



# API Documentation

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## Introduction

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Welcome to the first draft of our documentation of Solcast's our 'sites' based API for rooftop and utility scale solar systems. This API can provide both forecasts and estimates of the actual power output (estimated actuals) from solar PV systems. The API is structured by a 'sites' based framework, where users will be provided with unique identifier for each registered PV site, which can be used to retrieve the forecasts or estimated actuals for that site. This sites based framework allows Solcast to provide you with access to our 'tuning' technologies, which use measured power output data from a PV site to individualise and improve forecasts. This sites-based framework also allows Solcast to provide real-time reporting on forecast accuracy, so that you can track our performance and validate our product with ease.

Lastly, before we get started, do us a favour - if you find any errors, or something is unclear, or just have some helpful feedback, please let us know at [support@solcast.com.au](mailto:support@solcast.com.au). Oh, and we're assuming you've already signed-up for the API moving forward, so do that now if you haven't!

# Base URL

All relative paths in this documentation relate to our public API available at `https://api.solcast.com.au/`. For example, relative URLs like `/utility_scale_sites/{resource_id}/forecasts` are referring to `https://api.solcast.com.au/utility_scale_sites/{resource_id}/forecasts` where `{resource_id}` is a token representing a user or resource specific value, in this example a utility scale site resource ID.

## Data Formats

All GET endpoints support HTML (preview), JSON, CSV and XML data formats by one of the following methods:

- "Accepts" HTTP request header, eg "application/json" for JSON
- "format" query string, eg "format=json" for JSON
- Endpoint suffix file extension, eg "forecasts.json" for JSON

Exploration of data can use any of these data formats however **only JSON should be used for integrations** as not all formats are support on all endpoints.

## JSON only support

The Solcast API can serialize multiple formats including JSON, XML and CSV. Though these different formats are available, JSON is the only serialization format that works everywhere across our API. **XML and CSV should not be used for automated integration.** XML/CSV can be handy for exploring our data however production systems should use JSON only for integration.

If you are using XML or CSV in an integration, move the integration to the respective JSON endpoint as soon as possible. Changes that are backwards compatible for JSON (like the addition of a property) can be brittle for CSV or XML which can cause problems for projects with existing integrations. If you are a customer and need help with this migration, please reach out to [support@solcast.com.au](mailto:support@solcast.com.au).

## Authentication

Authentication for these endpoints can be done via one of the following methods using your user specific API key which is accessible from your account page in the Solcast API Toolkit. An API key will be a 32 character text string e.g.  
01234567890123457890123456789012

Name	Description
Query string	Add the <code>api_key</code> query string parameter to the URL of your request, eg <code>&amp;api_key=your_api_key</code>
Bearer token	Add the following <code>Authorization</code> header of your request: <code>Authorization: Bearer your_api_key</code>
Basic	Use Basic authentication and provide your API key as the username with an empty password. For more information, see Basic access Authentication

Name	Description
Digest	Use Digest based authentication and provide your API key as the username with an empty password. For more information, see Digest access Authentication

## Rate Limits

The Solcast API supports a default rate limit of 600 requests per minute per user. If you exceed this limit, your request to the API will receive a `429` status code, indicating you have exceeded your rate limit.

When this occurs, the response from the Solcast API will contain a few headers that aim to help you handle rate limiting:

- `x-rate-limit` specifies what the rate limit is per minute.
- `x-rate-remaining` specifies how many additional requests you can make until the rate limit is exceeded.
- `x-rate-limit-reset` specifies when (UTC in Unix Time format) the limit will reset.

## Rooftop Sites

Rooftop sites are PV sites that have a fixed tilt and capacity under 1MW. This API is suited to small to medium PV sites, usually on a rooftop of a residential home or a commercial building.

### Forecasts - Rooftop Site

This endpoint will retrieve the forecasts for a single rooftop site.

```
{
  "forecasts": [
    {
      "pv_estimate": "9.5",
      "pv_estimate10": "6",
      "pv_estimate90": "13.8",
      "period_end": "2018-01-01T01:00:00.00000Z",
      "period": "PT30M"
    },
    {
      "pv_estimate": "10",
      "pv_estimate10": "8",
      "pv_estimate90": "12",
      "period_end": "2018-01-01T12:30:00.00000Z",
      "period": "PT30M"
    }
  ]
}
```

#### REQUEST

GET /rooftop\_sites/{resource\_id}/forecasts

#### URL PARAMETERS

Parameter	Description	Required
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Parameter	Description	Required
resource_id	The resource id of the rooftop site	Yes

QUERY PARAMETERS

Parameter	Description	Required
hours	An offset to which the number of forecasts will be included in the response	168

RESPONSE

Attributes	Description
forecasts	Array of forecasts for the rooftop site.

FORECAST

Attributes	Description	Details
pv_estimate	double	PV power estimated in kilowatts (kW)
pv_estimate10	double	PV power estimate in kilowatts (kW) 10th percentile (low scenario)
pv_estimate90	double	PV power estimate in kilowatts (kW) 90th percentile (high scenario)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
400	The rooftop site missing capacity, please specify capacity or provide historic data for tuning.
404	The rooftop site cannot be found or is not accessible.

