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1. API Set-up

1.1 An Introduction to APIs

An Application Programming Interface (API) is a software intermediary that allows two applications to talk to each other. Imagine you're sitting at a table in a restaurant with a menu of choices to order from. The kitchen is the part of the "system" that will prepare your order. What is missing is the critical link to communicate your order to the kitchen and deliver your food back to your table. That's where the 'Waiter' or API comes in. The waiter is the messenger – or API – that takes your request or order and tells the kitchen – the system – what to do. Then the waiter delivers the response back to you; in this case, it is the food.

In the context of Flexible Power's services, the API replaces the requirement for dedicated hardware to be provided to connect to a participant's sites in order to collect the metering and send control requests from the central control desk.

Participants are expected to develop their own interface for the API to the assets that they intend to offer to Flexible Power. Due to the large variety of potential scenarios that can occur, ranging from a single asset such as a standalone generator through to a complex estate with multiple assets or even part of a portfolio under management by a commercial aggregator. Flexible Power representatives are available to assist in discussions to advise of options that may be appropriate for participants circumstances. The objective of the participant is to establish a single point where they can aggregate the metering from all assets within a CMZ along with communications to send to Flexible Power, and are able to receive start and stop requests. It is at this point that we would expect a device such as a PC would host an API software script that can act as the 'Waiter'.

1.2 Background Information

Every step of this procedure must be performed in the User Acceptance Testing (UAT) environment which offers new participants as a safe environment in which test establish and test the technical aspects of the Flexible Power service. UAT replicates the live environment that is used for operating all Flexible Power services. Participants can use this to establish the API interface as well as familiarise with the diary system used for capacity declaration.

- The UAT Environment (for testing only) is found at: <https://uat.flexiblepowerwpd.co.uk/>
- UAT includes a self-testing environment where participants can set up and test API and declaration procedures.
- A supervised test will be required before a participant is given access to the Production Environment
- The Production environment (live site, dispatching will result in sending a dispatch order to the participants) is found at: <https://prod.flexiblepowerwpd.co.uk>
- Please use a Chrome or Internet Explorer browser to access the platform. The platforms cannot be used on Safari.

1.3 Accessing the Portal for the first time

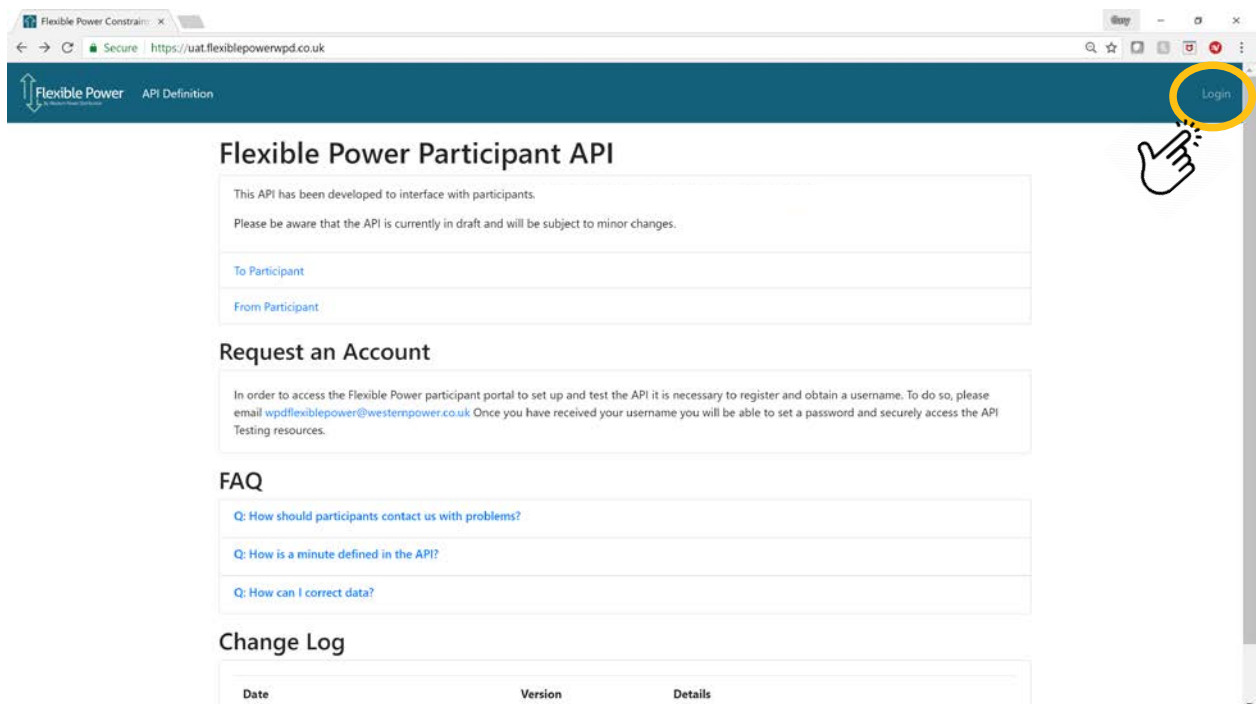
New participants requiring access to the Flexible Power customer portal can do so by providing the following information to WPDFlexiblepower@westernpower.co.uk:

- Organisation / Company name
- Zones in which they wish to declare capacity
- Initial Contact Person's name and email address

