Synergy Distributed Energy Resources Functionality Requirements

For systems connected to the South West Interconnected System

26 March 2025

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Synergy acknowledges the Traditional Owners of the Land on which we operate and their continuing connection to the land, water and community. We pay our respects to all Aboriginal and Torres Strait Islander communities, their cultures and to Elders past, present and emerging.

Contents

1 Definitions

Term	Explanation
Auxiliary equipment	Equipment used part of a DER installation, and which is required to permit functionality and if which affected can render the DER installation functionality curtailed or unavailable.
AEMO	Australian Energy Market Operator. AEMO manages electricity and gas systems and markets across Australia,
BESS	Battery energy storage system. A BESS is an asset that is able to store energy, which may result from renewable sources like solar and wind, for later use.
CSIP-Aus	Common Smart Inverter Profile – Australia. CSIP-Aus (as defined within document SA HB 218:2023) is a communications standard used nationally for remote management of DER.
Customer CSIP-Aus agreement	For non-contestable customers in the WEM this is the agreement between the customer and Synergy as Western Australia's sole aggregator to be able to monitor and orchestrate the customers' DER assets as defined in the agreement.
DER	Distributed energy resources. The collective term for small scale devices that can either use, generate or store electricity and form a part of the local distribution system. Also referred to as household, business or community energy assets.
DNSP	Distribution network service provider. For the SWIS, this is Western Power.
DOEs	Dynamic operating envelopes. An export limit issued to a site by Western Power, also known as flexible export limit.
EG	Embedded generation. EG is the generation of electricity at a local level connected to the distribution system.
ESM	Emergency solar management. ESM is the remote management of household solar. It works to stabilise the system when there is a high amount of solar energy being generated from rooftop solar systems, and not enough demand.
Export monitoring device	A device that monitors point of connection voltage and active/reactive power flows as per the requirements of Synergy's *Utility interconnection handbook*.
Gateway	A device that collects data from and manages one or more DER assets, for example a home energy management system.
NMI	National meter identifier. The NMI is the unique number for a customer's electricity connection.
OEM	Original equipment manufacturer. An OEM is a company that makes parts or equipment that are sold by another company.
PoC	Point of connection. The point where customer equipment meets network. For this document, the PoC also has the same meaning as point of supply as defined in Australian and New Zealand standard AS/NZS3000.
PV inverter	An inverter, as referenced in Australian standard AS4777.2 able to receive and connect to a (or several) photovoltaic generation array(s).
SWIS	South West Interconnected System. This is Western Australia's main electricity system.
Synergy's Utility interconnection handbook	Document providing technology providers and original equipment manufacturers (OEMs) with all necessary information to implement a compatible hardware and software solution to allow for testing, listing and being provided with access to production by Synergy.

Technology provider	An organisation that has built and is operating a utility client to allow for remote device management through Synergy's utility server. The OEM may act as the technology provider themselves or have a third party operate as the technology provider.
Utility client	An IEEE 2030.5 utility client that has implemented the required capabilities and functions set as defined in SA HB 218.
Utility server	A 2030.5 utility server that has implemented the required capabilities and functions set as defined in the SA HB 218.
WEM	Wholesale Electricity Market. The WEM supplies electricity to the south-west of Western Australia via the SWIS.

2 About Synergy

Synergy is proud to be Western Australia's largest integrated electricity generator and energy retailer. Working with more than one million Western Australian household and business customers throughout the South West Interconnected System (SWIS), we provide safe, reliable power at the lowest sustainable cost.

Alongside our customers, we are on a journey towards a more sustainable energy future. This means developing new renewable energy generation and storage solutions to replace our coal-fired power stations, which will be retired by 2030. Throughout this transition, we are committed to helping our customers better manage their energy usage and contain their costs, without compromising the provision of reliable energy.

The uptake of distributed energy resources (DER) like rooftop solar, batteries, and electric vehicles continues to accelerate in households and businesses across the SWIS. DER is essential to Western Australia's energy transition, as it supports a low carbon, low-cost system. However, high levels of unmanaged DER can pose a risk to the reliability and security of the energy system as it attempts to keep up with the two-way energy flow.

To meet the challenges presented by DER, the State Government released the DER Roadmap in 2020. The roadmap outlines critical actions that need to be taken in order to help realise a future with lower emissions and more accessible energy. Synergy's approach to remote management of DER assets plays an integral role in delivering these initiatives and advancing Western Australia's DER maturity.

As part of our approach, we are focused on building low-cost, scalable aggregation and coordination capabilities which will enable us to seamlessly integrate customer DER at scale into the SWIS.

3 Purpose and audience

This document details Synergy's requirements for generating and consuming DER assets in the SWIS[1]. The purpose of this document is to:

1. Provide context of Synergy's remote management approach and highlight the relevant Synergy standards that define the requirements.

