

SUPPORTING THE CONNECTION OF MORE GENERATION AND STORAGE



OUTCOME OF THE NORTHERN POWERGRID CONSULTATION

www.northernpowergrid.com



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Executive Summary

Northern Powergrid is committed to supporting the connection of more generation and storage. As part of our connections service improvement plans for 2016/17 we said we would work with customers to better understand any issues they have experienced with constrained networks in the Northern Powergrid region. We said where necessary, we will continue to develop new solutions that address curtailment of output; consortium connections; constrained connections; communicating investment plans and any other additional activities to facilitate grid connections.

We have sought the views of our customers to understand what, if any, improvements to our current processes and approaches are needed to resolve the issues faced by Northern Powergrid customers. The consultation we issued sought our customers' views on issues they were experiencing regarding constrained networks within Northern Powergrid.

From the responses to our consultation it is evident that the ability of connection customers to receive flexible connection offers will continue to be one of the most important aspects of making connections to distribution networks in the future. Operating Active Network Management (ANM) schemes and enabling customers to consider different connection options is something that we have already embarked upon and we will continue to develop these services in conjunction with our ongoing stakeholder engagement.

To make the assessment of flexible connection options quick and efficient, it is important that we continue to provide comprehensive heat map capacity and curtailment information. Also important is the ongoing ease of access of our expert engineers and to that end we will continue to provide customer surgeries and the option for customers to access a multiple optioneering processes.

The transition of Distribution Network Operators (DNOs) to Distribution Network Operators (DSOs) is an area highlighted by respondents as something that is likely to impact them and which may provide customers with opportunities to provide network support services. The development of DSOs is an issue that we are currently considering and we will soon be able to share our vision for the transition and also seek stakeholders' views to help shape our view of the way forward.

Consortium connections does not appear to be an issue that currently concerns our customers, however, we believe that there is potential for such arrangements to become more prevalent in the future and so we will continue to operate and develop processes that enable this approach.

The connection of storage is an important issue which we must continue to support and develop. The operation of storage as a service has potential to assist with the development of DSOs; the future control of distribution networks and their efficient operation and exploitation. Northern Powergrid continues to be active in this arena and we intend to share with stakeholders our experience of the projects that we are undertaking.

Altogether the responses to our consultation have raised a number of issues which we have committed to respond to with actions that continue with recognised good practice. We will introduce changes to processes where necessary, review the issues and seek to make changes where necessary and continue to engage with stakeholders to give them opportunities to influence the way in which we are developing business process to address the challenges of the future.

Findings of the Consultation

Flexible connection offers

With reference to Northern Powergrid addressing concerns about levels of constraints, customers responding to the consultation raised a number of points;

- The design of distribution networks should be revised to enable connection of more generation rather than the continued bias to the connection of load.
- There is a need for a mechanism that enables the full capacity of circuits and plant to be utilized in a real time manner.
- A more detailed description of time based and capacity constraints should be provided in connection offers.
- The capacity information provided via heat maps is useful but for the information to be valid and truly useable it needs to be kept up to date.
- Providing customers' clients with a commercial business case relies on the ability to be able to reflect levels of constraints into commercial agreements and therefore it is important to have information when un-constrained capacity is available.
- Customers need knowledge of network capacities and the ability to discuss control requirements to avoid any network issues at a particular connection point.

DNOs networks have historically been designed with a bias towards load connections. In recent years as distributed generation has become necessary and viable, so the needs of connectees has changed and the way in which the distribution network is designed and built has changed and will continue to evolve to accommodate this different mode of operation.

Within Northern Powergrid we have not experienced the same level of network constraints as DNOs in some other parts of the country¹. The bulk of our larger substations have spare capacity, with two thirds of higher voltage circuits having material capacity available to connect new generators and storage. 91% of larger substations are able to accept up to 25MW of new generation capacity at each location.

