purposes of Condition 25 of the Licence; or
- (c) if, when requested to do so by SONI, NIE and/or the Republic of Ireland System Operator does not offer to enter into an agreement for connection and/or modification works in respect of the **Connection Agreement** or Transmission Use of System Agreement in question.

All Users who have equipment such as Synchronous Condensers connected to the **Transmission System** (or all persons who are applying to have equipment such as Synchronous Condensers connected to the **Transmission System**) must comply with (or commit to comply with) the **Grid Code**¹. Data submitted pursuant to this application are deemed to be submitted under the **Grid Code**. The SONI Grid Code is available on SONI website at www.soni.ltd.uk.

This application form sets out the information which must be submitted to SONI in order for SONI to prepare and issue an offer to connect a Synchronous Condenser to the **Transmission System**.

Definitions of terms used in this form can be found in the Glossary and Definition section of the **Grid Code**.

¹ For the avoidance of doubt, a Synchronous Condenser, or any analogous term, is currently not specifically defined under the Grid Code as at the date of this application form publication. However, the applicant should familiarise yourself with all the relevant obligations that apply under Grid Code and/or other relevant licences or codes as may be applicable, and keep apprised of any future obligations that will apply under relevant licences or codes in relation to this type of technology. The Grid Code is available on the SONI website (<https://www.soni.ltd.uk>) please consider both the Grid Code and approved modifications.

The Planning Code within the **Grid Code** defines two sets of data which must be submitted to SONI:

Preliminary Project Planning Data

Preliminary Project Planning Data must be provided to SONI when requesting an offer to connect or requesting an offer to modify an existing connection to the **Transmission System**. This set of data is set out in this application form.²

Detailed Planning Data

Detailed Planning Data must be submitted to SONI within 28 days of accepting a connection offer from SONI. A pro forma setting out **Detailed Planning Data** will be supplied by SONI on request. It can also be found in the **Grid Code** as part of the **Data Registration Code (DRC)**.

SONI recommends that all potential connection applicants carefully review the **Grid Code** and satisfy themselves that they can meet all the requirements relevant to their type of Synchronous Condenser.

SONI shall ensure that any new network additions or modifications do not result in unacceptable or unstable conditions on the **Transmission System**. This will be done by undertaking a number of system studies replicating the Synchronous Condenser's proposed development and the effect it may have on the **Transmission System**.

Completed Application Forms should be sent to:

NI Connections
SONI Ltd
Castlereagh House
12 Manse Road
Belfast
BT6 9RT

If any additional information is required or if assistance is needed in completing this form please contact connections@soni.ltd.uk.

² It should be noted that under PC6.4.2 of the Grid Code, SONI may specifically request Detailed Planning Data at application stage to permit more detailed System or Other Transmission System studies for the purposes of formulating a connection offer. As such, SONI reserves the right to request additional data if necessary and the applicant should provide such information promptly during and post the connection offer process.

2 Synchronous Condenser Connection Application

1. We hereby apply for an offer of terms for connection to the **All-island Transmission Networks** in respect of:

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

(Please insert proposed name of facility or project³)

Consent to Release Information Form

2. We authorise the release of information provided pursuant to this application to NIE Networks should SONI consider it necessary and/or to progress any associated Construction Application as per the Transmission Interface Arrangements.

| | |
|---|--|
| Signed by: An appropriately authorised ⁴ person, acting for and on behalf of the applicant | |
| Print Name: | |
| Date: | |

³ 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.

⁴ As per Companies House <https://beta.companieshouse.gov.uk/>

Application Declaration Form

3. We undertake for the purposes of this application to be bound by the terms of the **Grid Code**⁵ in as far as it is applicable to the facility / project and we hereby confirm that we have read the **Grid Code** and understand the compliance requirements in the context of the above proposed facility / project which we are applying to connect to the **Transmission System**.

Further, to the best of our knowledge the facility / project shall operate in compliance with the terms of the **Grid Code**. Should we become aware that the proposed facility / project will be unable to comply with any provision of the **Grid Code**, then we shall report such non-compliance(s) to SONI and shall make all reasonable efforts as are required to remedy such non-compliances as soon as reasonably practicable.

| | |
|---|--|
| Signed by: An appropriately authorised ⁶ person, acting for and on behalf of the applicant | |
| Print Name: | |
| Date: | |

⁵ For the avoidance of doubt, a Synchronous Condenser, or any analogous term, is currently not specifically defined under the Grid Code as at the date of this application form publication. However, the applicant should familiarise yourself with all the relevant obligations that apply under Grid Code and/or other relevant licences or codes as may be applicable, and keep apprised of any future obligations that will apply under relevant licences or codes in relation to this type of technology. The Grid Code is available on the SONI website (<https://www.soni.ltd.uk>) please consider both the Grid Code and approved modifications.

