Open Networks Project
Advisory Group

Thursday 6th May 2021
Thank you for joining this Open Networks Project Advisory Group session.

- This webinar will commence at 09:30.
- If you are unable to play the audio through your device, you can dial in by calling +44 20 3855 5885 and using access code 613 266 473#.
- All microphones have been set to mute to avoid background noise.
- Please ask questions or make comments via the chat function throughout the meeting.
- Please be aware this meeting will be recorded for ENA record keeping purposes. You may wish to keep your camera off in light of this.
- If you would like to receive information about the Open Networks Project or have any feedback you would like to submit, please get in touch with us at opennetworks@energynetworks.org.
- We would welcome you all to please take a moment to visit www.slido.com so you can take part in our Q&A's later in the meeting. The event code is #ONAG.
## Agenda

### Session A

**WS1A P7 - Baseline methodologies**
- Feedback on methodology design

### Session B

**WS1A P1 - Common Evaluation Methodology**
- Feedback on User Forum under Open Governance & ToR

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<th>Item</th>
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<td>09:30</td>
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<td>Welcome / Introductions</td>
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<td>Communications Activity</td>
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<td>09:40</td>
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<td>Progress updates</td>
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<td>20</td>
<td>WS1A P6 - Non DSO Services Trading &amp; Sharing Capacity</td>
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<td>Product Updates</td>
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<td>Break</td>
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<td>Breakout Session 1</td>
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<td>Breakout Session feedback and additional thoughts</td>
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<td>Slido Q&amp;A's</td>
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<td>WS1B P7 - Operational Data Sharing</td>
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<td>Flex Gen Forecasting Project update</td>
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<td>Slido Q&amp;A's</td>
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<td>Wrap Up</td>
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Communications Activity
Emily Jones
Advisory Group ToR

The Advisory Group is essential to our project to:
- Ensure stakeholders are aware and taking the Project into account;
- Request input from stakeholders to improve the quality of our products;
- Increase awareness about project risks & issues, ask for views on risks & issues and collaboratively resolve where appropriate.

We will provide input to:
- Steering Group on project scope, progress, risks & issues;
- Workstreams with deliverable comments/feedback.

We will seek to send information in advance of meetings to ensure that views can be sought by trade associations in advance. Our objective is to encourage open feedback from you all across all of our work.

Thank you for the continued input.
Stakeholder engagement programme

Update

• Drafted a stakeholder engagement programme to ensure all key stakeholders are strategically considered throughout the year

• Two-fold approach: content creation and drumbeat engagement

• In the lead up to COP26 the delivery of our activity will have one consistent core theme: Getting our networks to net zero. There will be three further sub-themes which link back to key principles of the project: Transparency and visibility, Collaboration and a Simplified approach

• Programme created to be used in conjunction with the 2021 Open Networks Stakeholder map, Messaging Grid and Communications Planner – as well as ENA’s broader activity grid.
Additional updates

• First Community Energy Forum of the year last week (29th April)
• Progressing our Whole Energy Systems activity – included updated messaging and targeted digital activity. Plan is to launch beginning of June.
• Webinar updates
  • Common Evaluation Methodology
  • DSO roadmap and implementation plan
  • Queue Management (14th May)
• Work stream products:
  • ANM – myth busting activity is in progress, with a view to launching end of May
  • CoI and UC Register - We are in conversation with stakeholders who gave feedback via PID consultation, WS3 and WS5 to gauge awareness/understanding of the register and what needs to be addressed. Developing recommendations and a plan of action will be implemented in May
Progress Updates
Progress Updates

Key publications since March 2021
- V1.2 Common Contract (Mar)
- Evolution report (Apr)
- DSO Roadmap Q1 Update (Mar)
- Conflicts of Interest and Unintended Consequences Register Q1 update (Mar)
- Paper summarising market simulation findings on trading & sharing capacity (Apr)
- Report summarising User Commitment shortfalls and areas to update (Apr)

Key upcoming publications (May-Jun)