Northern Powergrid will continue to respond to customer's demands and have already deployed ANM solutions. Since April 2016, customers who have applied to connect generation on our network in Driffield in the East Riding of Yorkshire (one area of our network which is constrained) have been given the opportunity to join a new replicable ANM scheme and the opportunity to benefit from lower overall connections costs.

Constrained connections is an ongoing issue where we need to continue to understand the changing impacts on customers' proposed projects and therefore we give a commitment to continue our dialogue and assessment of the subject.

Northern Powergrid proposed action: Update stakeholders on the progress of Driffield ANM being the first new replicable scheme. We will discuss how it works, network communications, charging policy and how it can apply to other areas.

¹ Ofgem constrained networks publication @ www.ofgem.gov.uk

The change in the way DNOs will operate in the future with the transition from DNO to DSOs will potentially have an impact on the way in which customers connect and provide services. This is an important aspect of our development in which customers play a significant part and therefore their engagement is a critical input to the way in which we develop. Therefore, we give our commitment to hold a dialogue with customers on this subject to enable their input.

Northern Powergrid proposed action: Share our vision for the transition from DNO to DSO, describe the work taking place within Northern Powergrid and seek connections stakeholders' views to help shape the outputs from this work.

In the consultation responses customers cited the usefulness of our capacity heat map information but recognised that its usefulness diminishes quickly if the information becomes out of date. We have already recognised that as an issue and having already invested a great deal of time and effort in developing our heat maps we made a commitment in 2016/17 to update the data contained in our demand² and generation³ heat maps every month. We will continue to do this in the future.

Northern Powergrid proposed action: Continue to update our heat map information every month.

The consultation also highlighted the point that it is important for customers to receive information about levels of curtailment in connection offers so that they can translate this information into commercial agreements. We want to help wherever possible with customers understanding of curtailment and the impact it will have on their proposed scheme and so we are committing to provide customers with curtailment information where relevant.

Northern Powergrid proposed action: Develop a tool to provide curtailment estimates for 33kV, 66kV and 132kV flexible and actively managed connections to be included with all relevant generation quotation estimates.

Customers highlighted the importance of being able to discuss projects in terms of the availability of capacity, control requirements and connection options. This is an issue that we have recognised from previous engagements with customers and on we have previously acted upon by introducing customer surgeries giving access to technical, commercial and delivery experts and by introducing a concept of multiple application optioneering where customers are able to propose a number of options for budget review and then choose the most appropriate one to progress into a firm quotation. We commit to continue our optioneering dialogues with customers.

Northern Powergrid proposed action: Continue to provide customer optioneering surgeries and to operate a multiple application optioneering process.

² <http://www.northernpowergrid.com/demand-availability-map>

³ <http://www.northernpowergrid.com/generation-availability-map>

Consortium connections

In examining the information that we make available and the process to provide consortium connections, customers have not raised any issues and have generally reported that our performance is reasonable.

It was noted by one respondent that the community energy sector struggles to access the expertise on grid connection issues, and anything that helps local community schemes access better connections would be helpful. Northern Powergrid sponsor a seed fund for community energy groups which can help them obtain the financial support to engage the correct expertise to help them form a community energy project. We will Powergrid continue to support this initiative.

Northern Powergrid proposed action: Continue to support the community energy sector with the community energy seed fund initiative.

Information on network constraints

With reference to the adequacy of the information Northern Powergrid provides on constrained networks contained within its heat maps and connection offers, customers responding to the consultation raised a number of points;

- The information provided by the heat maps has improved dramatically and is adequate giving a good indication of network capacity with substation level data on downstream and upstream capacity and headroom being very helpful.
- Heat map information would be more useful if it included fault level information.
- Customers are able to discuss their requirements with the Northern Powergrid team and find this adequate for their needs.
- Make information available within the heat maps regarding site specific technical studies that are carried out post acceptance of a quotation.
- Heat maps are useful but it would be more helpful to have access to more real time information on substation utilisation, headroom available, constraint issues, connection queues etc.
- It is helpful for the heat maps to include information about constraint threshold and for the accuracy of the information to be maintained.

