



Interface Specification

Web API Interface Specification

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1. Introduction

1.1 Purpose

The Swagger documentation should be referred to in preference to this API document. This is an intentional decision to exploit online up-to-date documentation over static documents. The online Swagger documentation will be accurate for that version of the API while this document will be relevant as of the date of release and for the API releases known at its publication.

The purpose of this document is to describe in sufficient detail the method by which external information systems should interface to the Redback Technologies Web API.

Note that the API has online and current documentation through the industry standard Swagger capabilities. This is accessed through the URL as described below in 2.1.1 URL

1.2 Intended Audience

Organisation/Individual	Interest
Installers/System Integrators / VPP providers / Asset managers	Use this document as a guide for managing fleets of Redback Inverters programmatically.

2. Interface Specification

2.1 Overview

This API is provided using RESTful web service endpoints with a JSON payload.

2.1.1 URL

Comment	URL
Base URL	https://api.redbacktech.com

2.1.2 Documentation

The Web API uses [Swagger](#) to provide online and current documentation and the ability to execute example requests. This is accessed through the URL above. Authentication for Swagger is described below.

2.1.3 Date Formats

Date formats follow ISO 8601 in UTC time, as per: <https://www.w3.org/TR/NOTE-datetime>

(Local time must be converted to UTC time before sending.)

Field Type	Format	Example
Date	YYYY-MM-DD	2018-01-22
Date Time	YYYY-MM-DDThh:mm:ssZ	2018-01-22T13:25:56Z

Where:

- YYYY = four-digit year
- MM = two-digit month (01=January, etc.)
- DD = two-digit day of month (01 through 31)
- hh = two digits of hour (00 through 23) (am/pm NOT allowed)
- mm = two digits of minute (00 through 59)
- ss = two digits of second (00 through 59)
- Z = time zone designator for UTC

2.1.4 Throttling

For requests which exceed rate limits HTTP 429 Too Many Requests is returned. The request can be retried later. Rate limits may be subject to change.

Throttling rules are configured and incorporate the endpoint and time period to manage a set limit. They may also restrict on IP or Client Id.

When a limit is exceeded for a configured time period, then subsequent requests will fail until that time period has completed.

Currently the throttle rules are configured to manage catastrophe issues where extreme number of requests are requested.

Consumers should consider the frequency of their requests in line with the resolution of dynamic data and also exploit any batch capabilities offered in the API.

2.2 Authentication

The Web API requires authentication through the Microsoft Identity Platform using OAuth2 flow. Before using a Web API request, a service account and token is required.

2.2.1 Service Account and Secret

A Client Id and Secret are required with two options to obtain:

1. A self-service capability is available in the Redback Portal. It may be found by navigating from the left hand *Support* menu and the *API Access* top level navigation. It provides the Client Id and allows for generation of a Secret.
2. Email request through the customer support team and Redback will securely reply back with the login details.

2.2.2 Obtaining a Token

In combination the Client Id and Client Secret is used to obtain a token as described in [Access token request with a shared secret](#)

The token has an expiry of 1 hour. The implication is that renewal of the token is required.

An example is shown with the post where Client Id and Client Secret are substituted.

Title	Get Token
Description	Get a
URL	https://login.microsoftonline.com/fb46c16c-9144-45e0-87b7-f578abed629f/oauth2/v2.0/token
Method	POST
Headers	application/x-www-form-urlencoded
Body	<pre>scope: "api://f0ea23e1-8533-44ab-8592-509cff0774da/.default" grant_type: "client_credentials" client_id: "Client id here" client_secret: "Client secret here"</pre>
Success Response	<pre>{ "token_type": "Bearer", "expires_in": 3599, "ext_expires_in": 3599, "access_token": "eyJ0eXAiOiJKV1QiLC...QXJiXVg" }</pre>
Notes	

2.2.3 Authentication using Swagger

Redback have enabled the ability to Authorise through Swagger so that a user with a Client Id and Client Secret may securely execute requests.

On accessing on the online documentation through Swagger, the user may obtain a Token by

1. Clicking the Authorise button as shown in Figure 1 Authentication and Authorisation using Swagger

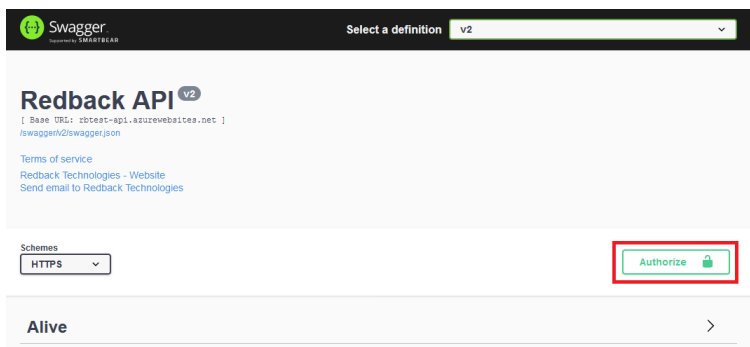


Figure 1 Authentication and Authorisation using Swagger

2. Entering Client Id and Client Secret as shown in Figure 2 Entering credentials using Swagger

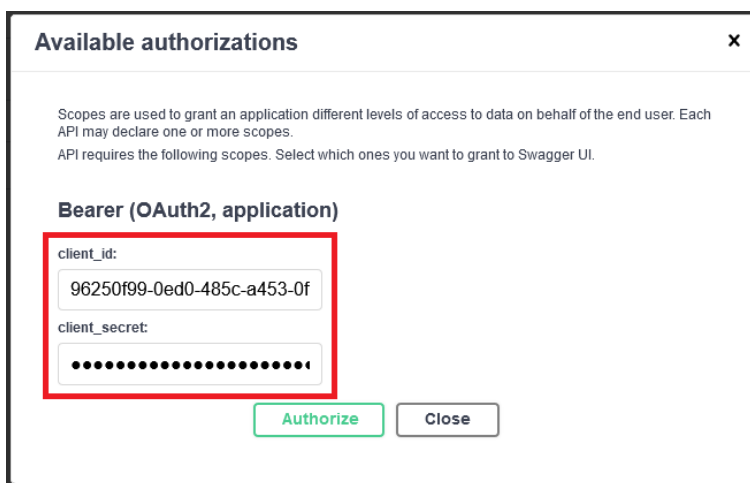


Figure 2 Entering credentials using Swagger

3. Web Requests may be executed securely on the Swagger web page.

2.3 Response Codes

Response Code	Description
200	Successful
400	Bad request body or parameters
401	Unauthorized, missing or expired authentication token
404	Resource not found
413	Request too large (there is a 10MB hard limit by API gateway)
422	Data validation error
429	Too many requests (throttled)
500, 504	Unhandled internal or Gateway error

2.4 Maximum Submission Size

The maximum size limit for submission of a single message to the Web API is 10MB.

The Web API will return a 413 response for submissions that exceed the limit.

It is anticipated that all normal submissions will be well within this limit.

3. API Endpoints version 2.0

Each endpoint is described below including the definition of the request and responses.

For all definitions, it is recommended to use the online documentation (Swagger) which will provide the request and response models.

3.1 Energy Data

3.1.1 Get all Sites

Title	Get All Sites	
Description	Returns all sites for the user in a paged manner.	
URL	/api/v2/EnergyData	
Method	GET	
Parameters	Item	Description
	Page	Page Number from zero for first page
	Page Size	Number of records in the page. Maximum is 100.
Response	Array of Site Ids that are accessible for the authorised user.	
Example	<pre>{ "Page": 0, "PageSize": 5, "PageCount": 5, "TotalCount": 25, "Data": ["S174564f93dcQLD", "S1747b1ee2ccQLD", "S2353dd00d815", "S370d8d817175", "S3a517b466e4e"] }</pre>	

3.1.2 Get all Sites With Nodes

Title	Get All Sites With Nodes	
Description	Returns all sites for the user including Node information such as inverter information in a paged manner.	
URL	/api/v2/EnergyData/With/Nodes	
Method	GET	
Parameters	Item	Description

	Page Page Number from zero for first page Page Size Number of records in the page. Maximum is 100.
Response	Returns Paging information Returns a hierarchy of Energy Data Simple (refer to section 4.1).
Example Response	<pre>{ "Page": 0, "PageSize": 3, "PageCount": 3, "TotalCount": 25, "Data": [{ "Id": "S174564f93dcQLD", "Type": "Site", "Nodes": [{ "SerialNumber": "RB17041101200119", "Id": "RB17041101200119", "Type": "Inverter", "Nodes": null }, { "Id": "Houseload", "Type": "Houseload", "Nodes": null }] }, { "Id": "S1747b1ee2ccQLD", "Type": "Site", "Nodes": [{ "SerialNumber": "RB17051202100048", "Id": "RB17051202100048", "Type": "Inverter", "Nodes": null }, { "Id": "Houseload", "Type": "Houseload", "Nodes": null }] }, { "Id": "S2353dd00d815", "Type": "Site", "Nodes": [{ "SerialNumber": "RB17041101200154", "Id": "RB17041101200154", "Type": "Inverter", "Nodes": null }, { "Id": "Houseload", </pre>

	<pre> "Type": "Houseload", "Nodes": null }] } } </pre>
Notes	TotalCount provides the total number of sites available. Use this to manage the Page and PageSize parameters to return all sites.

