



Government
of South Australia

Department for
Energy and Mining

Technical Regulator Guideline

Remote Communications Capabilities for Inverters

Declared Components of Electricity Infrastructure or an Electrical Installation
Associated with an Electricity Generating Plant

Deemed Methodologies for Remote Disconnection and Reconnection of Electricity
Generating Plants

Remote Updating Methods

Export Limiting Methods




1 Document Approval and Control

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		the requirement to be dynamic export capable.	Jesse Daughtry
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3 Table of Abbreviations and Definitions

Battery Inverter	Refers to an inverter as defined in AS/NZS 4777.2 with an energy storage port, but no PV port.
CSIP-AUS	The Common Smart Inverter Profile for Australia, an implementation guide for IEEE 2030.5 applicable to Australia. The CSIP-AUS can be downloaded from the ARENA DEIP interoperability steering committee website .
Dynamic Export Capable	Describes a site which is both <i>capable of being export limited</i> and <i>capable of being updated remotely</i> as described in the <i>Electricity (General) Regulations 2012</i> , regulation 55E.
Dynamic Export Capable Connection Agreement	Describes a connection agreement with the relevant distribution network operator which requires utilisation of dynamic export capability to implement and update export limits. May be referred to as a flexible connection agreement.
DNSP	Distribution Network Service Provider. For most of the electricity network in South Australia, this party is SA Power Networks.
EVSE	Electric Vehicle Supply Equipment. Equipment or a combination of equipment, providing dedicated functions to supply electric energy from a fixed electrical installation or supply network to an Electric Vehicle for the purpose of charging.
EVSDE	Electric Vehicle Supply and Discharge Equipment. Equipment that has the same characteristics as an EVSE but is also capable of regulating discharge of electricity from an EV to the grid. These devices are variously referred to as V2G, V2X or Vehicle to Grid chargers.
Hybrid Inverter	Refers to a multiple mode inverter as defined in AS/NZS 4777.2 with photovoltaic and energy storage ports.
IEEE 2030.5	Refers to the Standard IEEE 2030.5-2018, IEEE Standard for Smart Energy Profile Application Protocol.
SCADA	Supervisory Control and Data Acquisition, a system utilised to monitor and control a variety of machinery or other plant. Normally only associated with larger distribution network connected generation.
Site	Refers to an electrical installation, as defined in the <i>Electricity (General) Regulations 2012</i> . References to site export limits presume a single point of

measurement of the flow of energy to or from an electricity distribution network for an entire electrical installation.

Solar PV Inverter	Refers to an inverter as defined in AS/NZS 4777.2 with a PV port but no energy storage port.
USB	Universal Serial Bus

4 Objectives

The objective of this document is to detail Technical Regulator guidelines which concern designated *electricity generating plants* under the *Electricity (General) Regulations 2012*.

These guidelines provide the following under the *Electricity (General) Regulations 2012*:

- Requirements for ensuring that an inverter connected to a designated *electricity generating plant* is remote communications capable as required by regulation 55E(2)(a), noting that the Technical Regulator must prepare and publish guidelines that set out the requirements for ensuring that an inverter is remote communications capable;
- Declared Components for remote disconnection and reconnection associated with a designated *electricity generating plant* for the purpose of regulation 55B;
- Declared Components for export limitation associated with a designated *electricity generating plant* for the purpose of regulation 55E;
- Methods for ensuring that a designated *electricity generating plant* is capable of being remotely disconnected from, and reconnected to, a distribution network for the purpose of regulation 55B(6);
- Methods for ensuring that a designated *electricity generating plant* is capable of being export limited as required by regulation 55E(2)(b)(i); and
- Methods for ensuring that the export limits of a designated *electricity generating plant* are capable of being updated remotely (without a person required to attend the site of the designated *electricity generating plant*) as required by regulation 55E(2)(b)(ii).

A designated *electricity generating plant* compliant with these guidelines should be considered *Dynamic Export Capable*.

These guidelines may be reviewed from time to time by the Technical Regulator, and a new version of this document published.

5 Remote Communications Capabilities Guideline

Electricity generating plant connected inverters must have internet capability (the ability to share data via the internet) and an on-board communication port that can be used for a physical connection to another device (e.g. via ethernet, USB and RS-232).

If an inverter can communicate wirelessly in a manner similar to an on-board communication port (for example by providing a secure Application Programming Interface or API over Wifi) that can be used for a connection to another device, this may be utilised in lieu of a physical communication port.

6 Declared Components of Electricity Infrastructure or an Electrical Installation Associated with an Electricity Generating Plant Guideline

6.1 Objective

The objective of this guideline is to detail components of electricity infrastructure or an electrical installation associated with a designated *electricity generating plant* which if replaced would require that *electricity generating plant* to meet additional requirements under the Electricity (General) Regulations 2012.

The Technical Regulator is required to publish and maintain an up-to-date list of declared components under the Electricity (General) Regulations 2012.

6.2 Declared Components for Remote Disconnect and Reconnection

For the purpose of the *Electricity (General) Regulations 2012* regulation 55B the following components associated with a designated *electricity generating plant*, are deemed declared components:

1. Grid-connected inverters and multiple mode inverters (MMI) as defined within AS/NZS 4777.2, including where this standard is amended from time to time, where this component is or is intended to be connected to a designated *electricity generating plant*.

6.2.1 Exemptions

The components detailed above are not deemed declared components if they are:

- Repaired, or replaced under warranty; or
- Relocated to another position on the same building e.g. due to renovations or building works.

Where an existing inverter is intended to be relocated to a different building within the same electrical installation, it is not exempt.

6.3 Declared Components for Export Limitations

For the purpose of the *Electricity (General) Regulations 2012* regulation 55E the following components associated with a designated *electricity generating plant*, are deemed declared components:

1. Grid-connected inverters and multiple mode inverters (MMI) which possess one or more Photovoltaic ports, as defined within AS/NZS 4777.2, including where this standard is amended from time to time, where this component is or is intended to be connected to a designated *electricity generating plant*.

6.3.1 Exemptions

The components detailed above are not deemed declared components if they are:

- Repaired, or replaced under warranty; or
- Relocated to another position on the same building e.g. due to renovations or building works.

Where an existing inverter is intended to be relocated to a different building within the same electrical installation, it is not exempt.

7 Deemed Methodologies for Remote Disconnection and Reconnection of Electricity Generating Plants Guideline

7.1 Objective

The objective of this document is to detail guidelines that set out methods for ensuring that a designated *electricity generating plant* is capable of being remotely disconnected from, and reconnected to, a distribution network as referenced in the *Electricity (General) Regulations 2012*

These guidelines are intended to provide clarity to those considering registration as a Relevant Agent by detailing methods of disconnection and reconnection of *electricity generating plants* that are deemed by the Technical Regulator to meet the requirements of the *Electricity (General) Regulations 2012*.

7.2 Roles and Responsibilities of Relevant Agents and Further Information

The roles and responsibilities of Relevant Agents are not considered in this document. For further information please refer to the Technical Regulator Guideline - Relevant Agent Roles and Responsibilities found on the [Department for Energy and Mining Website](#).

7.3 Deemed Methods for Disconnection and Reconnection of Electricity Generating Plant

The following are functional descriptions, which provide details on the minimum functions that could be utilised by systems designed to facilitate disconnection and reconnection of *electricity generating plants* by a Relevant Agent. The Technical Regulator may from time to time review and update these methodologies.

1. A device connected to the DRM port of a low voltage inverter, which on receipt of a signal from the relevant agent - asserts a DRM0 signal to the inverter – causing the inverter to operate its disconnection device. The inverter shall reconnect after the DRM0 signal is no longer asserted and comply with the connection and reconnection procedure detailed in AS/NZS 4777.2:2015.
2. A device connected to the DRM port of a low voltage inverter, which on receipt of a signal from the relevant agent – asserts a DRM5 signal to the inverter – causing the inverter to cease to generate.
3. A communication channel to the low voltage inverter, such that the inverter can receive a signal from the relevant agent and in response operate the disconnection device or reduce energy exported to the distribution network to zero.
4. An electricity meter configured and wired such that on receipt of a signal from the relevant agent, the electricity meter can disconnect or reconnect the *electricity generating plant* from the distribution network.
5. A Central Protection Unit (or Network Protection Unit), which in response to a signal from the relevant agent acts to either disconnect or reconnect the *electricity generating plant* from the distribution network or to reduce exported energy to zero.
6. A Supervisory Control and Data Acquisition (SCADA) system configured to be able to either disconnect or reconnect the *electricity generating plant* or reduce energy exported to the distribution network to zero on receipt of a signal from the relevant agent.