## Estimated Actuals - Rooftop Site

This endpoint will retrieve the estimated actuals for a single rooftop site.

```
{
  "estimated_actuals": [
    {
      "pv_estimate": "10",
      "period_end": "2018-01-01T01:00:00.00000Z",
      "period": "PT30M"
    },
    {
      "pv_estimate": "9",
      "period_end": "2018-01-01T12:30:00.00000Z",
      "period": "PT30M"
    }
  ]
}
```

REQUEST

```
GET /rooftop_sites/{resource_id}/estimated_actuals
```

**URL PARAMETERS**

Parameter	Description	Required
resource_id	The resource id of the rooftop site	Yes

**QUERY PARAMETERS**

Parameter	Description	Required
hours	An offset to which the number of forecasts will be included in the response	168

**RESPONSE**

Attributes	Description
estimated_actuals	The estimated actuals for the rooftop site

**ESTIMATED ACTUAL**

Attributes	Description	Details
pv_estimate	double	PV power estimated in kilowatts (kW)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

**ERROR CODES**

Code	Description
400	The rooftop site missing capacity, please specify capacity or provide historic data for tuning.
404	The rooftop site cannot be found or is not accessible.

## Measurements - Rooftop Site

An automated POST of regular power measurements for a site allows us to perform tuning for a site which will improve forecasts and observations over time. Shading and other factors that can impact power output at a PV site can be taken into account when showing forecasts or estimated actuals for the same site.

Be aware of your local timezone if you are not recording your measurements in UTC as when you convert localized times to ISO8601 you will need to be mindful of your timezone and if it is correctly marked in the datetime string format, this is of particular importance if you are recording localized times in Daylight Savings Time. This is important for the tuning aspect of the site and should agree with the latitude/longitude of the site day/night hours as expressed in UTC timezone (It is important to know what your timezone adjustment is when first integrating your measurement data).

It is important that when sending measurements that the time period from which the measurement was collected is submitted as the end time not the start time. The value of the `total_power` should be the period average of the specified `period` in kilowatts (kW).

If incorrect measurements are sent, they are replaced by resending values for the same `period_end`.

**REQUEST**

```
POST /rooftop_sites/{resource_id}/measurements
```

```
/* Single measurement */
{
  "measurement": {
    "period_end": "2018-02-02T03:30:00.000000Z",
    "period": "PT5M",
    "total_power": 1.23456
  }
}
```

```
/* Multiple measurements */
{
  "measurements": [
    {
      "period_end": "2018-02-02T03:30:00.000000Z",
      "period": "PT5M",
      "total_power": 1.23456
    },
    {
      "period_end": "2018-02-02T03:35:00.000000Z",
      "period": "PT5M",
      "total_power": 1.98765
    }
  ]
}
```

**URL PARAMETERS**

Parameter	Description	Required
resource_id	The resource id of the rooftop site	Yes

**REQUEST PARAMETERS**

Parameter	Description	Required
measurement	Single measurement posted to a single rooftop site	Only required if measurements is empty
measurements	Multiple measurement posted to a single rooftop site	Only required if measurement is empty

**RESPONSE**

Attributes	Type	Description
measurement	Measurement object	Single measurement posted to a single rooftop site
measurements	Array of measurement objects	Multiple measurement posted to a single rooftop site

**MEASUREMENT**

Attributes	Type	Description
period_end	DateTime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	TimeSpan	Length of averaging period in ISO8601 duration format.
total_power	double	Power output being measured averaged over the <code>period</code> ending at <code>period_end</code> in kilowatts (kW)

**ERROR CODES**

Code	Description
400	The measurement does not pass validation (only for single measurement).

Code	Description
404	The rooftop site cannot be found or is not accessible.

**i** For posting multiple measurements, validation will not return a 400, but will instead ignore the invalid measurement.

If your measurements are not passing validation, the below list are some potential causes for your measurement being rejected by the API

- Invalid total power: total power must be a positive double measured in kW which cannot exceed the stated capacity of the rooftop site.
- Invalid period: period must be a valid TimeSpan greater or equal to 5 minutes
- Invalid period end: period end must be a valid DateTime which cannot represent a DateTime in the future

## Utility Scale Sites

Utility scale sites are PV sites that don't have limitation of capacity and have a range of additional features to support power utility PV sites such as tracking, inverter availability, and much more.

API access for management of utility scale sites is also available to Enterprise customers. Please contact our support team for details.

## Forecasts - Utility Scale Site

This endpoint will retrieve the forecasts for a single utility scale site.

```
{
  "forecasts": [
    {
      "pv_estimate": 9.5,
      "pv_estimate10": 6,
      "pv_estimate90": 13.8,
      "period_end": "2018-01-01T01:05:00.00000Z",
      "period": "PT5M"
    },
    {
      "pv_estimate": 10,
      "pv_estimate10": 8,
      "pv_estimate90": 12,
      "period_end": "2018-01-01T01:00:00.00000Z",
      "period": "PT5M"
    }
  ]
}
```

### REQUEST

GET /utility\_scale\_sites/{resource\_id}/forecasts

### URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the utility scale site	Yes

## QUERY PARAMETERS

Parameter	Description	Default
Period	Length of the averaging period in ISO8601 duration format. Allowed values are PT5M, PT10M, PT15M and PT30M	PT30M
hours	An offset to which the number of forecasts will be included in the response	168

## RESPONSE

Attributes	Description
forecasts	The forecasts for the utility scale site

## FORECAST

Attributes	Description	Details
pv_estimate	double	PV power estimated in megawatts (MW)
pv_estimate10	double	PV power estimate in megawatts (MW) 10th percentile (low scenario)
pv_estimate90	double	PV power estimate in megawatts (MW) 90th percentile (high scenario)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

## ERROR CODES

Code	Description
404	The utility scale site cannot be found or is not accessible.
404	Forecasts cannot be found for the site at the specified period.