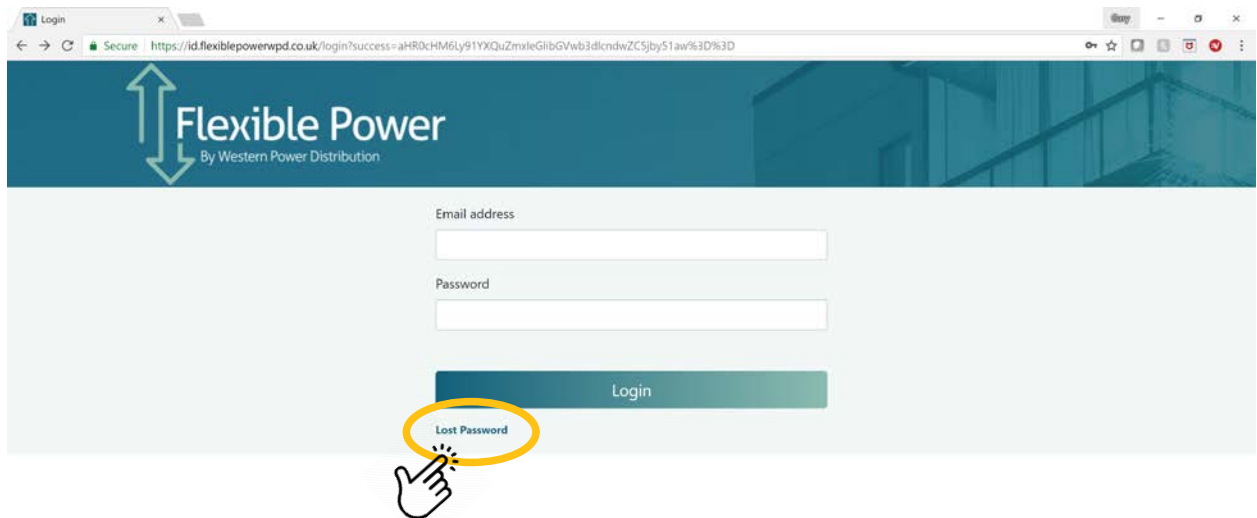
An account will then be created with 3 working days for the user in the User Acceptance Testing (UAT) environment and Flexible Power will send a notification when this has been completed.

The Participant should then visit; <https://uat.flexiblepowerwpd.co.uk/>

Follow the '**Login**' link at the top right corner of the page.



This link will take the user to a page that has a box to input email address and password. On the first time visiting this page the user should use the '**lost password**' link and input the email address previously provided in the email requesting registration.



Please check the email account for an email from Flexible Power with a reset link to create the user's password. (please note, only one user account per organisation is typically provided in the UAT environment, but multiple are permitted when set up in Production)

An email from Flexible Power will allow the user access to the Participant Portal to ensure that the API is fully functioning and to familiarise themselves with the various actions around the declarations processes.

1.4 Submitting Readings

Every participant can send their aggregated reading for each sub-zone via an API. All the information needed by participant to develop this API can be found here.

(https://uat.flexiblepowerwpd.co.uk/docs/api_from_participant_v1_0.html)

In order to allow participants an environment to experiment with development of their API interface, we have created a 'self-test facility' within the UAT portal. To access this;

Login to the UAT Portal and go to '**API Testing**' via the link at the top of the page.

Make sure that all the timestamps are in ISO 8601 UTC.

go to '**Readings**' via the link



Under the 'Readings' title, the participant can see the most recent data points they have sent to the Central Control, compare these data points to the original data points to make sure the data and times are correct.

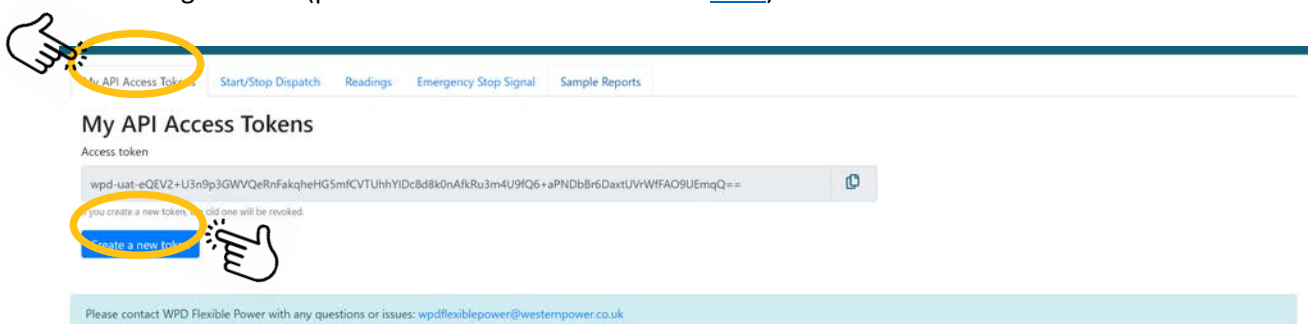
An example 'curl' command to send reading the platform can be found in the grey box at the bottom (circled in blue)

One of the advantages of REST APIs is that you can use almost any programming language to call the endpoint. The endpoint is simply a resource located on a web server at a specific path. Each programming language has a different way of making web calls. Rather than providing different methods to make web calls in a multitude of different languages such as Java, Python, C++, JavaScript, Ruby, and so on, we are able to show the call using curl.

curl provides a generic, language agnostic way to demonstrate HTTP requests and responses. Users can see the format of the request, including any headers and other parameters. This allows Flexible Power Participants to translate this into the specific format for the language they're using.

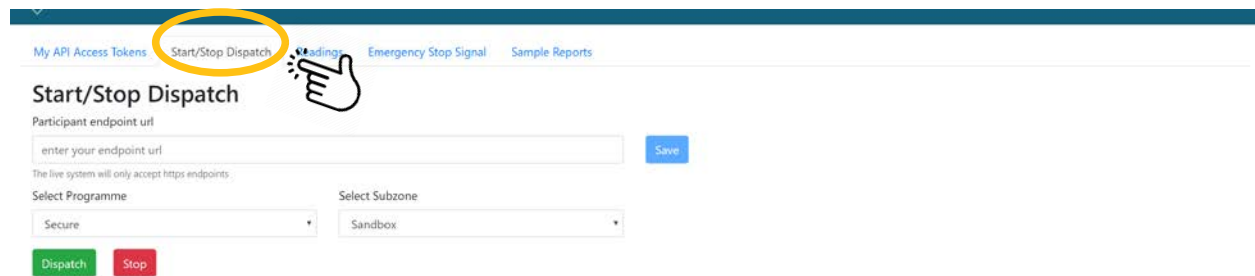
1.5 Testing Dispatch API

Under 'My API access tokens', create an access token that you can use for authorisation purpose when using the APIs (please refer to the API definition [here](#)).