Note: These requirements do not supersede those specified in Australian Standards or other documents.

7.4 Alternative Methodologies

The intent of this guideline is to provide technical methodologies which are, if utilised by a Relevant Agent; deemed to meet the standard. These methodologies are subject to change, and Relevant Agents seeking to utilise alternative methodologies may propose these to the Technical Regulator at the time of registration as a Relevant Agent.

7.5 Testing

The relevant agent must test their remote disconnect and reconnect capability and provide evidence of such testing to the Technical Regulator on request.

The relevant agent may also be requested by the Technical Regulator from time to time to complete a test of the activation of the remote disconnect and reconnect functionality. This will involve the receipt of a test instruction and activating a disconnection and a reconnection in accordance with that instruction.

8 Introduction to Dynamic Exports Requirements

8.1 Scope of the guidelines

The aim of the following guidelines is to ensure all sites that include relevant *electricity generating plant* (new/upgrade inverter connected generators) are *dynamic exports capable* for the purposes of regulation 55E of the *Electricity (General) Regulations* 2012. To achieve this, from 1 July 2023, each installation must include the capability to monitor and manage all *electricity generating plant* on site to keep within a site-wide export limit and have that export limit updated remotely by the relevant DNSP.

This capability will ensure any customer with a compliant system has the option to enrol in a *dynamic exports* connection offer from the relevant DNSP.

For a site to be considered *dynamic exports capable* it must meet the requirements detailed in the following two Technical Regulator Guidelines, summarised in Figure 8-1 alongside the compliance timeline described by Figure 8-2:

1. **Remote updating methods guideline:** Details the compliant pathways to enable dynamic exports limits to be remotely communicated by the DNSP. This includes the application of the IEEE 2030.5 communications protocol with reference to the CSIP-AUS implementation guide, and the associated communications integration models.

2. **Export limiting methods guideline:** Details what capabilities are required by *electricity generating plant* on-site to meet the dynamic export limiting requirements, including the ability for the site export limit to be managed.

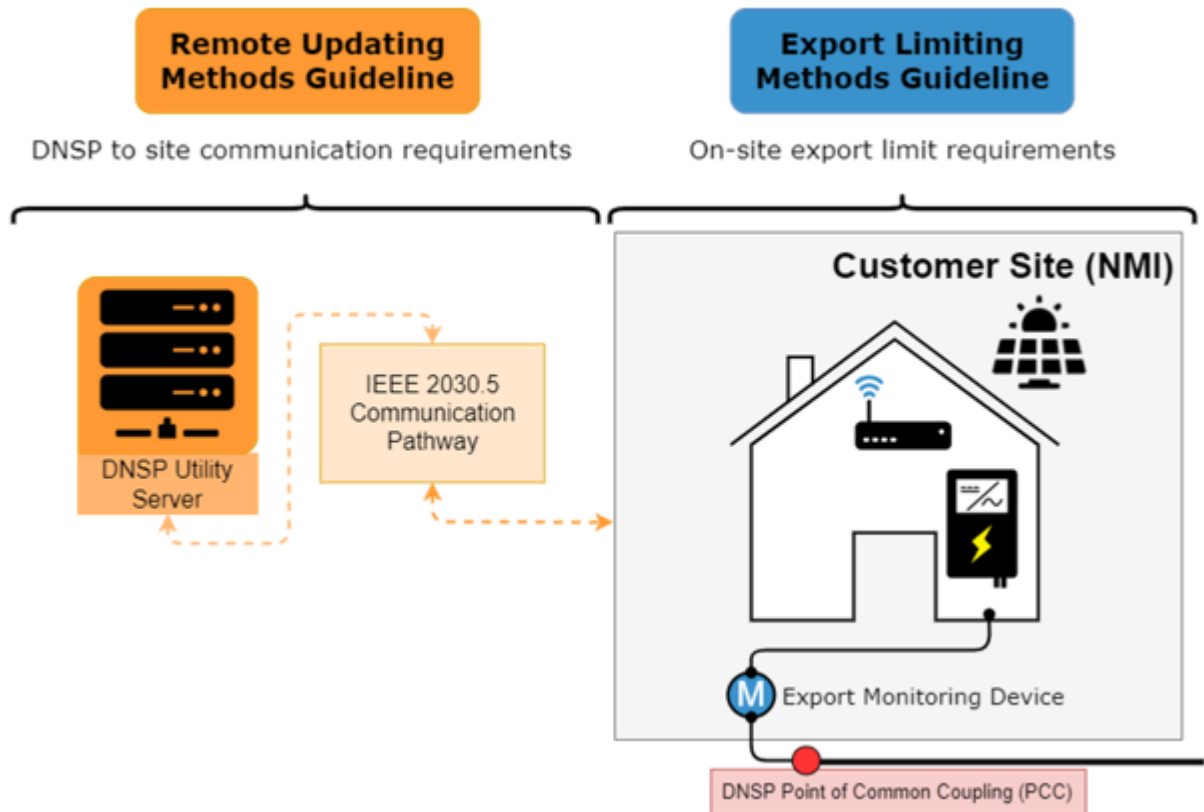


Figure 8-1 Applicability of the dynamic export guidelines detailed in sections 9 and 10

Dynamic Export Guidelines Compliance Timeline



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From 1 July 2023

Small Embedded Generator (SEG) Connections (< 30 kW)

All new installations intending to export to the grid must use certified dynamic export-capable equipment from CEC or transitional listings (detailed in sections 9.8.2 & 10.5.2).

SEG Exceptions & Exemptions

For sites which applied for a connection agreement prior to **1 July 2023**, compliance with the dynamic exports guidelines is not required if that site's installation is completed prior to **1 September 2023**.

Sites using a *static export connection* are not required to complete the dynamic exports capability test as part of commissioning.

Sites configured to permanent zero export are exempt from dynamic export compliance requirements.

Sites using a *dynamic export capable connection agreement* must also pass the *dynamic exports capability test* as part of installation commissioning.

Sites with no option to connect via a *dynamic export capable connection agreement* may have reduced compliance requirements (as described in sections 9.8.3 and 10.5.3.)

Other Exceptions & Exemptions

AC coupled batteries, except those utilising a hybrid inverter, are exempt from dynamic export compliance requirements (See guideline section 9.7.2 & 10.4.2 for more information).

Medium embedded generators (MEG) with generator capacity >30kW - 200kW are exempt from dynamic export compliance requirements until **1 July 2024**

From 1 April 2024

Transitional Listing Arrangement Ends

Transitional exemption listings of compliant *electricity generating plant* are removed. All new export-capable sites installed after **1 April 2024** must use dynamic export capable equipment as listed by the CEC and pass the *dynamic export capability test* as part of commissioning.

(See sections 9.8.2 & 10.5.2 for further details)

From 1 July 2024

Medium Embedded Generator (>30kW - 200kW) Exemption Ends

Dynamic export compliance exemption for MEG plant ends. From 1 July 2024 dynamic export compliance is mandatory for all new MEG installations. New MEG installations must also pass the *dynamic export capability test* during commissioning to achieve compliance.

Figure 8-2 Dynamic Export Guideline Compliance Timeline

8.2 Dynamic exports use-cases

There are five functional use-cases that must be met for a site to be considered *dynamic exports capable*. A high-level summary of these use-cases is shown in Table 8-1 below with specific requirements detailed in the *Remote Updating Methods* and *Export Limiting Methods* guidelines.

Table 8-1 Dynamic exports use cases

Use-case	Description
Registration	Registration of the site with the network operator to commence communication and provide standing data about the installation. Note that registration is required from 1 July 2023, for any site connecting to a relevant distribution network under a dynamic export capable connection agreement, unless otherwise exempted from this requirement.
Dynamic export limits	The communication and application of site level dynamic export limits published by the DNSP Utility Server.
Emergency curtailment	Capability to curtail or de-energise all generation on site on receipt of instruction from DNSP Utility Server.
Communications fall back	Capability to fall back to a predefined export limit in the event of a communications failure (i.e. when no active dynamic export limits or curtailment instructions are available). The value of this fall back may be updated by the DNSP Utility Server from time to time.
Monitoring capability	The capability for measurement and reporting of metering parameters to the DNSP utility server at the specified frequency.

8.3 Dynamic Exports Capable Installation

For a site to be compliant with these guidelines and considered a *dynamic exports capable installation*, a site shall include:

1. A certified *communication software client* compliant with the Remote Updating Methods Guideline; and
2. Inverter(s) compliant with the Export Limiting Methods Guideline and the associated *communication software client*
3. The equipment, or combination of equipment installed on site to achieve compliance shall be certified, and published on a list of compliant dynamic exports capable equipment by the Clean Energy Council.

