



Gwasanaeth Ynni
Energy Service

Guidance note 1: Monitoring and maximising the performance of roof-top solar arrays. **Fact-finding.**



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1. Background

This **fact-finding** guidance note 1 is preceded by an introductory guidance note, '[Monitoring and maximising the performance of roof-top solar arrays](#)'. The introductory note explains why the operation of rooftop solar panels must be **actively managed** if they are to achieve their performance potential.

The introductory guidance note concludes;

“whether active management is outsourced to a specialist solar asset manager or conducted in-house, fact-finding is the first step.

Gathering key information about the solar installation, its history, its present operation, and its wider electrical system is essential. Active management will also require accurate information regarding the applicable electricity supply and purchase tariffs, and any historic subsidies, such as the Feed-in-tariff.

This may involve a visit to the site itself and to various departments within your organisation. It is helpful to compile the information you find into a factsheet or 'solar operations manual'. This will alert

you to key recurring contractual dates and may be updated when information changes or passed on to other stakeholders.”

The purpose of this **fact-finding** guidance note is to explain common terminology and specify the data or information needed to manage rooftop solar generation and where to find it.

If you are new to managing renewable generation, it may seem that there are more questions than answers! The next section describes some common terminology in renewables management.



Image 1: group of three people discussing renewables.

2. Common terminology

Term	Description
Capacity	The electrical load capability of plant or electricity supply point (kilowatt).
Commissioning certificate	This states key performance measurements and certifies correct installation.
Data collector	A data collector is appointed by an electricity supplier or power purchaser to retrieve half-hourly data from a half-hourly electricity meter.
Electrical Demand	Kilowatt hours consumed by electrical plant, measured at a submeter, or measured at the electrical supply point import meter.
Electrical design /Single line diagram (SLD)	A diagram, issued post-installation,which illustrates how the solar plant and meters interface with the electrical design of the building.
Electricity supply contract	An agreement between an electricity consumer and an electricity supplier stating the supply tariff at their point of supply.
Electricity supply invoice	A monthly or quarterly invoice from the electricity supplier stating kilowatt hours consumed at the point of supply and the amount due.
Energy Management System (EMS) / Building Management System (BMS)	A software platform enabling users to monitor the performance of multiple elements of mechanical, electrical and environmental systems in a built environment.
Export	Kilowatt hours exported to the network measured at the electrical supply point export meter.

Term	Description
Feed-in Tariff (Feed-in Tariff)	A historic government subsidy payment received for each kilowatt hour generated and/or exported. The Feed-in Tariff scheme closed to new applicants on 01/04/2019.
Feed-in Tariff accreditation	A letter from Ofgem confirming the date the generation plant was accredited to receive Feed-in Tariff payments.
Feed-in Tariff provider	An electricity supplier who registered the installation and passes on Feed-in Tariff payments to the generator.
Generation	kilowatt hours electricity generated by electrical plant measured at a generation meter.
Grid connection agreement	A contract between the Distribution Network Operator and the consumer or generator specifying the terms of connection to the grid.
Half-hourly meter >100 kilowatts	A meter measuring, recording and communicating data to a data collector each half hour.
Kilowatt (kW)	A measure of electrical power capacity.
Kilowatt hour (kWh)	A measure of energy being generated or consumed.
Microgeneration Certification Scheme (MCS) Installation certificate	A certificate from the Microgeneration Certification Scheme. This will state the date of installation, operating kilowatt capacity of the solar array, the date of Feed-in Tariff accreditation, and the details of the installation contractor.
Meter Point Administration Number (MPAN)	A 13-digit numeric identifying the location of an electrical supply point meter. This can refer to the import or export of electricity to or from the network and is stated on the electricity supply or purchase invoice related to the supply point.
Meter Serial Number (MSN)	A combination of letters and numbers unique to each electricity meter. The MSN is printed on the meter itself and stated on the electricity supply or purchase invoice related to the supply point.

Term	Description
MID Meter <100kilowatt (Measuring Instruments Directive)	A meter measuring, recording and communicating data to a data collector each half hour.
Monitoring contractor	A party appointed to monitor the operation of a solar array. They provide remote access to plant performance data via an application or a web portal.
Monitoring device	A live performance monitoring device is typically fitted at the solar inverter. Measurements include kilowatt hours generated, power at the inverter and system faults. The device may also monitor the electricity meters, have a weather station and an SMS fault alert system.
Monitoring platform	The software offered by the Monitoring contractor to provide remote access to live performance data.
Ofgem	Ofgem is Great Britain's independent energy regulator. They administer the Feed-in Tariff Scheme.
Operations and Maintenance contract	A contract between the solar array owner/manager and an operations and maintenance contractor to provide a specified set of services to maintain the solar plant.
Power Purchase Agreement (PPA)	An agreement between a power purchaser and a power generator stating the purchase tariff at the point of supply to the grid or, if via a private wire, at the point of supply. (The tariff may be a Smart Export Guarantee)
Power purchase invoice	A monthly or quarterly statement from the power purchaser stating kilowatt hours measured at the point of supply and the amount due to be paid.
Renewable Energy Guarantees of Origin (REGOs)	A digital certificate issued to the generator to certify electricity is renewable in origin

3. Types of data or information

Active management of power generation involves cross-referencing **fixed**, **cyclical** and **dynamic** data in order to assess and improve the performance of the generation plant or solar array.