## Estimated Actuals - Utility Scale Site

This endpoint will retrieve the estimated actuals for a single utility scale site.

```
{
  "estimated_actuals": [
    {
      "pv_estimate": 10,
      "period_end": "2018-01-01T01:05:00.000000Z",
      "period": "PT5M"
    },
    {
      "pv_estimate": 9,
      "period_end": "2018-01-01T01:00:00.000000Z",
      "period": "PT5M"
    }
  ]
}
```

## REQUEST

GET /utility\_scale\_sites/{resource\_id}/estimated\_actuals



URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the utility scale site	Yes

QUERY PARAMETERS

Parameter	Description	Default
Period	Length of the averaging period in ISO8601 duration format. Allowed values are PT5M, PT10M, PT15M and PT30M	PT30M
hours	An offset to which the number of estimated actuals will be included in the response	168

RESPONSE

Attributes	Description
estimated_actuals	The estimated actuals for the utility scale site

ESTIMATED ACTUAL

Attributes	Description	Details
pv_estimate	double	PV power estimated in megawatts (MW)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
404	The utility scale site cannot be found or is not accessible.

# Radiation Forecast - Utility Scale Site

This endpoint will retrieve the weather forecasts for a single utility scale site.

```
{
  "forecasts": [{
    "ghi": 808,
    "ghi90": 808,
    "ghi10": 769,
    "ebh": 737,
    "dni": 1008,
    "dni10": 959,
    "dni90": 1008,
    "dhi": 71,
    "air_temp": 16,
    "zenith": 43,
    "azimuth": -18,
    "cloud_opacity": 0,
    "period_end": "2019-09-02T01:25:00.000000Z",
    "period": "PT5M"
  }, {
    "ghi": 812,
    "ghi90": 812,
    "ghi10": 771,
```

```

    "ebh": 741,
    "dni": 1011,
    "dni10": 960,
    "dni90": 1011,
    "dhi": 70,
    "air_temp": 16,
    "zenith": 43,
    "azimuth": -17,
    "cloud_opacity": 0,
    "period_end": "2019-09-02T01:30:00.000000Z",
    "period": "PT5M"
  }
]
}

```

**REQUEST**

```
GET /utility_scale_sites/{resource_id}/weather/forecasts
```

**URL PARAMETERS**

Parameter	Description	Required
resource_id	The resource id of the utility scale site	Yes

**QUERY PARAMETERS**

Parameter	Description	Default
Period	Length of the averaging period in ISO8601 duration format	PT5M
Hours	An offset to which the number of forecasts will be included in the response	168

**RESPONSE**

Attributes	Type	Description
forecasts		The weather forecasts for the utility scale site

**FORECASTS (RADIATION DATA)**

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean).
ghi90	int	Global Horizontal Irradiance (W/m2) 90th percentile (high scenario)
ghi10	int	Global Horizontal Irradiance (W/m2) 10th percentile (low scenario)
ebh	int	Direct (Beam) Horizontal Irradiance
dni	int	Direct Normal Irradiance (W/m2)
dni90	int	Direct Normal Irradiance (W/m2) 90th percentile (high scenario)
dni10	int	Direct Normal Irradiance (W/m2) 10th percentile (low scenario)
dhi	int	Diffuse Horizontal Irradiance
air_temp	int	The temperature of the air in the given location (10 meters above ground level)
zenith	int	The angle between a line perpendicular to the earth's surface and the sun (90 deg = sunrise and sunset; 0 deg = sun directly overhead)

Attributes	Description	Details
azimuth	float	The angle between a line pointing due north to the sun's current position in the sky. Negative to the East. Positive to the West. 0 at due North.
cloud_opacity	int	The measurement of how opaque the clouds are to solar radiation in the given location. Attenuation of incoming light due to cloud. Varies from 0 (no cloud) to 100 (full attenuation of incoming light).
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
404	The utility scale site cannot be found or is not accessible.