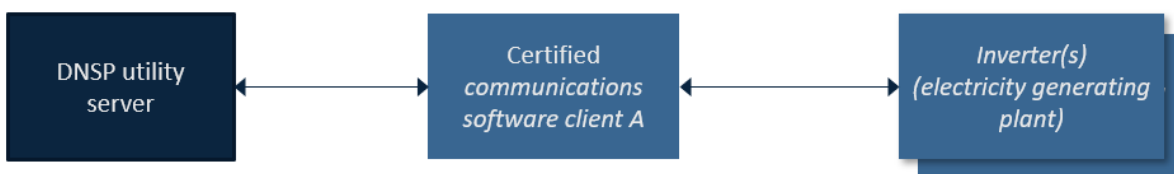


Figure 8-3 1 Example of the critical components to allow for a dynamic export capable site.

8.3.1 Compliant Equipment Listing and Site Export Limitation Test Procedure

The list of dynamic exports capable equipment will be maintained by the **Clean Energy Council**. From 1 July 2023, a site will be considered compliant if the *electricity generating plant* (and related devices as necessary) contains equipment which has successfully completed the *communications software client test procedure* provided by the DNSP and subsequently been approved and listed by the Clean Energy Council. Technology and other original equipment manufacturers (OEMs) can apply to have *communication software clients* and Inverter series tested to prove compatibility. The test setup must comprise at least one each of certified *communications software client* and *electricity generating plant* and will be conducted in communication with the DNSP test utility server as shown in Figure 8-4

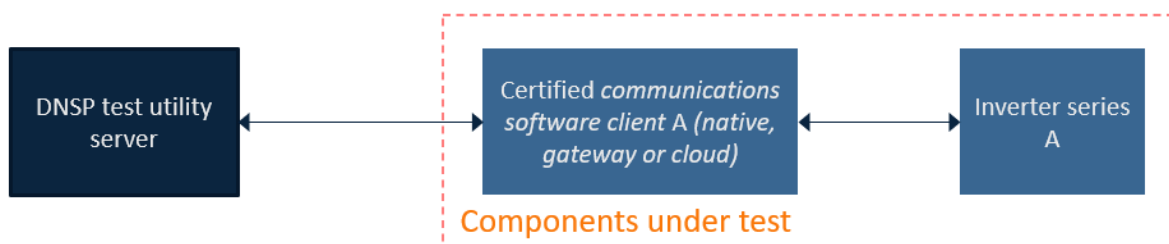


Figure 8-4 Example test configuration for 'site export limitation' testing

The inverter under test may be in a lab or other test environment nominated by the party seeking site export compliance. Final testing shall be witnessed by the relevant DNSP and so must be co-ordinated accordingly.

After 1 July 2023, any newly installed system, having undergone testing, approval, and listing, may be required to be validated for dynamic exports capability (compliance) through an on-site *dynamic exports capability* test issued by the DNSP.

This test is required for all *electricity generating plant* installations with a total installation size of a maximum of 30kVA, which have nominated to connect to a relevant distribution network under a **dynamic export capable connection agreement**. Installations with an installed capacity larger than 30kVA which are not required to possess a SCADA connection to the relevant DNSP, will also be required to undertake the *dynamic exports capability test*, however export connection options for such a site will be subject to individual assessment by the relevant DNSP.

8.4 Roles and responsibilities

Table 8-3 Parties responsible for achieving dynamic export capability

Responsibility	Responsible party
Develop software and hardware compliant with the <i>Remote Updating Methods</i> and <i>Export Limiting Methods</i> guidelines	Technology providers and OEMs
Develop test procedures and assess compliance with the guidelines	DNSP
List compliant <i>communications software clients</i> and <i>electricity generating plant</i>	The Clean Energy Council
Host utility server and automated <i>dynamic exports capability test</i>	DNSP
Sell customers equipment and configurations compatible with these requirements (where applicable)	Solar retailers
Install and configure customer equipment and successfully execute <i>dynamic exports capability test</i> where required: From 1 July 2023 , for any site connecting to a relevant distribution network under a <i>dynamic export capable connection agreement</i> unless otherwise exempted from this requirement .	Solar installers
Configure site to conform with export limits defined in DNSP connection agreement (flexible or fixed export limits)	Solar installers
Installation auditing to ensure ongoing compliance with guidelines	Technical Regulator

9 Remote Updating Methods Guideline

9.1 Objective

The objective of this guideline is to provide methods as required by regulation 55E(5)(a) of the *Electricity (General) Regulations 2012* for ensuring that the export limits of a designated *electricity generating plant* are capable of being updated remotely (without a person required to attend the site of the designated *electricity generating plant*) as required by regulation 55E(2)(b)(ii).

This will ensure that a site containing a designated *electricity generating plant* has the capability to receive export limits advised remotely by the Distribution Network Operator utility server. Guidance is provided on agreed communication channels to facilitate integration with a utility server operated by the Distribution Network Operator, as well as commissioning steps required to confirm successful communication and operation.

In each case a communication channel will be prescribed between a utility server operated by the Network Operator and a software client which can implement site wide export limits. Utilisation of this communication channel after initial commissioning is not mandated by this guideline.

This guideline should be read in conjunction with the Export Limiting Methods guideline.

9.2 Connectivity Requirements

Designated *electricity generating plants* connected to a relevant electricity distribution network and installed after 1 July 2023 shall be capable of being export limited and for these export limits to be updated remotely.

Several pathways are provided to demonstrate compliance with this guideline, any one of which is sufficient.

Each site utilising the native inverter or gateway pathways shall have only a single CSIP-AUS compliant IEEE 2030.5 software client configured to communicate with the DNSP utility server, such that site-wide export limits can be enacted after a signal is received by that software client.

Cloud vendors utilising the cloud pathway must have a CSIP-AUS compliant IEEE 2030.5 software client which can, in response to signals provided by the DNSP utility server, exert export limit control via communication to sites which utilise their services to achieve dynamic export capability and provide the required monitoring data to the DNSP.

For a site connecting to the network under a *dynamic export capable connection agreement* to be considered *dynamic export capable*, confirmation must be provided by the DNSP utility server. It is permissible to utilise a temporary internet connection (such as a tethered mobile phone) for commissioning and to confirm a site is *dynamic export capable*.

It should be noted that if used - once this temporary connection is removed, the plant must be configured to connect to the DNSP utility server via a permanent on-site internet connection or the plant must be configured to a static export limit provided by the DNSP during the commissioning process.

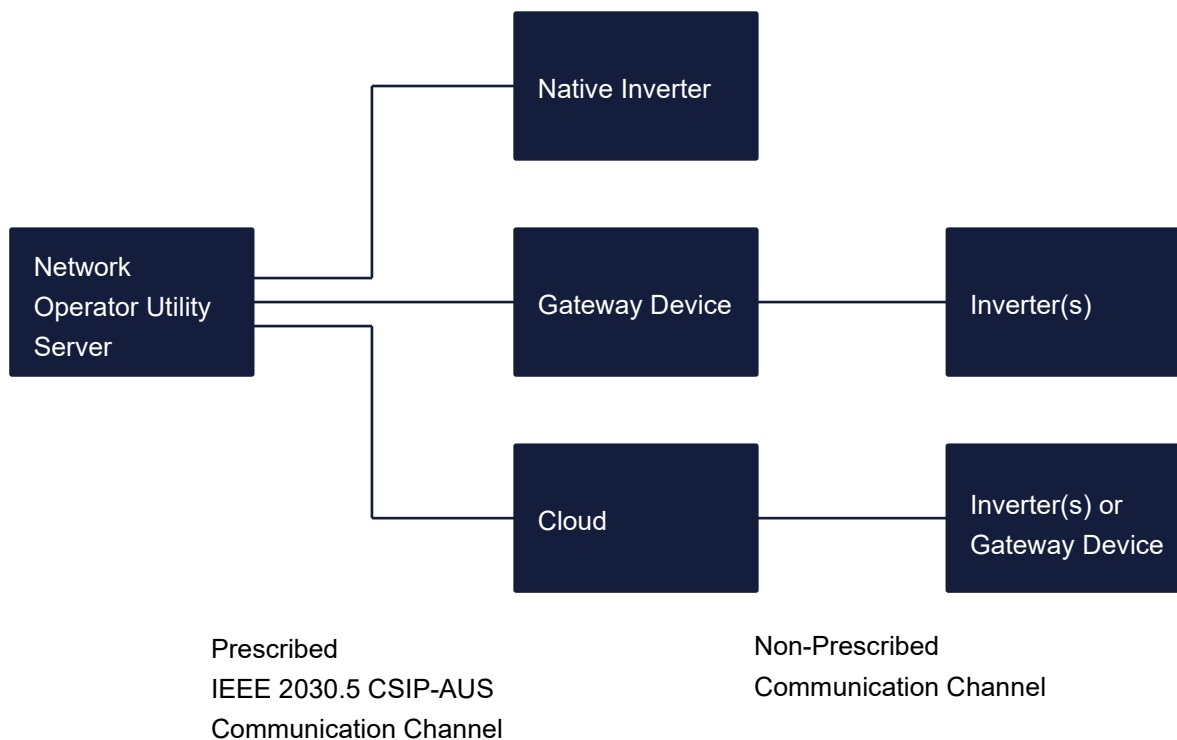


Figure 9-1 Communication Pathways for Dynamic Exports

9.2.1 Native Inverter Communication

The communication channel to a software client hosted on an inverter that can be utilised to set and update site wide export limits shall be between the inverter on site and the utility server operated by the distribution network operator and shall be compliant with the CSIP-AUS and IEEE 2030.5 to the extent required by the CSIP-AUS.