3.1.3 Get static data for a Site

Title	Get static information for a site				
Description	Returns static site information including Node information such as inverter information and its Status				
URL	/api/v2/EnergyData/{siteId}/Static				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Site Id</td><td>Unique identifier of a site</td></tr> </table>	Item	Description	Site Id	Unique identifier of a site
Item	Description				
Site Id	Unique identifier of a site				
Response	Returns an Inverter Site Data hierarchy (refer to section 4.7)				
Example Response	<pre> { "Data": { "StaticData": { "TimestampUtc": "2021-02-03T03:26:01.5899408Z", "Location": { "Latitude": -34.8352816, "Longitude": 138.7001319, "AddressLineOne": "Australia Avenue", "AddressLineTwo": null, "Suburb": "Modbury", "State": "South Australia", "Country": "Australia", "PostCode": "5092" }, "TechnologyProvider": "RBT", "RemoteAccessConnection": { "Type": "WIFI", "CustomerChoice": true }, "ApprovedCapacityW": null, "SolarRetailer": { "Name": "Best Energy", "ABN": "87600341112" }, "SiteDetails": { "SiteExportLimitkW": null, "BatteryMaxChargepowerkW": 4.6, "BatteryMaxDischargepowerkW": 4.6, "BatteryCapacitykWh": 0, "UsableBatteryCapacitykWh": 0, </pre>				

	<pre> "PanelModel": "CNPV ", "PanelSizekW": 0, "SystemType": "Hybrid", "InverterMaxExportPowerkW": 5, "InverterMaxImportPowerkW": 5 }, "CommissioningDate": "2019-12-12", "NMI": "NGGG00000000", "LatestDynamicDataUtc": "2021-02-03T03:25:17Z", "Status": "OK", "Id": "S2353dd00d815", "Type": "Site", "DynamicDataMetadata": { "ActiveExportedPowerInstantaneouskWMetadata": { "Measured": true }, "ActiveImportedPowerInstantaneouskWMetadata": { "Measured": true }, "VoltageInstantaneousVMetadata": { "Measured": true }, "CurrentInstantaneousAMetadata": { "Measured": true }, "PowerFactorInstantaneousMinus1to1Metadata": { "Measured": true }, "FrequencyInstantaneousHzMetadata": { "Measured": true }, "BatterySoCInstantaneous0to1Metadata": { "Measured": false }, "PvPowerInstantaneouskWMetadata": { "Measured": false }, "InverterTemperatureCMetadata": { "Measured": true }, "BatteryPowerNegativeIsChargingkWMetadata": { "Measured": false }, "PvAllTimeEnergykWhMetadata": { "Measured": false }, "ExportAllTimeEnergykWhMetadata": { "Measured": true }, "ImportAllTimeEnergykWhMetadata": { "Measured": true }, "LoadAllTimeEnergykWhMetadata": { "Measured": false } } }, "Nodes": [{ "StaticData": { </pre>
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	<pre> "modelName": "SH4600", "batteryCount": 0, "batteryModels": [], "id": "RB17041101200154", "type": "Inverter", "dynamicDataMetadata": null }, "nodes": null }, { "staticData": { "id": "HouseLoad", "type": "HouseLoad", "dynamicDataMetadata": null }, "nodes": null }] } </pre>
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3.1.4 Get dynamic data for a Site by Site Id

Title	Get dynamic information for a site						
Description	Returns dynamic information at site level.						
URL	/api/v2/EnergyData/{siteId}/Dynamic						
Method	GET						
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Site Id</td><td>Unique identifier of a Site</td></tr> <tr> <td>Metadata</td><td>Whether to provide additional metadata. False by default</td></tr> </table>	Item	Description	Site Id	Unique identifier of a Site	Metadata	Whether to provide additional metadata. False by default
Item	Description						
Site Id	Unique identifier of a Site						
Metadata	Whether to provide additional metadata. False by default						
Response	Returns an array of Energy Data (refer to 5.1)						
Notes	For backwards compatibility, this will return the first device that was installed at the Site. A new API, /api/v2/EnergyData/{siteId}/Dynamic/Combined or similar will be provided once the Site model is fully operational.						
Example Response	<pre> { "Data": { "TimestampUtc": "2020-09-07T04:37:44Z", "SiteId": "string", "Phases": [{ "Id": "A", "ActiveExportedPowerInstantaneouskW": 0, "ActiveImportedPowerInstantaneouskW": 0, "VoltageInstantaneousV": 0, "CurrentInstantaneousA": 0, </pre>						

	<pre> "PowerFactorInstantaneousMinus1to1": 0 }], "FrequencyInstantaneousHz": 0, "BatterySoCInstantaneous0to1": 0, "PvPowerInstantaneouskW": 0, "InverterTemperatureC": 0, "BatteryPowerNegativelsChargingkW": 0, "PvAllTimeEnergykWh": 0, "ExportAllTimeEnergykWh": 0, "ImportAllTimeEnergykWh": 0, "LoadAllTimeEnergykWh": 0, "Status": "OK", "Inverters": [{ "SerialNumber": "string", "PowerMode": { "InverterMode": "NoMode", "PowerW": 0 } }] } </pre>
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3.1.5 Get dynamic data for a Serial Number

Title	Get dynamic information for a serial number						
Description	Returns dynamic information for a serial number						
URL	/Api/v2/EnergyData/Dynamic/BySerialNumber/{serialNumber}						
Method	GET						
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Site Id</td><td>Unique identifier of a Site</td></tr> <tr> <td>Metadata</td><td>Whether to provide additional metadata. False by default</td></tr> </table>	Item	Description	Site Id	Unique identifier of a Site	Metadata	Whether to provide additional metadata. False by default
Item	Description						
Site Id	Unique identifier of a Site						
Metadata	Whether to provide additional metadata. False by default						
Response	Returns an array of Energy Data (refer to 5.1)						
Notes	This method may be deprecated and intended for existing consumers only. New consumers should consider using the method accepting the Site Id.						

3.1.6 Get dynamic data for a Site by Site Id [Batch]

Title	Get dynamic information for a batch of sites in a single call
Description	Same as Get Dynamic data for a Site with ability to take up to 100 Site requests in a single call.

URL	/Api/v2/EnergyData/Multiple/Dynamic				
Method	POST				
Parameters	<table><tr><th>Item</th><th>Description</th></tr><tr><td>Site Ids</td><td>An array of Site Ids. Up to 100</td></tr></table>	Item	Description	Site Ids	An array of Site Ids. Up to 100
Item	Description				
Site Ids	An array of Site Ids. Up to 100				
Response	Returns - Total Count of the sites returned. - Returns an array of Energy Data (refer to 5.1)				
Response	<pre>{ "TotalCount": 0, "Data": [{ "TimestampUtc": "2020-09-07T04:37:44Z", "SiteId": "string", "Phases": [{ "Id": "A", "ActiveExportedPowerInstantaneouskW": 0, "ActiveImportedPowerInstantaneouskW": 0, "VoltageInstantaneousV": 0, "CurrentInstantaneousA": 0, "PowerFactorInstantaneousMinus1to1": 0 }], "FrequencyInstantaneousHz": 0, "BatterySoCInstantaneous0to1": 0, "PvPowerInstantaneouskW": 0, "InverterTemperatureC": 0, "BatteryPowerNegativeIsChargingkW": 0, "PvAllTimeEnergykWh": 0, "ExportAllTimeEnergykWh": 0, "ImportAllTimeEnergykWh": 0, "LoadAllTimeEnergykWh": 0, "Status": "OK", "Inverters": [{ "SerialNumber": "string", "PowerMode": { "InverterMode": "NoMode", "PowerW": 0 } }] }] }</pre>				

3.1.7 Get dynamic data for a Serial Number [Batch]

Title	Get dynamic information for a batch of serial numbers	
Description	Same as Get Dynamic data for Serial Number with ability to request up to 100 Serial Numbers in a single request and response.	
URL	/Api/v2/EnergyData/Multiple/Dynamic	
Method	POST	
Parameters	Item	Description
	Serial Numbers	An array of serial numbers. Up to 100.
Response	Returns • Total Count of the sites returned. • Returns an array of Energy Data (refer to 5.1)	

3.1.8 Get dynamic data for a Serial Number at a specific Timestamp

Title	Get dynamic information at a specific timestamp for a serial number	
Description	Batch level retrieval of dynamic data for given serial numbers.	
URL	/Api/v2/EnergyData/{serialNumber}/Dynamic/BySerialNumber/At/{timestamp}	
Method	GET	
Parameters	Item	Description
	Serial Number	Serial Number of an inverter
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	Metadata	Flag to include metadata. Default to false
Response	Returns Energy Data (section 4.1) at that specific timestamp for the serial number	
Notes	Recommend using Site Id instead of Serial Number to get all dynamic information for a site. This API left for past consumers who have not migrated.	

3.1.9 Get dynamic data for a Site at a specific Timestamp

Title	Get dynamic information for a Site at a specific Timestamp	
Description	Retrieval of dynamic data for a Site at a specific timestamp	
URL	/Api/v2/EnergyData/{siteId}/Dynamic/BySerialNumber/At/{timestamp}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	Metadata	Flag to include metadata. Default to false

Success Response	Returns Energy Data (section 4.1) that specific timestamp and Site Id.
Notes	

3.1.10 Get dynamic data for Site over a time period

Title	Get dynamic information for a Site over a time period	
Description	Get site data over a requested time period	
URL	/Api/v2/EnergyData/{siteId}/Dynamic/LatestBeforeUtc/{timestamp}/{periodInMinutes}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes
	Metadata	Flag to include metadata. Default to false
Response	An array of Returns Energy Data (section 4.1) items matching the time window from Timestamp back the number of minutes.	
Notes		

3.1.11 Get dynamic data for Serial Number over a time period

Title	Get dynamic information for a Serial Number over a period of time.	
Description		
URL	/Api/v2/EnergyData/{serialNumber}/Dynamic/BySerialNumber/LatestBeforeUtc/{timestamp}/{periodInMinutes}	
Method	GET	
Parameters	Item	Description
	Serial Number	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes
	Metadata	Flag to include metadata. Default to false
Success Response	An array of Energy Data (section 4.1) items matching the time window from Timestamp back the number of minutes.	
Notes		

3.1.12 Get dynamic data for Site between two timestamps

Title	Get dynamic information for a Site over a time period	
Description	Get site data over a requested time period	
URL	/Api/v2/EnergyData/{siteId}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	StartTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	EndTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimestamp
Response	Returns an array of Energy Data (section 4.1) items matching the time window.	
Notes		

3.1.13 Get dynamic data for Serial Number between two timestamps

Title	Get dynamic information for a Serial Number over a period of time.	
Description		
URL	/Api/v2/EnergyData/{serialNumber}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description
	Serial Number	Unique identifier of a Site
	StartTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	EndTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimestamp
	Item	Description
Success Response	Returns an array of Energy Data (section 4.1) items matching the time window	
Notes		

3.1.14 Get Static Data By NMI

Title	Get Site data by NMI	
Description	Retrieves data by NMI	
URL	/Api/v2/EnergyData/{nmi}/StaticByNmi	
Method	GET	
Parameters	Item	Description
	NMI	Unique identifier of a Site
Response	Returns Site Static Data model	

Notes	
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3.1.15 Get Dynamic Data By NMI

Title	Gets dynamic Site data by NMI	
Description	Retrieves the dynamic data for a NMI	
URL	/Api/v2/EnergyData/{nmi}/DynamicByNmi	
Method	GET	
Parameters	Item	Description
	NMI	Unique identifier of a Site
Response	An Energy Data Simple (section 4.1)	
Notes		

3.1.16 Get Dynamic Data By NMI [Batch]

Title	Get Dynamic data for a batch of NMIs				
Description	Retrieves the dynamic data for a batch of NMIs in a single call				
URL	/Api/v2/EnergyData/Multiple/DynamicByNmi				
Method	POST				
Parameters	<table><tr><th>Item</th><th>Description</th></tr><tr><td>NMIs</td><td>Array of NMIs. Maximum of 100.</td></tr></table>	Item	Description	NMIs	Array of NMIs. Maximum of 100.
	Item	Description			
NMIs	Array of NMIs. Maximum of 100.				
Response	An array of Energy Data Simple (section 4.1) items for the requested NMIs				
Notes	Allows for retrieving of up to 100 items in a single request and response.				