## Radiation Estimated Actuals - Utility Scale Site

This endpoint will retrieve the radiation estimated actuals for a single utility scale site.

```
{
  "estimated_actuals": [{
    "ghi": 710,
    "ebh": 646,
    "dni": 958,
    "dhi": 64,
    "cloud_opacity": 0,
    "period_end": "2019-09-02T00:30:00.000000Z",
    "period": "PT30M"
  }, {
    "ghi": 639,
    "ebh": 573,
    "dni": 938,
    "dhi": 66,
    "cloud_opacity": 0,
    "period_end": "2019-09-02T00:00:00.000000Z",
    "period": "PT30M"
  }
]
```

REQUEST

GET /utility\_scale\_sites/{resource\_id}/weather/estimated\_actuals

URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the utility scale site	Yes

QUERY PARAMETERS

Parameter	Description	Default
Period	Length of the averaging period in ISO8601 duration format	PT30M

Parameter	Description	Default
Hours	An offset to which the number of estimated actuals will be included in the response	168

**RESPONSE**

Attributes	Description
estimated_actuals	The weather estimated actuals for the utility scale site

**ESTIMATED ACTUAL (RADIATION DATA)**

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean).
ebh	int	Direct (Beam) Horizontal Irradiance
dni	int	Direct Normal Irradiance (W/m2) - centre value (mean).
dhi	int	Diffuse Horizontal Irradiance
cloud_opacity	int	The measurement of how opaque the clouds are to solar radiation in the given location.
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

**ERROR CODES**

Code	Description
404	The utility scale site cannot be found or is not accessible.

## Super Rapid Forecasts - Utility Scale Site

Super rapid forecasts utilize live measurements provided to our system usually via a SCADA feed along with our other data sources to provide a 1 minute forecast resolution out to 30 minutes ahead. This product is more accurate and suitable for use in live energy markets than our standard 5 minute Utility Scale Forecasts, please contact our team about this product if you are looking for an live energy market solution.

```
{
  "forecasts": [
    {
      "pv_estimate": 9.5,
      "pv_estimate10": 6,
      "pv_estimate90": 13.8,
      "period_end": "2020-01-01T01:01:00.00000Z",
      "period": "PT1M"
    },
    {
      "pv_estimate": 10,
      "pv_estimate10": 8,
      "pv_estimate90": 12,
      "period_end": "2020-01-01T01:00:00.00000Z",
      "period": "PT1M"
    }
  ]
}
```

## REQUEST

`GET /utility_scale_sites/{resource_id}/forecasts/super_rapid`

## URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the utility scale site	Yes

## QUERY PARAMETERS

Parameter	Description	Default
Minutes	An offset to which the number of forecasts will be included in the response	30

## RESPONSE

Attributes	Description
forecasts	The super rapid forecasts for the utility scale site

## FORECAST

Attributes	Description	Details
pv_estimate	double	PV power estimated in megawatts (MW)
pv_estimate10	double	PV power estimate in megawatts (MW) 10th percentile (low scenario)
pv_estimate90	double	PV power estimate in megawatts (MW) 90th percentile (high scenario)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

## ERROR CODES

Code	Description
404	The utility scale site cannot be found or is not accessible.
409	Super rapid forecasts have not been enabled for this site.
409	Measurement data is more than 5 minutes old.

## Measurements - Utility Site

An automated POST of regular power measurements for a utility scale site allows us to perform tuning for a site which will improve forecasts and observations over time. This allows our tuning to pick up on each sites unique characteristics that can impact power output allowing us to provide better estimated actuals and forecasts.

Please be aware that `period_end` must be formatted to ISO8601 and must be converted to UTC or include the UTC offset.

It is important when sending measurements that the time period from which the measurement was collected is submitted as the end of the period interval and not the start of the period interval. The value of the `total_power` should be the period average of the specified `period` up until the `period_end` in megawatts (MW). For instantaneous values, set `period` to PT0S, utility sites providing instantaneous values must provide them with shorter intervals to correctly capture the variability of a sites measurements, every 30 seconds at least.

If incorrect measurements are sent, they can be replaced by resending values for the same `period_end`.

Additional information is also helpful for tuning if the utility scale site is externally constrained. For example a grid operator might force output of a utility scale site to be lowered to maintain grid stability. Or not all inverters may be online at the time of output. These external factors can be specified in optional parameters `availability` for a percentage of inverter capacity available and `constraint_power_ceiling` for a grid operator constraining output. See below for all optional measurement properties.

### Super Rapid Enabled Sites:

Measurements submitted for Super Rapid enabled sites must meet the following criteria:

- Measurements must be received on an ongoing basis and be no older than 5 minutes
- Measurements must be averaged over a 15 or 30 second period. Measurements can be instantaneous, but must also be received every 15 or 30 seconds.
- All attributes in a measurement are mandatory

### REQUEST

POST `/utility_scale_sites/{resource_id}/measurements`

```
/* Single measurement */
{
  "measurement": {
    "period_end": "2018-02-02T03:30:00.000000Z",
    "period": "PT30S",
    "total_power": 1.23456,
    "availability": 97.25,
    "constraint_power_ceiling": 1.3
  }
}

/* Multiple measurements */
{
  "measurements": [
    {
      "period_end": "2018-02-02T03:30:00.000000Z",
      "period": "PT30S",
      "total_power": 1.23456,
      "availability": 97.25,
      "constraint_power_ceiling": 1.3
    },
    {
      "period_end": "2018-02-02T03:35:00.000000Z",
      "period": "PT30S",
      "total_power": 1.98765,
      "availability": 97.25,
      "constraint_power_ceiling": 3
    }
  ]
}
```

### URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the utility scale site	Yes

### REQUEST PARAMETERS

Parameter	Description	Required
measurement	Single measurement posted to a single utility scale site	Only required if measurements is empty
measurements	Multiple measurements posted to a single utility scale site. Maximum of 999 measurements	Only required if measurement is empty

## RESPONSE

Attributes	Type	Description
measurement	Measurement object	Single measurement posted to a single utility scale site
measurements	Array of measurement objects	Multiple measurement posted to a single utility scale site

## MEASUREMENT

Attributes	Type	Required	Description
period_end	DateTime	Y	End of the averaging period in ISO8601 datetime format in UTC timezone
period	TimeSpan	Y	Length of averaging period in ISO8601 duration format.
total_power	double	Y	Power output being measured averaged over the <code>period</code> ending at <code>period_end</code> in megawatts (MW)
availability	double	N (Y for Super Rapid)	Percentage of inverters online during output. This is to provide context for tuning and forecasting.
constraint_power_ceiling	double	N (Y for Super Rapid)	External constraint of output, usually grid operator. This provides context to tuning and forecasting.
mean_ghi	int	N (Y for Super Rapid)	Average GHI reading from pyronometers on site. This is to provide additional information for tuning purposes.
network_constraint	bool	N (Y for Super Rapid)	Yes/no flag for if output was constrained for this measurement, applicable if specific constraint value is not available.

## ERROR CODES

Code	Description
400	The measurement does not pass validation (only for single measurement).
404	The utility scale site cannot be found or is not accessible.

**i** For posting multiple measurements, validation will not return a 400, but will instead ignore the invalid measurement.

## Weather Sites

Solar irradiance and other weather data.

API access for management of weather sites is also available to Enterprise customers. Please contact our support team for details.

## Forecasts - Weather site

This endpoint will retrieve the forecasts for a single weather site.

```
{
  "forecasts": [
    {
      "ghi": "10",
      "ghi90": "12",
      "ghi10": "8",
      "ebh": "10",
      "dni": "10",
      "dni90": "12",
      "dni10": "8",
      "air_temp": "20",
      "zenith": "90",
      "azimuth": "45.1234",
      "cloud_opacity": "12",
      "period_end": "2018-01-01T01:00:00.00000Z",
      "period": "PT30"
    },
    {
      "ghi": "10",
      "ghi90": "12",
      "ghi10": "8",
      "ebh": "10",
      "dni": "10",
      "dni90": "12",
      "dni10": "8",
      "air_temp": "20",
      "zenith": "90",
      "azimuth": "45.1234",
      "cloud_opacity": "12",
      "period_end": "2018-01-01T12:30:00.00000Z",
      "period": "PT30"
    }
  ]
}
```

REQUEST

GET /weather\_sites/{resource\_id}/forecasts

URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the weather site	Yes

RESPONSE

Attributes	Description
forecasts	The forecasts for the weather site

FORECASTS (RADIATION DATA)

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean).
ghi90	int	Global Horizontal Irradiance (W/m2) 90th percentile (high scenario)
ghi10	int	Global Horizontal Irradiance (W/m2) 10th percentile (low scenario)
ebh	int	Direct (Beam) Horizontal Irradiance
dni	int	Direct Normal Irradiance (W/m2)



Attributes	Description	Details
dni90	int	Direct Normal Irradiance (W/m2) 90th percentile (high scenario)
dni10	int	Direct Normal Irradiance (W/m2) 10th percentile (low scenario)
dhi	int	Diffuse Horizontal Irradiance
air_temp	int	The temperature of the air in the given location (10 meters above ground level)
zenith	int	The angle between a line perpendicular to the earth's surface and the sun (90 deg = sunrise and sunset; 0 deg = sun directly overhead)
azimuth	float	The angle between a line pointing due north to the sun's current position in the sky. Negative to the East. Positive to the West. 0 at due North.
cloud_opacity	int	The measurement of how opaque the clouds are to solar radiation in the given location. Attenuation of incoming light due to cloud. Varies from 0 (no cloud) to 100 (full attenuation of incoming light).
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
404	The weather site cannot be found or is not accessible.

## Estimated Actuals - Weather site

This endpoint will retrieve the estimated actuals for a single weather site.

```
{
  "estimated_actuals": [
    {
      "ghi": "10",
      "ebh": "10",
      "dni": "10",
      "dhi": "10",
      "cloud_opacity": "12",
      "period_end": "2018-01-01T01:05:00.00000Z",
      "period": "PT5M"
    },
    {
      "ghi": "10",
      "ebh": "10",
      "dni": "10",
      "dhi": "10",
      "cloud_opacity": "12",
      "period_end": "2018-01-01T01:00:00.00000Z",
      "period": "PT5M"
    }
  ]
}
```

REQUEST

GET /weather\_sites/{resource\_id}/estimated\_actuals

URL PARAMETERS

Parameter	Description	Required
resource_id	The resource id of the weather site	Yes

RESPONSE

Attributes	Description
estimated_actuals	The estimated actuals for the weather site

ESTIMATED ACTUAL (RADIATION DATA)

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean).
ebh	int	Direct (Beam) Horizontal Irradiance
dni	int	Direct Normal Irradiance (W/m2) - centre value (mean).
dhi	int	Diffuse Horizontal Irradiance
cloud_opacity	int	The measurement of how opaque the clouds are to solar radiation in the given location.
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
404	The weather site cannot be found or is not accessible.