9.2.2 Communication to a Gateway Device

The communication channel to a software client hosted on a device that can be utilised to set and update site wide export limits shall be between the gateway device on site and the utility server operated by the DNSP and shall be compliant with the CSIP-AUS and IEEE 2030.5 to the extent required by the CSIP-AUS.

Communication methods between this device and the inverter(s) or other devices which can achieve export limitation on site are not prescribed by this guideline but shall comply with the Remote Communications Capabilities Guideline.

9.2.3 Communication to a Cloud

The communication channel to a software client hosted within a cloud shall be compliant with the CSIP-AUS and IEEE 2030.5 to the extent required by the CSIP-AUS.

Communication methods between this device and the inverter or inverters on site are not prescribed by this guideline but shall comply with the Remote Communications Capabilities Guideline.

9.3 Commissioning Requirements

9.3.1 Network Operator Connection Procedures

A *dynamic export capable connection agreement* which allows for export limits to be updated remotely requires registration of the plant with the DNSP to validate connectivity.

From 1 July 2023, each site connecting to the network under a *dynamic export capable connection agreement* must be registered with the DNSP utility server to validate connectivity. The DNSP may publish additional requirements which relate to site registration.

9.3.2 Site Registration

Site registration is the means by which a new electricity generating plant (site) is registered within the DNSP utility server.

This is achieved through provision to the DNSP of the:

- IEEE 2030.5 software client Long Form Device Identifier (LFDI)
- Site National Metering Identifier (NMI)

9.3.2.1 Communication to a Cloud

Those sites which utilise the Cloud pathway shall be registered with the cloud service provider (aggregator). This service provider must be registered with the DNSP and maintain a connection to the DNSP utility server, according to terms and conditions provided by the DNSP. Site registration shall be advised to the DNSP via this connection.

9.4 Certification

To ensure safe and reliable operation of dynamic export capable systems, the DNSP may publish requirements which define performance and/or testing requirements. For a site to be recognised as *dynamic export capable*, the associated devices must be recognised by the DNSP as having met these performance and/or testing requirements. Further details on required functionality are provided in Section 9.5.

As the dynamic export device space grows, it is likely that alternative testing and certification services will become available. At that time the Technical Regulator may opt to expand this requirement to recognise alternative testing and certification.

9.5 CSIP-AUS Compliance

The [CSIP-AUS](#) is the Australian implementation guide for IEEE 2030.5 Smart DER communications protocol. This protocol is designed to facilitate the remote management of distributed energy resources by a Utility Server over internet communications.

To be considered compliant with these guidelines, a *communication software client* shall be compliant with CSIP-AUS IEEE 2030.5 implementation guide as defined in this section.

Note that this guideline prescribes required capabilities and performance but does not provide a requirement for ongoing monitoring or other telemetry between the site and the DNSP.

9.5.1 Use-case Mapping

The following table provides mapping of key dynamic exports use-cases to CSIP-AUS communication functions to provide guidance around how the CSIP-AUS is to be applied.

This is designed to highlight key use-cases as they relate to these guidelines but does not represent the full set of requirements to achieving CSIP-AUS compliance as defined in Section 9.5.2.

Table 9-1 Dynamic exports Use-cases

Use-case	CSIP-AUS mapping	Implementation notes
Registration	Out-of-band process described in Section 9.3.2	An in-band registration process is in development and the Technical Regulator may opt to update this guideline to recognise that process once available. Site registration is required for dynamic exports capable connection agreements from from 1 July 2023.
Export limit	DERControl: <i>csipaus:opModExpLimW</i>	Control pollRate will be set at 5 mins by default in alignment with CSIP-AUS. Arbitrary pollRates will be supported and may be utilised by the Utility Server. Subscription/notification required for aggregators.
Emergency curtailment	DERControl: <i>DERControl:OpModGenLimW</i> <i>DERControl:OpModEnergize</i>	
Communications failsafe	DefaultDERControl: <i>csipaus:OpModExpLimW</i> <i>setGradW</i>	
Monitoring Capability	Following telemetry readings for through the Metering Mirror function set: <ul style="list-style-type: none">Site Real Power (kW)	Required monitoring data shall be 5-minute average and the EGP must be capable of sending this every 5-minutes.

	<ul style="list-style-type: none"> • Site Reactive Power (kVAr) • Site Voltage (V) • Gross EGP Real Power (kW) • Gross EGP Reactive Power (kVAr) • EGP Voltage (V)* 	Arbitrary monitoring postRates shall be supported to a minimum interval of 60s in alignment with the CSIP-AUS. This functionality may be utilised by the Utility Server during testing and the capability test.
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*At least one of site or device voltage must be reported. Where site voltage is available, it must be reported.

9.5.2 CSIP-AUS Compliance

The CSIP-AUS IEEE 2030.5 implementation guide is built for a set of DER integration use cases broader than dynamic export limits. This means there are a number of functions in the CSIP-AUS that are not required for this dynamic export capability.

To be compliant with these guidelines, each communication software client shall be compliant with CSIP-AUS IEEE 2030.5 implementation guide, except where described below:

- **Excluding** the following DERControl and DefaultDERControls from CSIP-AUS 5.2.4 Table 9:

<i>Excluded Grid support Functions</i>	<i>Excluded IEEE 2030.5 DERControls</i>	<i>Excluded IEEE 2030.5 DefaultDERControls</i>
Ramp Rate Setting		setSoftGradW
Site Import Limit (in Watts)	OpModImpLimW	
Max generation limit	OpModMaxLimW	
Max load limit	OpModLoadLimW	

- **Excluding** CSIP-AUS Annex C – DRED communications.

9.5.3 CSIP-AUS Certification

Communications software clients must be certified to be utilised as part of a *dynamic export capable* installation.

A national CSIP-AUS certification process is not available at the time of publication of this guideline. Until such time the DNSP shall be responsible for certifying that a *communications software client* is compliant with CSIP-AUS per the requirements specified in Section 9.5.2.

Certification will be granted upon successful completion of the *communications software client test procedure* provided by the DNSP.

The test procedure will be executed against a test utility server, so server access and test activities must be co-ordinated accordingly.

Once certified, the devices which host an approved *communications software client* will be listed by the Clean Energy Council. To be considered a *dynamic exports capable* site, a certified communications software client must be accompanied by one or more compatible *electricity generating plant*. Requirements for site to be deemed *dynamic exports capable* can be found in the *Export Limiting Methods* guideline.

It is noted that some *communications software clients* may be compatible with more than one compatible inverter series. In this scenario, the *communication software client* only needs to be and certified once and be listed against multiple compatible equipment.

9.6 Cybersecurity

Platforms and communication channels outside of the Utility Server to IEEE 2030.5 software client communication channel are not governed by CSIP-AUS or the IEEE 2030.5 standard, ie:

- Gateway to downstream inverter(s)
- Cloud platform to downstream inverter(s)

These non-prescribed communications channels must be secure. It is likely that once an appropriate Australian Standard or similar document for cybersecurity is available, this will be required by the Technical Regulator to ensure these communication channels are secure.

The DNSP may publish additional requirements relating to cybersecurity and Public Key Infrastructure (PKI). For a site to be considered *dynamic export capable* these requirements must be complied with.

9.7 Exemptions

The exemptions in this section are granted by the Technical Regulator under the *Electricity (General) Regulations 2012*, 89(1) and are subject to the conditions listed. The Technical Regulator may remove or alter these exemptions from time to time.