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<thead>
<tr>
<th>WS1A - Flexibility Services</th>
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<tr>
<td>Report on stakeholder feedback and recommendations on Legacy ANM Contracts (P3, May)</td>
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<td>Baseline methodologies design and draft implementation plan (P7, June)</td>
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<td>Principles for improving curtailment information (P9, May)</td>
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<td>Alignment on procurement windows (P2, Jun)</td>
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<td>Options for balancing curtailment risks (P8, Jun)</td>
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<th>WS1B – Whole Electricity Systems</th>
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<td>Methodology for best view forecast (P2, May)</td>
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<td>Operational DER Visibility &amp; Monitoring use cases (P6, May)</td>
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<tr>
<td>Operational data to share with non-network stakeholder &amp; mechanisms for sharing (P7, Jun)</td>
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<th>WS2 – Connections</th>
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<td>QM updated user guide (P2, May)</td>
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<th>WS3 – DSO Transition</th>
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<td>Q2 Update of Col &amp; UC (P1, Jun)</td>
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<th>WS4 – Whole Energy Systems</th>
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<tr>
<td>Proposals for coordinated gathering of regional data (P3, Jun)</td>
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<tr>
<td>Whole System Optioneering Proposal (P4, May)</td>
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<td>LAEP Scope proposal (P5, June)</td>
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2021 Workplan Consultation

ENA received 9 responses from a 6-week consultation on it’s 2021 workplan. We are finalising our responses the feedback received and updating the PID to reflect this. A summary of responses, our next steps and an updated version of the PID will be published in May 21.
Product Updates
WS1A P6 – Trading & Sharing Capacity
Matthew Hamilton (SSEN)
Objectives and Organisation of Market Simulations

Objectives
• WS1A P6 will undertake the following work during 2021:
  – market simulation exercises for trading and sharing of capacity and risk of curtailment during Q1 2021;
  – live trials in Q2 2021 and Q3 2021; and
  – develop guidelines for business as usual implementation.

• The market simulation exercises were designed to be interactive sessions focused on obtaining stakeholder feedback on work undertaken by the Non-Access SCR working group who developed principles and rules that could be used to govern trading and sharing of capacity.
Objectives and Organisation of Market Simulations

Four Workshops

• Workshop 1 - Trading Firm Capacity
  – where users with excess Firm Capacity trade it with users who have insufficient Firm Capacity.

• Workshop 2 - Trading Risk of Curtailment (Non-Firm Capacity)
  – where users with a low risk of curtailment could trade their priority stack position with users who have a higher risk of curtailment to increase certainty.

• Workshop 3 - Shared Capacity
  – where a group of participants combine and share their capacity to enable new connections or trade any excess.

• Workshop 4 - Potential Customer and Network Benefits
  – reviewed the feedback from Workshops 1 to 3 and discussed other potential benefits and wider barriers.
## Summary of Feedback

<table>
<thead>
<tr>
<th>Appetite/ Interest</th>
<th>DNO</th>
<th>Trading</th>
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<tr>
<td>There is some appetite for Trading and Sharing of Capacity, but less so for Trading Risk of Curtailment.</td>
<td>The effect of Sensitivity Factors and lead time for system studies / approval could affect market growth.</td>
<td>Need visibility of the users willing to trade and market information; no price information to DNO.</td>
</tr>
<tr>
<td>There is a risk there may be more sellers than buyers.</td>
<td>Should the DNO be the NMF given it is a non-core activity, they lack expertise and they will trade in the market?</td>
<td>Trading and Sharing Capacity could increase LCT penetration, increase network usage and replace some ANM schemes.</td>
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<tr>
<td>Other changes, e.g. Profiling Capacity and outcome of the SCR, could reduce appetite for Trading and Sharing Capacity.</td>
<td>Impact of trading or sharing capacity on third parties needs to be considered.</td>
<td>ST / MT trades suit temporary / ad hoc requirements at low risk and LT trades suit investment decisions.</td>
</tr>
<tr>
<td>The effect of Sensitivity Factors and lead time for system studies / approval could affect appetite.</td>
<td>Require clarity on what constitutes hoarding, market rules and trading mechanisms.</td>
<td>Standardisation of P2P contract and trading blocks would encourage market participation and growth.</td>
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Considerations for Future Work

**System Study Requirements**
Consider how managed market growth could be accommodated without adversely affecting the potential appetite for trading and sharing of capacity.

**Sensitivity Factors**
These could act as a significant barrier to trading and sharing capacity. Consider how these could be developed so that users have an early indication of the capacity to trade.

**Market Operation and Rules**
Further detail is required. Develop a clear set of market rules to enable the trading and sharing of capacity and consider how the market would operate and be facilitated.