The consultation responses highlighted that the information that we provide through our heat maps has improved and is adequate. The information already includes fault level information at primary substations and indicates which electrical parameter is the issue that drives any constraint at that point on the distribution network. Although the information we provide is not currently provided in real time it is kept up to date on a monthly basis. This information is important to customers and therefore we commit to keep it valid and up to date.

Northern Powergrid proposed action: Continue to update our heat map information every month.

A response to the consultation highlighted the point about making information available regarding site specific technical studies that are carried out post acceptance of a quotation. These studies can include the statement of works process with National Grid Electricity Transmission (NGET) to understand if there are any constraints on the NGET network that will impact the proposed connection. It would be useful for this information to be included on our heat maps and the provision of such information together with a review of the statement of works process is currently being undertaken by a national working party which Northern Powergrid are involved in. As this can be an important aspect to the development of a viable connection for a customer we commit to continue to play an integral part in the review and to reflect the findings into our processes where applicable to improve the service we provide.

Northern Powergrid proposed action: Consider and where appropriate implement best practice outcomes from the national TSO/DSO project working group

Connecting storage

With reference to the adequacy of information and Northern Powergrid process to help customers connect storage customers responding to the consultation raised a number of points:

- It is important for DNOs to support storage projects and their network control benefits.
- It would be useful if information could be provided on where battery storage facilities could actually be an asset to the Northern Powergrid network to help build commercial project cases.
- Internal planning assumptions need to change to enable more tailored connection schemes and agreements to be developed to support the uptake of flexible connections enabling the most efficient use of connections and also enabling storage to be deployed at the most efficient network locations, at the source of volatility.
- It is important to be able to have open discussions with Northern Powergrid about project options, specifically including the levels of available import and export capacity that are available at a particular site.
- One respondent was finding it challenging to use underutilised connection capacity from existing connections. They considered that DNOs should not be assessing applications or modifications to existing applications on name plate capacities but on actual connection utilization/load/diversity factors etc. (demand and renewable generation sites).

Customers have again highlighted the importance of being able to discuss projects with the Northern Powergrid team at the early stages of a quotation to properly understand the distribution network characteristics and connection options. To enable this we have previously acted to introduce customer surgeries giving access to technical, commercial and delivery experts and also to introduce a concept of multiple application optioneering. We commit to continue to provide these processes.

Northern Powergrid proposed action: Continue to provide customer optioneering surgeries and to operate a multiple application optioneering process.

The development of storage and its network control benefits are something that we are considering as part of the development of our transition from a DNO to a DSO. It is important that we share our thoughts with customers and allow them to influence the development whilst at the same time learn from projects we have undertaken to develop the emerging technology. We therefore commit to continue to engage with stakeholders to enable them to influence the outcomes where appropriate.

Northern Powergrid proposed action: Share our vision for the transition from DNO to DSO, describe the work taking place within Northern Powergrid and seek connections stakeholder views to help shape the outputs from this work.

Northern Powergrid proposed action: Hold targeted workshop engagements during 2017/18 on emerging connections topics including storage and flexible connections.

Northern Powergrid proposed action: Develop and publish case studies to share future use cases and applications for storage based on the projects being carried out by Northern Powergrid as an extension of its Customer-Led Network Revolution project.

The proposed actions above are included in our proposed 2017/18 Incentive on Connections Engagement (ICE)⁴ service improvement action plan. We will consult on our proposed work plan in April 2017 before submitting to our regulator Ofgem. If you have any further questions, feedback or suggestions on our proposed actions to address network constraints, please provide us with comments so that we may develop our thinking further.

If you have any questions on this response please contact:

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⁴ <http://www.northernpowergrid.com/incentive-connections-engagement>



Consultation on Addressing Network Constraints - Customer Responses

Name:	Mike Ford
Organisation:	Whitby Esk Energy

Question 1: Constrained connection offers

Do you consider that Northern Powergrid sufficiently addresses your concerns about levels of constraints on its network and from your experience of its processes what could it do differently to improve constrained network offers?