⁶ As per Companies House <https://beta.companieshouse.gov.uk/>

3 Applicant's Details

Where the application is being submitted on behalf of a company please complete Part A only. Otherwise, please complete Part B.

Part A

| | |
|-------------------------------------|--|
| Company Name: | |
| Company Registered Address: | |
| Company Registration No: | |
| Contact within company: | |
| Address: (if different to above) | |
| Tel No: | |
| Email address: | |
| Fax No: | |

Part B

| | |
|--------------------|--|
| Name of Applicant: | |
| Address: | |
| Tel No: | |
| Email address: | |
| Fax No: | |

4 Prerequisites

| | |
|--|--|
| Has the applicant signed the Application Declaration (in part 2 of this form)? | Yes / No * |
| If assumed data will need to be used, has the Applicant provided the relevant declaration on company letterhead (form of letter available from SONI)? | Yes / No * / NA |
| Does the applicant wish to pay a fixed price connection application fee or an outturn cost connection application fee? (See Section 8 of the TCCMS) | Fixed Application Fee / Outturn Application Fee * |
| A connection application fee is required. Has the relevant application fee been submitted with this application? (See Table 1 of the TCCMS or the Interpretation in the context of System Service Only Connections) | Yes / No * |

* *delete as appropriate*

5 General Details of the Synchronous Condenser Facility/Project

| | | |
|---|--|-------------------------|
| Proposed Project Name: | | |
| Address/Location of Site: | | |
| Grid co-ordinates of the electrical Connection Point (Irish Grid Reference or IGR) | Easting (6 digit IGR): | Northing (6 digit IGR): |
| Site location plan enclosed? | <p>Yes / No *</p> <p>Please provide a 1:50,000 (approx.) Ordnance Survey map with the location of the facility / project clearly marked. If it is intended that facility / project will be spread geographically over a number of different sites, please also indicate each site on this site location plan, by labelling each site).</p> | |
| Site layout plan enclosed? | <p>Yes / No *</p> <p>Please provide an Ordnance Survey map on an appropriate scale (e.g. 1:10,000) with the electrical connection point clearly marked with an "X". All synchronous condenser units and other infrastructure should be shown and labelled.</p> | |
| Target Connection Date: | | |
| Have any connection feasibility studies for this facility / project already been carried out by SONI? | Yes / No * | |
| If so, date(s) of study: | | |
| Planning or other Relevant Consent Reference Number? | | |

* delete as appropriate

6 Preliminary Project Planning Data (Connection Site and User System Data)

| | | |
|---|--------------------|----------------|
| User System Layout Has a Single Line Diagram (SLD) enclosed? Please provide a SLD of existing and proposed arrangements of main connections and primary distribution systems showing equipment ratings and if available number and nomenclature. This should include: <ul style="list-style-type: none"> • Busbar layouts • Electrical circuitry (i.e. lines, cables, transformers, switchgear, etc.) • Phasing arrangements • Earthing arrangements • Switching facilities and interlocking arrangements • Operating voltages • Numbering and nomenclature | Yes / No * | |
| | | |
| Total number of synchronous condenser units: | | |
| Details for the total number of synchronous condenser units: Maximum export reactive power at the <u>Connection Point</u>: Maximum import reactive power at the <u>Connection Point</u>: | +MVar -MVar | |
| Maximum auxiliary demand (please include the requirements for the entire connection site here – individual synchronous condenser unit data to be provide in Sections 7 or 8 below as relevant): Active: Reactive: | | MW MVar |
| Operating regime of units not subject to Central Dispatch (e.g. continuous, peak lopping, intermittent): | | |
| Maximum 3-phase short circuit current infeed into the Transmission System : | | kA |
| Minimum zero sequence impedance of the applicant's system at the Connection Point with the Transmission System: | | % on 100 |
| Details of any transformers proposed to be connected on customer side of the Connection Point (if applicable) should be provided in Tables 9A and/or 9B | | |

* delete as appropriate

7 Synchronous Condenser Preliminary Project Planning Data

Please complete the tables in this section.

(Please continue on separate sheet if necessary).