**Standardisation for Trading**
Work with key market actors to develop a standard P2P trade agreement, determine acceptable minimum duration and determine minimum trading periods.

**Data Availability**
Open data is being actively discussed but further progress will lower barriers to entry and support trading.

**Aligning Changes**
A roadmap of known decisions would help users understand the journey from Firm / Non-Firm Capacity through trading of capacity and flexible capacity agreements to other known future changes.

**Appetite**
Given the variation in appetite, it is proposed WS1A P6 conducts a more rigorous poll to determine the level of interest in trading and sharing capacity and the potential value.

**Phased Introduction**
This would avoid overload of the DNOs with system studies, allow further consideration of the effect of trading on ANM systems and provide visibility of other changes that may be more attractive, e.g. profiled capacity.
Next Steps

Market Simulation Workshop Report
- Currently being reviewed by the WS1A P6 working group
- Released to wider stakeholders in the coming weeks

Live Trials
- Live trials will be held later in 2021 and potential participants need to be identified soon to maximise the effect of these trials.
WS2 P2 – Queue Management
Peter Turner (NPG)
Progress to date

- With Open Networks approval the QM group has finalised and published the following documents on the ENA website:
  - Queue Management User Guide
  - Open Letter
- The Transmission Charging Methodology Forum (TCMF) has been briefed and responded positively to the CUSC modification.
- A CUSC modification will be initiated to introduce a clause covering project progression that allows contract termination where milestones are not met.
- The CUSC modification will run in parallel with implementation of the new QM arrangements.
- A webinar is scheduled for 14 May to update stakeholders on the QM process and the plans to implement from 1 July 2021.
Further stakeholder engagements

- Further stakeholder engagement has been carried out and concerns raised about the existing milestone arrangements which focussed on:
  - Timescales for early milestones regarding planning permission and land rights are considered insufficient
  - Milestones could be improved to reflect the size of the project
- The key points to note with regard to the published QM guide are:
  - Milestones have existed since 2016 and are unchanged (additional Project Commitment milestone added).
  - The addition of tolerance periods and the recognition that there can be exceptional issues outside of a customer’s control provides additional flexibility.
  - Clarity is being developed to recognise that a relevant authorities can place obligations on projects which developers are required to complete before the project can progress. These obligations can be discussed with the network operator and, subject to agreement, avoid failing a milestone.
- Significant stakeholder engagement has already been done and the May webinar could raise further issues. These will be reviewed and either addressed through further clarity or discussed with the steering group to agree the way forward.
WS4 P1 – Whole System CBA
Ian Dunstan (WWU) &
David Bowman (NG-ESO)
WS4 P1 - Whole System CBA Framework update

Status
- Model, methodology and user guide published on the ENA’s website in December 2020
- Seeking early users to provide feedback. Suggestions welcome via the Open Networks team

Use in regulatory mechanisms
- Coordinated Adjustment Mechanism: Ofgem expect submissions to use the whole system CBA
- Network Innovation Allowance: submissions may use the whole system CBA.

Plan for 2021
- Seek early users of the model to collect feedback
- Produce an updated version at the end of the year
- We are considering setting up a stakeholder User Group to help update the framework (details to be published in due course)
5 Minute Break
Breakout Sessions
WS1A P7 – Baseline methodologies
Helen Sawdon (WPD)
Our Approach – roadmap

- Varying DNO approaches to baselining
- Research of existing UK and international baseline methodologies
- Principles and priorities defined and agreed through DNO and stakeholder engagement.
- Recommendations for common DNO approach presented and published
- Consult with stakeholders on recommendations
- Finalise baseline methodologies for adoption
- Quantitative testing and validation of methodologies
- Publish tool to support DNO and FSP adoption of common methodologies

Common DNO approach – Well informed, simple and accessible

- Ongoing governance to manage updates in respect of any relevant future developments.

2019
- Ambition to adopt existing approaches where possible – ‘don’t re-invent the wheel’

2020
- Stakeholder feedback supporting standardisation

2021
- 2022 onwards
- The voice of the networks
Assessment Conclusions

• GB DNO Flexibility Products involve some specific parameters that are not widely seen internationally, most notably long utilisation instruction periods due to requirement predictability.

• As such, DNO constraint management products do not suitably compare against existing GB and international practices. Nevertheless, examples have been taken into account for the recommendations.