Your response:

There is a fundamental bias within the infrastructure towards the addition of load to the network over the addition of generation.

This is particularly prevalent on rural networks.

It is based on the tenet that power is provided at maximum voltage on the periphery of the network because historically “every” connection would act to decrease the voltage at (and below) the point of connection.

This results in significant voltage headroom on the network for load but little for generation.

If you combine this with the philosophy that individual applicants must fund grid reinforcement “appropriate” for their connection you get a significant bias towards load.

This is classically demonstrated at a domestic level where it is very easy to connect an extra 9kW shower but impossible to connect more than 3.6kW of generation.

DNOs need to reduce the rural network “input” voltage and force/assist loads at the end of the network with reinforcement such that voltage limits are met for all connections AND more voltage headroom is provided for generation across the whole network.

Question 2: Consortium connections

Do you consider that Northern Powergrid provides adequate information about consortium connections and from your experience what could it do to improve the process of delivering consortium connection offers?

Your response:

I am not aware of consortium connections (but I haven’t looked for them)...

Question 3. The provision of information on network constraints

Is the information provided by Northern Powergrid on constrained networks contained within its heat maps and connection offers adequate and does it fulfil your requirements? From your experience is there any other information which you would wish to be provided with and how would it benefit you?

You response:

Yes.

No – I think the information has improved dramatically

Question 4. Connecting storage

What can we do to help you connect storage projects? Are there any changes to processes, additional information requirements or technical aspects that we need to consider further?

Your response:

We are not in the storage business so I have no view on specific processes.

In principle DNOs should give every possible support for storage projects as it benefits voltage control, local infrastructure costs (capacity, peak demand), the national capacity shortfall and the generation carbon footprint.

Question 5. Additional activities

From your experience do you think that there are any additional activities or outputs regarding constrained networks that Northern Powergrid do not currently undertake or provide that you would benefit from?

Your response:

See Q1.



Name:	Anonymised response
Organisation:	

Question 1: Constrained connection offers

Do you consider that Northern Powergrid sufficiently addresses your concerns about levels of constraints on its network and from your experience of its processes what could it do differently to improve constrained network offers?

Your response:

The heatmaps often appear to have outdated information, with many DNO's citing the fact that application rates and capacity availability are so dynamic that it's hard to keep them up to date. If there a way to make the information more current, it would be useful and lead to fewer applications in areas which have become constrained.

Constrained offers are difficult to accept with business cases which are based on contractual obligations. If the DNO could make an offer with contractual obligations and liabilities as to when the unstrained capacity of the connection would be available, these could be 'passed through' into the project's commercial contracts, ensuring certainty as to when services can be provided.

Earlier engagement with customers would be welcome to talk through constraints. As soon as an application comes in, you must have a pretty good idea of the likely issues (and costs. If these could be discussed within the first week, many more applications could be withdrawn, saving you time and money.

Question 2: Consortium connections

Do you consider that Northern Powergrid provides adequate information about consortium connections and from your experience what could it do to improve the process of delivering consortium connection offers?

Your response:

Yes, this seems adequate.

Question 3. The provision of information on network constraints

Is the information provided by Northern Powergrid on constrained networks contained within its heat maps and connection offers adequate and does it fulfil your requirements? From your experience is there any other information which you would wish to be provided with and how would it benefit you?

Your response:

Where there is a fault level constraint, the relevant values could be provided so that we could

determine whether any redesign of our site could eliminate the need for constraint.

Question 4. Connecting storage

What can we do to help you connect storage projects? Are there any changes to processes, additional information requirements or technical aspects that we need to consider further?

Your response:

Would it be possible to provide information on where battery storage facilities could actually be an asset to your network, either now or in the future?

We are keen to build commercial cases to support DNO's and it'd be useful to know the pinch-points where storage assets could help.