1. **Fixed data** is data that will not change, for example:

- technical facts, such as the kilowatt rated power of the solar installation
- geographical facts, such as the location of the solar installation
- time-based facts, such as the commissioning date of the array
- historic performance data.

Fixed data provide the benchmarks for measuring performance.

2. **Cyclical data** is data that changes periodically, for example:

- contract parties and contract start and end dates
- tariff data, how much is received or paid per kilowatt hour of imported, generated or exported power
- physical factors, such as tree growth or new buildings.

This information informs financial and operational decision-making.

3. **Dynamic data** is live or real-time information, for example:

- electricity meter consumption, generation and export data
- equipment fault notifications
- meteorological conditions, such as irradiance levels.

Dynamic data provides operational context and illustrates live performance. Faults can be picked up via direct notifications, or through meter data analyses. **Prompt resolution of faults will minimise lost generation and use of expensive imported electricity.**

Establishing the validity of the data is crucial to successful management.

The following three tables specify the **fixed**, **cyclical**, and **dynamic** data or information you will need to locate, validate and record in a **factsheet**. The tables indicate methods of validation in the right-hand column labelled, 'Validation'.

Please Note: Items prefixed with an *asterisk, may not be applicable to your solar asset, however, do keep a record of steps taken to find the items to evidence that is the case. A '?' in a table field indicates that the data item should be located, recorded, and filed.

Table 1: Fixed Data

Meter	Import	Export	Generation	Submeter	Location	Validation
Meter Serial Number	?	?	?	?	Printed on meter	Electricity supply / purchase invoice
Meter Point Administration Number (MPAN)	?	?	n/a	n/a	Supply / purchase invoice	Grid connection agreement
Kilowatt (kW) capacity or demand	?	?	?	?	On site / accounts department.	Electrical engineer/ building survey
*Feed-in Tariff (FIT) eligibility details	n/a	?	n/a	?	On site / accounts department.	Ofgem / Feed-in Tariff provider
* Renewable Energy Guarantees of Origin (REGO) Registration	n/a	?	n/a	n/a	On site / accounts department	Power Purchase Agreement/ Ofgem
*Monitoring	?	?	?	?	On site; monitoring plant present at solar inverter. Half-hourly/smart meters	
	The Monitoring Contractor's app or web portal. The Supplier/Purchaser's data website.					

Table 2: Cyclical Data

Meter	Import	Export	Generation	Submeter	Location	Validation
Cost (pence per kilowatt hour)	?	n/a	n/a	?	Electricity supply invoice	*Electricity supply contract
Cost (Operation and maintenance of solar plant)	n/a	n/a	?	n/a	*Operation and Maintenance Contract/s	Purchase orders / invoices
Generation Revenue (pence per kilowatt hour)	n/a	n/a	?	n/a	*Feed-in tariff statement	Electricity supply contract or *Power Purchase Agreement
Export Revenue (pence per kilowatt hour)	n/a	?	n/a	n/a	*Power purchase invoice	Power Purchase Agreement
Tariff Structure	?	?	n/a	?	Supply or purchase contract	Supply or purchase invoice
Insurance Certificate	Whole solar electrical system				Facilities Management	Insurance provider
Statutory Safety Certificates	Whole solar electrical system				As above	Health and Safety Manager

Table 3: Dynamic data

Meter	Import	Export	Generation	Submeter	Source	Validation
Electricity consumption	?	n/a	n/a	?	*Web portal / application / *EMS	Invoices, manual meter reads
Electricity generation	n/a	n/a	?	n/a	As above	As above
Electricity demand	?	n/a	n/a	?	As above	As above and
System faults	?	?	?	?	As above	*Site visit record from Operation and Maintenance contractor

4. Factsheet and operations manual

A **factsheet** serves as a quick reference document and forms the front page of an **operations manual**. The operations manual serves as a 'single source of truth', relied upon for all aspects of rooftop solar management. It is created in an electronic format and saved on a secure server, preferably backed up each day.

The **operations manual** contains:

- Copies of **fixed data**, such as plant technical data sheets, as-built electrical design drawings and performance warranty certificates. (You may find additional technical material on manufacturer websites to download and keep on file.)
- Copies of **cyclical data**, such as supply contracts, power purchase agreements, operation and maintenance contracts, statutory safety certification, communication service contracts and insurance certificates.
- Historic data, such as meter and performance data, is also collected, labelled, and filed in an electronic operations manual.

The person nominated to manage the solar asset will be responsible for updating the operations manual whenever information changes. It is useful to hold a hard copy on site for reference.

Once the factsheet and operational manual are complete, active operational management processes can begin to be put in place.

The next in this series, Guidance note 2: **'Monitoring and maximising the performance of roof-top solar arrays – checks and procedures'**, will describe the simple checks, validations and actions which will enable you to maximise generation.

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Gwasanaeth Ynni Energy Service

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