• Recommendations focus on three types of baselining methodologies that are relatively simple, are known in GB markets, and which are currently in use by DNOs and/or in ESO balancing services and/or in the Balancing Mechanism.

• Recommendations also give consideration to the inclusivity and simplicity values which FSPs rated most important.
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<th>Baseline</th>
<th>Description</th>
<th>Product Applicability</th>
<th>Technology Applicability</th>
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<tbody>
<tr>
<td>Historic - Week ahead Utilisation Instruction Period</td>
<td>Calculated every week, using asset data from the most recent ‘non active days’. Separate calculation for Weekdays and Weekends. Excludes Outliers - highest and lowest day is excluded. Mid 8 of 10 (weekdays), mid 2 of 4 (weekends). Likely DNO will calculate and communicate to FSP ahead of operational week. *Non active days are days where no DNO event delivery has occurred.</td>
<td>Sustain</td>
<td>Flexible Demand</td>
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<td>Restore</td>
<td>Non-dispatchable Generation</td>
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<tr>
<td>Historic with SDAs - Closer to real time Utilisation Instruction Period</td>
<td>Calculated every week, using asset data from the most recent ‘non active days’. Allows for FSP to make Same Day Adjustments. Separate calculation for Weekdays and Weekends. Excludes Outliers - highest and lowest day is excluded. Mid 8 of 10 (weekdays), mid 2 of 4 (weekends). Likely DNO will calculate and communicate to FSP ahead of operational week. *Non active days are days where no DNO event delivery has occurred.</td>
<td>Sustain</td>
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<td>Restore</td>
<td>Non-dispatchable Generation</td>
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<tr>
<td>Nomination - Alternative for Secure, Dynamic &amp; Restore</td>
<td>For accuracy, most suitable where sub-metering is available. Must be submitted by the FSP in advance of operation, fixed time to be prescribed by the DNO.</td>
<td>Secure</td>
<td>All technology types where accuracy levels of historical baselines are (too) low &amp;</td>
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<td>Dynamic</td>
<td>All technology types where historical data is not available</td>
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<td>Restore</td>
<td>All technology types where historical data is not available</td>
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<tr>
<td>Zero - Alternative for Sustain services</td>
<td>Most applicable where assets are not intended to stack. Or in the short term, where no historic data is available. Short term use will be replaced by appropriate method when data is available.</td>
<td>Sustain (where applicable, some scheduled secure services)</td>
<td>Dispatchable Generation</td>
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<tr>
<td>Zero with capacity de-rating - Alternative for Sustain services</td>
<td>Most applicable where assets are not intended to stack. Or in the short term, where no historic data is available. Short term use will be replaced by appropriate method when data is available.</td>
<td>Sustain (where applicable, some scheduled secure services)</td>
<td>Non-Dispatchable Generation</td>
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1. Do you agree with the approach DNOs have taken to researching the applicability of common UK DNO baseline methodologies? Yes 65% No 35%

2. Do you agree the research undertaken was well informed and sufficiently considered? Yes 76% No 24%

3. Do you agree with the prioritisation of Simplicity and Inclusivity as identified through stakeholder engagement? Yes 80% No 20%

4. Do you agree that the range of baselines proposed will support participation for all technology and provider types? Yes 29% No 71%

5. Do you feel that the proposed baseline could prevent or discourage you from participating in DNO flexibility, or do you consider the proposal workable? Yes (prevent/discourage) 77% No (workable) 23%

6. Do you agree that the baselines proposed have been matched suitably to DNO flexibility products? Yes 33% No 67%

7. Do you think that the publication of a baseline tool will support FSPs and 3rd Parties with their understanding and application of DNO baselines? Yes 92% No 8%

8. Do you agree with the proposed roadmap for baseline standardisation? Yes 83% No 17%
Further Engagement

While the responses to our slido survey were in general positive, particular in respect of our approach to date and plans for 2021, there were some responses that demonstrate further engagement is needed around the suitability of the recommendations.

We would like to invite stakeholders to provide further feedback in respect of questions 4, 5 & 6. We are particularly interested to know;

• What technologies could the recommendations present a barrier to and why? And are these technologies established or emerging?
• How could the recommendations present a barrier your participation? It is due to technology type, data provision requirements, impact on revenues etc…?
• Which products do you feel have not been matched to a suitable methodology and why?