Question 5. Additional activities

From your experience do you think that there are any additional activities or outputs regarding constrained networks that Northern Powergrid do not currently undertake or provide that you would benefit from?

Your response:

Providing more information about how/when the constraints could be overcome and the level of investment required would be useful.



Name:	Anonymised response
Organisation:	

Question 1: Constrained connection offers

Do you consider that Northern Powergrid sufficiently addresses your concerns about levels of constraints on its network and from your experience of its processes what could it do differently to improve constrained network offers?

Your response:

I have found that Northern Powergrid have been responsive and helpful. We are in the process of having a new supply installed and we would like the option to generate also. It has been explained to us that the network cannot accept generation at the moment but improvements are coming and should resolve issues in 12 months.

Dalton Airfield is the largest industrial area in North Yorkshire however and there are at least 60 acres more land available for development of the network so I fear there is not enough strategic development as the new customers are not here to fund it.

Question 2: Consortium connections

Do you consider that Northern Powergrid provides adequate information about consortium connections and from your experience what could it do to improve the process of delivering consortium connection offers?

Your response:

I have no experience or knowledge of this

Question 3. The provision of information on network constraints

Is the information provided by Northern Powergrid on constrained networks contained within its heat maps and connection offers adequate and does it fulfil your requirements? From your experience is there any other information which you would wish to be provided with and how would it benefit you?

You response:

I have not used this facility really and have simply discussed our requirements with your team. This was perfectly adequate for our needs

Question 4. Connecting storage

What can we do to help you connect storage projects? Are there any changes to processes, additional information requirements or technical aspects that we need to consider further?

Your response:

The network system at Dalton is inadequate so needs to be improved/upgraded. I understand this is being done but do not know if the works will adequately allow for future requirements. There are 10s of acres of warehouse roofs here that could be used for solar generation but at the moment that is not a real option

Question 5. Additional activities

From your experience do you think that there are any additional activities or outputs regarding constrained networks that Northern Powergrid do not currently undertake or provide that you would benefit from?

Your response:

Don't know



Name:	Paul Graham
Organisation:	UK Power Reserve Ltd

Question 1: Constrained connection offers

Do you consider that Northern Powergrid sufficiently addresses your concerns about levels of constraints on its network and from your experience of its processes what could it do differently to improve constrained network offers?

Your response:

As a non-intermittent generator constrained connections are a last resort. We exist to meet peak demand at a national (and potentially in the future, local) level and cannot effectively use a connection that may be constrained down at a time outside of our control.

Having said that we recognise that the DNO networks are increasingly constrained and we need a mechanism that enables the full capacity of circuits and plant to be utilized in a real time manner. ANM is a way forward to achieve this, but it will require flexibility at the site level for non-intermittent plants.

Connection offers should recognise the distinction between intermittent and non-intermittent generators. A more detailed description of time based and capacity constraints should be provided in the connection offer.

Question 2: Consortium connections

Do you consider that Northern Powergrid provides adequate information about consortium connections and from your experience what could it do to improve the process of delivering consortium connection offers?

Your response:

N/A

Question 3. The provision of information on network constraints

Is the information provided by Northern Powergrid on constrained networks contained within its heat maps and connection offers adequate and does it fulfil your requirements? From your experience is there any other information which you would wish to be provided with and how would it benefit you?

You response:

The Northern Powergrid capacity maps give a good indication of network capacity indicating areas to avoid! The substation level data on downstream and upstream capacity and headroom is very helpful.

The connection offer provides a good level of the physical detail, but in many cases rely on technical studies post acceptance that may materially affect the cost and viability of the connection. Whilst these are site specific studies it would be helpful if the knowledge gained from them was incorporated into the capacity maps for wider benefit.

Question 4. Connecting storage

What can we do to help you connect storage projects? Are there any changes to processes, additional information requirements or technical aspects that we need to consider further?