3.1.17 Get dynamic data for NMI at timestamp

Title	Get dynamic information for a NMI at a specific time						
Description	Get dynamic information for a NMI at a specific time.						
URL	/Api/v2/EnergyData/{nmi}/DynamicByNmi/At/{timestamp}						
Method	GET						
Parameters	<table><tr><th>Item</th><th>Description</th></tr><tr><td>NMI</td><td>Unique identifier of a Site</td></tr><tr><td>Timestamp</td><td>UTC timestamp in yyyyMMddTHH:mm:ssZ format</td></tr></table>	Item	Description	NMI	Unique identifier of a Site	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	Item	Description					
	NMI	Unique identifier of a Site					
Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format						
Success Response	An Energy Data Simple (section 4.1) items matching the timestamp						
Notes							

3.1.18 Get dynamic data for Number over a time period

Title	Get dynamic information for a NMI over a period of time.	
Description	Gets dynamic information for a NMI from a particular time point and going back a configurable period.	
URL	/Api/v2/EnergyData/{nmi}/Dynamic/ByNMI/LatestBeforeUtc/{timestamp}/{periodInMinutes}	
Method	GET	
Parameters	Item	Description
	NMI	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes
	Metadata	Flag to include metadata. Default to false
Success Response	An array of Energy Data Simple (section 4.1) items matching the time window from Timestamp back the number of minutes.	
Notes		

3.1.19 Get dynamic data for NMI between two timestamps

Title	Get dynamic information for a NMI over a period of time.	
Description		
URL	/Api/v2/EnergyData/{nmi}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description
	NMI	Unique identifier of a Site
	StartTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	EndTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimestamp
	Item	Description
Success Response	An Energy Data Simple (section 4.1) items matching a time window.	
Notes		

3.2 Inverter APIs

3.2.1 Register an inverter

Title	Register an inverter
Description	Allows the user to register an inverter including additional details
URL	/Api/v2/Inverter/Register

Method	POST
Parameters	<pre>{ "SerialNumber": "RB1010101010", "NMI": "665544443", "Identity": { "FirstName": "First", "LastName": "Name", "Email": "first.name@hotmail.com", "Phone": "10101" }, "Address": { "AddressLineOne": "Address1", "AddressLineTwo": "Address2", "Suburb": "Warrnambool", "State": "VIC", "Country": "Australia", "PostCode": "3280" }, "SolarInformation": { "Manufacturer": "SunShines", "Type": "N", "Panels": [{ "PanelDirection": [None, N, E, W, S, NE, NW, SE, SW] "NumberOfPanels": 20, "WattsPerPanel": 88 }] } }</pre>
Success Response	<pre>{ "Data": { "SerialNumber": " RB1010101010", "SiteId": "100201010QLD" } }</pre>
Notes	

3.3 Schedules (Control) APIs

3.3.1 Create Schedule for a Site

Title	Create Schedule for a Site
Description	A schedule is created for a Site

URL	/Api/v2/Schedule/Create
Method	POST
Parameters	
Response	The Id of the created schedule
Example Response	<pre>{ "Data": { "ScheduleId": "34403-2334343" } }</pre>
Notes	For backwards compatibility, the schedule will be for the first inverter. If a Site becomes a multi-device site, then it will start to use an API specific for multi-device sites.

3.3.2 Create Schedule for a Serial Number

Title	Create Schedule for a serial number														
Description	A schedule is created for a serial number														
URL	/Api/v2/Schedule/Create/By/SerialNumber														
Method	POST														
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Serial Number</td><td>Serial Number of the device</td></tr> <tr> <td>StartTimeUtc</td><td>Start time of schedule.</td></tr> <tr> <td>Duration</td><td>Duration in a timespan format of "HH:MM:SS"</td></tr> <tr> <td>UserNotes</td><td>Free text of notes to attach to schedule</td></tr> <tr> <td>Desired Mode.Inverter Mode</td><td>Refer to Appendix B: Inverter Modes</td></tr> <tr> <td>Desired Mode.ArgumentInWatts</td><td>Number of watts</td></tr> </table>	Item	Description	Serial Number	Serial Number of the device	StartTimeUtc	Start time of schedule.	Duration	Duration in a timespan format of "HH:MM:SS"	UserNotes	Free text of notes to attach to schedule	Desired Mode.Inverter Mode	Refer to Appendix B: Inverter Modes	Desired Mode.ArgumentInWatts	Number of watts
Item	Description														
Serial Number	Serial Number of the device														
StartTimeUtc	Start time of schedule.														
Duration	Duration in a timespan format of "HH:MM:SS"														
UserNotes	Free text of notes to attach to schedule														
Desired Mode.Inverter Mode	Refer to Appendix B: Inverter Modes														
Desired Mode.ArgumentInWatts	Number of watts														
Response	The Id of the created schedule														
Example Response	<pre>{ "Data": { "ScheduleId": "34403-2334343" } }</pre>														
Notes															

3.3.3 Create Schedule for a NMI

Title	Create Schedule for a NMI
Description	A schedule is created for a NMI
URL	/Api/v2/Schedule/Create/By/NMI
Method	POST

Parameters	Item	Description
	NMI	Unique meter identification of a site
	StartTimeUtc	Start time of schedule.
	Duration	Duration in a timespan format of "HH:MM:SS"
	UserNotes	Free text of notes to attach to schedule
	Desired Mode.ArgumentInWatts	Number of watts
Response	The Id of the created schedule	
Example Response	<pre>{ "Data": { "ScheduleId": "34403-2334343" } }</pre>	
Notes		

3.3.4 Get Schedules for a Site

Title	Get Schedules for a Site	
Description	Gets all schedules for a site	
URL	/Api/v2/Schedule/By/Site/{siteId}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identification of the Site
	includeState	Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.
Response	Returns an array of Schedule (refer to section 4.6) divided between Daily Schedules and Schedule	
Example Response	<pre>{ "Data": { "DailySchedules": [{ "StartTime": "2021-0201T12:34:10Z", "Duration": "60", "DaysActive": "1", "TimezoneIANA": "E. Australia", "DesiredMode": { "InverterMode": "ChargeBattery", "ArgumentInWatts": 1000 } }] } }</pre>	
Notes	Lists all the schedules for a site	

	For backwards compatibility, the schedule will be for the first device that was installed. A new API will be made available for multi-device Sites.
--	---

3.3.5 Get Schedules for a Serial Number

Title	Get Schedules for a Serial Number						
Description	Gets all schedules for a specific inverter as identified by the serial number						
URL	/Api/v2/Schedule/By/SerialNumber/{serialNumber}						
Method	GET						
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Serial Number</td><td>The serial number of the inverter.</td></tr> <tr> <td>includeState</td><td>Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.</td></tr> </table>	Item	Description	Serial Number	The serial number of the inverter.	includeState	Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.
Item	Description						
Serial Number	The serial number of the inverter.						
includeState	Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.						
Response	Returns an array of Schedule (refer to section 4.6) divided between Daily Schedules and Schedule						
Example Response	<pre>{ "Data": { "DailySchedules": [{ "StartTime": "2021-0201T12:34:10Z", "Duration": "60", "DaysActive": "1", "TimezoneIANA": "E. Australia", "DesiredMode": { "InverterMode": "ChargeBattery", "ArgumentInWatts": 1000 } }] } }</pre>						
Notes							

3.3.6 Get Schedules for a NMI

Title	Get Schedules for a NMI						
Description	Similar to getting schedules by Site, it uses the NMI to identify the particular site.						
URL	/Api/v2/Schedule/By/NMI/{nmi}						
Method	GET						
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>NMI</td><td>National Metering Identifier for the site</td></tr> <tr> <td>includeState</td><td>Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.</td></tr> </table>	Item	Description	NMI	National Metering Identifier for the site	includeState	Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.
Item	Description						
NMI	National Metering Identifier for the site						
includeState	Flag indicating if historical schedules are returned. Note that historical schedules may be archived and not available regardless of flag setting.						

Response	Returns an array of Schedule (refer to section 4.6) divided between Daily Schedules and Schedule
Example Response	<pre>{ "Data": { "DailySchedules": [{ "StartTime": "2021-0201T12:34:10Z", "Duration": "60", "DaysActive": "1", "TimezoneIANA": "E. Australia", "DesiredMode": { "InverterMode": "ChargeBattery", "ArgumentInWatts": 1000 } }] } }</pre>
Notes	

3.3.7 Get Schedule by Schedule Id for a Site, Serial Number of NMI

Title	Get Schedules for a Site, Serial Number or NMI	
Description	Gets a specific schedule for either a Site, Serial Number or NMI	
URL	/Api/v2/Schedule/By/Site/{siteId}/{scheduleId} /Api/v2/Schedule/By/SerialNumber/serialNumber/{scheduleId} /Api/v2/Schedule/By/Nmi/[nmi]/{scheduleId}	
Method	GET	
Parameters	Item	Description
	Site Id Serial Number NMI	Either the Site Id, Serial Number or NMI to target for the query.
	Schedule Id	Unique identification of the schedule
Response	Returns an array of Schedule (refer to section 4.6) divided between Daily Schedules and Schedule	
Example Response	<pre>{ "Data": { "DailySchedules": [{ "StartTime": "2021-0201T12:34:10Z", "Duration": "60", "DaysActive": "1", "TimezoneIANA": "E. Australia", "DesiredMode": { "InverterMode": "ChargeBattery", "ArgumentInWatts": 1000 } }] } }</pre>	

	<pre> }] }</pre>
Notes	If the schedule does not exist for the targeted site or device, no information is returned.

3.3.8 Delete Schedule by Schedule Id of Site, Serial Number or NMI

Title	Delete a specific schedules for a Site, Serial Number or NMI	
Description	Gets a specific schedule for either a Site, Serial Number or NMI	
URL	/Api/v2/Schedule/By/Site/[siteId]/[scheduleId] /Api/v2/Schedule/By/SerialNumber/serialNumber]/[scheduleId} /Api/v2/Schedule/By/Nmi/[nmi]/[scheduleId}	
Method	DELETE	
Parameters	Item	Description
	Site Id Serial Number NMI	Either the Site Id, Serial Number or NMI to target for the query.
	Schedule Id	Unique identification of the schedule to delete
Response	A flag indicating success or failure.	
Notes	If the schedule does not exist for the targeted site or device, no information is returned.	

3.4 Operating Envelopes

3.4.1 Overview

Consider the following guidelines when designing operating envelope calls:

- A single Control in an Operating Envelope. This means you can be certain of the status of the operating envelope.
- Delete Operating Envelopes that are no longer valid. Although there is a superceeding concept, this will ensure the operating envelope cannot be considered for execution.