Participants can refresh their unique API token as often as they wish using the 'Create a new token' button. This will automatically update the example curl commands show on the 'readings' and 'emergency stop' pages. Whenever a new token is created it will be necessary to update the API software script for communications to continue.

Now go to 'Start / Stop Dispatch' tab via the link circled below



Under send a test dispatch, add your '**url endpoint**', this is where the dispatch order will be sent to, from WPD Flexible Power Central Control. It will typically be a webserver that can receive the metering data but doesn't have to physically be located where the asset is. Aggregators for example will in most cases have their own systems connected to customer sites to collect data back to their own central facilities which in turn may be located in 'the cloud' rather than at a specific premises.

While developing and self-testing the Participant should choose any programme from the drop down menu (Secure, Dynamic / Restore) and select the '**Sandbox**' subzone. When connecting a site in the 'Production' environment, the subzone will be the name of the CMZ in which a particular asset(s) is located. When ready click on '**Dispatch**'.

This will send a dispatch order via the dispatch API for the '**Sandbox**' sub-zone/program, only to the participant that was added under "participant endpoint url".

The participant is then required to check the endpoint to confirm;

- the dispatch order is received
- the dispatch order is for the chosen programme and 'sandbox' sub-zone

Repeat the same process to confirm that the '**STOP**' signal can also be received to the endpoint.

This concludes the 'self-test' procedure for the API functions. If the participant is happy that they are ready one of the Flexible Power developers will confirm receipt of metering and UAT signals. The participant will then be granted access to the live environment but without access to the constraint zones. A final test will be carried out in conjunction with a member of Flexible Power technical support using the 'sandbox' facility. This provides limited access where participants can experiment safely to interact with the live API connection.

This simply repeats what has already been proven in UAT but the API key and endpoint requires to be created so as to connect to the live system. Once proven, the participant will have all the zones in which they wish to participate added to their CMZ drop down menu.

IMPORTANT NOTE;

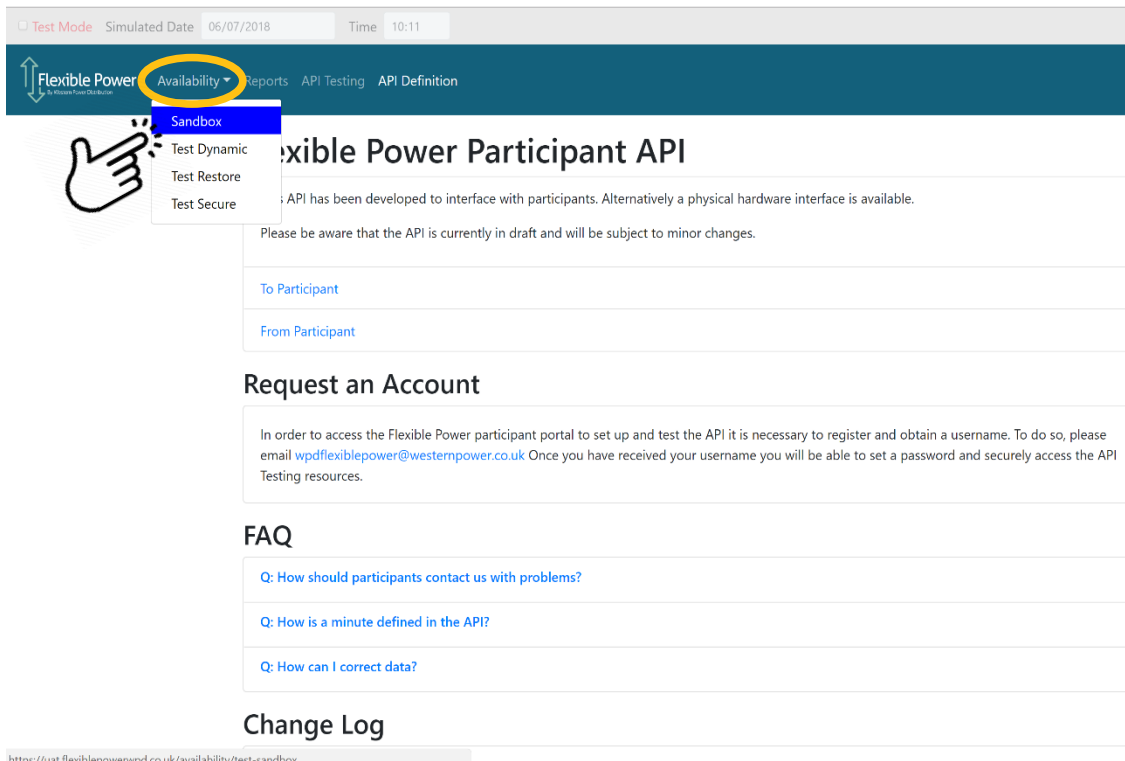
Once a participant has completed the initial set up and testing within the UAT environment they will be provided with a log in to the full production environment. This will require the participant to modify the API to reflect the 'end point' so that they are able to receive the signals to their chosen device and send metering signals / emergency stop to Flexible Power's live environment.

2. UAT Testing

2.1 Creating Declarations in the test environment

In addition to the API functions, the portal includes access to the declarations diary to enable participants to familiarise themselves with the screens within the live environment. This can be used to practice making declarations of capacity. This can be accessed as follows:

- Navigate to <https://uat.flexiblepowerwpd.co.uk/> and log in
- Click on the 'Availability' menu and four zones should be shown in the drop down.
- Select 'Sandbox' from the drop down menu of Zones. In 'Production' environment this will list the zones in which the participant has capacity. Please note that the zone is designated as a 'Dynamic' service zone but the principals are the same for all services.



Test Mode Simulated Date 06/07/2018 Time 10:11

Flexible Power Availability Reports API Testing API Definition

Sandbox

Test Dynamic

Test Restore

Test Secure

Flexible Power Participant API

The API has been developed to interface with participants. Alternatively a physical hardware interface is available.