Your response:

More insight into the actual demand profiles at primary substation level would assist in determining the opportunity for customer storage at grid scale level.

Internal planning assumptions based on 'worst case' scenarios should be expanded to include more 'typical' usage profiles, enabling a more tailored Connection Agreement to be agreed.

Question 5. Additional activities

From your experience do you think that there are any additional activities or outputs regarding constrained networks that Northern Powergrid do not currently undertake or provide that you would benefit from?

Your response:

No



Northern Powergrid

Consultation on addressing network constraints

Name:	Ewan Boyd		
Organisation:	Green Community Buildings CIC		
Contact details:	teclimited@btinternet.com		
Can we contact you to discuss your response?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Question 1: Constrained connection offers

Do you consider that Northern Powergrid sufficiently addresses your concerns about levels of constraints on its network and from your experience of its processes what could it do differently to improve constrained network offers?

Your response:

We work on a number of small to medium renewable projects (up to c 3MW) on behalf of community groups. Some of these have experienced grid constraint issues. Where this has happened, we have received the information from NPG but without any clear indication of the potential options. For example, a quote for a recent solar PV application was supplied which suggested a very high cost due to a long run required to access a suitable primary network. It would have helpful to know what the maximum capacity of the existing network would have been, and to be able to have a discussion regarding the control requirements NPG would need to avoid any network issues at this connection point. Instead, we have been asked to submit a new application for a much lower amount to be able to find out what the local connection capacity is.

If grid connection quotes in such circumstance could indicate the available peak capacity, that would be very helpful. It would also be extremely useful for us to have an idea of how often the capacity constraints can be expected. So for example, if a specific grid connection capacity would breach the network constraints on a daily basis or whether it would be a rare occurrence on just a few occasions on very sunny days etc. I assume that dynamic capacity constraints, that reflect actual capacities, rather than just a one off minimum level, could enable schemes to be built if there is sufficient understanding of the level and frequency of capacity constraints. At present, capacity limitations are being presented by NPG as constant factors despite grid usage varying widely from hour to hour. This issue is particularly important as we start to explore storage options.

Question 2: Consortium connections

Do you consider that Northern Powergrid provides adequate information about consortium connections and from your experience what could it do to improve the process of delivering consortium connection offers?

Your response:

We have never come across these so this may well be an issue that needs looking at.

In general, within the community sector we struggle to access the expertise on grid connection issues, and anything that helps local community schemes access better connections would be helpful. If NPG are able to promote the use of consortium connections to community projects that could be highly useful.

Question 3. The provision of information on network constraints

Is the information provided by Northern Powergrid on constrained networks contained within its heat maps and connection offers adequate and does it fulfil your requirements? From your experience is there any other information which you would wish to be provided with and how would it benefit you?

Your response:

This information is helpful, but does not always appear accurate. It is also looks like whether the heat maps display thresholds over which capacity constraints can be expected, but not the frequencies when these thresholds may be reached. If a heat map indicates a part of the network is at or close to capacity, does this happen on a daily basis, only at weekends/overnight, once a year etc?

The issue of the timing and frequency of capacity constraints is potentially significant. If for example, there is a constraint level that occurs frequently between midnight and 7am, this will be of little concern to a PV installation, but would potential have a big impact on a wind turbine. The heat maps therefore appear to be a somewhat blunt instrument.

Question 4. Connecting storage

What can we do to help you connect storage projects? Are there any changes to processes, additional information requirements or technical aspects that we need to consider further?

Your response:

This is an area we are only just beginning to explore, so at present we are unable to provide any detailed comments.

Question 5. Additional activities

From your experience do you think that there are any additional activities or outputs regarding constrained networks that Northern Powergrid do not currently undertake or provide that you would benefit from?

Your response:

As a general response, and not specifically in relation to constrained networks, I would ask that NPG recognises the distinction between commercial and community energy projects. If there is greater assistance that can be given to the community energy sector, in terms of technical advice, reduced costs and prioritized access to the network that could help the sector.