Controls are evaluated in time intervals of 15 seconds. The best matching operating envelope will be executed in the order of:

1. Matching Control
2. Start and End times cover the time interval
3. Is Network level priority
4. Created First

3.4.2 Create Operating Envelope for a Site

Title	Operating Envelope
Description	Sends an envelope
URL	/Api/v2/OperatingEnvelope/Create/By/Site
Method	POST

Parameters	Item	Description
	Envelope	An Create Operating Envelope request (Refer to section 4.3)
Response	Returns a Create Operating Envelope Response (refer to section 4.4)	
Notes		

3.4.3 Create Operating Envelope for a Site [Batch]

Title	Operating Envelope - Batch	
Description	Sends an operating envelope up to 100 in a batch	
URL	/Api/v2/OperatingEnvelope/Create/Multiple/By/Site	
Method	POST	
Parameters	Item	Description
	Envelope	An array of Create Operating Envelope (Refer to section 4.3). Maximum of 100
Response	An array of Create Operating Envelope Response (refer to section 4.4) for each item in the request.	
Notes	Recommended API for efficiently sending large numbers of operating envelopes.	

3.4.4 Create Dynamic Operating Envelope by NMI

Title	Operating Envelope	
Description	Sends an envelope	
URL	/Api/v2/OperatingEnvelope/Create/By/Nmi	
Method	POST	
Parameters	Item	Description
	Envelope	An Create Operating Envelope request (Refer to section 4.3)
Response	Returns a Create Operating Envelope Response (refer to section 4.4)	
Notes		

3.4.5 Create Dynamic Operating Envelope by NMI [Batch]

Title	Operating Envelope by NMI - Batch	
Description	Sends a batch of operating envelopes based on NMI	
URL	/Api/v2/OperatingEnvelope/Create/Multiple/By/Nmi	
Method	POST	

Parameters	Item	Description
	Envelope	An array of Create Operating Envelope (Refer to section 4.3). Maximum of 100
Response	An array of Create Operating Envelope Response (refer to section 4.4) for each item in the request.	
Notes	Recommended API for efficiently sending large numbers of operating envelopes.	

3.4.6 Create Dynamic Operating Envelope for a Group

Title	Operating Envelope by NMI - Batch	
Description	Sends a batch of operating envelopes based on NMI	
URL	/Api/v2/OperatingEnvelope/Add/By/Group	
Method	POST	
Parameters	Item	Description
	Envelope	A Create Operating Envelope (Refer to section 4.3) with the Group id
Response	A Create Operating Envelope Response (refer to section 4.4) for the Group.	
Notes		

3.4.7 Delete Dynamic Operating Envelope

Title	Delete an Operating Envelope	
Description	Deletes an operating envelope	
URL	/Api/v2/OperatingEnvelope/By/EventId/{eventId}	
Method	DELETE	
Parameters	Item	Description
	Event Id	Identification given to Operating Envelope on creation.
Response	A flag indicating if successful.	
Notes		

3.4.8 Get Operating Envelopes by Event

Title	Gets an operating envelope for an event	
Description	Gets an operating envelope for the specified EventId	
URL	/Api/v2/OperatingEnvelope/By/EventId/{eventId}	
Method	GET	
Parameters	Item	Description
	Event Id	Identification given to Operating Envelope on creation.
	pastHours	Number of hours in the past to include.

	If not provided, only envelopes finishing in the future are included. Envelopes ending more than 7 days ago are not returned.
Response	Returns Total Count of records returned Array of Operating Envelope model (refer to section 4.5)
Notes	

3.4.9 Delete Dynamic Operating Envelope - All

Title	Delete all operating envelopes
Description	Deletes all operating envelopes owned by the sender
URL	/Api/v2/OperatingEnvelope/All
Method	DELETE
Parameters	None
Response	A flag indicating if successful.
Notes	

3.4.10 Get Operating Envelopes by Site

Title	Gets an operating envelope for a Site	
Description	Gets all operating envelopes for a site	
URL	/Api/v2/OperatingEnvelope/By/Site/{siteId}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier for a site.
	pastHours	Number of hours in the past to include. If not provided, only envelopes finishing in the future are included. Envelopes ending more than 7 days ago are not returned.
Response	Returns Total Count of records returned Array of Operating Envelope model (refer to section 4.5)	

3.4.11 Get Operating Envelopes by NMI

Title	Gets operating envelopes for a NMI	
Description	Gets all operating envelopes for a NMI	
URL	/Api/v2/OperatingEnvelope/By/Nmi/{nmi}	
Method	GET	
Parameters	Item	Description
	NMI	Unique metering identification linked to a site

	pastHours Number of hours in the past to include. If not provided, only envelopes finishing in the future are included. Envelopes ending more than 7 days ago are not returned.
Response	Returns Total Count of records returned Array of Operating Envelope model (refer to section 4.5)

3.4.12 Get Operating Envelopes by Group

Title	Gets operating envelopes for a Group	
Description	Gets all operating envelopes for a Group	
URL	/Api/v2/OperatingEnvelope/By/Group/{group}	
Method	GET	
Parameters	Item	Description
	Group	Name of a group
	pastHours	Number of hours in the past to include. If not provided, only envelopes finishing in the future are included. Envelopes ending more than 7 days ago are not returned.
Response	Returns Total Count of records returned Array of Operating Envelope model (refer to section 4.5)	
Notes	Groups must be pre-defined and provided by Redback.	

3.4.13 Get Operating Envelopes Compliance Report

Title	Returns a compliance report for a Group	
Description	Gets compliance report for a group	
URL	/Api/v2/OperatingEnvelope/RequestComplianceReport/By/Group/{group}	
Method	POST	
Parameters	Item	Description
	Group	Name of a group
Response	A Compliance report structure	
Example Response	<pre>{ "Data": { "Id": "string", "Status": "Queued", "DownloadLink": "string", "PerecentageComplete": 0, "Message": "string", "ColumnDefinitions": { "NMI": "string", "SiteId": "string", "SitePowerW": 0, </pre>	

	<pre> "LastConnectionUtc": "2022-10-31T06:59:45.750Z", "AddressLineOne": "string", "AddressLineTwo": "string", "State": "string", "PostCode": "string", "Suburb": "string", "SiteExportLimitEnabled": true, "SiteExportLimitW": 0, "IsDisconnected": "string", "IsOnline": "string", "GenerationStatus": "string", "Comment": "string" } } } </pre>
Notes	Groups must be pre-defined and provided by Redback.

3.5 Site

3.5.1 Site by Serial Number

Title	Site by Serial Number				
Description	Allows the user to determine a Site from a Serial Number				
URL	/Api/v2/Site/SiteId/By/SerialNumber/{serialNumber}				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Serial Number</td><td>Unique identifier of an inverter.</td></tr> </table>	Item	Description	Serial Number	Unique identifier of an inverter.
Item	Description				
Serial Number	Unique identifier of an inverter.				
Notes	Used in situations where the Serial Number is well known and need to resolve Site Id for use in the Site specific APIs				
Response	Site Id for the requested Serial Number.				

3.5.2 Site by NMI

Title	Site by NMI		
Description	Gets the Site ID based on NMI		
URL	/Api/v2/Site/SiteId/By/Nmi/{Nmi}		
Method	GET		
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> </table>	Item	Description
Item	Description		

	NMI Unique identifier of a site
Notes	NMI may not be populated for a Site.
Response	Site Id for the requested Serial Number.

3.6 Configuration

The Configuration APIs allow for the reading of configuration settings of an inverter.

3.6.1 Configuration by Site Id

Title	Configuration of a site				
Description	Gets configuration data of each device at a Site				
URL	/Api/v2/Configuration/{siteId}/Configuration				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>SiteId</td><td>Unique identification of a site.</td></tr> </table>	Item	Description	SiteId	Unique identification of a site.
Item	Description				
SiteId	Unique identification of a site.				
Notes					
Response	An array of Inverter Configurations (refer to section 4.8)				

3.6.2 Configuration by Site Id [Batch]

Title	Configuration for multiple sites.				
Description	Gets configuration data of each device based on a list of Sites.				
URL	/Api/v2/Configuration/Multiple/Configuration				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Array of Site Ids</td><td>List of site Ids to get configuration</td></tr> </table>	Item	Description	Array of Site Ids	List of site Ids to get configuration
Item	Description				
Array of Site Ids	List of site Ids to get configuration				
Notes					
Response	An array of Inverter Configurations (refer to section 4.8)				

3.6.3 Configuration by Serial Number

Title	Configuration for an inverter
-------	-------------------------------

Description	Gets configuration data of inverter based on serial number.				
URL	/Api/v2/Configuration/BySerialNumber/{serialNumber}				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Serial Number</td><td>Unique serial number of an inverter.</td></tr> </table>	Item	Description	Serial Number	Unique serial number of an inverter.
Item	Description				
Serial Number	Unique serial number of an inverter.				
Notes					
Response	Inverter Configurations (refer to section 4.8)				

3.6.4 Configuration by Serial Number [Batch]

Title	Configuration for an inverter by serial number				
Description	Gets configuration data of each device at a Site				
URL	/Api/v2/Configuration/Multiple/BySerialNumber/Configuration				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Array of Serial Number</td><td>List of serial numbers.</td></tr> </table>	Item	Description	Array of Serial Number	List of serial numbers.
Item	Description				
Array of Serial Number	List of serial numbers.				
Notes					
Response	Inverter Configurations (refer to section 4.8)				

3.6.5 Configuration by NMI

Title	Configuration of inverters based on NMI				
Description	Gets configuration data of each device linked to the NMI				
URL	/Api/v2/Configuration/{nmi}/ConfigurationByNmi				
Method	GET				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>NMI</td><td>NMI of the Site</td></tr> </table>	Item	Description	NMI	NMI of the Site
Item	Description				
NMI	NMI of the Site				
Notes					
Response	Inverter Configurations (refer to section 4.8)				

3.6.6 Configuration by NMI [Batch]

Title	Configuration for a list of NMIs	
Description	Gets configuration data of each device linked to the list of NMIS	
URL	/Api/v2/Configuration/Multiple/ConfigurationByNmi	
Method	GET	
Parameters	Item	Description
	Array of NMIs	List of NMIs
Notes		
Response	Inverter Configurations (refer to section 4.8)	

4. Schema Definitions version 2.0

4.1 Energy Data Simple

Item	Description
Id	Id of the Node dependent on Type - Site – Site Id - Inverter – Serial Number - Houseload – “Houseload”
Nmi	Unique identifier of a Site and populated in child nodes of Site.
Type	Type of Node - Site - Inverter – an inverter model - Houseload
Nodes	Access to any child nodes in the same structure. A Site Node will have an inverter child node for each inverter on site and a single Houseload node.