Please be aware that the API is currently in draft and will be subject to minor changes.

To Participant

From Participant

Request an Account

In order to access the Flexible Power participant portal to set up and test the API it is necessary to register and obtain a username. To do so, please email wpdflexiblepower@westernpower.co.uk Once you have received your username you will be able to set a password and securely access the API Testing resources.

FAQ

Q: How should participants contact us with problems?

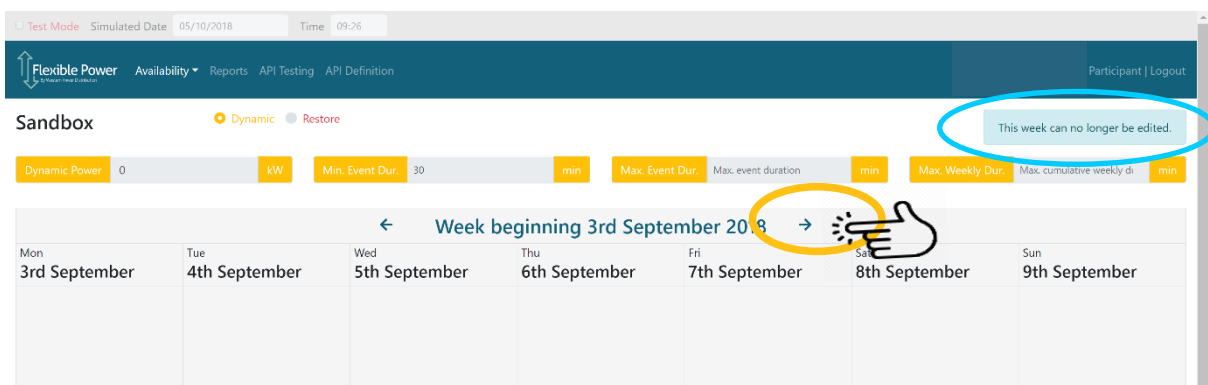
Q: How is a minute defined in the API?

Q: How can I correct data?

Change Log

<https://uat.flexiblepowerwpd.co.uk/availability/test-sandbox>

- There is an information dialogue in the top right that tells you whether the current viewed week is available for editing. Navigate the weeks using the arrows next to the date to find the editable week.



Test Mode Simulated Date 05/10/2018 Time 09:26

Flexible Power Availability Reports API Testing API Definition

Participant | Logout

Sandbox

Dynamic Restore

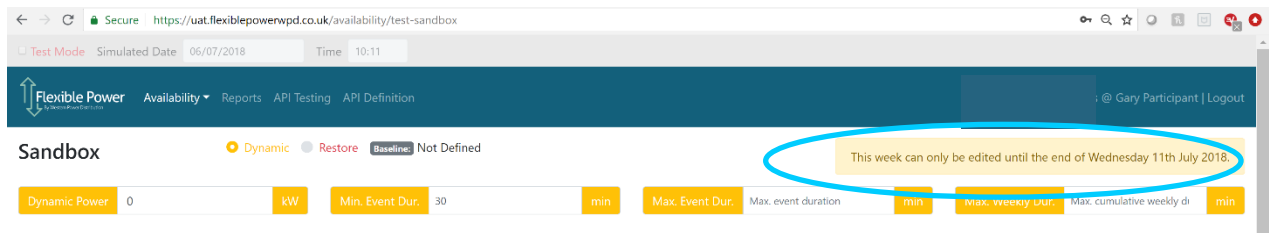
Dynamic Power 0 kW Min. Event Dur. 30 min Max. Event Dur. Max. event duration min Max. Weekly Dur. Max. cumulative weekly duration min

Week beginning 3rd September 2018

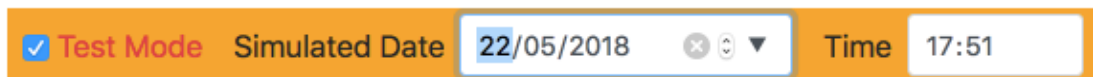
Mon	Tue	Wed	Thu	Fri	Sat	Sun
3rd September	4th September	5th September	6th September	7th September	8th September	9th September

This week can no longer be edited.

Guide to API Set-up & UAT Testing

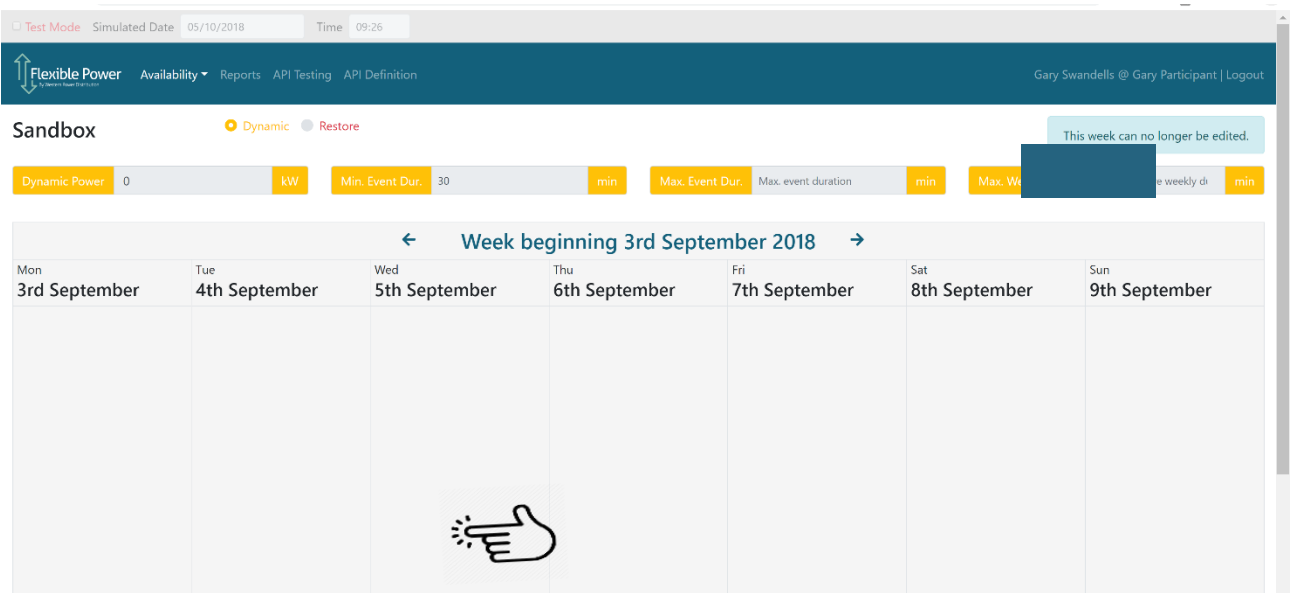


- Alternatively, to make any week editable, you can use the "test Mode". Turn on the test mode in the top left and reduce the date until the week becomes editable. This function is