9.7.1 Zero Export

A designated *electricity generating plant* is exempt from Regulation 55E under the *Electricity (General) Regulations 2012* if it is installed with permanent export control function set to zero kVA.

An installer of such plant shall certify via an electronic Certificate of Compliance (eCoC) that the electricity plant has a permanent export control function enabled accordingly.

9.7.2 AC Coupled Battery Energy Storage Systems

AC coupled Battery Energy Storage Systems (BESS), installed in a designated *electricity generating plant* using a battery inverter, are exempt from Regulation 55E under the *Electricity (General) Regulations 2012*.

Note: that integration of AC coupled BESS and controlled load under the management of the communications software client is optional. A communications software client-managed BESS may provide the customer with further optimisation benefit.

Note 2: Hybrid Inverters, which possess both PV array and battery system ports, are considered in the same manner as solar PV inverters by this guideline and are required to be *Dynamic Export Capable*.

9.7.3 Inverter Connected Wind, Hydroelectric, Diesel and Gas Fired Generation

Wind, hydroelectric, diesel and gas fired generators connected to the distribution network via a low voltage inverter are exempt from Regulation 55E under the *Electricity (General) Regulations 2012* and not required to be *dynamic export capable*.

9.7.4 Sites Possessing Applications to Connect Prior to 1 July 2023

A designated *electricity generating plant* is exempt from Regulation 55E under the *General (Electricity) Regulations 2012* provided that a written application to connect that plant to the distribution network was submitted to the DNSP on or before 1 July 2023, and that plant is installed and commissioned prior to 1 September 2023.

An installer of such *electricity generating plant* shall certify via eCoC the date on which the installation was commissioned.

9.7.5 Sites with total generation capacity of greater than 30kW prior to 1 July 2024

A designated *electricity generating plant* installed prior to 1 July 2024 on a site approved by the DNSP for total connection capacity of greater than 30kW is exempt from Regulation 55E under the *Electricity (General) Regulations 2012* and is not required to be *dynamic export capable*.

Note: this exemption does not preclude the use of complaint *electricity generating plant* for such installations, where a manufacturer has achieved certification of the relevant *communication software client* through the DNSP's *communications software client test procedure* and the plant is listed by the Clean Energy Council as CSIP-AUS compliant.

9.7.6 Electric Vehicle Supply and Discharge Equipment (EVSDE)

EVSDE installed in a designated *electricity generating plant* are exempt from Regulation 55E under the *Electricity (General) Regulations 2012*.

9.8 Deemed to Comply Arrangements

9.8.1 SCADA Equipped Plant

A designated electricity generating plant connected to a SCADA system sufficient to exert export control at a site level or gross inverter control to the satisfaction of the DNSP is deemed to comply with the *Remote Updating Methods* guideline.

9.8.2 Transitional Arrangements

A designated *electricity generating plant* which can achieve, through a compatible *communication software client*, the critical functionality (listed below in table 9-2) of the *communications software client test procedure*, such that said plant can:

- Successfully complete the *dynamic exports capability test* provided by the DNSP, and;
- Receive, process, and enact an export limit sent from the DNSP utility server

Is deemed to comply with the *Remote Updating Methods* guideline so long as the manufacturer of that *electricity generating plant* has applied to the DNSP for recognition of this arrangement and public listing (including specific mention of non-certified functionality).

Any such listing by the DNSP shall be valid until 1 April 2024, or until the manufacturer achieves complete certification of the relevant *communication software client* through the DNSP's *communications software client test procedure* and the plant/client pairing is listed by the Clean Energy Council as CSIP-AUS compliant prior to 1 April 2024.

Table 9-2 Communications Software Client Test Critical Functionality

Communications Software Client Test ID	Communications Software Client Test Name
4.1.1	Discovery
4.1.2	Site Registration
4.2.1	Readings
4.3.1.1.1	Polled Active Controls Export Limit
4.3.1.2.1	Polled Default Controls Export Limit
4.3.3	Control Responses
4.3.5	Scheduling
4.3.7	Communications Loss
5.1.1	Export Limitation Validate Measurements
5.2.1.1	Export Limitation Export Limit Control
5.2.1.2	Export Limitation Load Following
5.2.2	Export Limitation Default Control Fallback
5.3	Grid Reconnection

9.8.3 Sites Where Dynamic Export Capable Connection Agreements Are Not Available

For designated *electricity generating plant* being installed at a site for which no dynamic export capable connection agreement is offered by the DNSP at the time of application, all newly installed *electricity generating plant* shall be publicly listed as certified for CSIP-AUS by either the CEC, or the DNSP under the transitional arrangement described in sections 9.8.2 and 10.5.2. For any such site, no additional metering or gateway devices are required to be installed unless otherwise required by the connection agreement.

A site which satisfies the above criteria is deemed to comply with the *Remote Updating Methods* guideline.

Note: Any site with total generating capacity greater than the static export limit specified by the connection agreement will be required to install such equipment as necessary to export-limit that site to the agreed limit.

10 Export Limiting Methods Guideline

10.1 Objective

This guideline provides methods as required by regulation 55E(5)(a) of the *Electricity (General) Regulations* 2012 that will ensure that a designated electricity generating plant can be export limited at the point of connection to the relevant Distribution Network. These export limits can be achieved either through the interaction of a *communications software client* with the native functions of an inverter or via interaction with an external device or system of devices to measure and achieve an equivalent export limitation outcome across a whole site.

Guidance is provided on approved technical methods capable of achieving the required export limitation outcomes, allowable device configurations and relevant standards of measurement and operation of approved methods of export limitation.

10.2 On-Site Requirements

Designated *electricity generating plant* on a site connected to a relevant electricity distribution network and installed after 1 July 2023 shall be capable of being export limited at the point of common coupling (PCC) to the relevant electricity distribution network.

Each site shall have a certified *communications software client*, which can monitor net exports from the site at the PCC and manage all *electricity generating plant* to ensure that the net exports from the site do not exceed its remotely updated export limit.

Refer to *Remote Updating Methods* guideline Section 9.4 for further details on what is required for a *communication software client* to be certified.

Table 10-1 summarises the key use-cases that shall be met on site and describes how they interface with IEEE 2030.5 CSIP-AUS communications via the *communications software client*. The detailed requirements for these use cases are defined in the remainder of this guideline. To be considered compliant with this guideline, a site operating under a connection agreement which allows for export limits to be updated remotely must be capable of meeting all relevant use-cases. For all other sites, the timeline for requirements is described in Figure 8-2.

Note: This guideline provides requirements relating to the capability of a site to receive and enact dynamic export limits. It does not provide a requirement for ongoing monitoring or other telemetry between the site and the DNSP.

Note: that integration of battery energy storage systems (BESS) and controlled load under the management of the *communications software client* is optional. A BESS may provide the customer with further optimisation benefit.

Table 10-1 Use-cases required to be met for a compliant dynamic export capable site (cont. over page)

Use-case	On-site device requirements	CSIP-AUS mapping
Registration	<i>Electricity generating plant</i> must report their nameplate ratings and settings to the <i>communications software client</i> to enable these to be communicated to the DNSP utility server.	Process described in Section 9.3.2 Site registration is required for any sites connecting to the network through a dynamic exports capable connection agreement from 1 July 2023.
Export limit	The <i>communications software client</i> shall monitor net export at the network connection point and manage all <i>electricity generating plant</i> on site to keep within the export limit published by the DNSP utility server.	DERControl: <i>csipaus:opModExpLimW</i>
Emergency curtailment	The <i>communications software client</i> shall have the capability to manage the gross generation setpoint of all <i>electricity generating plant</i> on site in response to the command from the DNSP utility server.	<i>DERControl:OpModGenLimW</i>
	The <i>communications software client</i> shall have the capability to de-energise all <i>electricity generating plant</i> on site in response to the command from the DNSP utility server.	<i>DERControl:OpModEnergize</i>
Communications failsafe	The <i>communications software client</i> shall have the capability to manage site export to a failsafe level on the expiration of an export limit, where no further export limit has been received (e.g. when communications to the DNSP utility server is lost or an export limit expires). The value of this communications failsafe export limit shall be	DefaultDERControl: <i>csipaus:OpModExpLimW</i> <i>setGradW</i>

	updateable by the DNSP utility server.	
Monitoring Capability	The <i>communications software client</i> shall be capable of monitoring telemetry readings from the network PCC and all exporting devices on site. These telemetry readings shall be provided to the DNSP utility server during the <i>dynamic exports capability test</i> as part of commissioning of the site where required. Any ongoing provision of monitoring telemetry readings shall be in accordance with connection agreement conditions specified by the <i>DNSP</i>	<p>Following telemetry readings for through the Metering Mirror function set:</p> <ul style="list-style-type: none"> • Site Real Power (kW) • Site Reactive Power (kVAr) • Site Voltage (V) • Gross EGP Real Power (kW) • Gross EGP Reactive Power (kVAr) • EGP Voltage (V)

10.2.1 Site configuration examples

This section contains examples of deemed to comply configurations for the communications integration models introduced in *Remote Updating Methods* guideline Section 9.2.

