# CONSULTATION ON NIE NETWORKS PROVIDING DISTRIBUTION GENERATION EXPORT OFFERS TO APPLICANTS LESS THAN 5MW

NIE Networks Connections
31/03/2023

# Contents

# EXECUTIVE SUMMARY

This consultation paper seeks to gain feedback from stakeholders on NIE Networks proposal to amend existing distribution connection offer policy for exporting generators with a registered capacity less than 5MW. For the avoidance of doubt generators less than 5MW refers to G99/NI Small Scale Generation (SSG) offer with export capability (>3.68kW single phase, >11.04kW 3 phase up to 5MW). SSG connects exclusively to the distribution system, while larger generators may connect to either the distribution system or the transmission system. Generation connections to the distribution system are subject to the Distribution Generation Application and Offer Process Statement (DGAOP)[1].

It is intended that the SSG connections process contained within the Alternative Connection Application and Offer Process (ACAOP),[2] which was developed through consultation with industry and stakeholders and implemented in 2016, will cease to apply.

Generation connected to the distribution system under 5MW is deemed to be uncontrollable in normal system operation as it cannot be curtailed or constrained by the Transmission System Operator. As the Transmission System Operator (TSO) for Northern Ireland, SONI is required to ensure system operational balance between demand and generation at all times. With increased levels of uncontrollable generation, there is a risk of increasing the likelihood of generation exceeding system demand in a specific scenario. Recently, SONI informed NIE Networks that it is no longer possible to ensure security of supply during this scenario due to the high levels of uncontrollable generation under 5MW connected to the distribution system.

NIE Networks and SONI recognise the important role SSG plays in achieving the wider objectives of the Energy Strategy for Northern Ireland[3], and as a result of this NIE Networks is considering an update to SSG Connection Offers and Agreements as an alternative to issuing refusals to connect. NIE Networks and SONI are developing actions to manage and mitigate against further system security risk, whilst also enabling generation under 5MW export offers to be issued.

Consequently, two workstreams being progressed, in system operations and in connections, to meet this objective. They are detailed below:

1. System Operations – NIE Networks and SONI are collaborating to investigate and implement operational solutions to the concerns around system security being at risk with erosion of minimum load due to uncontrollable generation.
2. Connections – This consultation looks to implement an amendment to SSG Distribution Connection Offers and Agreements to ensure offers can be issued for generators under 5MW with export.

Since 2019, increased controllability requirements are already in place for SSG as part of COMMISSION REGULATION (EU) No 2016/631 Requirements for Generators (RfG)[4]. The RfG updates were incorporated into the NIE Networks Distribution Code and associated Engineering Recommendation G99/NI. The amendment NIE Networks is proposing is to clause 6 of SSG Distribution Connection Offer and Agreements that details control requirements implemented as part of RfG. The proposed updated clause is to include wording that permits control requirements to be utilised for system security reasons. This requirement would only be enacted in emergency circumstances when the system is at risk.

These requirements are not intended to apply to those generators who already hold a Connection Agreement or who have accepted a Connection Offer.

**It is important to note that without the proposed update to SSG Distribution Connection Offers and Agreements NIE Networks will remain in the position that it cannot issue SSG export Distribution Connection Offers as per SONI's recommendation on the grounds of system security concerns.**

[1] https://www.nienetworks.co.uk/documents/connections/distribution-application-offer-statement-jan-2022.aspx
[2] https://www.nienetworks.co.uk/documents/generation/alternative-connection-application-and-offer-p-(1).aspx
[3] https://www.economy-ni.gov.uk/publications/energy-strategy-path-net-zero-energy
[4] https://www.entsoe.eu/network_codes/rfg/

In this paper, NIE Networks is seeking feedback on its proposals.

## How to Respond

NIE Networks invites interested parties to respond to this consultation by responding to the three questions listed in section four of this paper.

Responses should be sent electronically to connectiondesign@nienetworks.co.uk by 5 pm on Friday 12th May 2023. The responses will be analysed by NIE Networks and SONI and will be used in the development of a decision paper that will publish the result of this consultation and new connection process go live date.

## Stakeholder Engagement Zoom Event

NIE Networks invites interested parties to attend a Zoom event where a short presentation will take place, followed by the opportunity to ask questions. This Zoom event will take place on the 26th of April 2023. If you wish to attend, please mail connectiondesign@nienetworks.co.uk for joining details. Participants are encouraged to submit questions ahead of the event by sending them to connectiondesign@nienetworks.co.uk.