2. Present standard requirements for the installations and technical features required to be performed or met by DER equipment to external stakeholders.

3. Present minimum functional outcomes to be achieved through implementation of Synergy's remote management approach.

It provides technology providers, installers, retailers or other industry participants with information about Synergy's remote management requirements for DER in the SWIS.

This document should also be read in conjunction with documents listed under the *Section 5 - Reference documents.*

[1] For Synergy customers. Contestable customers which are served by a different retailer and who own DER assets are not covered by the scope of these requirements.

4 Scope

The requirements of this document are applicable for all new inverter-connected DER installations, with an aggregate capacity of 30kVA or less, through a staged roll out approach beginning in 2025[2].

The scope is inclusive of all new site installations and additions or upgrades to existing installations, whereby the requirements of this document apply to the complete installation inclusive of new and existing assets.

The assets detailed above are excepted from these requirements if they are:

- Repaired or replaced under warranty (like for like); or
- Relocated within the same electrical installation.

Existing systems, and systems greater than 30kVA, that are able to comply with Synergy's *Utility interconnection handbook* requirements or be upgraded via software to comply with these requirements, are also eligible to connect to Synergy for the purpose of remote management and opt in to new products.

[2] Inclusive of ESM.

5 Reference documents

Document	Description	Audience
Synergy's utility interconnection handbook DMS# 36500738	Document providing technology providers and original equipment manufacturers (OEMs) with all necessary information to implement a compatible hardware and software solution to allow for testing, listing and being provided with access to production by Synergy.	OEMs and technology providers
Synergy's installer handbook (Publication Date TBC)	Document providing installers with all information required for installation and commissioning of DER assets to connect and operationalise assets in Synergy's CSIP-Aus server.	Installers
Synergy's supported solutions list (Publication Date TBC)	List of supported utility clients and hardware solutions that meet the requirements of Synergy's *Utility interconnection handbook*.	Installers and customers
Western Power's basic embedded generation (EG) guidelines	Western Power guideline providing users of basic EG connections, information about their obligations for connection to, and interfacing with Western Power's low voltage distribution network.	Installers
Western Power's technical rules	Western Power document containing technical requirements that must be met by Western Power and all users of the SWIS.	Installers

6 Roles and responsibilities

Who	Roles and responsibilities
Technology providers (and OEMs)	• Understand timing of requirements and details for remote management as listed both in this document and in Synergy's *Utility interconnection handbook*. • Provide instructions to installers for connecting to the internet and detail installation configurations supported by the implementation. • Produce and supply compliant technology with appropriate default settings. • Provide appropriate warranties. • If complying with CSIP-AUS via a cloud platform, maintain a connection to Synergy's utility server. • Provide technology solutions with high level of availability (to the extent that it is within the technology provider's control) • Work with Synergy to resolve issues, such as losses of server connectivity and, where applicable as a part of specified program/product, provide support services to Synergy for resolution of any issues. • Maintain and update technology solutions to ensure that any solution operates and meets non-functional performance requirements. • Notify Synergy of any software releases to any systems that form part of the solution. • Undertake comprehensive testing of the solution in a non-production environment prior to deployment to production.
Installers	• Install new, upgraded or replacement DER systems in compliance with this document. Typically, this will involve: - selecting CSIP-AUS compliant equipment (or combination of equipment), - connecting the inverter(s) to the internet, and - configuring the installation to communicate with Synergy's Utility Server and conduct onboarding and commissioning testing. • Adhere to relevant Australian Standards (AS 4777.2, AS 4509, AS/NZS 5033, AS/NZS 5139). • Ensure that knowledge of DER installation requirements and practice is up to date, including: - accreditation with the Accreditation Scheme Operator (ASO); - as part of maintaining accreditation, completing relevant training in line with the Accreditation Scheme's continuous professional development (CPD) requirements; and - Synergy's installation requirements. • Maintain up-to-date understanding of eligible equipment and installation configurations. • Share information with customers at the point of installation. • Show customers how to reconnect the inverter to the internet if it becomes disconnected.

Customers	• Ensure new systems are appropriately maintained. • Ensure systems remain connected to the internet, including when updating Wi-Fi passwords or changing internet providers. • Ensure contact details provided to Synergy remain up-to-date. • If notification is received from the manufacturer or distribution business that the system has lost internet connectivity, follow manufacturer instructions to reconnect (typically through the inverter smart phone application or display).
Synergy	• Operate a utility server that can remotely monitor and manage the electricity generation of DER systems covered by the scope of this document. • Operate as the sole aggregator for all non-contestable customers in the SWIS, as the default control agent. • Implement and publish a DER functionality requirements document (this document). • Provide and maintain a list of supported solutions that meet Synergy's requirements for remote management.