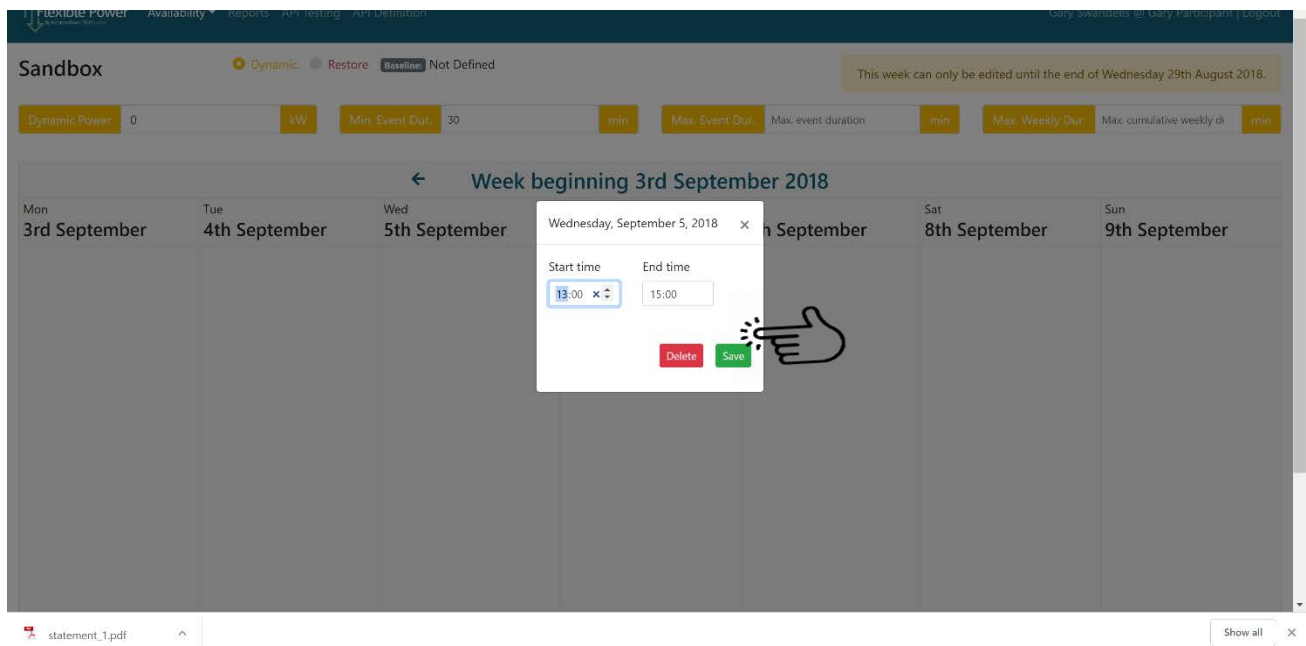
only available in UAT and is present to simplify testing.

- Select a programme in the top left (restore/dynamic/secure). Each zone will only have a maximum of two programmes to choose from. 'Restore' is available in all zones, and then either 'Dynamic' or 'Secure' as they are mutually exclusive.