# World API - Solar Radiation

Solar irradiance forecasts and estimated actuals requested by location (latitude, longitude).

This is a JSON compatible replacement for the `/radiation/*` endpoints, see migration notes for more info.

## Forecasts by location

This endpoint takes a location and returns a radiation forecast. The time window is by default 48 hours but can be extended up to 7 days.

```
{
  "forecasts": [{
    "ghi": 690,
    "ghi90": 802,
    "ghi10": 537,
    "ebh": 407,
    "dni": 501,
    "dni10": 334,
```

```
    "dni90": 792,
    "dhi": 283,
    "air_temp": 37,
    "zenith": 37,
    "azimuth": 72,
    "cloud_opacity": 35,
    "period_end": "2017-01-30T05:00:00.000000Z",
    "period": "PT30M"
  }, {
    "ghi": 422,
    "ghi90": 707,
    "ghi10": 141,
    "ebh": 56,
    "dni": 78,
    "dni10": 3,
    "dni90": 722,
    "dhi": 366,
    "air_temp": 37,
    "zenith": 43,
    "azimuth": 78,
    "cloud_opacity": 81,
    "period_end": "2017-01-30T05:30:00.000000Z",
    "period": "PT30M"
  }
]
```

REQUEST

GET /world\_radiation/forecasts

URL PARAMETERS

Parameter	Description	Required
latitude	The latitude of the location (EPSG:4326) eg, -35.123	Yes
longitude	The longitude of the location (EPSG:4326) eg, 149.123	Yes
hours	Time window of the response in hours (default 48, max 168)	No

RESPONSE

Attributes	Description
forecasts	Array of forecasts for the requested location

FORECAST

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean)
ghi90	int	Global Horizontal Irradiance (W/m2) - 90th percentile value (high scenario)
ghi10	int	Global Horizontal Irradiance (W/m2) - 10th percentile value (low scenario)
dni	int	Direct Normal Irradiance (W/m2) - centre value (mean)
dni10	int	Direct Normal Irradiance (W/m2) - 10th percentile value (low scenario)
dni90	int	Direct Normal Irradiance (W/m2) - 90th percentile value (high scenario)
dhi	int	Diffuse Horizontal Irradiance
air_temp	int	Air temperature (degrees Celsius)

Attributes	Description	Details
zenith	int	Solar zenith angle (degrees). Zero means directly upwards/overhead. Varies from 0 to 180. A value of 90 means the sun is at the horizon.
azimuth	double	Solar azimuth angle (degrees). Zero means true north. Vaies from -180 to 180. A value of 90 means the sun is in the east.
cloud_opacity	int	The attenuation of incoming light due to cloud. Varies from 0 (no cloud) to 100 (full attenuation of incoming light).
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

**ERROR CODES**

Code	Description
400	Latitude, longitude or hours are invalid, see <code>response_status</code> for further details
404	The location is outside our coverage area.

**GHI ONLY**

This endpoint limits the output to GHI only forecasts.

**REQUEST**

GET `/world_radiation/forecasts/ghi`

```
{
  "forecasts": [{
    "ghi": 690,
    "ghi90": 802,
    "ghi10": 537,
    "period_end": "2017-01-30T05:00:00.000000Z",
    "period": "PT30M"
  }, {
    "ghi": 422,
    "ghi90": 707,
    "ghi10": 141,
    "period_end": "2017-01-30T05:30:00.000000Z",
    "period": "PT30M"
  }
]
```

**URL PARAMETERS**

Parameter	Description	Required
latitude	The latitude of the location (EPSG:4326) eg, -35.123	Yes
longitude	The longitude of the location (EPSG:4326) eg, 149.123	Yes
hours	Time window of the response in hours (default 48, max 168)	No

**RESPONSE**

Attributes	Description
forecasts	Array of forecasts for the requested location

FORECAST

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean)
ghi90	int	Global Horizontal Irradiance (W/m2) - 90th percentile value (high scenario)
ghi10	int	Global Horizontal Irradiance (W/m2) - 10th percentile value (low scenario)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
400	Latitude, longitude or hours are invalid, see <code>response_status</code> for further details
404	The location is outside our coverage area.

## Estimated actuals by location

This endpoint takes a location and returns satellite derived observations ("estimated actuals"). The time window is by default 48 hours but can be extended up to 7 days.

```
{
  "estimated_actuals": [{
    "ghi": 640,
    "ebh": 516,
    "dni": 803,
    "dhi": 124,
    "cloud_opacity": 0,
    "period_end": "2017-01-29T23:00:00.000000Z",
    "period": "PT30M"
  }, {
    "ghi": 543,
    "ebh": 430,
    "dni": 769,
    "dhi": 113,
    "cloud_opacity": 0,
    "period_end": "2017-01-29T22:30:00.000000Z",
    "period": "PT30M"
  }
]
```

REQUEST

`GET /world_radiation/estimated_actuals`

URL PARAMETERS

Parameter	Description	Required
latitude	The latitude of the location (EPSG:4326) eg, -35.123	Yes
longitude	The longitude of the location (EPSG:4326) eg, 149.123	Yes
hours	Time window of the response in hours (default 48, max 168)	No

## RESPONSE

Attributes	Description
estimated_actuals	Array of estimated actuals for the requested location

## ESTIMATED ACTUALS

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean)
dni	int	Direct Normal Irradiance (W/m2) - centre value (mean)
dhi	int	Diffuse Horizontal Irradiance
cloud_opacity	int	The attenuation of incoming light due to cloud. Varies from 0 (no cloud) to 100 (full attenuation of incoming light).
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

## ERROR CODES

Code	Description
400	Latitude, longitude or hours are invalid, see <code>response_status</code> for further details
404	The location is outside our coverage area.