# 1. INTRODUCTION

The Northern Ireland energy system is at a transformational juncture. In December 2021, the Department for the Economy published its Energy Strategy for Northern Ireland, setting a long-term vision of 'net zero carbon and affordable energy' by 2050. Subsequently, the Climate Change Act[5] was passed by the Northern Ireland Assembly in 2022. The Climate Change Act makes a legal commitment to net zero carbon emissions by 2050. It also commits to 80% of electricity consumption coming from renewable sources by 2030.

## 1.1 Background to the Network

NIE Networks and SONI have connected and accommodated 1,774MW renewable generation capacity,[6] to the Northern Ireland grid to date, which in turn accounted for 51% of electricity consumed in Northern Ireland coming from renewable energy in the 12 months ending December 2022. 322MW of the generation connected is made up of SSG projects, while 97MW is made up of microgeneration projects. Work is ongoing in planning a number of generation projects which will bring the total amount of generation connected to the grid in the next few years to approx. 2,267MW, 380MW of this are SSG projects. Around 76% of these projects are for onshore wind, 15% for solar, 8% for biomass and 1% from other renewables. The generation donuts below highlight the figures.

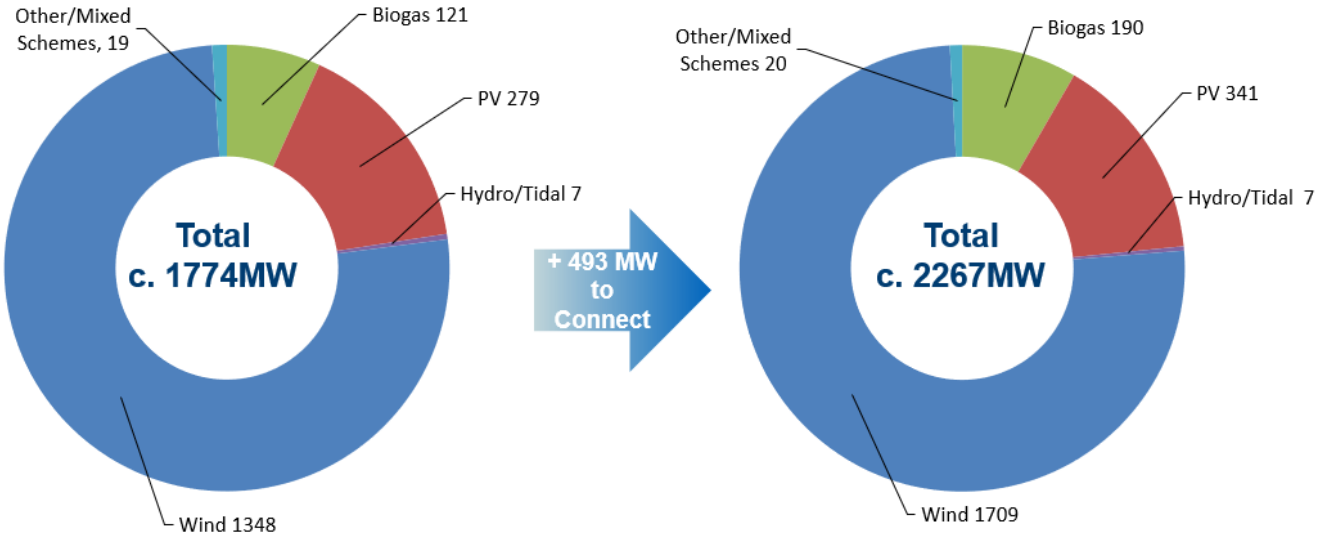


FIGURE 1 - NI CONNECTED AND COMMITTED RENEWABLE GENERATION TECHNOLOGY MIX

NIE Networks and SONI have continued to play a critical role in providing connections for renewable energy sources, including showing a willingness to embrace new technologies, with the energisation of four major innovative battery storage projects in Mullavilly, Drumkee, Kells and Castlereagh. The sites each provide 50MW of capacity making them the largest of their kind in Northern Ireland and a significant contribution to helping Northern Ireland reach a decarbonised future. In total there is a further 36MW of battery storage committed to connect to the distribution network[5].