The examples provided in this guideline are not exhaustive but are intended to provide a reference and guidance on what a compliant installation might look like for the range of models and equipment shown. Any configuration not shown in these examples that complies with all the functional requirements in this guideline shall also be considered compliant.

10.2.1.1 Native inverter model

The native inverter model may be applied where an inverter has a built-in *communications software client* and can meet the functional requirements and use-cases described in this guideline.

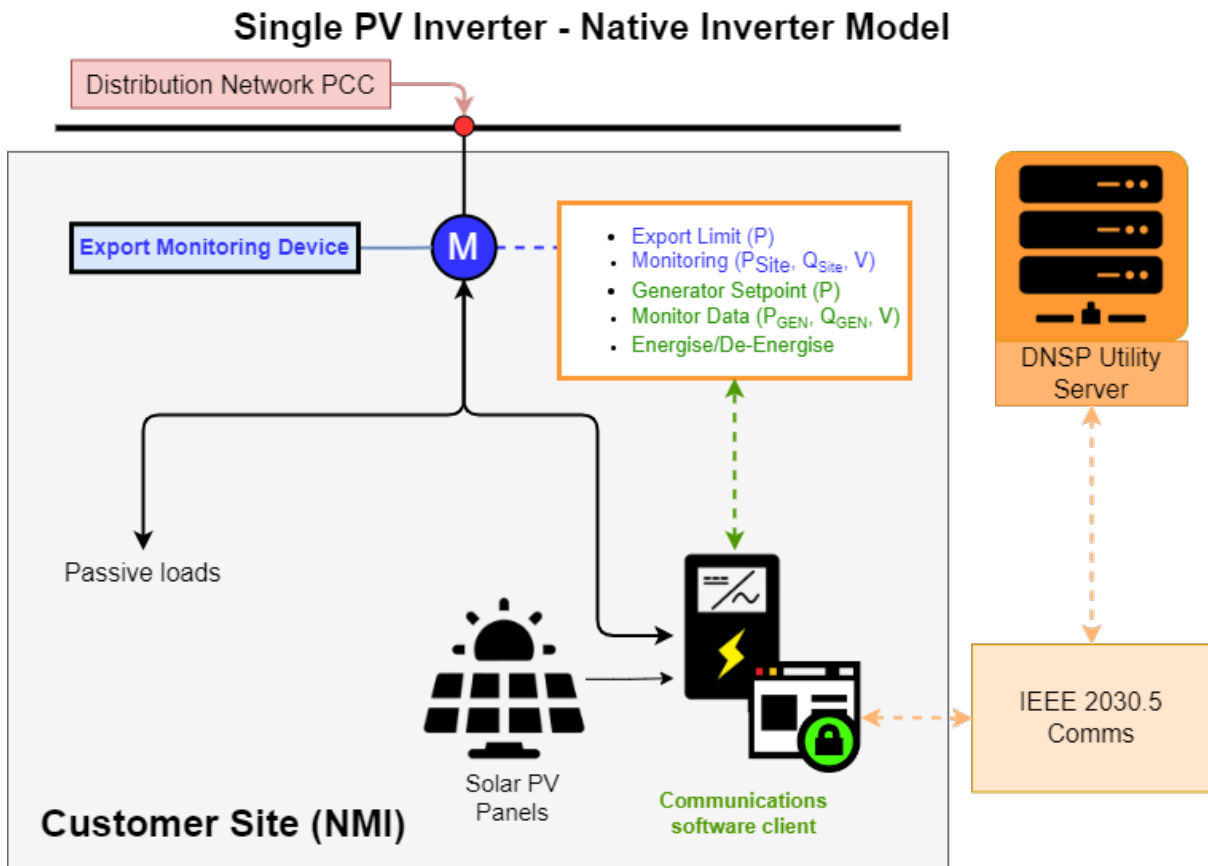


Figure 10-1 Example site configuration for native inverter model

10.2.1.2 Gateway model – Single PV Inverter

The gateway model could be applied where an inverter does not have a certified *communications software client* onboard nor the required functional capabilities to comply with this guideline. In such a case a compliant, listed gateway device containing a certified *communications software client* and configured to have local communications interfaces to all *electricity generating plant* on site can be used. An example of this configuration is shown in Figure 10-2.

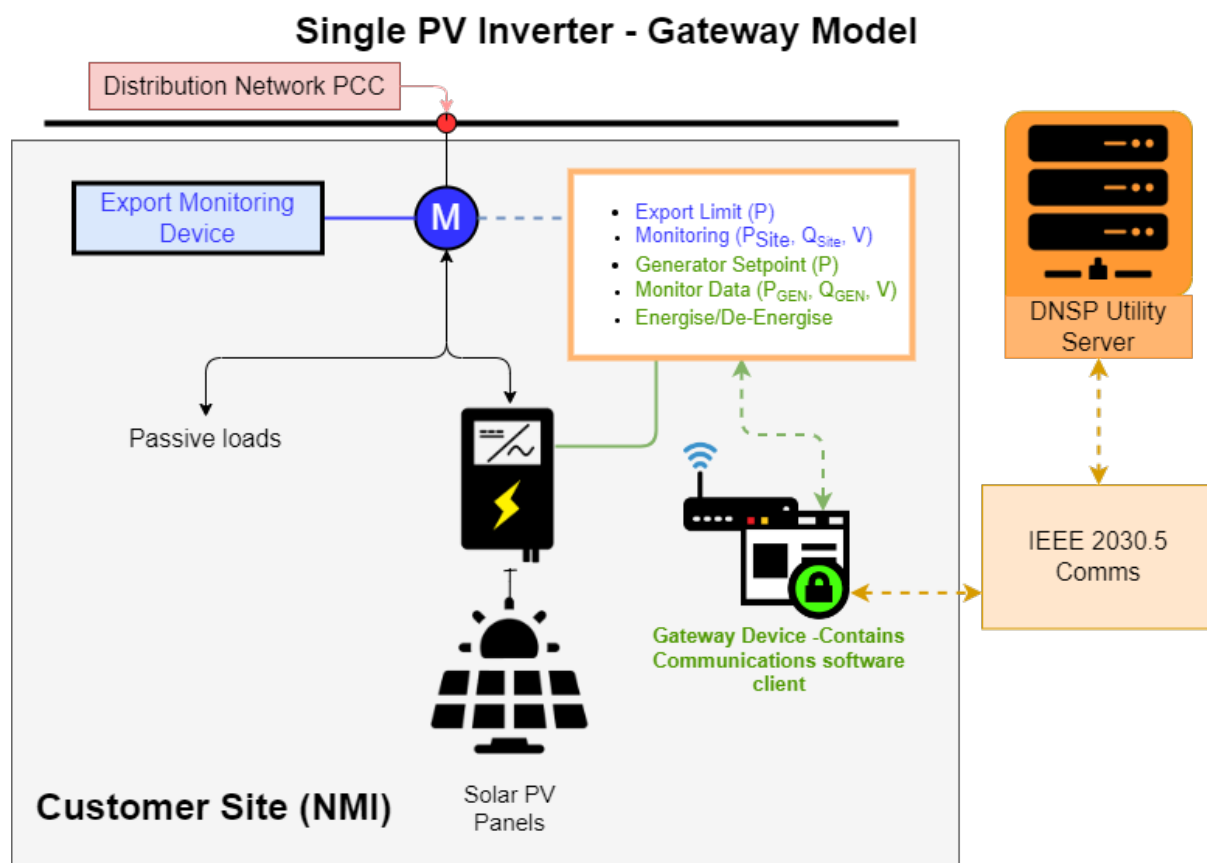


Figure 10-2 Example site configuration of gateway model with single inverter

10.2.1.3 Gateway model – Multiple PV Inverters

The gateway model could also be applied where multiple inverters exist on site to enable site wide export limitation to be achieved. In this case, the gateway device may be an additional hardware device on site or be a function of one of the inverters acting as a master controller for the site. An example of this model is shown in Figure 10-3.