Responses were due by 26th March, only 2 responses, feedback mainly reflects concerns around the use of a historic baseline both for LCTs and dispatchable generation.
WS1A P1 - User Forum under Open Governance & ToR

Simon Brooke (ENWL)
Farina Farrier (ENA)
User Forum under Open Governance & ToR

- We presented an update on our early thinking on the governance of Open Networks products.
- As part of this, for 2021, we are setting up User Forums for key products below to bring in stakeholders into the development process for the next iteration:
  - WS1AP1 Common Evaluation Methodology (CEM), aim to kick off in Jul
  - WS4 P1 Whole System CBA Framework, aim of kick off in Aug

We are seeking your views on the ToR that we have developed for the CEM User Forum and the proposed process to set this up.
Example of questions/areas for input

- Have we got the right stakeholder groups? Are we missing anyone?

- Timing for invitation process?

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<tr>
<th>Activity/Milestone</th>
<th>Duration</th>
<th>Date</th>
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<tr>
<td>Publish invitation to participate</td>
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<td>21 May</td>
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<tr>
<td>Open for expression of interest to join user forum</td>
<td>2 weeks</td>
<td>24 May – 4 Jun</td>
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<tr>
<td>Review all requests</td>
<td>1 week</td>
<td>7 Jun – 11 Jun</td>
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<tr>
<td>Notify all parties</td>
<td>1 week</td>
<td>14 Jun - 18 Jun</td>
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- How can we ensure participation and collaborative working?

- Are we asking the right level of detail from proposers as part of the process to raise issues?
5 Minute Break
Breakout Session feedback
Slido Q&A’s
Breakout Session Product Leads
Emily Jones (ENA)
WS1B P7 – Operational Data Sharing
Richard Wilson (UKPN)
P7 Requirements

- Circuit Rating and Configuration
- Outage Data
- Constraint Data
- Historical Utilisation Ratings
- Operational Forecasting

What detail is useful to market participants?
Circuit Rating and Configuration

• Rating – Asset data made available through Long Term Planning
  – Replication of information?

• Configuration
  – Benefits to market participants?
  – Provide market participant connection details
    – Current & normal supply point to understand constraints that are relevant?

• CIM
  – Full use of CIM would allow publication
  – Size of data transfer and integration for market participants vs cost?
Outage Data

- EHV currently published
  - Detailed up to 8 weeks ahead
  - High level beyond
  - High impact for significant works
  - Detail of requirements for market will not be known without detailed forecasting – not accurate long term

- HV/LV not published
  - Shutdown information provided to impacted parties
  - Timeframes for HV/LV generally short, long term detailed plans will not exist.
  - Short duration of works will limit benefit of long term planning
  - Outages impacting market participants to require specific timeframe to prevent HV/LV being disconnected or constrained when bidding for services?
Constraint Data

• Accuracy will be forecast dependant
• High level for EHV will provide general market indications for medium term

• HV/LV
  – Planned works
    – Short duration
    – Will be planned close to market time frames
  – Long term constraints on network will be driven from Planning
    – Data for long term constraints (asset replacement deferral outside of operational scope at present)

• Market participants link to a constraint?
**Historical Utilisation**

- Site & Circuit Data
- Resolution of data
  - Half hour data?
- Publish rate
  - Weekly / Monthly / Quarterly update?
- How will this be used?
Timeframe

• What time frame are we working to?
  – Real Time
  – >24 or 48 hours ahead?

• At 24/48 hours DNO/DSOs will provide service requirements via market platforms
• Proposing this product is therefore looking further ahead >24 hours
  – Is this the correct time frame?