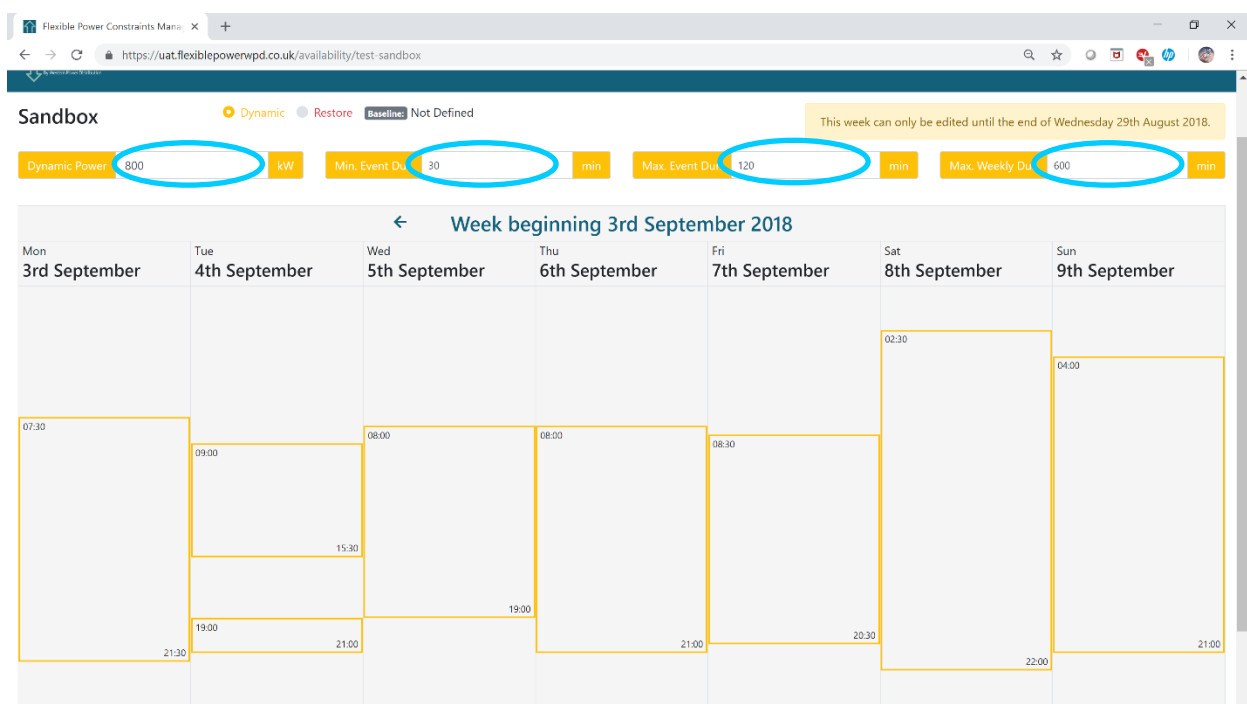


- Click somewhere (under the day you prefer) in the calendar to create a declaration on a day
- Complete the form the add a declaration (press save at the end). Please make a declaration longer than 2 hours for the purpose of this test.

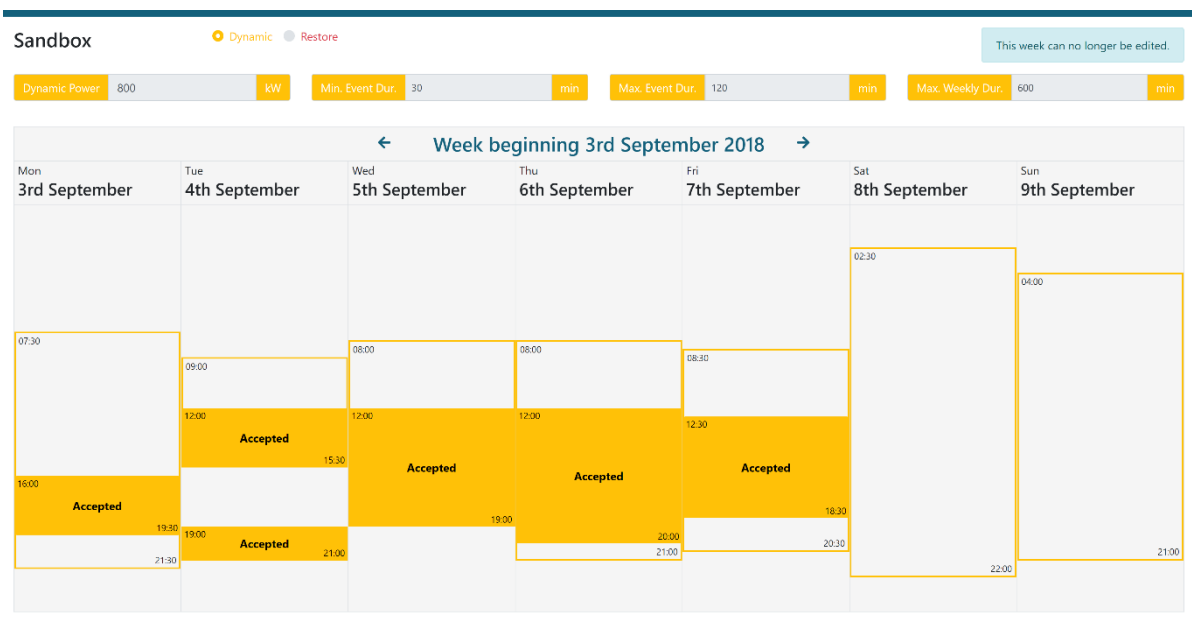
Guide to API Set-up & UAT Testing



- The declaration should display as an empty block, circled in blue below. The declaration will be unsuccessful if the declared capacity is 0 W. Declared windows can be edited or deleted simply by clicking on them again
- Continue adding windows until a full week of simulated declarations has been created. Set weekly values. Please note that if you wish to make a declaration the power value (kW) needs to show a positive value. If left at zero, no declaration will be submitted. The remaining weekly values are provided for the participant to protect processes, assets or fuel reserves to ensure that DSR service parameters stay within a range that is acceptable.



This is the limit of what a Participant can achieve with ‘self-testing’ as they are unable to carry out the weekly acceptance that will be done by Flexible Power and WPD’s Console Operators on a Thursday morning. We have however shown a sample screen below of what accepted windows appear like to help familiarise participants with the formatting.