4.2 Energy Data

Field	Description		
Site Id	Unique identifier of a Site		
TimestampUtc	UTC date for the data		
FrequencyInstantaneousHz	Current Frequency		
BatterySoCInstantaneous0to1	Battery state of charge as decimal between 0 and 1 (100%).		
PvPowerInstantaneouskW	PV Power in kilowatts		
InverterTemperatureC	Inverter Temperature		
BatteryPowerNegativeIsChargingkW	Battery Power		
PvAllTimeEnergykWh	Accumulation of total energy from PV in kWh. This value should increase but there may be circumstances where a meter is reset to zero.		
ExportAllTimeEnergykWh	Accumulation of total energy to grid in kWh This value should increase but there may be circumstances where a meter is reset to zero.		
ImportAllTimeEnergykWh	Accumulation of total energy from grid in kWh. This value should increase but there may be circumstances where a meter is reset to zero.		
LoadAllTimeEnergykWh	Accumulation of load in kWh. This value should increase but there may be circumstances where a meter is reset to zero.		
Status	<table><tr><th>Value</th><th>Description</th></tr></table>	Value	Description
Value	Description		

Field	Description
	OK All inverters are online and connected and sending telemetry. Offline Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue. Fault Any inverter in the site has reported an error of a configured severity that requires attention by the maintaining installer.
<i>Inverters</i>	Node containing an array of Inverter models. One for each inverter on the site.
<i>Phases</i>	Node containing an array of Phases

4.2.1 Inverters

Item	Description
Serial Number	Unique Identifier of an inverter
PowerMode.Inverter Mode	Refer to Appendix B: Inverter Modes
PowerMode.PowerW	Power in watts

4.2.2 Phases

Item	Description
Id	Name of the Phase 'A', 'B', 'C'
ActiveExportedPowerInstantaneouskW	Active power being exported to grid in Kw. Zero if importing.
ActiveImportedPowerInstantaneouskW	Active power being imported from grid in Kw. Zero if exporting.
VoltageInstantaneousV	Instantaneous Voltage
CurrentInstantaneousA	Instantaneous Current
PowerFactorInstantaneousMinus1to1	Power Factor as decimal value between 0 and 1

4.3 Create Operating Envelope

Field	Description
[Site Id NMI GroupId]	Depending on the request type, it will be one of the following identifiers to determine the scope of the operating envelope. Refer to the API definition to confirm. Site Id

Field	Description
	- NMI - Group Id
Event Id	String up to 128 characters. A custom value that may be shared between operating envelopes as a design option.
StartAtUtc	UTC timestamp on the start time of the operating envelope.
EndAtUtc	UTC timestamp of the end time of the operating envelope.
MaxImportPowerW	Maximum import power from the grid in Watts. Zero will stop importing.
MaxExportPowerW	Maximum import power from the grid in Watts. Zero will stop importing.
MaxDischargePowerW	Maximum discharge from the battery in Watts. Zero will stop discharge.
MaxChargePowerW	Maximum charge to the battery in Watts. Zero will stop charging.
MaxGenerationPowerVA	Maximum generation from the inverter. Zero will stop generation. Note: Generation limit is from the Grid Interactive Port and so will not stop generation from charging a battery, for example.

4.4 Create Operating Envelope Response

Field	Description
Site Id	Unique identification of a Site
NMI	The meter identification number for the Site.
Event Id	The value requested for Event Id of the operating envelope on its creation.
Error Message	Null if successfully created. If not successfully created, a message explaining the reason.

4.5 Operating Envelope

Field	Description
Event Id	Identifier assigned to the operating envelope by the requester on creation.
Nmi	Unique meter identification linked to the Site
Site Id	Unique identification of the Site
StartAtUtc	UTC timestamp on the start time of the operating envelope.
EndAtUtc	UTC timestamp of the end time of the operating envelope.
MaxImportPowerW	As per field defined in 4.3 Create Operating Envelope

Field	Description
MaxExportPowerW	As per field defined in 4.3 Create Operating Envelope
MaxDischargePowerW	As per field defined in 4.3 Create Operating Envelope
MaxChargePowerW	As per field defined in 4.3 Create Operating Envelope
MaxGenerationPowerVA	As per field defined in 4.3 Create Operating Envelope
IsNetworkLevel	Flag if the operating envelope has been created and scheduled by an energy network. Network level operating envelopes have higher priority than non-network level.
ReportedStartUtc	Reported time of when the operating envelope was applied
ReportedFinishUtc	Time when the operating envelope stopped being applied
Status	Status of envelope (refer to section 4.5.1 for definition)

4.5.1 Status Enumeration

Value	Description
OldUnreported	Old control that was scheduled, but unable to report when it finished.
New	New Control created from, awaiting evaluation to existing controls.
Scheduled	Control received and scheduled in as provided.
Cancelled	Control has been cancelled as requested.
ReportStarted	Commenced control has reported back that it has started.
ReportFinished	Completed control has reported back that it has finished.
SupersededPriorToStart	Previously scheduled control, has been superseded prior to starting.
FutureSupersede	Previously scheduled and started control, has had its duration shortened, to support a new control which will supersede it when the time comes.
SupersededAfterStart	Previously scheduled and started control, has now been superseded by a later control
FutureCancel	Previously scheduled and started control, has been cancelled and is expect to finish running on the device shortly.
CancelledAfterStart	Previously scheduled and started control, has now been cancelled
RejectedPastEvent	Control received and rejected due to completion in the past.
RejectSuperseded	Control received and rejected due to another control received at the same time that takes priority.

4.6 Schedule [and Daily Schedule]

Item	Description
ScheduleId	Unique identification of schedule
Site Id	Site assigned for this schedule
User Notes	Free text of notes associated with schedule when created.
Statements	Start time of schedule in UTC.
Duration	The duration of the schedule in the a timespan format of "HH:MM:SS"
DesiredMode.InverterMode	Refer to Appendix B: Inverter Modes
DesiredMode.ArgumentInWatts	Number of watts. Note that this value is not validated on schedule creation and so could be rejected or modified by the inverter if invalid on execution.
DaysActive	<i>Daily Schedule model only</i> An enumeration of days the schedule is applied • Sunday • Monday • Tuesday • Wednesday • Thursday • Friday • Weekdays • Saturday • Weekends • Everyday
TimezoneIANA	<i>Daily Schedule model only</i> The time zone of the schedule

4.7 Inverter Site Data

Item	Description
Id	Unique Site reference
Site Type	One of • Site • Houseload • Inverter
TimestampUTC	UTC time of when the information was relevant.
Location	Refer to Location (refer to 4.7.2)
Technology Provider	Provider of the device.

Item	Description								
	RBT is Redback Technology								
Remote Access Connection	Structure composed of Type and Customer Choice <table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Type</td><td> Describes the type of connection as one of: - Unknown - Wifi - Mobile - Access Point - Ethernet </td></tr> <tr> <td>Customer Choice</td><td>Default to Yes</td></tr> </table>	Item	Description	Type	Describes the type of connection as one of: - Unknown - Wifi - Mobile - Access Point - Ethernet	Customer Choice	Default to Yes		
Item	Description								
Type	Describes the type of connection as one of: - Unknown - Wifi - Mobile - Access Point - Ethernet								
Customer Choice	Default to Yes								
ApprovedCapacityW	Approved capacity in Watts								
SolarRetailer	A structure containing the installer information. <table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Name</td><td>Name of Installer</td></tr> <tr> <td>ABN</td><td>ABN of installer</td></tr> </table>	Item	Description	Name	Name of Installer	ABN	ABN of installer		
Item	Description								
Name	Name of Installer								
ABN	ABN of installer								
SiteDetails	Refer to Site Details (refer to section 4.7.1)								
CommissioningDate	Date the device was commissioned.								
NMI	National Meter Identification for the site.								
LatestDynamicDataUtc	Timestamp of latest dynamic data received (UTC)								
Status	<table> <tr> <th>Value</th><th>Description</th></tr> <tr> <td>OK</td><td>All inverters are online and connected and sending telemetry.</td></tr> <tr> <td>Offline</td><td>Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.</td></tr> <tr> <td>Fault</td><td>Any inverter in the site has reported an error of a configured severity that requires attention by the maintaining installer.</td></tr> </table>	Value	Description	OK	All inverters are online and connected and sending telemetry.	Offline	Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.	Fault	Any inverter in the site has reported an error of a configured severity that requires attention by the maintaining installer.
Value	Description								
OK	All inverters are online and connected and sending telemetry.								
Offline	Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.								
Fault	Any inverter in the site has reported an error of a configured severity that requires attention by the maintaining installer.								

4.7.1 Site Details

Item	Description
GenerationHardLimitVA	Hard limit for generation in Volt Amps.
GenerationSoftLimitVA	Soft limit for generation in Volt Amps.
ExportHardLimitkW	Hard limit for export in Kilowatts.
ExportHardLimitW	Hard limit for export in Kilowatts.
ExportSoftLimitkW	Soft limit for export in Kilowatts.
ExportSoftLimitW	Deprecated.

Item	Description
	Same as ExportSoftLimitkW, that is, in Kilowatts. Exists only for backward compatibility.
SiteExportLimitkW	Export limit of the site in Kilowatts
BatteryMaxChargePowerkW	The nominal maximum charge power supported by the site's inverter and batteries. The actual "at this point in time" value may be lower. Measured in kilowatt
BatteryMaxDischargePowerkW	The nominal maximum charge power supported by the site's inverter and batteries. The actual "at this point in time" value may be lower. Measured in kilowatt
BatteryCapacitykWh	Size of the batteries in Kilowatt hours.
UsableBatteryCapacitykWh	The usable nominal energy of the batteries. The actual "at this point in time" value may be lower. Measured in kilowatt.
PanelModel	Manufacturer and model of the panels.
PanelSizekW	Gets the total PV size of the panels. Measured in Kilowatts.
SystemType	The type of system as per the DER standards • Hybrid • AC Coupled • Grid-Tie
InverterMaxExportPowerkW	Nominal export power in Kilowatts.
InverterMaxImportPowerkW	Nominal import power in Kilowatts.