• How far ahead - publishing periods/frequency
  – Monthly issue for data beyond one year
  – Weekly issue for 2 months to year ahead
  – Week ahead published daily
Operational Forecasting

• Week Ahead / Day Ahead
• Will be used to publish constraint data
• Will be used to calculate market requirements
  – Week ahead – low/medium accuracy
  – Day ahead – high accuracy
  – In day – to deal with changes / faults / non response
Data Transfer

- Easily created / transferred / consumed
  - CSV
  - API

- Complex
  - ICCP
  - CIM

Will ICCP / CIM be required for data being provided?
Will this preclude some market participants?
Flex Gen Forecasting Project update
Bethan Winter (WWU)
Stephen Harkin (Delta EE)
FLEXIBLE GAS GENERATION FORECASTING PROJECT
PRESENTATION FOR OPEN NETWORKS AG

MAY 2021

– Bethan Winter – bethan.winter@wwutilities.co.uk
– Evita Kourtza – evita.kourtza@delta-ee.com
– Stephen Harkin – stephen.harkin@delta-ee.com
2019 – WS4 - Product 2 – Introduction

• Recap of WS4 – Product 2

• **Problem statement** - There is a need to Review operational processes at real time and day ahead to

  • (i) improve data provision for customers
  • (ii) explore opportunities for sharing existing best practice between networks
  • (iii) identifying opportunities for more data sharing across networks. Focus on next 3-5 years to prioritise quick wins and futureproof where possible.
2019 - Product 2 – Examples of case studies

- Case studies to focus on the interfaces of gas and electricity networks:
  - CHP
  - Gas Fired Generation
  - H2 injection from constrained renewable generation
- Proposal to start with Power Generation being the most immediate issue with most to gain in the short term
- Learning from Power Generation examples would inform the approach for CHP and H2 injection at a later date following similar principles
2019 - Product 2 – Proposal for discussion

For this discussion:

- The value, and risks, in different approaches to sharing data eg. shared procurement of 3rd party forecasts vs a single network forecast vs shared forecasts between networks vs shared inputs to forecast models
- Potential approaches to delivery of this data sharing and value / risk comparisons
- Other opportunities or concerns with this proposal
- Is there any information you would find useful and for what purpose
- Is there any other use cases we should be considering within our 5 year horizon
- Consideration of reliability / Security of supply
- Should aggregators be obligated to provide dispatch plans
2019
Workgroup discussions
Advisory group input
End of year report recommending an innovation project

2020
Innovation project to develop a Flexible Generation Forecasting model

2021
Complete innovation project
Feedback to ON Share learning

Flexible Generation Forecasting | NIA_WWU_068 | Smarter Networks
Summary of overall project scope & approach

**Problem statement**

- Flexible gas generation is not yet specifically forecasted or included in system operation/control room activities by any network company and to date remains largely an unknown.
- The networks will model gas generation in their network analysis software, which assume optimal demand forecasting.
- So far this has not been a big issue as numbers of sites have been low and overall capacity small.
- However, an increase in flexible gas generation can bring new challenges for network companies. For GDNs, it is driving more volatile, difficult to predict gas demand in the short term (<48 hours). This is having operational impacts for the GDNs.
- **Improved modelling capability, to forecast the operation of flexible gas generation, is therefore needed.**
  - This will support GDNs in operating and managing their networks better.
  - This will also support SPEN, NG ESO and NGGT in gaining more visibility and understanding of flexible gas generation.
- **There is also increased need for improved data sharing between network companies.** If specific data sharing was allowed between network operators, value could be realised in improved operations by GDNs, DNOs and ESO, and in cost savings for customers.

**A four work-package approach**

- **WP1**: review of the current modelling capabilities for flexible generation
- **WP2**: scoping the key drivers and identifying data needs & availability
- **WP3**: model scoping and development
- **WP4**: demonstrating the value of data sharing

**Outputs**

- A robust model
- Compelling articulation & evidence of the need for, and value, in data sharing
- Reporting & supporting documentation & data

**Funding parties:**

- WWU, NGN, SPEN, ESO

**Supporting parties:**

- SGN, Cadent, NGGT
What do we mean by flexible gas generation?

Flexible gas generators are also referred to as gas peakers. These are plants that are usually reciprocating engines or turbines fuelled by natural gas.

Characteristics
- Predominantly reciprocating gas engines
- Distribution network connected
- 2-50MW electrical output
- 500 – 13,500 m³/h peak gas consumption

Strengths
- Fast ramp times
- Low start up costs
- Relatively low capital cost eg compared to CCGTs (400-450 $/kW vs 650-700 $/kW)

Limitations
- 30-40% electrical efficiency, lower than other gas generators such as CCGTs
- High variable operating costs - £70-90/MWh, which results in gas peakers requiring a high spark spread to be economic, leading to operation only at time of high electricity demand or system imbalance.
Drivers for flexible gas operation

So what are the key drivers that we will focus on in the model?

