

Working in partnership

Flexibility Baseline Tool - Functional Specification

Open Networks
February 2022 | Version 1.0

Contents

Introduction.....	3
Functional Specification.....	4

Introduction

This document outlines the final functional specification for the ENA Flexibility Baseline Tool that is being developed for ENA/Open Networks P7 team and funded through SSEN's TRANSITION innovation project.

The ENA's Technical Specification document, "ON21-WS1A-P7 Technical Specification Verification: Technical Specification - Baseline Methodology Verification Tool WS1A Product 7 - June 2021 | Version 1" outlined the initial design, build and testing requirements of a baselining tool to allow UK DNOs and relevant stakeholders the ability to calculate baselines for participation in the UK Distribution flexibility market.

There was significant overlap between this specification and the scope of work already confirmed for TNEI's work for TRANSITION's Flexibility Baseline tool. TNEI conducted a "gap analysis" between these two specifications, which allowed us to identify the extent of the overlap between the projects, and subsequently define the additional scope of work required to meet the ENA's requirements.

This scope of works has been refined further through regular discussions with the ENA and Open Networks P7 team in order to produce the functional specification detailed overleaf. This specification details the requirements of the tool itself, under the following headings:

- **Must** – these detail essential requirements of the tool, and form the minimum requirements of the tool that will be delivered by this project.
- **Should** – these detail additional, desirable elements that will be incorporated into the tool, with time and budget allowing. The order of work to address these will be prioritised according to the ENA/ Open Networks P7 team needs.
- **Could** – these are potential options, dependent on scope, project timeline, and overall priority, that may be incorporated, but are a lower priority to address during this work and may instead be carried over into ongoing work the ENA/Open Networks P7 team are planning for 2022.

Additional reports will be delivered alongside this specification to support the handover and use of the tool, including: a mathematical specification of the algorithms for performing the baselining calculations, and a demonstration and documentation report. These will be provided as separate accompanying documents.

A final handover and project completion report will be delivered by the ENA/Open Networks P7 team with support from TNEI.

Functional Specification

Topic	Must	Should	Could
<p>Methodologies</p>	<p>The tool must allow for baselines to be calculated using several different choices of methodology:</p> <ul style="list-style-type: none"> • Historic/rolling baselines, with 8-in 10 days selected for events on weekdays (2-in-4 for weekends and bank holidays), with an option for a same-day adjustment (SDA) • Nomination baseline • Zero baseline 	<p>The tool should allow users to select between the following configurable baseline options:</p> <ul style="list-style-type: none"> • Rolling X-in-Y baseline • Rolling X-in-Y baseline with fixed SDA 	<p>The tool could allow users to select the following option:</p> <ul style="list-style-type: none"> • Rolling baseline with custom parameters, including a custom SDA window
<p>User-configurable parameters</p>	<p>The tool must allow users to select whether their asset is in Scotland, England or Wales, for the purpose of bank holidays.</p> <p>The tool must allow users to define whether the timestamps in their data refer to the start of the period, or the end of the period.</p>	<p>When selecting a rolling baseline with custom parameters, the tool must allow the user to select the number of days of data that are eligible, and the number of days to select.</p>	<p>The custom parameters could include the time and duration of the same day adjustment window.</p>

<p>Access / hosting / platform</p>	<p>The tool must be hosted online for users to upload data to and then perform baseline calculations. Limits on usage will be defined (these limits are to be agreed with the ENA).</p>		<p>A desktop version of the tool could be published for users to download and use offline.</p>
<p>Publication</p>	<p>The calculations/algorithms that underpin the calculations must be published as a private Python package, accessible by the DNOs and the ENA.</p>		<p>The calculations/algorithms that underpin the calculations could be published on a separate open-source repository, as a publicly available Python package.</p>
	<p>The mathematical specification of the algorithms must be published, and will likely be included as an Annex to the ENA/Open Networks P7 Project Report.</p>		
<p>Data storage</p>	<p>The tool must not store any data that is uploaded for baseline calculations.</p>		
<p>Missing data</p>	<p>When data has been uploaded, the tool must report if there are any missing periods within the event window, and the total duration of these.</p>	<p>The tool should raise a warning if there are any inconsistencies in the data labels between different inputs (e.g. kW vs MWh). Note that by default, the tool rescales the data to kW for performing the calculations.</p>	<p>The tool could include a definition of the minimum acceptable number of days of data for the historic baselines, with a warning raised if the data provided does not meet the criteria. This warning could alert the user to the missing data, or a stronger warning would mean that the data was not accepted by the tool, and no baseline calculations</p>
	<p>For historic baselines, the tool must report for how many of the assessed and eligible days (e.g. 8 and 10) there is missing data, and the total (or average?) duration of missing data.</p>		