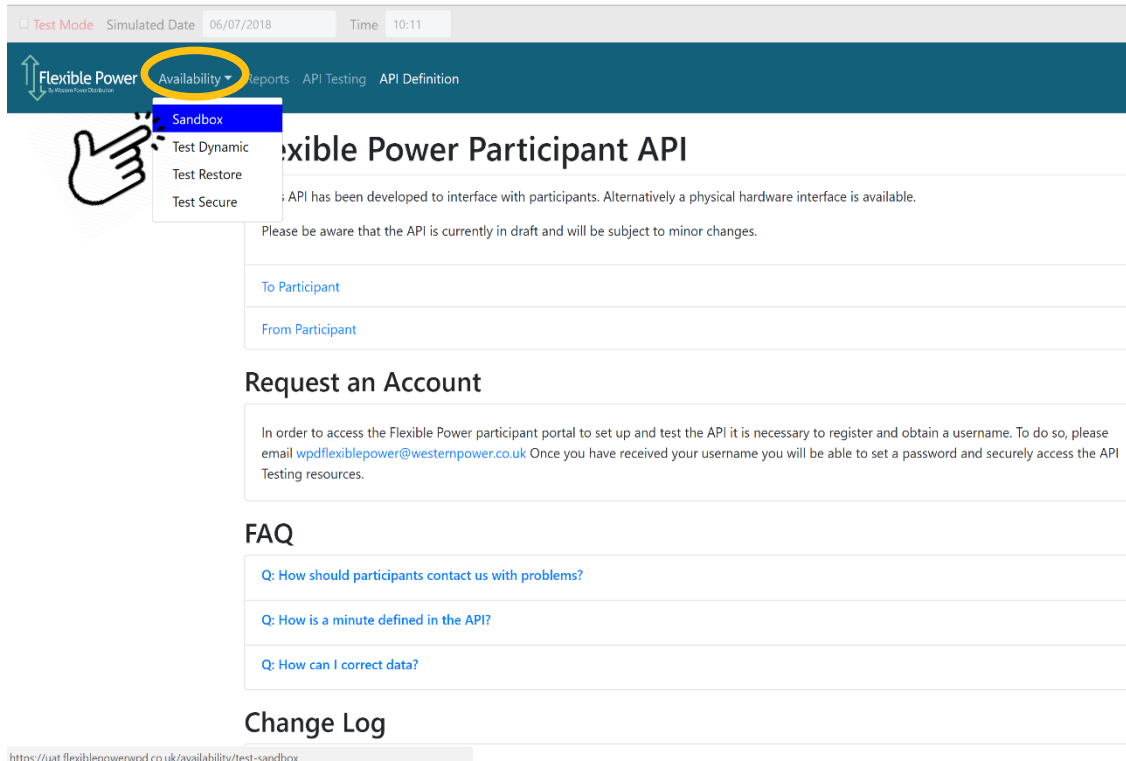
2.2 Sites and Baselines

After testing has been completed and participants are set up in the full Production environment they will have access to all the zones in which they wish to declare capacity. For each zone a single declaration is required, but this can consist of multiple assets and sites for which a single baseline will be used to measure the delivery during DSR events.

When first setting up a zone it is necessary for participants to state their own estimated baseline which will be used for the first month of operation. During the first month, Flexible Power will collect the metering data provided for that zone in order to automatically calculate and update the monthly baseline thereafter.

Guide to API Set-up & UAT Testing

Participants are required to provide details relating to all the sites that are incorporated into the single minute by minute metering signal that is sent to Flexible Power. It is necessary to set up a site in UAT testing. To do so you first need to navigate to the '**Availability**' page in the '**Sandbox**' zone.



The screenshot shows the 'Flexible Power Participant API' page. At the top, there's a navigation bar with 'Availability' highlighted in a yellow circle. A hand icon points to the 'Sandbox' dropdown menu. Below the navigation bar, the page title is 'Flexible Power Participant API'. A note states: 'API has been developed to interface with participants. Alternatively a physical hardware interface is available. Please be aware that the API is currently in draft and will be subject to minor changes.' Below this, there are links for 'To Participant' and 'From Participant'. Further down, there are sections for 'Request an Account' and 'FAQ'. The 'Request an Account' section explains that users need to register and obtain a username to access the API. The 'FAQ' section lists three questions: 'How should participants contact us with problems?', 'How is a minute defined in the API?', and 'How can I correct data?'. At the bottom, there is a 'Change Log' section.

Test Mode Simulated Date 06/07/2018 Time 10:11

Flexible Power Availability Reports API Testing API Definition

Sandbox

Test Dynamic

Test Restore

Test Secure

Flexible Power Participant API

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To Participant

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FAQ

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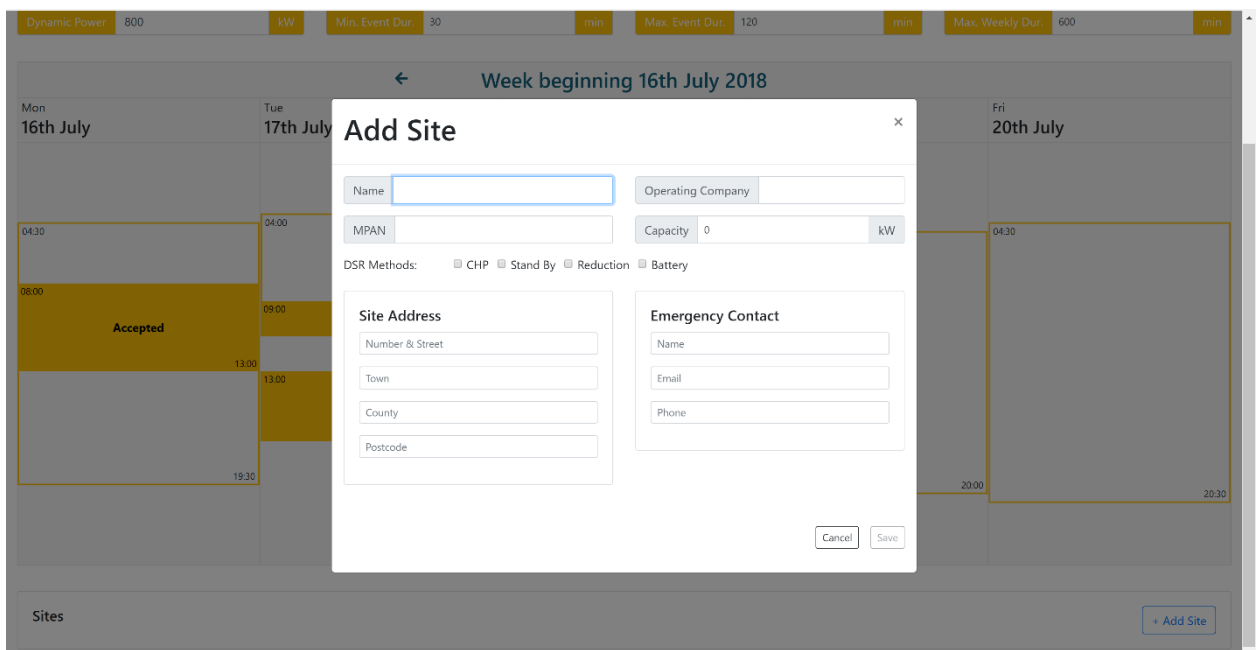
Q: How is a minute defined in the API?

Q: How can I correct data?

Change Log

<https://uat.flexiblepowerwpd.co.uk/availability/test-sandbox>

At the bottom of the 'Availability' page there is a link to 'Add Site'. Click here to trigger a pop up window requesting the details of the site you wish to add to the sandbox zone.