It is becoming increasingly common for generation connections to be installed for the purposes of self-consumption, known as zero export connections. Zero export connections remain viable at present and we

[5] https://www.legislation.gov.uk/nia/2022/31/contents/enacted
[6] Source: NIE Networks Generation Data

engage with customers regularly on this, with connection offers being issued frequently. (c. 10.0MW of offers issued to date this year, 9.4MW in 2022).

The renewable future of Northern Ireland hinges on good partnership working and collaboration, not only with other industry experts but with our customers and stakeholders too. NIE Networks and SONI are separate companies, with different responsibilities, who work in partnership. NIE Networks and SONI recognise the need to support industry in meeting the RES-E target while also considering efficient network utilisation.

## 1.2 Background to the Current Connection Process

The ACAOP was implemented in June 2016 following consultation with industry. ACAOP Phase 1 was identified as the best approach to efficiently manage the influx of over 1600 MW of generation applications to connect to the distribution system that occurred following the removal of planning permission as a prerequisite to apply for connection applications to the distribution system. The ACAOP has been successful in helping to facilitate large volumes of renewable generation to the network and assist in Northern Ireland achieving ambitious clean energy targets.

Technical, economic and operational impact analysis completed at the time of the ACAOP concluded that no immediate restriction was to be placed on uncontrollable SSG, thereby enabling further SSG connections, within the guidelines presented in the ACAOP document. However, it was also noted that continued erosion of system load was already a challenge for SONI. The power system requires sufficient synchronous generation capacity to both balance demand requirements and ensure system frequency and transient stability are maintained. In recent years, mainly due to increases in SSG and microgeneration connected to the distribution system, demand has been reducing. In the ACAOP, SONI concluded that it had the tools to manage the Transmission System during times of low system demand by implementing operational measures to mitigate the possibility of demand deficits in Northern Ireland which could otherwise put the system at risk.

Additionally, within the ACAOP, SONI made clear that they would continue to monitor and review the system security situation and the impact of the implementation of mitigation measures on an ongoing basis.

In January 2018 NIE Networks published a decision paper on an update to the DGAOP which provided detail on the submission requirements and process for generation connection to the distribution system for generators 5MW and above. Following this decision paper, an updated DGAOP containing the 'Distribution Generation Connection Offers with Non-Firm Market Access' connections process went live on Friday 14th of January 2022. This allows NIE Networks to issue Distribution Generation Connection Offers which have 'Non-Firm Market Access' attached to them, where appropriate. It is only available for generator applications 5MW and above. Generators 5MW or above are controllable, which means they can be curtailed or constrained by SONI.

Aside from generators with Non-Firm Market Access, there are currently an additional three available routes to connect to the distribution network for renewable generation in NI;

1. G98/NI Microgeneration up to 3.68kW single phase and 11.04kW three phase[7]
2. G99/NI Fast Track Process allows 16 Amps per phase of generation to be connected in parallel with 16 Amps per phase of storage connected via an inverter, with an export limiting device that restricts the output to the network to 16 Amps per phase[8]
3. G99/NI Zero Export / Over-install Process requires only that distribution capacity is available. For customers seeking to install more generation at their site than their Maximum Export Capacity (MEC) allows, the Total Installed Capacity (TIC) cannot be greater than 120% of MEC. NIE Networks and SONI intend to consult on the removal of this 120% MEC limit early in 2023 which will allow greater access to the network for customers seeking to over-install generation at their premises.

[7] https://www.nienetworks.co.uk/connections/generation-connections/micro-scale
[8] https://www.nienetworks.co.uk/connections/generation-connections/integrated-micro-generation-storage-application

# 2. CURRENT SSG CONNECTIONS PROCESS

Under the current process, there are 4 criteria that all need to be met in order for NIE Networks to issue a G99/NI Small Scale Generation (SSG) offer with export:

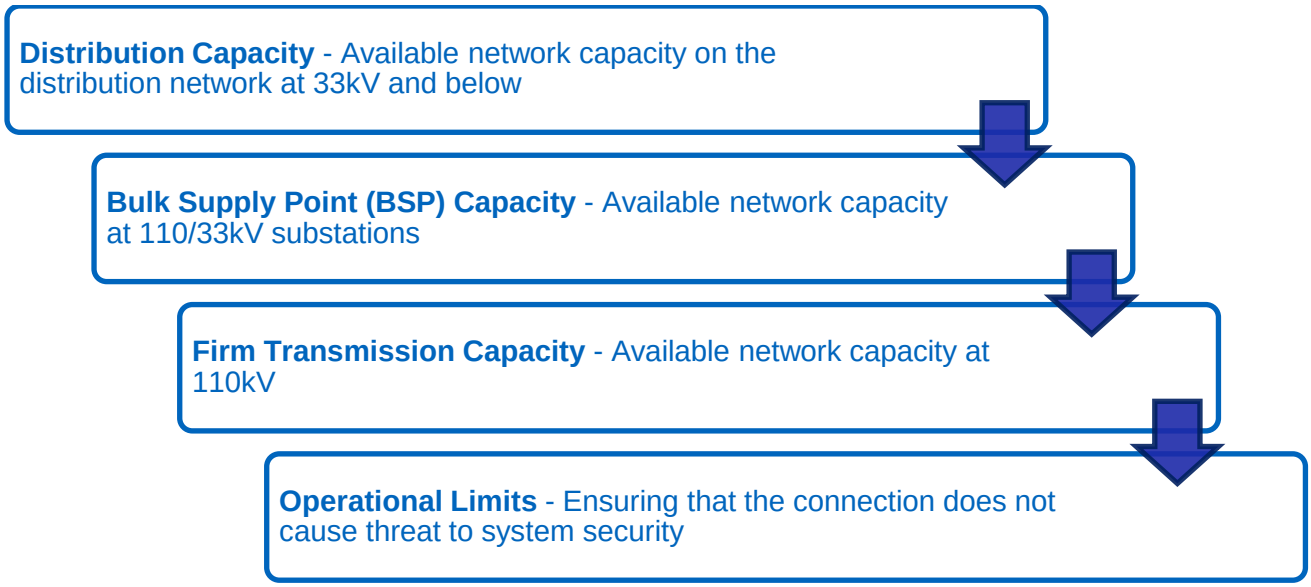


FIGURE 2 – CURRENT SSG CONNECTIONS ASSESSMENT CRITERIA

For each connection application NIE Networks must seek confirmation from SONI to ensure:

- BSP capacity
- Firm transmission capacity
- The connection doesn't cause the system to exceed operation limits of system security

With increased penetration of uncontrollable SSG and the continued increase in domestic micro-generation, maintaining a stable and secure power system has become more challenging. SONI has confirmed that there is no firm transmission capacity remaining in NI under the terms of the ACAOP and the operational limit has been reached. This means that under the criteria of the current connection policy, the ACAOP, NIE Networks can no longer issue any further SSG export offers for generation <5MW.

## 2.1 SONI System Operations

SONI has confirmed that the level of uncontrollable generation that is connected in Northern Ireland has reached a point where it is no longer possible to ensure security of supply during a specific set of circumstances. These circumstances are as follows:

- at times of minimum system demand;
- high levels of wind on the system; and
- the loss of the Moyle Interconnector or the North South Interconnector, when there is an outage of the other.

This is due to operational constraints on the Northern Ireland system. SONI review and publish operational constraints[9] on a weekly basis. The Northern Ireland system must be operated such that it is secure for the loss of any item of plant on the system. In the above scenario, SONI is unable to operate within operational security

[9] https://www.soni.ltd.uk/customer-and-industry/general-customer-information/operational-constraints/

standards[10]. To ensure the transient and frequency stability of the Northern Ireland system, three large machines must be online at any time. In a minimum demand scenario, the sum of the minimum stable generation output of three large machines, coupled with the output of uncontrollable generation could result in a minimum demand level in Northern Ireland that cannot be securely met, should Northern Ireland be islanded from Ireland or GB. This scenario could result in a generation and demand imbalance and system instability.

SONI work in close collaboration with EirGrid, National Grid, and Mutual Energy (owner of the Moyle Interconnector) to minimise the risk of this scenario occurring and it is not a scenario that is expected to be experienced regularly. The potential for Northern Ireland to be islanded from GB and ROI will be further reduced when the proposed second North South interconnector is constructed.