Flexible gas generation operation is driven almost entirely by optimising to electricity market price signals. This occurs over a variety of different time scales.

What drives flex gas generator operation?

There is no single buyer of flexibility in the electricity system.
- This means that flexible gas generators are active in multiple electricity markets, selling to multiple buyers of flexible generation. Flex gas generators will optimise their operation to maximise the revenue they can access from these various revenue streams.

Currently, the core drivers for operation are:
- Day ahead wholesale market prices
- Intraday wholesale market prices
- Balancing mechanism prices and activations
- GDUoS rates

Typically, these drivers incentivise flexible gas generators to:
- Operate during the morning and evening peak periods, when demand is high and margins tight
- Operate at times of high renewable generation, when system imbalance is likely to be greatest

What this means for forecasting gas demand?

Dispatch decisions change within the delivery day – this makes accurate day ahead forecasting challenging
- Within day revenue streams are an important part of the flexible gas generator value stack. The prices for these revenue streams may be forecasted in advance, but these forecasts evolve as the settlement period approaches, leading to changes in dispatch decisions.

Day ahead nominations are often considered commercially sensitive
- Operators will be forecasting likely dispatch scenarios at day ahead stage. However, as these trades have not yet taken place, these forecasts are commercially sensitive, and operators are unwilling to share them with any third parties.
Data availability and who uses what

All system level data that is important for forecasting flexible gas generation is publicly available.

- GDNs are currently not using any of this information.
- NGGT and SPEN are using some of the available data for their own forecasting purposes (not for flexible gas generation).
- NG ESO is using all system level data in some capacity and is producing most of the system level forecasts.

Most of the data that is specific to flexible gas generator sites is not readily available and is sometimes commercially sensitive.

- GDNs have data on the location of sites and occasionally have data on:
  - The number of units at a site, the efficiency of the site and its rating, but only if they have asked the sites directly for this.
  - Gas demand profiles of sites if there are loggers installed, deployment of which is limited currently.
- DNOs have data on the location of sites and:
  - GDUoS rates although these can be commercially sensitive
  - Flexibility tenders

### MAPPING OF WHO USES WHAT

<table>
<thead>
<tr>
<th>Data required for effective forecasting</th>
<th>GDNs</th>
<th>SPEN</th>
<th>NG ESO</th>
<th>NGGT</th>
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</thead>
<tbody>
<tr>
<td>Day ahead electricity price</td>
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<td>Cashout electricity price</td>
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<td>Gas price</td>
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<td>Carbon price</td>
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<tr>
<td>Electricity demand forecasts</td>
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<td>Dispatch data</td>
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<td>Loss-of-load probability (LoLP) and de-rating margin (DRM)</td>
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<tr>
<td>Wind and solar generation output and availability</td>
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<tr>
<td>Number of units on site</td>
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<tr>
<td>Generation efficiency</td>
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<tr>
<td>Electrical power rating</td>
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<td>Gas transportation costs</td>
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<tr>
<td>Other variable operating &amp; start costs</td>
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<tr>
<td>Locality</td>
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<tr>
<td>GDUoS rates</td>
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<tr>
<td>Details on any limitations imposed by gas network on operation profile</td>
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<tr>
<td>Details on any services provided to the power system</td>
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<tr>
<td>Historic real power output (demand profile)</td>
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<td>EU ETS exemption</td>
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</tbody>
</table>
Model output
A flexible gas generator demand forecasting tool

An Excel model forecasting flexible gas generation demand by location or site

User guide for the model

Flexible gas generation forecasting tool documentation

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Model – example outputs
Forecasting of flexible gas generation works well

- The following graphs are comparing all the historical data available between January and March 2020 to the model predictions. Gas data is provided by the GDNs which result in 18 sites for this period.

Overall forecasting of flexible gas generation using the methodology / approach defined in WP3 looks positive and captures the overall behaviour.
The daily trends are well captured by the model

Knowing the type of site is key to understand the behaviour and how accurate the forecast can be.