The screenshot shows the 'Add Site' pop-up window. The background is a calendar view for the week beginning 16th July 2018. The pop-up window has a title bar 'Add Site' and a close button. It contains several input fields: 'Name', 'Operating Company', 'MPAN', 'Capacity' (with a unit dropdown set to 'kW'), 'DSR Methods' (with checkboxes for CHP, Stand By, Reduction, and Battery), 'Site Address' (with fields for Number & Street, Town, County, and Postcode), and 'Emergency Contact' (with fields for Name, Email, and Phone). At the bottom of the pop-up are 'Cancel' and 'Save' buttons. The background calendar shows a timeline from 04:30 to 20:30 on Monday 16th July, with a yellow box labeled 'Accepted' from 08:00 to 13:00.

Dynamic Power 800 kW Min. Event Dur. 30 min Max. Event Dur. 120 min Max. Weekly Dur. 600 min

Week beginning 16th July 2018

Mon 16th July Tue 17th July Fri 20th July

Add Site

Name Operating Company

MPAN Capacity 0 kW

DSR Methods: ☐ CHP ☐ Stand By ☐ Reduction ☐ Battery

Site Address

Number & Street

Town

County

Postcode

Emergency Contact

Name

Email

Phone

Cancel Save

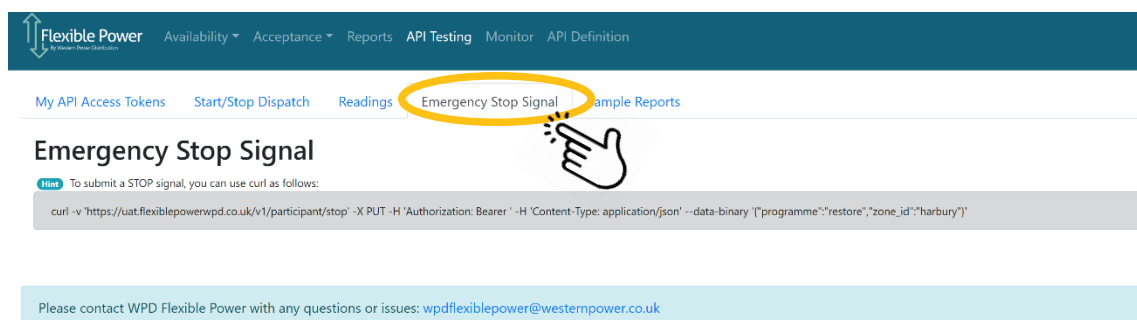
Sites [+ Add Site](#)

Field Name	Description
Name	The name to which the participant would like to use to easily identify a site if in discussion with Flexible Power.
Operating Company	If the participant is providing DSR capacity on behalf of 3 rd parties, please provide the name of the company or organisation that owns the site. This will typically accord with the recorded owner of the MPAN
MPAN	Metering Point Administration Number associated with the site's main connection point. This can include import and export.
Capacity	The maximum theoretic capacity that a site would expect to offer in a DSR event.
Address	Postal address for the site from which the metering is originated. This shouldn't be a correspondence address or central company address.
Emergency Contact	A representative from the site who could be contacted in the unlikely event of an emergency situation. This shouldn't be a central contact unless the site is normally unmanned.

2.3 Emergency Stop by Participants

An optional signal is provided for participants that is not mandatory in order to provide Flexible Power with DSR capacity. It is provided as a facility to participants who would appreciate the capability to ensure sites can rapidly 'opt out' in the event of an emergency. This is not intended to be used as a regularly accessed facility to decide whether or not to deliver DSR based on commercial outcomes or convenience. It has been provided so that in the event of unexpected events occurring during an accepted availability window or armed period there is a single point control where a participant can cease an event or prevent a dispatch which could otherwise have a negative impact on their core activities.

Participants can issue an emergency stop using the template curl command in <https://uat.flexiblepowerwpd.co.uk/testing> 'Emergency Stop Signal' tab for the programme secure and the zone that the secure declaration was made in.



The screenshot shows the Flexible Power UAT testing interface. The top navigation bar includes links for Availability, Acceptance, Reports, API Testing, Monitor, and API Definition. Below this, a secondary navigation bar contains links for My API Access Tokens, Start/Stop Dispatch, Readings, Emergency Stop Signal (highlighted with a yellow circle and a hand cursor), and Sample Reports. The main content area is titled 'Emergency Stop Signal' and includes a 'Hint' section with a curl command for submitting a STOP signal. At the bottom, there is a contact information bar for WPD Flexible Power.

Emergency Stop Signal

Hint To submit a STOP signal, you can use curl as follows:

```
curl -v 'https://uat.flexiblepowerwpd.co.uk/v1/participant/stop' -X PUT -H 'Authorization: Bearer ' -H 'Content-Type: application/json' --data-binary '{"programme":"restore","zone_id":"harbury"}'
```

Please contact WPD Flexible Power with any questions or issues: wpdflexiblepower@westernpower.co.uk

As this signal is sent via the API it is entirely up to a Participant as to what form of trigger will initiate the signal and from what type of device. When the signal is received, Flexible Power will record that time as the end of expected delivery for that day is during a DSR event and withdraw availability for the issue of any events in that zone. This will be automatically reset for the following day, so if a Participant's issues at site can't be resolved they would be expected to contact Flexible Power to request a longer period of 'opt-out'. It does however provide the Participant time to prioritise their

resources to address and assess any issues without the pressure of having to try and contact Flexible Power.

2.4 Reports

The layout of UAT environment is the same as that in Production, but although it is possible to view the 'Reports' page by clicking on the appropriate tab in the navigation bar, it is not possible to provide any reports as these will be created dynamically, drawing on metering data contained in the vault.

2.5 Using the production environment

We have produced a [Participant Portal Guide](#) which provides full details on how to use the portal within the live environment

3. Help & reporting an issue

If you need help or have any problems with the portal you can report them via email to wpdflexiblepower@westernpower.co.uk and a member of our team will assist you. Responses from this mailbox can take up to 3 working days, if you have an urgent query please call the Flexible Power team on 01332 827436.