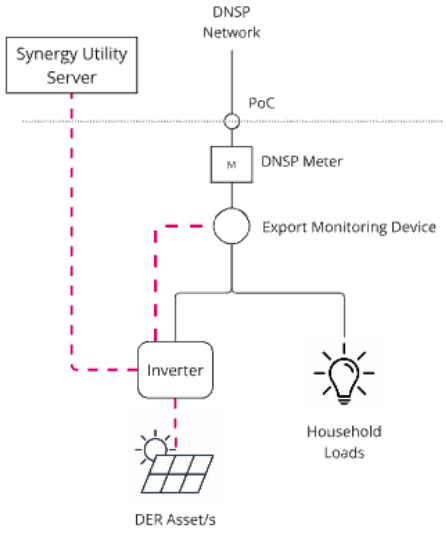
7 Remote management approach

CSIP-Aus is the selected profile for remote management of all DER (Synergy or third party owned) integrating to Synergy systems. Synergy is deploying a CSIP-Aus utility server for third party technology providers to connect their utility clients to.

Synergy's *Utility interconnection handbook* provides technology providers and OEMs with all necessary information to implement a compatible hardware and software solution to allow for testing, listing and being provided with access to production by Synergy.

7.1 Remote management configurations

Examples of accepted site and communications configurations supporting Synergy's *Utility interconnection handbook* requirements are provided below. Other configurations not shown in these examples that comply with all requirements in this document and Synergy's *Utility interconnection handbook* may also be considered compliant.



Integrated configuration

The DER is compliant to Synergy's *Utility interconnection handbook* via a built-in communications software client enabling direct communications between the utility server and the solar system.

Figure 1 (left): integrated configuration

Aggregator configuration

The aggregator platform acts as the communications software client, communicating with the utility server and end devices. The end device may be one or more DER assets or a gateway device.

DER management shall be supported for individual end devices which shall represent one or more DER assets at an individual site.

Fail-safe operating modes must be implemented at each site (such as in the end device), so that fail-safe export limits will operate correctly if there is a failure of the aggregator platform.

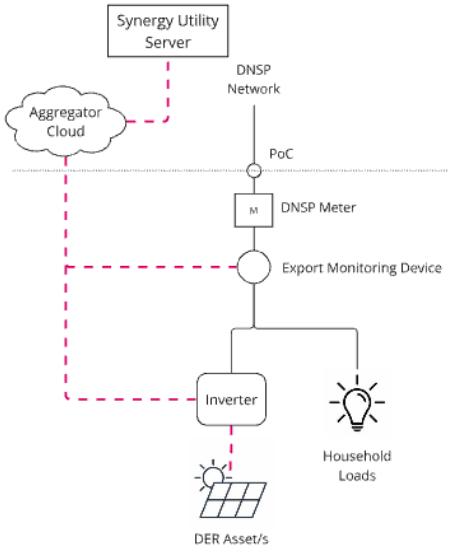


Figure 2 (right): aggregator configuration

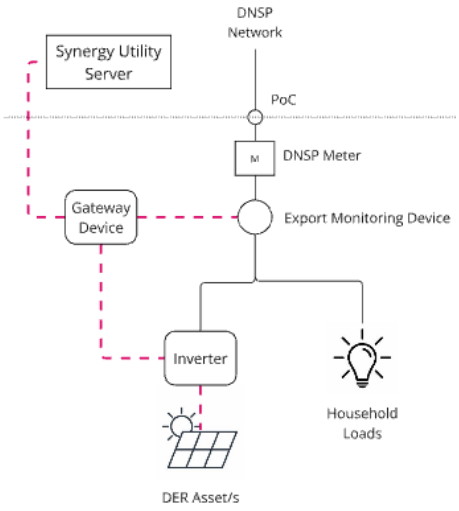


Figure 2: gateway device configuration

Gateway device configuration

Suitable option where an inverter cannot act as the communications software client or multiple DER sites that are not interoperable.

The gateway must be compliant to Synergy's *Utility interconnection handbook* and collect data from and manage the end devices. It may appear as a single device to the utility server.

Fail-safe operating modes must be implemented at each site, either in the end device or within the local gateway.

8 Customer participation tiers

When customers connect their DER assets to the energy system, they can choose from the participation tiers their installations/devices have the capability to meet.

Regardless of the participation category, all new assets as defined in *Section 4* will be required to comply with minimum requirements of Synergy's *Utility interconnection handbook*. Refer to *Appendix A* for a summary of requirements.

This document does not define customer products only the functionality requirements that enable assets to participate and provides the framework for customer products to be built upon.

8.1 Tier 0 customers

Tier 0 customers include all customers who choose not to participate in any Synergy DER management products and do not have emergency management requirements such as ESM.

These customers have the ability to consume their generated energy on-site however will be locally configured with a static 1.5kW export limit. The assets installed will not be required to connect to Synergy's utility server, however, will require the installation of an export monitoring device to enable local export limiting control. As the site is not connected to Synergy's utility server, Synergy will not have visibility of or be able to manage these assets.