4.7.2 Location

Item	Description
Latitude	Latitude of Site
Longitude	Latitude of Site
Address Line One	First line of address
Address Line Two	Second line of address
Suburb	Suburb of site
State	State in the country
Country	Country of the location.
Postcode	Postcode reference for the site

4.8 Inverter Configuration

Item	Description
SiteId	Unique identifier of the site
Nmi	

Item	Description
Serial Number	Serial number of the device.
GenerationHardLimitVA	Generation hard limit in Volt Amps
GenerationSoftLimitVA	Generation soft limit in Volt Amps
ExportHardLimitkW	Export to grid limit in kilowatts.
ExportSoftLimitkW	Export to grid soft limit in kilowatts.
SiteExportLimitkW	Export limit of the site in kilowatts.
BatteryMaxChargePowerkW	Static nominal maximum charge power theoretically supported by the site's inverters and batteries. Note that the actual point in time value may be lower.
BatteryMaxDischargePowerkW	Static nominal discharge power theoretically supported by the site's inverters and batteries.
BatteryCapacitykWh	Capacity of the batteries in kilowatt hours.
UsableBatteryCapacitykWh	Usable nominal energy of the batteries. Actual point-in-time value may be lower and affected by current SoC and the Min SoC.
SystemType	Hybrid, AC Coupled, Grid-Tie
InverterMaxExportPowerkW	Static nominal export power.
InverterMaxImportPowerkW	Static nominal import power.
MinSoC0to1	Current minimum state of charge between 0 and 1.
MinOffgridSoC0to1	Current off-grid minimum state of charge between 0 and 1

5. API Endpoints Version 2.19

Use this version of the API over version 2.0 for Energy Data capabilities so that the additional Energy Data information is available for consumption.

The parameters are identical with the intention of a seamless upgrade.

5.1 Energy Data

All API capabilities for Energy Data are available with the same parameters as Version 2.0. That is, version 2.19 is backward compatible with version 2.0. The change is the returned Energy Data Extended response.

5.1.1 Get dynamic data for a Site by Site Id

Title	Get dynamic information for a site	
Description	Returns dynamic information at site level.	
URL	/api/v2.19/EnergyData/{siteId}/Dynamic	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Metadata	Whether to provide additional metadata. False by default
Response	Returns an array of Energy Data Extended (refer to section 6.1)	
Notes		

5.1.2 Get dynamic data for a Serial Number

Title	Get dynamic information for a serial number	
Description	Returns dynamic information for a serial number	
URL	/Api/v2.19/EnergyData/Dynamic/BySerialNumber/{serialNumber}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Metadata	Whether to provide additional metadata. False by default
Response	Returns an array of Energy Data Extended (refer to section 6.1)	
Notes	This method may be deprecated and intended for existing consumers only. New consumers should consider using the method accepting the Site Id.	

5.1.3 Get dynamic data for a Site by Site Id [Batch]

Title	Get dynamic information for a batch of sites in a single call
--------------	---

Description	Same as Get Dynamic data for a Site with ability to take up to 100 Site requests in a single call.				
URL	/Api/v2.19/EnergyData/Multiple/Dynamic				
Method	POST				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Site Ids</td><td>An array of Site Ids. Up to 100</td></tr> </table>	Item	Description	Site Ids	An array of Site Ids. Up to 100
Item	Description				
Site Ids	An array of Site Ids. Up to 100				
Response	Returns - Total Count of the sites returned. - Returns an array of Energy Data Extended (refer to section 6.1)				

5.1.4 Get dynamic data for a Serial Number [Batch]

Title	Get dynamic information for a batch of serial numbers				
Description	Same as Get Dynamic data for Serial Number with ability to request up to 100 Serial Numbers in a single request and response.				
URL	/Api/v2.19/EnergyData/Multiple/Dynamic				
Method	POST				
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Serial Numbers</td><td>An array of serial numbers. Up to 100.</td></tr> </table>	Item	Description	Serial Numbers	An array of serial numbers. Up to 100.
Item	Description				
Serial Numbers	An array of serial numbers. Up to 100.				
Response	Returns - Total Count of the sites returned. - Returns an array of Energy Data Extended (refer to section 6.1)				

5.1.5 Get dynamic data for a Serial Number at a specific Timestamp

Title	Get dynamic information at a specific timestamp for a serial number								
Description	Get information a device for a device at a specific time.								
URL	/Api/v2.19/EnergyData/{serialNumber}/Dynamic/BySerialNumber/At/{timestamp}								
Method	GET								
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Serial Number</td><td>Serial Number of an inverter</td></tr> <tr> <td>Timestamp</td><td>UTC timestamp in yyyyMMddTHH:mm:ssZ format</td></tr> <tr> <td>Metadata</td><td>Flag to include metadata. Default to false</td></tr> </table>	Item	Description	Serial Number	Serial Number of an inverter	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format	Metadata	Flag to include metadata. Default to false
Item	Description								
Serial Number	Serial Number of an inverter								
Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format								
Metadata	Flag to include metadata. Default to false								
Response	Returns of Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number								
Notes	Recommend using Site Id instead of Serial Number to get all dynamic information for a site. This API left for past consumers who have not migrated to using Site Id or NMI.								

5.1.6 Get dynamic data for a Site at a specific Timestamp

Title	Get dynamic information for a Site at a specific Timestamp	
Description	Retrieval of dynamic data for a Site at a specific timestamp	
URL	/Api/v2.19/EnergyData/{siteId}/Dynamic/BySerialNumber/At/{timestamp}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	Metadata	Flag to include metadata. Default to false
Success Response	Returns an Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number	
Notes		

5.1.7 Get dynamic data for Site over a time period

Title	Get dynamic information for a Site over a time period	
Description	Get site data over a requested time period	
URL	/Api/v2.19/EnergyData/{siteId}/Dynamic/LatestBeforeUtc/{timestamp}/{periodInMinutes}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes
	Metadata	Flag to include metadata. Default to false
Response	Returns an Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number items matching the time window from Timestamp back the number of minutes.	
Notes		

5.1.8 Get dynamic data for Serial Number over a time period

Title	Get dynamic information for a Serial Number over a period of time.	
Description		
URL	/Api/v2.19/EnergyData/{serialNumber}/Dynamic/BySerialNumber/LatestBeforeUtc/{timestamp}/{periodInMinutes}	
Method	GET	
Parameters	Item	Description
	Serial Number	Unique identifier of a Site

	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes
	Metadata	Flag to include metadata. Default to false
Success Response	Returns an array of Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number items matching the time window from Timestamp back the number of minutes.	
Notes		

5.1.9 Get dynamic data for Site between two timestamps

Title	Get dynamic information for a Site over a time period	
Description	Get site data over a requested time period	
URL	/Api/v2.19/EnergyData/{siteId}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	StartTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	EndTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimeStamp
Response	Returns an array of Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial numbers	
Notes		

5.1.10 Get dynamic data for Serial Number between two timestamps

Title	Get dynamic information for a Serial Number over a period of time.	
Description	Get the dynamic information of a device over a period of time for a serial number.	
URL	/Api/v2.19/EnergyData/{serialNumber}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description
	Serial Number	Unique identifier of a Site
	StartTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	EndTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimeStamp
Success Response	Item	Description
	Returns an array Energy Data Extended (refer to section 6.1) items matching the time window	
Notes		

6. Schema Definitions version 2.19

6.1 Energy Data Extended

This is an extension of the Energy Data Energy DataError! Reference source not found. (refer to section 4.2). All existing fields from the original Energy Data model are retained with only additional fields.

Field	Description								
Site Id	Unique identifier of a Site								
TimestampUtc	UTC date for the data								
FrequencyInstantaneousHz	Current Frequency								
BatterySoCInstantaneous0to1	Battery state of charge as decimal between 0 and 1 (100%).								
PvPowerInstantaneouskW	PV Power in kilowatts								
InverterTemperatureC	Inverter Temperature								
BatteryPowerNegativeIsChargingkW	Battery Power								
PvAllTimeEnergykWh	Accumulation of total energy from PV in kWh. This value should increase but there may be circumstances where a meter is reset to zero.								
ExportAllTimeEnergykWh	Accumulation of total energy to grid in kWh This value should increase but there may be circumstances where a meter is reset to zero.								
ImportAllTimeEnergykWh	Accumulation of total energy from grid in kWh. This value should increase but there may be circumstances where a meter is reset to zero.								
LoadAllTimeEnergykWh	Accumulation of load in kWh. This value should increase but there may be circumstances where a meter is reset to zero.								
Status	<table><tr><th>Value</th><th>Description</th></tr><tr><td>OK</td><td>All inverters are online and connected and sending telemetry.</td></tr><tr><td>Offline</td><td>Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.</td></tr><tr><td>Fault</td><td>Any inverter on the site has reported an error of a configured severity that requires attention by the maintaining installer.</td></tr></table>	Value	Description	OK	All inverters are online and connected and sending telemetry.	Offline	Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.	Fault	Any inverter on the site has reported an error of a configured severity that requires attention by the maintaining installer.
Value	Description								
OK	All inverters are online and connected and sending telemetry.								
Offline	Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.								
Fault	Any inverter on the site has reported an error of a configured severity that requires attention by the maintaining installer.								
Inverters	Node containing an array of Inverter models. One for each inverter on the site.								
Phases	Node containing an array of Phases								
PVs	Array of PV information								

6.1.1 Inverters

Item	Description
Serial Number	Unique Identifier of an inverter
PowerMode.Inverter Mode	The inverter mode as defined in Error! Not a valid bookmark self-reference.
PowerMode.PowerW	Power in watts

6.1.2 Phases

Item	Description
Id	Name of the Phase 'A', 'B', 'C'
ActiveExportedPowerInstantaneouskW	Active power being exported to grid in Kw. Zero if importing.
ActiveImportedPowerInstantaneouskW	Active power being imported from grid in Kw. Zero if exporting.
VoltageInstantaneousV	Instantaneous Voltage
CurrentInstantaneousA	Instantaneous Current
PowerFactorInstantaneousMinus1to1	Power Factor as decimal value between 0 and 1

6.1.3 PVs

Item	Description
CurrentA	Current of the PV string in Amps.
VoltageV	Voltage of the PV string in Volts.
PowerKw	Power of the PV string in Kilowatts.

6.1.4 Battery

Item	Description								
CurrentNegativeIsChargingA	Current of battery in Amps								
VoltageV	Voltage of battery in Volts								
VoltageType	Enumeration of battery voltage type <table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Unknown voltage type</td></tr><tr><td>1</td><td>High Voltage Battery</td></tr><tr><td>2</td><td>Low Voltage Battery</td></tr></table>	Value	Description	0	Unknown voltage type	1	High Voltage Battery	2	Low Voltage Battery
Value	Description								
0	Unknown voltage type								
1	High Voltage Battery								
2	Low Voltage Battery								
NumberOfModules	Number of battery modules. Can be used to correlate with the number of modules in the Modules node.								
Cabinets	Cabinet information (refer to section 6.1.5 Battery Cabinet)								
Modules	An array of battery modules with their specific information (refer to section 6.1.6 Battery Module)								

6.1.5 Battery Cabinet

Item	Description
TemperatureC	Temperature of cabinet in Celsius
FanState	State of the fan 0 – On 1 - Off

6.1.6 Battery Module

Item	Description
CurrentNegativeIsChargingA	Current of battery module in Amps
VoltageV	Voltage of battery module in Volts
PowerNegativeIsChargingkW	Power of battery module in Watts
SoC0To1	State of charge of battery between 0 and 1 in decimal.