Table 7A. Synchronous condenser data

| | Synchronous condenser data |
|---|----------------------------|
| Proposed for site(s) if applicable: | |
| Synchronous Condenser Terminal voltage: | kV |
| Reactive Power Import/Export at the <u>machine terminals</u> | +MVar -MVar |
| Starting Method (e.g. electric motor, static frequency converter) | |
| Maximum auxiliary demand at Connection Point including losses: | |
| Active: | MW |
| Reactive: | MVar |

* delete as appropriate

Table 7B. Synchronous Condenser data

| | | |
|--|--|-----------------------------|
| Inertia constant: | | MWs/MVA |
| Short circuit ratio: | | |
| Direct axis transient reactance: | | % on MVA |
| Direct axis sub-transient reactance: | | % on MVA |
| Positive sequence resistance: | | % on MVA |
| Positive sequence reactance: | | % on MVA |
| Negative sequence resistance: | | % on MVA |
| Negative sequence reactance: | | % on MVA |
| Zero sequence resistance: | | % on MVA |
| Zero sequence reactance: | | % on MVA |
| Generating transformer Rating: Positive sequence reactance: Tap change range: | | MVA % on MVA +% to -% |

8 Additional / Alternative Data

SONI may reasonably require additional data from **Users** to represent correctly the performance of **Plant** and **Apparatus** on the **Transmission System** where the present data submissions would, in the SONI's reasonable opinion, prove insufficient for the purpose of producing meaningful system studies for the relevant parties.

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

Please note that the connection voltage is determined by SONI 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 the Application, SONI will request new data corresponding to the new voltage level.

If the full transformer details are not available or provided at the time of application SONI can assume values based on the expected transformer size in MVA provided by the applicant. Please note that these assumptions used by SONI, in the absence of the details being provided by the applicant, would be at the applicants risk and should these materially differ from what the applicant does install that this may result in further changes to the terms and conditions (including applicable charges) under the connection offer.

It should be noted that the Applicant will have to provide the information requested in this section and a full manufactures test report for the installed transformer prior to energisation.

Table 8A. Transformer Data – Two Winding Transformers (if applicable)

| | Transformer Type 1 |
|---|--------------------|
| Rating of Transformer (MVA) | |
| Transformer voltage ratio HV/ LV (kV) | |
| Transformer positive sequence resistance ($R_1\%$) | |
| Transformer positive sequence reactance ($X_1\%$) | |
| Transformer zero sequence resistance ($R_0\%$) | |
| Transformer zero sequence reactance ($X_0\%$) | |
| Transformer vector group | |
| Please provide details of tap changer (Nature of tap changer off load/on load/off circuit) | kV |
| | + Steps |
| | - Steps |
| | % Step Size |

Table 8B. Transformer Data – Three Winding Transformers (if applicable)

Transformer Type 1 (if applicable)

| | HV Winding | LV1 Winding | LV2 Winding |
|--------------------------|------------|-------------|-------------|
| Transformer rated (MVA) | | | |
| Transformer rated (kV) | | | |
| Transformer vector group | | | |

With regards to the transformer(s), clearly specify the MVA base which the measured impedances below are related to:

| | Transformer |
|---|-------------|
| Transformer positive sequence resistance ($R_{1HL1}\%$) between HV/LV ₁ : | |
| Transformer positive sequence reactance ($X_{1HL1}\%$) between HV/LV ₁ : | |
| Transformer zero sequence resistance ($R_{0HL1}\%$) between HV/LV ₁ : | |
| Transformer zero sequence reactance ($X_{0HL1}\%$) between HV/LV ₁ : | |
| Transformer positive sequence resistance ($R_{1HL2}\%$) between HV/LV ₂ : | |
| Transformer positive sequence reactance ($X_{1HL2}\%$) between HV/LV ₂ : | |
| Transformer zero sequence resistance ($R_{0HL2}\%$) between HV/LV ₂ : | |
| Transformer zero sequence reactance ($X_{0HL2}\%$) between HV/LV ₂ : | |
| Transformer positive sequence resistance ($R_{1L1L2}\%$) between LV ₁ /LV ₂ : | |
| Transformer positive sequence reactance ($X_{1L1L2}\%$) between LV ₁ /LV ₂ : | |
| Transformer zero sequence resistance ($R_{0L1L2}\%$) between LV ₁ /LV ₂ : | |
| Transformer zero sequence reactance ($X_{0L1L2}\%$) between LV ₁ /LV ₂ : | |
| Transformer positive sequence resistance ($R_{1HL1L2}\%$) between HV/(LV ₁ +LV ₂): | |
| Transformer positive sequence reactance ($X_{1HL1L2}\%$) between HV/(LV ₁ +LV ₂): | |

Table 8C. Additional Reactive Power Devices (if applicable)

Please provide details of any reactive devices or power factor correction devices on the MV side of the grid connected transformer on site.

| | |
|--|--|
| Number of inductive devices: | |
| Mvar capability of each device: | Please attached details of each separately |
| If device has more than one step: | |
| • No. of steps | |
| • Mvar per step | |
| | |
| Number of capacitive devices: | |
| Mvar capability of each device: | Please attached details of each separately |
| If device has more than one step: | |
| • No. of steps | |
| • Mvar per step | |
| | |
| Will shunt compensation as harmonic filters be utilised on site? | Yes / No * |

* delete as appropriate