## GHI ONLY

This endpoint limits the output to GHI only estimated actuals.

## REQUEST

`GET /world_radiation/estimated_actuals/ghi`

```
{
  "estimated_actuals": [{
    "ghi": 640,
    "period_end": "2017-01-29T23:00:00.000000Z",
    "period": "PT30M"
  }, {
    "ghi": 543,
    "period_end": "2017-01-29T22:30:00.000000Z",
    "period": "PT30M"
  }
]
```

## URL PARAMETERS

Parameter	Description	Required
latitude	The latitude of the location (EPSG:4326) eg, -35.123	Yes
longitude	The longitude of the location (EPSG:4326) eg, 149.123	Yes
hours	Time window of the response in hours (default 48, max 168)	No

## RESPONSE

Attributes	Description
estimated_actuals	Array of estimated actuals for the requested location

**ESTIMATED ACTUALS**

Attributes	Description	Details
ghi	int	Global Horizontal Irradiance (W/m2) - centre value (mean)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

**ERROR CODES**

Code	Description
400	Latitude, longitude or hours are invalid, see <code>response_status</code> for further details
404	The location is outside our coverage area.

## Migrating from our beta radiation endpoint

Since the launch of the Solcast API in early 2017 we offered an easy way to get solar radiation forecasts or estimated actuals by just providing a location (longitude, latitude). To make the migration to this replacement API easier, we've maintained JSON compatibility and as well as listened to feedback on making the API easier to use for different use cases.

A breaking change to JSON users will be the default length of time window that is returned from this API call. Previously we always returned 7 days worth of data however, this will be reduced to 48 hours along with a way to either decrease or increase this time window by providing an optional `hours` parameter. For example, `&hours=72` will return most recent 3 day time window where as `&hours=4` will return the most recent 4 hour time window.

If you are using this endpoint in an automated way with either XML or CSV, we recommend (and only support) migrating to using the JSON format response type (by use of the `Accept: application/json` header or `&format=json`), see Data Formats and notes in JSON Only Support section for more info. If you need assistance migrating, please reach out on our community forums.

If you are using JSON and 48 hours still works for your usage scenario, you will need to update the URL from `/radiation/forecasts` to `/world_radiation/forecasts`, or for estimated actuals, `/radiation/estimated_actuals` to `/world_radiation/estimated_actuals`. Everything else is the same for JSON clients. While the original `/radiation/*` endpoints will continue to operate, we will be sending out notifications to clients currently using the beta endpoints and let them know of specific dates for when they will need to migrate.

## World API - PV Power

World API PV power data requested by location (latitude, longitude). This endpoint uses live radiation data to return modelled PV forecasts or estimated actuals based on the parameters specified in the request.

This is a JSON compatible replacement for the `/pv_power/forecasts` and `/pv_power/estimated_actuals` endpoints, see migration notes for more info.

## PV Power forecasts by location

This endpoint takes a location along with PV system capacity and other optional parameters to produce a PV power forecast based on satellite derived radiation. The time window is by default 48 hours but can be extended up to 7 days.

```
{
  "forecasts": [{
    "period_end": "2019-08-01T04:00:00.000000Z",
    "period": "PT30M",
    "pv_estimate": 3084.34529720409
  },
  {
    "period_end": "2019-08-01T04:30:00.000000Z",
    "period": "PT30M",
    "pv_estimate": 2835.17088260779
  }
]
```

### REQUEST

GET /world\_pv\_power/forecasts

### URL PARAMETERS

Parameter	Description	Required
latitude	The latitude of the location (EPSG:4326) eg, -35.123	Yes
longitude	The longitude of the location (EPSG:4326) eg, 149.123	Yes
capacity	The capacity of the inverter (AC) or the modules (DC), whichever is greater. Units in kilowatts. Must be greater than zero.	Yes
tilt	The angle (degrees) that the PV system is tilted off the horizontal. Must be between 0 and 90. A tilt of 0 means the system is facing directly upwards, and 90 means the system is vertical and facing the horizon. The default value is 23.	No
azimuth	The angle (degrees) from true north that the PV system is facing, if titled. Must be between -180 and 180. An azimuth of 0 means the system is facing true north. Positive values are anticlockwise, so azimuth is -90 for an east-facing system and 135 for a southwest-facing system. The default value is 0 (north facing) in the southern hemisphere, 180 (south-facing) in the northern hemisphere.	No
install_date	The date (yyyy-MM-dd) of installation of the PV system. We use this to estimate your loss_factor based on the ageing of your system. If you provide us with a loss_factor directly, we will ignore this date.	No
loss_factor	A factor by which to reduce your output forecast from the full capacity based on characteristics of the PV array or inverter. This is effectively the non-temperature loss effects on the nameplate rating of the PV system, including inefficiency and soiling. For a 1kW PV system anything that reduces 1000W/m2 solar radiation from producing 1000W of power output (assuming temperature is 25C)	No
hours	Time window of the response in hours (default 48, max 168)	No