7. API Endpoints Version 2.21

Use this version of the API over previous versions for:

1. Battery “all time” energies in Energy Data endpoints. Request parameters are identical to v2 and v2.19:
 - a. BatteryChargeAllTimeEnergykWh
 - b. BatteryDischargeAllTimeEnergykWh
2. New Relay Control endpoints:
 - a. POST /Api/v2.21/RelayControl/Set/Multiple/BySerialNumber
 - b. POST /Api/v2.21/RelayControl/Get/Multiple/BySerialNumber

Relay Control endpoints use a new structure for returning responses to request for multiple entities. The introduced response type is `ResultMultiple2<T, TId>`; for example:

1. `ResultMultiple2<GetRelaysBySnDto, InverterSnId>`:
2. `ResultMultiple2<RelayControlSetSingleResponseDto, RelayControlId>`.

Please see the RelayControl endpoint for json examples.

The intention is to use the ResultMultiple2 for future endpoints. Existing endpoints are not affected.

7.1 Energy Data

All API capabilities for Energy Data are available with the same parameters as versions 2.0 and 2.19. That is, version 2.21 is backward compatible with versions 2.0 and 2.19. The change is the returned Energy Data Extended response: new fields were added, existing fields have not changed.

7.1.1 Get dynamic data for a Site by Site Id

Title	Get dynamic information for a site						
Description	Returns dynamic information at site level.						
URL	/api/v2.21/EnergyData/{siteId}/Dynamic						
Method	GET						
Parameters	<table><tr><th>Item</th><th>Description</th></tr><tr><td>Site Id</td><td>Unique identifier of a Site</td></tr><tr><td>Metadata</td><td>Whether to provide additional metadata. False by default</td></tr></table>	Item	Description	Site Id	Unique identifier of a Site	Metadata	Whether to provide additional metadata. False by default
Item	Description						
Site Id	Unique identifier of a Site						
Metadata	Whether to provide additional metadata. False by default						
Response	Returns an array of Energy Data Extended (refer to section 6.1)						
Notes							

7.1.2 Get dynamic data for a Serial Number

Title	Get dynamic information for a serial number
Description	Returns dynamic information for a serial number
URL	/Api/v2.21/EnergyData/Dynamic/BySerialNumber/{serialNumber}
Method	GET

Parameters	Item	Description
	Site Id	Unique identifier of a Site
	Metadata	Whether to provide additional metadata. False by default
Response	Returns an array of Energy Data Extended (refer to section 6.1)	
Notes	This method may be deprecated and intended for existing consumers only. New consumers should consider using the method accepting the Site Id.	

7.1.3 Get dynamic data for a Site by Site Id [Batch]

Title	Get dynamic information for a batch of sites in a single call	
Description	Same as Get Dynamic data for a Site with ability to take up to 100 Site requests in a single call.	
URL	/Api/v2.21/EnergyData/Multiple/Dynamic	
Method	POST	
Parameters	Item	Description
	Site Ids	An array of Site Ids. Up to 100
Response	Returns - Total Count of the sites returned. - Returns an array of Energy Data Extended (refer to section 6.1)	

7.1.4 Get dynamic data for a Serial Number [Batch]

Title	Get dynamic information for a batch of serial numbers	
Description	Same as Get Dynamic data for Serial Number with ability to request up to 100 Serial Numbers in a single request and response.	
URL	/Api/v2.21/EnergyData/Multiple/Dynamic	
Method	POST	
Parameters	Item	Description
	Serial Numbers	An array of serial numbers. Up to 100.
Response	Returns - Total Count of the sites returned. - Returns an array of Energy Data Extended (refer to section 6.1)	

7.1.5 Get dynamic data for a Serial Number at a specific Timestamp

Title	Get dynamic information at a specific timestamp for a serial number	
Description	Get information a device for a device at a specific time.	
URL	/Api/v2.21/EnergyData/{serialNumber}/Dynamic/BySerialNumber/At/{timestamp}	
Method	GET	
Parameters	Item	Description

	Serial NumberSerial Number of an inverter TimestampUTC timestamp in yyyyMMddTHH:mm:ssZ format MetadataFlag to include metadata. Default to false
Response	Returns of Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number
Notes	Recommend using Site Id instead of Serial Number to get all dynamic information for a site. This API left for past consumers who have not migrated to using Site Id or NMI.

7.1.6 Get dynamic data for a Site at a specific Timestamp

Title	Get dynamic information for a Site at a specific Timestamp								
Description	Retrieval of dynamic data for a Site at a specific timestamp								
URL	/Api/v2.21/EnergyData/{siteId}/Dynamic/BySerialNumber/At/{timestamp}								
Method	GET								
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Site Id</td><td>Unique identifier of a Site</td></tr> <tr> <td>Timestamp</td><td>UTC timestamp in yyyyMMddTHH:mm:ssZ format</td></tr> <tr> <td>Metadata</td><td>Flag to include metadata. Default to false</td></tr> </table>	Item	Description	Site Id	Unique identifier of a Site	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format	Metadata	Flag to include metadata. Default to false
Item	Description								
Site Id	Unique identifier of a Site								
Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format								
Metadata	Flag to include metadata. Default to false								
Success Response	Returns an Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number								
Notes									

7.1.7 Get dynamic data for Site over a time period

Title	Get dynamic information for a Site over a time period										
Description	Get site data over a requested time period										
URL	/Api/v2.21/EnergyData/{siteId}/Dynamic/LatestBeforeUtc/{timestamp}/{periodInMinutes}										
Method	GET										
Parameters	<table> <tr> <th>Item</th><th>Description</th></tr> <tr> <td>Site Id</td><td>Unique identifier of a Site</td></tr> <tr> <td>Timestamp</td><td>UTC timestamp in yyyyMMddTHH:mm:ssZ format</td></tr> <tr> <td>PeriodInMinutes</td><td>Number of minutes to scan back from the Timestamp. Maximum is 60 minutes</td></tr> <tr> <td>Metadata</td><td>Flag to include metadata. Default to false</td></tr> </table>	Item	Description	Site Id	Unique identifier of a Site	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes	Metadata	Flag to include metadata. Default to false
Item	Description										
Site Id	Unique identifier of a Site										
Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format										
PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes										
Metadata	Flag to include metadata. Default to false										
Response	Returns an Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number items matching the time window from Timestamp back the number of minutes.										
Notes											

7.1.8 Get dynamic data for Serial Number over a time period

Title	Get dynamic information for a Serial Number over a period of time.	
Description		
URL	/Api/v2.21/EnergyData/{serialNumber}/Dynamic/BySerialNumber/LatestBeforeUtc/{timestamp}/{periodInMinutes}	
Method	GET	
Parameters	Item	Description
	Serial Number	Unique identifier of a Site
	Timestamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	PeriodInMinutes	Number of minutes to scan back from the Timestamp. Maximum is 60 minutes
	Metadata	Flag to include metadata. Default to false
Success Response	Returns an array of Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial number items matching the time window from Timestamp back the number of minutes.	
Notes		

7.1.9 Get dynamic data for Site between two timestamps

Title	Get dynamic information for a Site over a time period	
Description	Get site data over a requested time period	
URL	/Api/v2.21/EnergyData/{siteId}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description
	Site Id	Unique identifier of a Site
	StartTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format
	EndTimeStamp	UTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimestamp
Response	Returns an array of Energy Data Extended (refer to section 6.1) at that specific timestamp for the serial numbers	
Notes		

7.1.10 Get dynamic data for Serial Number between two timestamps

Title	Get dynamic information for a Serial Number over a period of time.	
Description	Get the dynamic information of a device over a period of time for a serial number.	
URL	/Api/v2.21/EnergyData/{serialNumber}/Dynamic/From/{starttimestamp}/To/{endtimestamp}	
Method	GET	
Parameters	Item	Description

	Serial NumberUnique identifier of a Site StartTimeStampUTC timestamp in yyyyMMddTHH:mm:ssZ format EndTimeStampUTC timestamp in yyyyMMddTHH:mm:ssZ format. Maximum is 60 minutes from StartTimeStamp ItemDescription
Success Response	Returns an array Energy Data Extended (refer to section 6.1) items matching the time window
Notes	

7.2 Relay Control

Relay control endpoints are provided in the batch form. To control a single inverter please use an array with one id.

7.2.1 Retrieve inverter's relay configuration

Title	Get Relay Configuration for multiple inverters
Description	Get Relay Configuration for multiple inverters
URL	/Api/v2.21/RelayControl/Get/Multiple/BySerialNumber
Method	POST
Parameters	Array of Serial Numbers, maximum 100.
Body examples	<pre>{ "SerialNumbers": ["RB21111905110154"] }</pre>
Success Response	Array of relay configurations (refer to section 8.2)
Notes	Maximum batch size is 100

7.2.1.1 Example – Get Relay with no schedules

Body examples	<pre>{ "SerialNumbers": ["RB21111905110154"] }</pre>
Success Response	<pre>{ "TotalCount": 1, "Data": [{ "Success": true, "Data": {</pre>

	<pre>"Id": { "InverterSerialNumber": "RB21111905110154" }, "Relays": [{ "RelayNumber": 1, "RelayName": "123", "Mode": "LoadOff", "Schedules": [], "NormallyOpen": false, "IsSmartEnabled": false }] }, "Error": null }</pre>
--	--

7.2.1.1 Get Relay with re-occurring schedule

Body examples	<pre>{ "SerialNumbers": ["RB21111905110154"] }</pre>
Success Response	<pre>{ "TotalCount": 1, "Data": [{ "Success": true, "Data": { "Id": { "InverterSerialNumber": "RBGEN30000042047" }, "Relays": [{ "RelayNumber": 1, "RelayName": "My Relay", "Mode": "Schedule", "Schedules": [{ "Id": "100d97df-f9e5-4972-8645-f806adec18c5", "DaysOfWeekActive": "Monday, Thursday", "StartUtc": null, "EndUtc": null, "StartRecurring": "16:00:00", "DurationRecurring": "00:30:00" }] }, "NormallyOpen": true, </pre>

	<pre> "IsSmartEnabled": true }] }, "Error": null }] } </pre>
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7.2.2 Change inverter's relay configuration

Title	Change Relay Configuration for multiple inverters
Description	Changes the configuration settings of a relay which may result in adding, modifying or removing a relay.
URL	/Api/v2.21/RelayControl/Set/Multiple/BySerialNumber
Method	POST
Parameters	Array of Error! Reference source not found. (refer to Error! Reference source not found.).
Body	
Success Response	Array with Error! Reference source not found. (refer to Error! Reference source not found.)
Notes	1. Returns 200 OK even if some or all results have errors. 2. Available for systems with software versions 2.18+, 3.* and 4.* 3. When adding schedules the schedule id can be provided (GUID) but it's not required and it is not provided the id will be generated by the server. 4. Multiple schedules can be added and deleted in the same request.