SONI performed analysis on the possibility of Northern Ireland system generation exceeding the system demand, the increasing occurrence of low demand scenarios and its correlation with factors such as time of day and wind levels. Table 1 below outlines system minimum conditions as per the operational constraints on the system:

### TABLE 1- SYSTEM MINIMUM OPERATING CONDITIONS

| Source of Generation | MW Requirement |
|---|---|
| Lowest possible combination of three min gen units (this combination is subject to unit availability) | 323 MW |
| Negative reserve | 50 MW requirement |
| Large scale controllable RES | All dispatched down to 0 MW |
| *Subtotal* | 373 MW |

Taking this value of 373MW for system minimum generation and including large scale uncontrollable generation, SONI found the minimum generation on the system may exceed the minimum demand when in the contingency scenario.

### TABLE 2 - MINIMUM DEMAND AND GENERATION COMPARISON

| ***Subtotal*** | **Total (MW)** |
|---|---|
| Minimum system generation with operational rules in place | 373 MW |
| Large scale uncontrollable generation | 79 MW |
| Total generation | 452 MW |
| Lowest minimum demand to date | 417 MW |

For clarification, the lowest minimum demand to date (417MW) is the lowest demand seen by SONI operators when balancing the system. This low level of demand is a result of the cumulative volumes of SSG meeting local demand and reducing the demand seen at transmission system level. Action to manage this risk and to mitigate against further risk, whilst enabling NIE Networks to issue SSG export Distribution Connection Offers and Agreements, must be agreed and implemented.

[10] https://www.soni.ltd.uk/media/documents/Operations/SONI%20Operating%20Security%20Standards%20v1.pdf

# 3. PROPOSAL FOR FUTURE CONNECTIONS PROCESS

Both NIE Networks and SONI agree that a new SSG G99/NI Distribution Connection Offer process is required to determine if there is system capacity to allow export Distribution Connection Offers and Agreements to be issued.

The ACAOP sought to treat both Large Scale Generation (LSG) and SSG consistently and this included the criteria for both requiring a need for firm transmission capacity. An updated process for LSG has been in place since the 14th of January 2022 as part of the DGAOP. This process included the removal of the requirement for firm transmission capacity for LSG connections. NIE Networks and SONI propose this criteria for SSG applicants would create parity with LSG connections. Steps would still be required to address the operational risk to the system and these are discussed in more detail below.

As future connection policy will be governed by the DGAOP it is intended that the SSG connections process contained within the Alternative Connection Application and Offer Process (ACAOP),[11] which was developed through consultation with industry and stakeholders and implemented in 2016, will cease to apply.

NIE Networks and SONI are proposing actions to manage and mitigate against further system security risk, whilst also enabling SSG offers to be issued. There are therefore two workstreams where work is ongoing, in system operations and connections to meet this objective. They are detailed below:

1. System Operations – NIE Networks and SONI are collaborating to investigate and implement operational solutions to the concerns around system security being at risk with erosion of minimum load due to uncontrollable generation. The connections changes proposed through this consultation are not dependent on the system operations work programme.
2. Connections – This consultation process looks to ensure Distribution Connection Offers and Agreements can be issued for exporting SSG. More detail on the proposed connections process is outlined below.

## 3.1 Proposed Connections Process

NIE Networks is proposing to include wording within Distribution Connection Offers and Connection Agreements for generators with a registered capacity less than 5MW that entitles NIE Networks to instruct the generator to cease or reduce parallel operation for system security reasons as instructed by SONI to NIE Networks. This amendment would be to clause 6 of the Distribution Connection Offer and Connection Agreement that details control requirements implemented as part of RfG. The requirement would only be enacted in emergency situations. This would be equivalent to a high impact, low probability (HILP) load shedding event, and thus is not expected to occur regularly. These requirements are not intended to apply to those generators who already hold a Connection Agreement or who have accepted a Connection Offer. This controllability clause would be included in all SSG Distribution Connection Offers and Connection Agreements going forward and would only apply from a date set in the future.