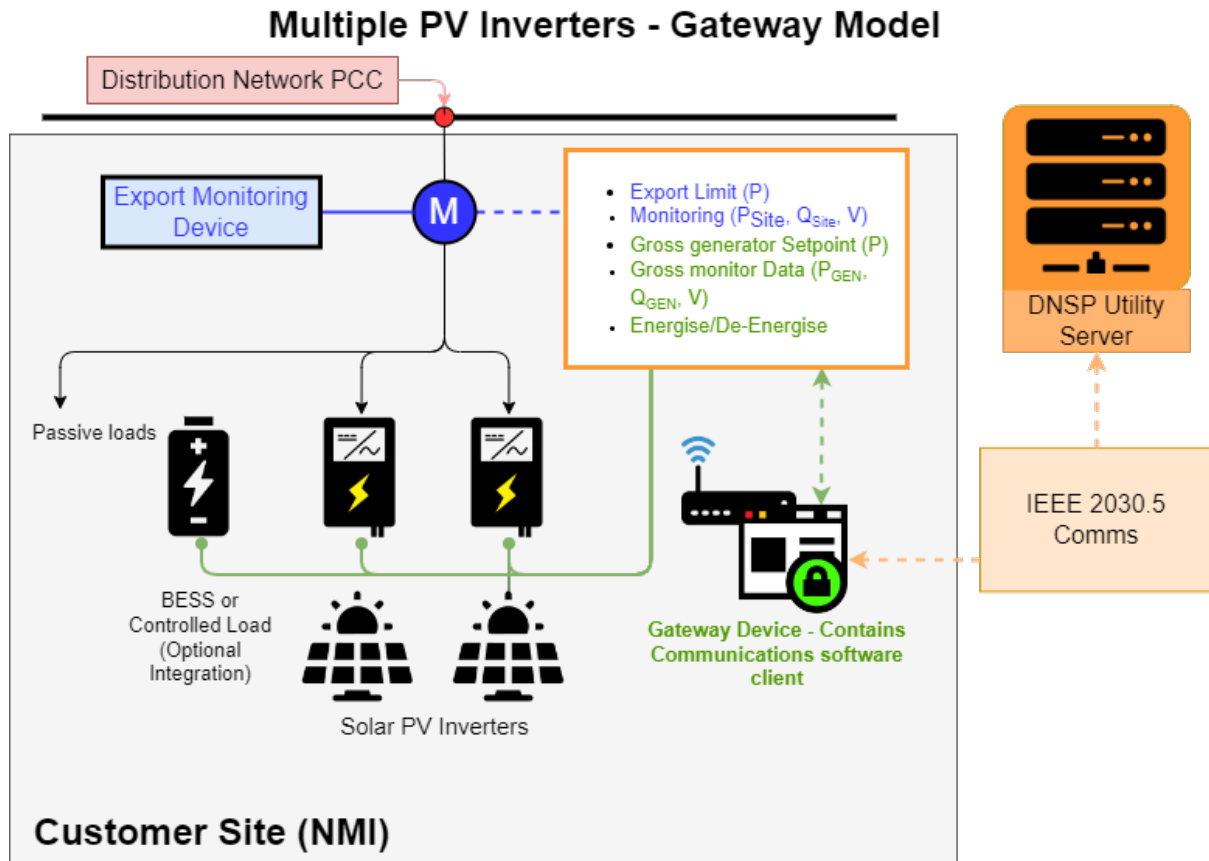


Figure 10-3 Example site configuration of gateway model with multiple inverters

10.2.1.4 Cloud model

The cloud model could be applied where inverter(s) do not have a *communications software client* installed within an inverter on site but do have the functional capabilities to comply with this guideline and connect via the internet to a *communications software client* running on a cloud platform. This model could also be applied when a site is enrolled in a remote management scheme such as a Virtual Power Plant (VPP). An example of this model is shown in Figure 10-4.

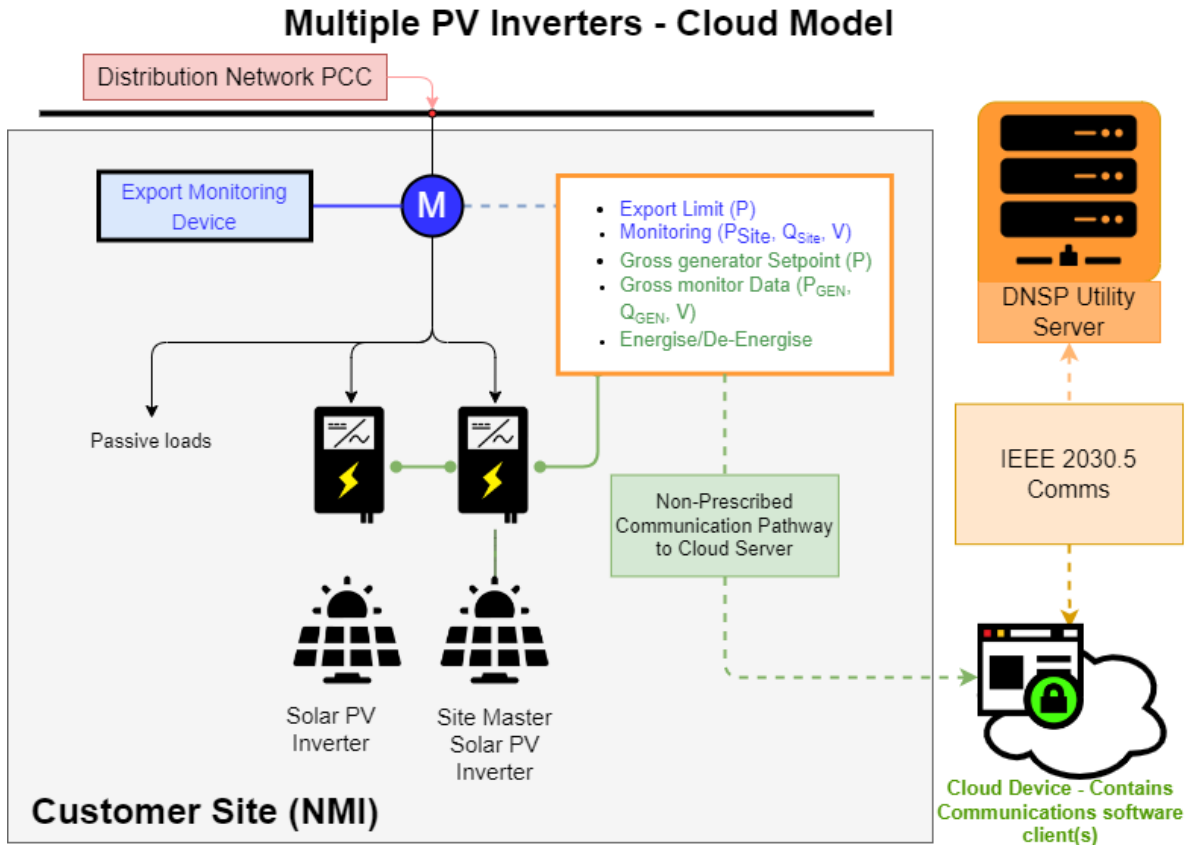


Figure 10-4 Example of cloud model site configuration

10.2.2 Export limiting requirements

Export limits will be communicated from the DNSP utility server to the *communications software client* using the CSIP-AUS *OpModExpLimW* command. The site net export must be monitored, and all *electricity generating plant* managed to keep the site within the export limit under the relevant DNSP connection agreement.

Application of the export limit shall meet the requirements of a 'soft' export limit as defined in clause 3.4.8 of AS/NZS 4777.1:2016.

10.2.3 Site monitoring requirements

The *communications software client* integration model used on site shall be capable of recording and reporting measurements from the network connection point and total generation on site for the following metrics:

Table 10-2 Required monitoring data

Network connection point metering	Total generation monitoring
Site real power (W)	Generation real power (W)
Site reactive power (Var)	Generation reactive power (Var)
Site voltage (V)*	Generator voltage (V)*

*Note: At least one of site or device voltage must be reported. Where site voltage is available, it must be reported.

The communications software client shall be able to report the above monitoring information as defined in CSIP-AUS Annex A – Reporting DER.

Any external monitoring devices used to provide the software client with the relevant data shall be capable of accurate measurement of the voltage, current & power factor in line with requirements for metering in section 7 of AS/NZS 4777.2:2020.

10.3 Commissioning Requirements and Responsibilities

For a site to achieve compliance with this guideline all *electricity generating plant* installed and commissioned shall be tested and approved as interoperable with the *communications software client* and can meet all functional requirements outlined in the guideline.