### RESPONSE

Attributes	Description
forecasts	Array of power forecasts for the requested location

### POWER FORECAST

Attributes	Description	Details
------------	-------------	---------



Attributes	Description	Details
pv_estimate	double	PV power estimated in kilowatts (kW)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

ERROR CODES

Code	Description
400	Invalid parameters, see <code>response_status</code> for more details
404	The location is outside our coverage area.

## PV Power estimated actuals by location

This endpoint takes a location and returns satellite derived observations ("estimated actuals") for a specific location and PV system parameters. The time window is by default 48 hours but can be extended up to 7 days.

```
{
  "estimated_actuals": [{
    "period_end": "2019-08-01T04:00:00.000000Z",
    "period": "PT30M",
    "pv_estimate": 3078.02380941897
  }, {
    "period_end": "2019-08-01T03:30:00.000000Z",
    "period": "PT30M",
    "pv_estimate": 3318.10586932724
  }
]
```

REQUEST

GET /world\_pv\_power/estimated\_actuals

URL PARAMETERS

Parameter	Description	Required
latitude	The latitude of the location (EPSG:4326) eg, -35.123	Yes
longitude	The longitude of the location (EPSG:4326) eg, 149.123	Yes
capacity	The capacity of the inverter (AC) or the modules (DC), whichever is greater. Units in kilowatts. Must be greater than zero.	Yes
tilt	The angle (degrees) that the PV system is tilted off the horizontal. Must be between 0 and 90. A tilt of 0 means the system is facing directly upwards, and 90 means the system is vertical and facing the horizon. The default value is 23.	No
azimuth	The angle (degrees) from true north that the PV system is facing, if titled. Must be between -180 and 180. An azimuth of 0 means the system is facing true north. Positive values are anticlockwise, so azimuth is -90 for an east-facing system and 135 for a southwest-facing system. The default value is 0 (north facing) in the southern hemisphere, 180 (south-facing) in the northern hemisphere.	No

Parameter	Description	Required
install_date	The date (yyyy-MM-dd) of installation of the PV system. We use this to estimate your loss_factor based on the ageing of your system. If you provide us with a loss_factor directly, we will ignore this date.	No
loss_factor	A factor by which to reduce your output forecast from the full capacity based on characteristics of the PV array or inverter. This is effectively the non-temperature loss effects on the nameplate rating of the PV system, including inefficiency and soiling. For a 1kW PV system anything that reduces 1000W/m2 solar radiation from producing 1000W of power output (assuming temperature is 25C)	No
hours	Time window of the response in hours (default 48, max 168)	No

**RESPONSE**

Attributes	Description
estimated_actuals	Array of power estimated actuals for the requested location and PV system paramters.

**POWER ESTIMATED ACTUALS**

Attributes	Description	Details
pv_estimate	double	PV power estimated in kilowatts (kW)
period_end	datetime	End of the averaging period in ISO8601 datetime format in UTC timezone
period	string	Length of the averaging period in ISO8601 duration format

**ERROR CODES**

Code	Description
400	Invalid parameters, see <code>response_status</code> for more details
404	The location is outside our coverage area.

## Migrating from our beta PV power endpoint

Since the launch of the Solcast API in early 2017 we offered an easy way to get PV power forecasts or estimated actuals by just providing a location (longitude, latitude) and details about your system. To make the migration to this replacement API easier, we've maintained JSON compatibility and as well as listened to feedback on making the API easier to use for different use cases.

**BREAKING CHANGES**

- Default return time window now 48 hours rather than 7 days
- `install_date` date format now consistent with other APIs using `yyyy-MM-dd` rather than `yyyyMMdd`.

Default return time window breaking change to JSON users will be the default length of time window that is returned from this API call. Previously we always returned 7 days worth of data however, this will be reduced to 48 hours along with a way to either decrease or increase this time window by providing an optional `hours` parameter. For example, `&hours=72` will return most recent 3 day time window where as `&hours=4` will return the most recent 4 hour time window. `install_date` format change will throw a 400 if format is incorrect.

If you are using this endpoint in an automated way with either XML or CSV, we recommend (and only support) migrating to using the JSON format response type (by use of the `Accept: application/json` header or `&format=json`), see Data Formats and notes in JSON Only Support section for more info. If you need assistance migrating, please reach out on our community forums.

If you are using JSON and 48 hours still works for your usage scenario and not using the `install_date` parameter, you will only need to update the URL from `/pv_power/forecasts` to `/world_pv_power/forecasts`, or for estimated actuals, `/pv_power/estimated_actuals` to `/world_pv_power/estimated_actuals`. Everything else is the same for JSON clients. While the original `/pv_power` endpoints will continue to operate, we will be sending out notifications to clients currently using the beta endpoints and let them know of specific dates for when they will need to migrate.