Since 2019, increased controllability requirements are already in place for SSG as part of COMMISSION REGULATION (EU) No 2016/631 Requirements for Generators (RfG)[12]. The RfG updates were incorporated into the NIE Networks Distribution Code and Engineering Recommendation G99/NI. This means that any SSG that has connected since the introduction of RfG (27th April 2019) will have the capability to be controlled and that SSG connecting going forward will have the capability to be controlled. The controllability clause currently included in SSG Distribution Connection Offers relative to the RfG updates is clause 6, and reads:

*Where the operating mode of any generating unit or storage unit referred to in Schedule 1, Table 3 or 4 as relevant, is described as "Long Term Parallel" or "Infrequent Short-Term Parallel" this shall be construed in accordance with Engineering Recommendation G99/NI. Where the operating mode of the Generator's Installation is described as Infrequent Short-Term Parallel NIE Networks shall be entitled to instruct the*

[11] https://www.nienetworks.co.uk/documents/generation/alternative-connection-application-and-offer-p-(1).aspx
[12] https://www.entsoe.eu/network_codes/rfg/

*Generator to cease or reduce parallel operation of the Generator's Installation for such period of time as NIE Networks may in its absolute discretion determine.*

*Notwithstanding the description of the operating mode of any generating unit or storage unit referred to in Schedule 1, Table 3 or 4 as relevant, NIE Networks shall be entitled to request the Generator to cease or reduce parallel operation of the Generator's Installation for a period of time in circumstances where the NIE Networks Distribution System is operating abnormally (for example, but without limitation, due to a network fault, due to a programmed outage or due to temporary network re-configuration). The Generator shall not be entitled to payment from NIE Networks during a period of required cessation or reduction of parallel operation of the Generator's Installation.*

NIE Network's proposal is that this clause will be updated to entitle NIE Networks following direction from SONI to instruct the generator to cease or reduce parallel operation for a period of time in circumstances where system security is at risk. This risk would be identified by SONI as the TSO, and passed to NIE Networks, based on agreed criteria and procedure.

There are two high-level scenarios that will arise:

1. Forecasted system security risk – A risk that can be identified ahead of real-time operations due to planned outages of transmission assets and forecasted generation and demand.
2. Forced system security risk - A risk that cannot be identified ahead of real-time operations, and arises due to the forced outage of transmission assets during times of high wind and low demand.

The notice period given to generators will vary depending on the scenario.

The expansion of this existing clause would mean that operational limits for system security is no longer an applicable criteria when it comes to determining if SSG Distribution Connection Offers seeking export can be issued, and thus can be removed as a criteria.

**It is important to note that without the proposed update to SSG Distribution Connection Offers and Agreements NIE Networks will remain in the position that it cannot issue SSG export Distribution Connection Offers as per SONI's recommendation on the grounds of system security concerns.**

For the avoidance of doubt, NIE Networks is not proposing any changes to the design criteria for distribution connections. Connections will continue to be designed on the basis of continuous access to the distribution system while it is operating normally.

Therefore, due to the reasons outlined above NIE Networks is proposing updating the DGAOP SSG Connections Assessment criteria to the following:

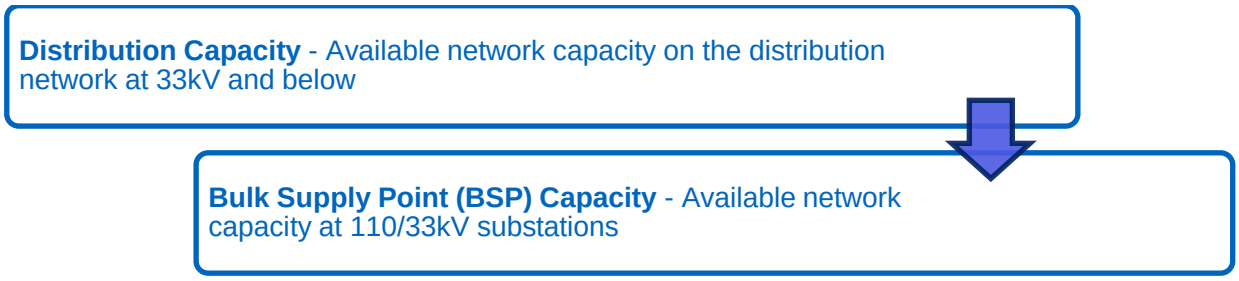


**FIGURE 3 -PROPOSED DGAOP SG CONNECTIONS ASSESSMENT CRITERIA**

The page overleaf features a flowchart that defines the existing Generation Connection Process (for Generators less than 5MW) which can be found in the DGAOP. The page following shows the proposed Generation Connection Process (for Generators less than 5MW) if changes outlined in this consultation were implemented. In addition to alterations proposed to the flowchart, the DGAOP contains text where the current process is explained for applications less than 5MW. This text will also be updated to reflect the proposed changes. This includes section 3 of the DGAOP, which outlines the process for determining if connection capacity is available.