Flexibility Baseline Tool - Functional Specification

Open Networks
February 2022

	<p>For nomination baselines, the tool must report if there is missing data in the nomination baseline, and the total duration of missing data.</p>		<p>are performed. (The latter would be dependent on setting an agreed minimum number of days of data required for performing baseline calculations.)</p>
<p>Generation and demand</p>	<p>For nomination baselines, the tool must report if there is an event window defined for which no nomination inputs have been uploaded.</p>	<p>The tool should also allow users to specify a storage site, or a mixed site for example that has both demand and generation, which has positive and negative values.</p>	
	<p>Users must be able to select whether their site is generation or demand. The tool must expect generation input to be positive, and demand input data to be negative.</p>		
	<p>The tool should raise a warning if a generation asset has negative values, and similar for demand, prompting the user to review the input data.</p>		
<p>Input data</p>	<p>The tool should invert graphical values such that demand is still positive for an import constraint, and so on.</p>	<p>The tool must accept data with granularities of half-an-hour and-1 minute.</p>	<p>The tool should accept data more granular than half-an-hour, but no more than 1-minute.</p> <p>The tool could provide input data templates that can be downloaded.</p>

Flexibility Baseline Tool - Functional Specification

Open Networks
February 2022

	<p>The tool must allow users to upload a time-series of measured data for the asset.</p> <p>This data must consist of two columns:</p> <ul style="list-style-type: none">• One column includes timestamps and is labelled either as “time” or “local_time”. The time series should be in either UTC time zone or BST time zone respectively.• The second column includes metering data, and is labelled either as W, kW, MW, Wh, kWh or MWh. Any of these labels will be accepted by the tool. <p>This guidance must be given to users.</p>		
	<p>The tool must allow users to upload a time-series of “required responses” that are defined in the same way as the measured data. This is the response that the asset is expected to provide during a flexibility event. This must always be positive, representing a contribution towards reducing a constraint.</p>	<p>The tool should not accept other granularities of data. If this occurs, the tool should raise a warning to the user and not perform the baseline calculations.</p>	

Flexibility Baseline Tool - Functional Specification

Open Networks
February 2022

	<p>The tool must allow a user to select whether their baseline is being calculated for an import constraint or an export constraint.</p>		
	<p>The tool must allow users to upload a data-set which defines the start- and finish- times of the flexibility events.</p>	<p>The tool should provide some example data for users.</p>	
	<p>For nomination baselines, the tool must allow users to upload a nominated baseline, which must be defined in the same way as the measured data.</p>		
<p>Outputs</p>	<p>The tool must output baselines for every specified event window.</p>	<p>The tool should have the option to report all outputs at a half-hourly granularity, irrespective of the granularity of the input series. If this option is not selected, the tool should calculate baselines at a granularity that matches the input data.</p>	<p>The tool could calculate baselines for every day of data that is provided.</p>
	<p>It must calculate the <i>flexibility response</i>, as the difference between the measured data and the baseline.</p>		<p>The tool could define events as “failures” or the response as “false” if there is no power/energy contributed towards reducing the constraint throughout the whole event window.</p>
	<p>It must allow a user to select a specified day, for which the baseline will then be displayed. This will be done with a calendar heatmap.</p>		
	<p>The baseline must be displayed graphically, with the option to export the output data, including the baseline, the measurement, the calculated response, and the contracted target capacity.</p>		

Flexibility Baseline Tool - Functional Specification

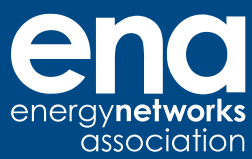
Open Networks
February 2022

	<p>The tool must report whether the flexibility response meets the required response, or is within a predefined % of that, for each event. If so, this event will be labelled “True”.</p> <p>If the response is less than this target %, in any part of the window, it will be labelled as “Partially True”. (The choice of labels can be updated prior to publication of the tool if required.)</p> <p>Note that this does not reflect a DNO’s <i>actual</i> measure of response, it only illustrates a comparison between the required response and the delivered flexibility response.</p>		
<p>Event definitions</p>	<p>The tool must allow users to define event windows for which baselines will be calculated. This will be via a data upload, where the template specifies the event start date and time and end date and time.</p>		<p>The tool could allow users to separately define flexibility event windows, with baselines calculated for every day (irrespective of whether there is a flexibility event or not).</p> <p>Note that when using a same day adjustment, this would require an assumption about what time the baseline calculation should start. This could be the most frequent start and finish times.</p>
	<p>The tool must exclude data from previous events when calculating the baseline.</p>		

Flexibility Baseline Tool - Functional Specification

Open Networks
February 2022

Branding	The tool must show all three logos (SSEN TRANSITION, the ENA, and TNEI) in the pop up information page that will describe the provenance of the tool.		
	The tool must show the ENA logo in the Navigation Bar.		



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