Sites under a *dynamic export capable connection agreement* will also require approval which will be granted upon successful completion of the *site export limitation test procedure* provided by the DNSP, this procedure is outlined in Section 8.3.1.

Designated *electricity generating plant* on a site connected to a relevant electricity distribution network and installed after 1 July 2023 shall meet specific criteria to be *dynamic exports capable*.

To be considered *dynamic exports capable*, an installation shall:

- Include a single certified *communication software client* compliant with the Remote Updating Methods Guideline;
- Include only inverters compliant with both the Export Limiting Methods Guideline and any associated *communication software client* as approved and listed by the Clean Energy Council;

10.3.1 Dynamic Exports Capability Test

The *dynamic exports capability test* is required to validate site connectivity with the DNSP Utility Server and ensure the *communications software client* can appropriately monitor and manage all compliant *electricity generating plant* on site to meet the requirements outlined in this guideline.

From 1 July 2023, the *dynamic exports capability test* shall be performed as part of commissioning for any site which will connect to a relevant distribution network through a *dynamic export capable connection agreement* in accordance with the *dynamic exports capability test procedure* supplied by the DNSP.

Any site installed after 1 July 2023, which was initially commissioned for a static export limit, then subsequently applies to connect to the network through a *dynamic export capable connection agreement*, must successfully complete the *dynamic exports capability test* as part of that connection process.

This test procedure will test the site's ability to successfully prove site compliance and interoperability to execute the five critical use-cases detailed in Table 10-1.

- **Registration**
- **Export Limit**
- **Emergency Curtailment**
- **Communications Failsafe**
- **Monitoring**

The test procedure shall require registration of the site with the DNSP and comprise a series of automated commands initiated by the DNSP utility server. Successful completion of the test will result in a unique

identified being logged in the utility server which may be required to be reported to the Technical Regulator from time to time.

It is permissible to utilise a temporary internet connection to complete the *dynamic exports capability test* (such as a tethered mobile phone) however note that an on-site internet connection will be required to receive export limits.

Note that the site must also be configured to comply with the terms of the connection agreement set by the DNSP.

10.3.2 Fail-Safe Mechanism on Communications Loss

From 1 July 2023, any site connected to a relevant electricity distribution network and commissioned to operate under a *dynamic export capable connection agreement* shall have a fail-safe mechanism in place to be considered *dynamic export capable*.

This fail-safe mechanism shall function such that if connectivity to the utility server is lost or an export limit expires, the *communications software client* will automatically set the export level of that site to the minimum allowed export as determined by the relevant DNSP.

Communications failures can manifest at different layers in the communications architecture as described below.

1. Communications loss between the *DNSP Utility Server* and *Communications Software Client*:

Under this communication failure mode, the communications failsafe export limit shall be achieved through application of the *DefaultDERControl OpModExpLimW* as specified in CSIP-AUS.

2. Communications loss between the *communications software client* and *electricity generating plant*:

- a. **Cloud model:** When communication is lost between the *communications software client* and the site, the failsafe export limit shall be achieved through application of the *DefaultDERControl OpModExpLimW* by the *electricity generating plants* on site.
- b. **Gateway model:** When communication is lost between the *communications software client* in the gateway device and *electricity generating plant(s)*, the requirements in AS4777.1:2016 clause 3.4.8.3 *Soft Limit* apply.

For any site connected to the network under a *dynamic export capable connection agreement* to be considered *dynamic export capable*, the fail-safe mechanism in place on that site must address possible failures of both communications pathways. Demonstration of the correct function of the fail-safe mechanism at a site will occur as part of the *dynamic exports capability test* as required by that test process.

10.4 Exemptions

The exemptions in this section are granted by the Technical Regulator under the *Electricity (General) Regulations 2012*, 89(1) and are subject to the conditions listed. The Technical Regulator may remove or alter these exemptions from time to time.

10.4.1 Zero Export

A designated *electricity generating plant* is exempt from Regulation 55E under the *Electricity (General) Regulations 2012* if it is installed with permanent export control function set to zero kVA.

An installer of such *electricity generating plant* shall certify via an electronic Certificate of Compliance (eCoC) that the *electricity generating plant* has a permanent export control function enabled accordingly.

10.4.2 AC Coupled Battery Energy Storage Systems

AC coupled Battery Energy Storage Systems (BESS) installed in a designated *electricity generating plant* through a battery inverter are exempt from Regulation 55E under the *Electricity (General) Regulations 2012*.

Note: that integration of AC coupled BESS and controlled load under the management of the communications software client is optional. A communications software client-managed BESS may provide the customer with further optimisation benefit.

Note 2: Hybrid Inverters are considered in the same manner as solar PV inverters by this guideline and are required to be *Dynamic Export Capable*.

10.4.3 Inverter Connected Wind, Hydroelectric, Diesel and Gas Fired Generation

Wind, hydroelectric, diesel and gas fired generators connected to the distribution network via a low voltage inverter are exempt from Regulation 55E under the *Electricity (General) Regulations 2012* and not required to be *dynamic export capable*.

10.4.4 Sites possessing applications to connect prior to 1 July 2023

A designated *electricity generating plant* is exempt from Regulation 55E under the *General (Electricity) Regulations 2012* provided that a written application to connect that plant to the distribution network was approved by the DNSP on or before 1 July 2023, and that plant is installed and commissioned prior to 1 September 2023.

An installer of such *electricity generating plant* shall certify via eCoC the date on which the installation was commissioned.

10.4.5 Sites with total generation capacity of >30kW prior to 1 July 2024

A designated *electricity generating plant* installed prior to 1 July 2024 on a site approved by the DNSP for total connection capacity of greater than 30kW is exempt from Regulation 55E under the *Electricity (General) Regulations 2012* and is not required to be *dynamic export capable*.

Note: this exemption does not preclude the use of complaint *electricity generating plant* for such installations, where a manufacturer has achieved certification of the relevant *communication software client* through the DNSP's *communications software client test procedure* and the plant/client pairing is listed by the Clean Energy Council as CSIP-AUS compliant.

10.4.6 Electric Vehicle Supply and Discharge Equipment (EVSDE)

EVSDE installed in a designated *electricity generating plant* are exempt from Regulation 55E under the *Electricity (General) Regulations 2012*.

10.5 Deemed to Comply Arrangements

10.5.1 SCADA Equipped Plant

A designated *electricity generating plant* connected to a SCADA system sufficient to exert export control at a site level or gross inverter control to the satisfaction of the DNSP is deemed to comply with the *Export Limiting Methods* guideline.

10.5.2 Transitional Arrangements

A designated *electricity generating plant* which can achieve, through a compatible *communication software client*, the critical functionality (listed below in table 10-3) of the *communications software client test procedure*, such that said plant can:

- Successfully complete the *dynamic exports capability test* provided by the DNSP, and;
- Receive, process, and enact an export limit sent from the DNSP utility server

Is deemed to comply with the *Export Limiting Methods* guideline so long as the manufacturer of that *electricity generating plant* has applied to the DNSP for recognition of this arrangement and public listing (including specific mention of non-certified functionality).

Any such listing by the DNSP shall be valid until 1 April 2024, or until the manufacturer achieves complete certification of the relevant *communication software client* through the DNSP's *communications software client test procedure* and the plant/client pairing is listed by the Clean Energy Council as CSIP-AUS compliant.

Table 10-3 Communications Software Client Test Critical Functionality

Communications Software Client Test ID	Communications Software Client Test Name
4.1.1	Discovery
4.1.2	Site Registration
4.2.1	Readings
4.3.1.1.1	Polled Active Controls Export Limit
4.3.1.2.1	Polled Default Controls Export Limit
4.3.3	Control Responses
4.3.5	Scheduling
4.3.7	Communications Loss
5.1.1	Export Limitation Validate Measurements
5.2.1.1	Export Limitation Export Limit Control
5.2.1.2	Export Limitation Load Following
5.2.2	Export Limitation Default Control Fallback
5.3	Grid Reconnection

10.5.3 Sites Where Dynamic Export Capable Connection Agreements Are Not Available

For designated *electricity generating plant* being installed at a site for which no dynamic export capable connection agreement is offered by the DNSP at the time of application, all newly installed *electricity generating plant* shall be publicly listed as certified for CSIP-AUS by either the CEC, or the DNSP under the transitional arrangement described in sections 9.8.2 and 10.5.2. For any such site, no additional metering or gateway devices are required to be installed unless otherwise required by the connection agreement.

A site which satisfies the above criteria is deemed to comply with the *Export Limiting Methods* guideline.

Note: Any site with total generating capacity greater than the static export limit specified by the connection agreement will be required to install such equipment as necessary to export-limit that site to the agreed limit.