7.2.2.1 Example – Set Relay Load Off

Body examples	<pre> { "Relays": [{ "SerialNumber": "RB21111905110154", "RelayNumber": 2, "SetMode": "LoadOff" }] } </pre>
Success Response	<pre> { "TotalCount": 1, "Data": [</pre>

	<pre>{ "Success": true, "Data": { "Id": { "InverterSerialNumber": "RB21111905110154", "RelayNumber": 1 } }, "Error": null }</pre>
--	---

7.2.2.1 Example – Add 30 minute re-occurring schedule

Body examples	<pre>{ "Relays": [{ "SerialNumber": "RBGEN30000042047", "RelayNumber": 1, "AddSchedules": [{ "DaysOfWeekActive": "Thursday, Monday", "StartRecurring": "16:00:00", "DurationRecurring": "00:30:00" }] }] }</pre>
Success Response	<pre>{ "TotalCount": 1, "Data": [{ "Success": true, "Data": { "Id": { "InverterSerialNumber": "RBGEN30000042047", "RelayNumber": 1 } }, "Error": null }] }</pre>

	} }
--	--------

8. Schema Definitions version 2.21

8.1 Energy Data Extended

This is an extension of the Energy Data (refer to section 6.1). All existing fields from the original Energy Data model are retained with only additional fields.

Field	Description	
Site Id	Unique identifier of a Site	
TimestampUtc	UTC date for the data	
FrequencyInstantaneousHz	Current Frequency	
BatterySoCInstantaneous0to1	Battery state of charge as decimal between 0 and 1 (100%).	
PvPowerInstantaneouskW	PV Power in kilowatts	
InverterTemperatureC	Inverter Temperature	
BatteryPowerNegativeIsChargingkW	Battery Power	
PvAllTimeEnergykWh	Accumulation of total energy from PV in kWh. This value should increase but there may be circumstances where a meter is reset to zero.	
ExportAllTimeEnergykWh	Accumulation of total energy to grid in kWh This value should increase but there may be circumstances where a meter is reset to zero.	
ImportAllTimeEnergykWh	Accumulation of total energy from grid in kWh. This value should increase but there may be circumstances where a meter is reset to zero.	
LoadAllTimeEnergykWh	Accumulation of load in kWh. This value should increase but there may be circumstances where a meter is reset to zero.	
BatteryChargeAllTimeEnergykWh	Accumulation of battery charge energy in kWh. This value should increase but there may be circumstances where a meter is reset to zero. Battery means the whole battery stack (all battery modules as one). [New in 2.21]	
BatteryDischargeAllTimeEnergykWh	Accumulation of battery discharge energy in kWh. This value should increase but there may be circumstances where a meter is reset to zero. Battery means the whole battery stack (all battery modules as one). [New in 2.21]	
Status	Value	Description
	OK	All inverters are online and connected and sending telemetry.
	Offline	Any inverter in the site has not sent telemetry in a configured time period (typically 10 minutes). Some type of connectivity issue.

Field	Description
	Fault Any inverter on the site has reported an error of a configured severity that requires attention by the maintaining installer.
<i>Inverters</i>	Node containing an array of Inverter models. One for each inverter on the site.
<i>Phases</i>	Node containing an array of Phases
<i>PVs</i>	Array of PV information

8.1.1 Inverters

Item	Description
Serial Number	Unique Identifier of an inverter
PowerMode.Inverter Mode	The inverter mode as defined in Error! Not a valid bookmark self-reference.
PowerMode.PowerW	Power in watts

8.1.2 Phases

Item	Description
Id	Name of the Phase 'A', 'B', 'C'
ActiveExportedPowerInstantaneouskW	Active power being exported to grid in Kw. Zero if importing.
ActiveImportedPowerInstantaneouskW	Active power being imported from grid in Kw. Zero if exporting.
VoltageInstantaneousV	Instantaneous Voltage
CurrentInstantaneousA	Instantaneous Current
PowerFactorInstantaneousMinus1to1	Power Factor as decimal value between 0 and 1

8.1.3 PVs

Item	Description
CurrentA	Current of the PV string in Amps.
VoltageV	Voltage of the PV string in Volts.
PowerKw	Power of the PV string in Kilowatts.

8.1.4 Battery

Item	Description
CurrentNegativeIsChargingA	Current of battery in Amps
VoltageV	Voltage of battery in Volts

VoltageType	Enumeration of battery voltage type	
	Value	Description
	0	Unknown voltage type
	1	High Voltage Battery
	2	Low Voltage Battery
NumberOfModules	Number of battery modules. Can be used to correlate with the number of modules in the Modules node.	
<i>Cabinets</i>	Cabinet information (refer to section 6.1.5 Battery Cabinet)	
<i>Modules</i>	An array of battery modules with their specific information (refer to section 6.1.6 Battery Module)	

8.1.5 Battery Cabinet

Item	Description
TemperatureC	Temperature of cabinet in Celsius
FanState	State of the fan 0 – On 1 - Off

8.1.6 Battery Module

Item	Description
CurrentNegativelsChargingA	Current of battery module in Amps
VoltageV	Voltage of battery module in Volts
PowerNegativelsChargingkW	Power of battery module in Watts
SoC0To1	State of charge of battery between 0 and 1 in decimal.

8.2 Relay Configuration

Field	Description
<i>Id</i>	Id of the system
<i>Relays</i>	Array of relay data

8.2.1 Id

Item	Description
Inverter Serial Number	Serial number of the inverter

8.2.2 Relays

Item	Description
Relay number	One based. This is not an ordinal number, and the first relay may not be 1.
Relay name	Name of the relay specified during commissioning. The name may change.
Mode	Relay mode LoadOff, LoadOn, SmartLoadControl or Schedule. Schedule mode is a "virtual" mode and means that the mode is LoadOff and there are schedules present.
Schedules	Schedules. Array of Relay Schedule (refer to section 8.2.3).
NormallyOpen	True if the relay is installed as normally open False if the relay is installed as normally closed.
IsSmartEnabled	If true, then Smart Load Control is configured for this relay.

8.2.3 Relay Schedule

Item	Description
Id	Id of the schedule
DaysOfWeekActive	A bit flag enumeration of days of the week with added convenience values: Value Never (0) Sunday Monday Tuesday Wednesday Thursday Friday Weekdays Weekend Everyday
StartUtc	Start for non-recurring schedules
EndUtc	End for non-recurring schedules
StartRecurring	Start of a recurring schedule. In local time.
DurationRecurring	Duration of a recurring schedule.

8.3 Relay Control

Item	Description
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SetMode	Relay mode Value LoadOff LoadOn SmartLoadControl Schedule
AddSchedules	Array of Relay Schedule to add (refer to section 8.2.3).
DeleteSchedules	Array of Schedule Ids to delete

8.4 Relay Control Response

Field	Description
Data	Acknowledge if success as a Relay Control Data Response.
Error	Error details if failure - inc. validation failures.
Success	If true, data is provided, if false Error is provided.

8.4.1 Relay Control Data Response

Item	Description
Id	Id of the relay

8.4.2 Error

Item	Description
Id	Id of the relay
ErrorMsg	Error message

8.4.3 Relay Control Id

Item	Description
InverterSerialNumber	Serial number of the inverter
RelayNumber	Relay number

9. Appendix B: Inverter Modes

Command	Technical Note
Auto	$P_{\text{Battery}} = P_{\text{Inv}} - P_{\text{meter}} - P_{\text{pv}}$ (Discharge/Charge)
	The battery power is controlled by the meter power when the meter communication is normal.
Force Charge Battery	$P_{\text{Battery}} = X_{\text{max}} + P_{\text{V}}$ (Charge)
	X_{max} is to allow the power to be taken from the grid, and PV power is preferred. When set to 0, only PV power is used. Charging power will be limited by charging current limit.
Force Discharge Battery	$P_{\text{Battery}} = X_{\text{max}}$ (Discharge)
	X_{max} is the allowable discharge power of the battery. When the power fed into the grid is limited, PV power will be used first.
Import Power	$P_{\text{Battery}} = X_{\text{set}} + P_{\text{V}}$ (Charge)
	X_{set} refers to the power purchased from the power grid. The power purchased from the grid is preferred. If the PV power is too large, the MPPT power will be limited.(grid side load is not considered)
Export Power	$P_{\text{Battery}} = X_{\text{set}}$ (Discharge)
	X_{set} is to sell power to the grid. PV power is preferred. When PV energy is insufficient, the battery will discharge.PV power will be limited by x.(grid side load is not considered)
Conserve	$P_{\text{Battery}} = P_{\text{V}}$ (Charge)
	In on-grid mode, the battery is continuously charged, and only PV power (AC Couple model takes 10% of the rated power of the power grid) is used. The battery can only discharge in off-grid mode.
Off Grid	$P_{\text{Battery}} = P_{\text{backup}} - P_{\text{pv}}$ (Charge/Discharge)
	Forced off-grid operation.
Hibernate	$P_{\text{Battery}} = 0$ (Standby)
	The battery does not charge and discharge
Buy Power	$P_{\text{Battery}} = P_{\text{Inv}} - (P_{\text{meter}} + X_{\text{set}}) - P_{\text{pv}}$ (Charge/Discharge)
	When the meter communication is normal, the power purchased from the power grid is controlled as X_{set} . When the PV power is too large, the MPPT power will be limited. When the load is too large, the battery will discharge.
Sell Power	$P_{\text{Battery}} = P_{\text{Inv}} - (P_{\text{meter}} - X_{\text{set}}) - P_{\text{pv}}$ (Charge/Discharge)
	When the communication of electricity meter is normal, the power sold from the power grid is controlled as X_{set} , PV power is preferred, and the battery discharges when PV energy is insufficient.PV power will be limited by X_{set} .
Charge Battery	$P_{\text{Battery}} = X_{\text{set}}$ (Charge)

	Xset is the charging power of the battery. PV power is preferred. When PV power is insufficient, it will buy power from the power grid. The charging power is also affected by the charging current limit.
Discharge Battery	$P_{\text{Battery}} = X_{\text{set}}$ (Discharge)
	Xset is the discharge power of the battery, and the battery discharge has priority. If the PV power is too large, MPPT will be limited. Discharge power is also affected by discharge current limit
No Mode	

10. Revisions

Amendment	Detail	Author	Date
Release	Updated for version 2.20	Paul Hillman, Director Of Software	07.02.2024
Draft	Updated for version 2.21	Tymek Majewski, Principal Software Developer	08.03.2024
Release	Review and release for 2.21	Paul Hillman, Director Of Software	10.04.2024
Release	Review and release for 2.22	Paul Hillman, Director Of Software	10.07.2024
Release	Review and release for 2.23	Paul Hillman, Director Of Software	06.11.2024
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