Flowcharts in the DGAOP define the existing Generation Connection Process (for Generators less than 5MW). The current process is:

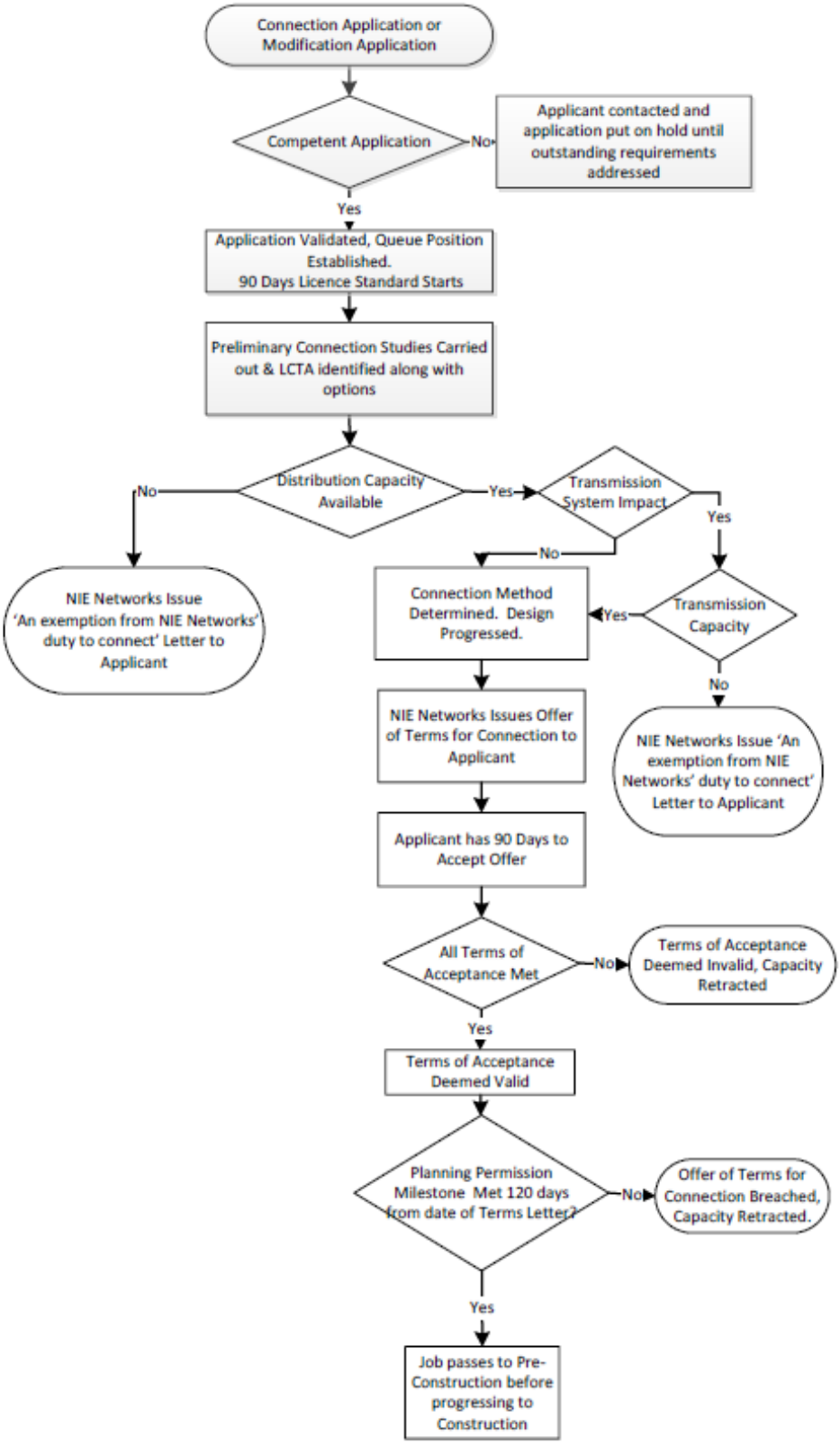


FIGURE 4 - CURRENT SSG CONNECTION PROCESS

Figure 5 below outlines the proposed Generation Connection Process (for Generators less than 5MW) if changes were implemented:

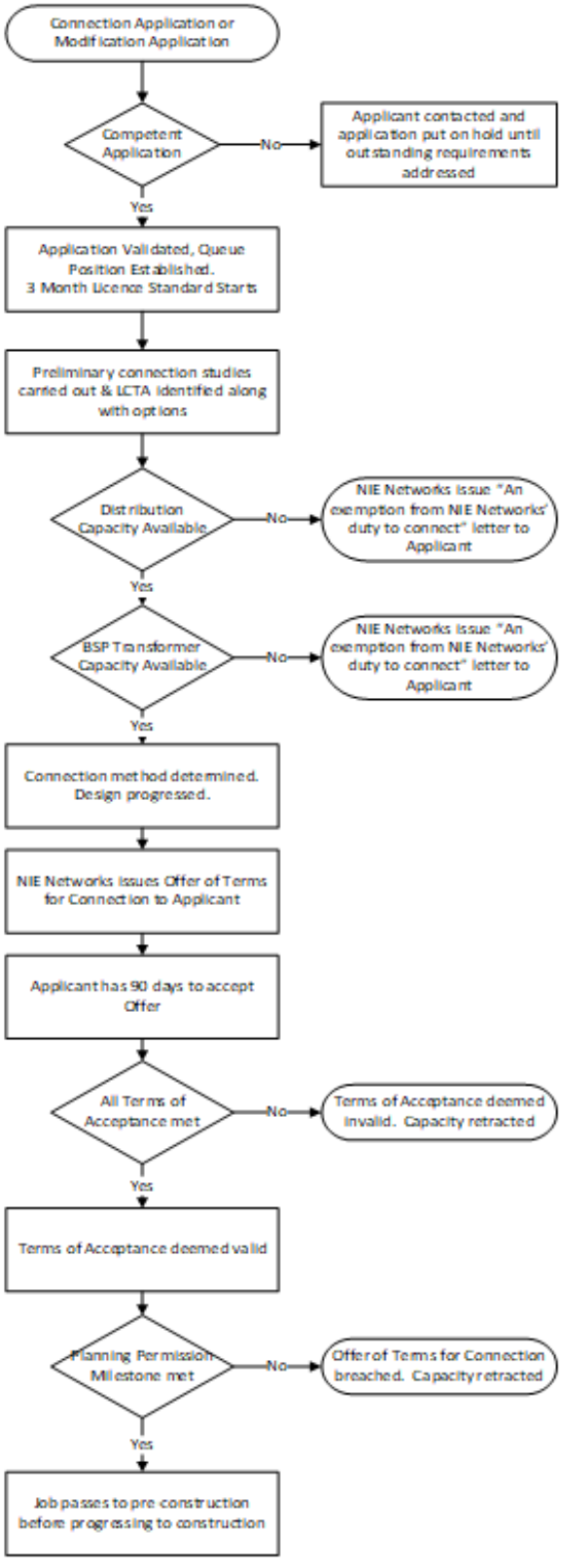


FIGURE 5 - PROPOSED SSG CONNECTION PROCESS

# 4. CONSULTATION QUESTIONS

1. **Are you in support of NIE Networks' proposal to amend the Distribution Generation Application and Offer Process Statement in accordance with Figure 5 above to ensure connection offers can be issued for exporting generators with a registered capacity less than 5MW?**
2. **Do you have any comments on the proposed update to Distribution Connection Offers and Agreements to include wording that permits control requirements to be utilised for system security reasons and thus ensure distribution connection offers can be issued for exporting generators with a registered capacity less than 5MW?**
3. **Do you believe there are other approaches NIE Networks could be considering to provide Distribution Connection Offers and Agreements for exporting generators with a registered capacity less than 5MW?**

# 5. NEXT STEPS

We have proposed the following timelines:


FIGURE 6 – PROPOSED PROCESS TIMELINES

## 5.1 How to Respond

NIE Networks invites interested parties to respond to this consultation by responding to the three questions listed in section four of this paper.

Responses should be sent electronically to connectiondesign@nienetworks.co.uk by 5 pm on Friday 12th May 2023. The responses will be analysed by NIE Networks and SONI and will be used in the development of a decision paper that will publish the result of this consultation and new connection process go live date.

## 5.2 Stakeholder Engagement Zoom Event

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