<table>
<thead>
<tr>
<th>Type of Sites/Number of sites</th>
<th>Degree of accuracy</th>
<th>Type of sites</th>
<th>Example</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Green sites (Upper Half)      | • Very good level of accuracy  
  • R Correlation between the best estimate and historical values >76% | • Strong GDuOS  
  • Day Ahead market driven | • The Drove  
  • Banbury | • Strong GDuOS/Day Ahead market driven  
  o Stronger peak during the evening  
  o Not active at night at all  
  o Usually full on or off  
  o Easier to predict |
| Number of Sites: 6            |                    |               |         |                 |
| Green Sites (Lower Half)      | • Good level of accuracy  
  • R Correlation between the best estimate and historical values >64% | • NV Chasing  
  • STOR Units | • Barton Hill  
  • Basing Stoke | • NV Chasing  
  o Relatively active (20% LF in Jan-Mar 2020)  
  o Not active at night  
  o Traders expectations differ to outturn events  
  • STOR  
  o Less active (6% LF in Jan-Mar 2020)  
  o Usually dispatched when the system is very tight but can be dispatched at night on some occasions |
| Number of Sites: 8            |                    |               |         |                 |
| Amber Sites                  | • Reasonable level of accuracy  
  • R Correlation between the best estimate and historical values >57% | • BM Units  
  • Alcoa  
  • Keekle | • BM Units  
  o Mostly based on the peak at night and evening  
  o More variation in the outputs with a wider range of actions from National Grid  
  o Can be active at night and off-peak hours |
| Number of Sites: 6            |                    |               |         |                 |
| Grey Sites                   | • Behaviour not captured by the model  
  • R Correlation<20% | • Other  
  • CHP | • Alders Way | • Other  
  o Poor data  
  o Unclear pattern not driven by price signal  
  • CHP  
  o Heat and industrial load sites driven |
Key recommendations

The historical consumption is within the range of the forecast with a more accurate estimation for the sites with stronger patterns.

The graphs show some sample days of January for both “Upper Green” and “Amber” sites. The main differences between the two types of sites results in the off peak activity.
Key recommendations
For progressing the model to BAU

Top recommendations to support moving the model from Innovation to BAU

1. **Test the model:** evaluate its impact on forecasting and explore integration with existing processes
2. **Improve logger data:** get more installed, improve quality
3. **Model updates:** if the model proves to be very useful, explore updates (recalibrate with more logger data, technical updates)
4. **GDNs evaluate importance of 2-day ahead forecast:** consider changes in system level inputs

How easy/difficult is it to implement?

- **Difficult**
  - GDNs – aim for majority of sites to have loggers installed
- **Somewhat difficult**
  - GDNs – assess logger data and address quality
  - GDNs – update data inputs regularly
  - GDNs – evaluate importance of 2-day ahead forecast
- **Easy**
  - GDNs – test the model to evaluate the impact it could make on forecasting and improving operations. Explore how it can be integrated with existing modelling processes.
  - GDNs – update model with new sites and any changes to existing sites
  - ALL – request technical annual recalibration updates to the model (for changes in drivers, electricity market)
  - GDNs – recalibration of the model once every 12 months using new logger data collected and new info on site operation

Key: Who are these recommendations for?

- **GDNs**
- **DNOs**
- **ALL**
- **NG ESO**

The voice of the networks
Key recommendations
On process

Top recommendations on process improvements and collaboration across networks

1. Dissemination of results: share results of this study with Open Networks and other key industry players

2. Get site-info directly from sites: update forms and standardise processes

3. Joined-up approach for GDNs-DNOs: improve data sharing starting from the Embedded Capacity Registers

How easy / difficult is it to implement?

Difficult

Somewhat difficult

Easy

When is best to implement?

Short-term

Medium-term

Long-term

Key: Who are these recommendations for?

GDNs

DNOs

ALL

NG ESO

GDNs and DNOs – coordinate to have site names consistent (starting from Embedded Capacity Registers)

GDNs – standardise the data obtained in the connection process for all entities (own & 3rd party)

GDNs and DNOs – consider having a shared database of info for flexible gas generation sites (e.g. adapting the Embedded Capacity Register)

NG ESO – Explore how to improve data availability and transparency of information on STOR contracts

ALL – Present results of this study to Open Networks WS4 group

ALL – Share / disseminate results more widely with the industry e.g. flexible gas generator sites, other DNOs, Ofgem

GDNs – update NExA forms and/or industrial load forms to ask for site specific information that is not commercially sensitive

The voice of the networks
End of session Slido Q&As
Emily Jones (ENA)
Wrap up

Sotiris Georgiopoulos (SG Chair - UKPN)