8.2 Tier 1 customers

Tier 1 customers include all customers who have emergency management requirements for their system. These customers have the ability to consume their generated energy on-site however will be remotely configured with a static 1.5kW export limit[3].

All assets installed through this pathway will be registered with Synergy's utility server and undergo commissioning testing at time of install. These assets will remain connected to the utility server at all times, but may have reduced communication requirements, such as reduced frequency of telemetry. If a customer changes to an alternative DER management product, then the requirements of that product, would need to be met.

8.3 Tier 2 customers

Tier 2 customers include all customers who elect to participate in a product with remote management requirements. These customers will be required to connect to Synergy's utility server to provide telemetry while also permitting control under their relevant product contract.

Synergy's DER management product offers for customers vary depending on the customer's DER capability. Customers will be permitted to transfer between tiers or products in line with the conditions of their contract. The installations will be required to meet the minimum requirements in Synergy's *Utility interconnection handbook* and where required for specific products comply with additional 'DER-Storage' listing category

[3] Customers participating in the Western Australian Government's Distributed Energy Buyback Scheme (DEBS) will be permitted to export up to 5kW, except under ESM or fail-safe behaviour response listed in section 9.3.

requirements of Synergy's *Utility interconnection handbook*. Customers will be required to provide an export monitoring device[4] in order to meet service delivery requirements.

8.4 Existing installations

Existing systems that contain assets that are non-compliant with Synergy's *Utility interconnection handbook* will be allowed to remain operating as per the approved parameters at the time of installation and in line with Western Power requirements.

Where an existing installation is able to comply with, or is upgraded to comply with, the Synergy's *Utility interconnection handbook*, the customer may choose to participate as either a Tier 1 or Tier 2 customer.

Where existing installations are upgraded to include new assets that fall within the scope of this document, the aggregated installation of existing and new assets must be made compliant to the requirements of this document. This is to ensure the capability to meet site wide controls, such as export limits, can be achieved, however where there are significant limitations in the ability to achieve this at a site Synergy will assess and accept derogations on a case-by-case basis. Refer to *Appendix B* for derogation advice.

[4] Legacy ESM assets installed prior to the date specified in Section 4 will not require retrofit of an export monitoring device to register to the Synergy utility server where only ESM services are being provided.

9 DER asset capability

DER remote management for Tier 1 and 2 customer connections can be undertaken on different levels:

- DER level management.
- Point of connection (PoC) level management (coupled with non-controllable load or other DER).
- Collectively at both the DER level and at the PoC and for multiple assets.

Capabilities are dependent on the hardware and software solutions that have been delivered by technology providers and OEMs, as well as the configuration of installed equipment for a specific customer installation. For example, presence of an export monitoring device, and capability of differing implementations of CSIP-Aus solutions.

9.1 Listing categories

Hardware and software solution providers will seek to list their products under categories defined by their functional requirements. These listings will be publicly available on Synergy's *Supported solutions list* and allow customers and installers to understand their asset capabilities and eligibility for participation in services and products. In future, additional categories may be introduced as capability and services develop.

Technology providers should refer to Synergy's *Utility interconnection handbook* for complete technical details of each listing category.

DER – generator

This listing category covers the minimum mandatory requirements for all DER systems managed via Synergy's utility server, including levels of control and monitoring, basic telemetry, ESM control and export limits.

Systems listed under this category will have the following functionality:

Function	Requirements
PoC telemetry	• Permit the monitoring of the PoC active power and reactive power transfers in one-minute average intervals.
DER asset aggregated telemetry	• Permit the management of the aggregation of DER assets, active power and reactive power transfers in 1-minute average intervals.

Nameplate ratings	• Report on aggregated nameplate ratings for:
	  • Apparent, active and reactive power
	  • Minimum power factors
	  • Support for various control modes.

Settings	• Report on aggregated adjusted settings of modified nameplate ratings.
Status reporting	• Report on aggregated asset connection and operational status
Export/import limit	• Manage the DER asset/s to keep the site within the export or import limits as specified by the DNSP or Synergy product contract.
Generation/load limit	• Manage the DER asset/s to keep the power transfers within the generation or load limits as specified by the DNSP or Synergy product contract.

Emergency curtailment	• Manage the gross generation setpoint of the DER asset/s in response to a command to de-energise the system.

Where multiple DER assets are co-located at a site, these should support interoperability to ensure minimum requirements for visibility and management are possible for all devices – refer to *Section 10.3*.

DER – storage

The *DER - storage* listing includes all requirements of *DER – generator* category with a small number of additional capabilities required to deliver specified use cases for energy service delivery. Where required for the service delivery the customer product will specify the requirement for assets to comply with the *DER-storage* listing category.

Inclusive of *DER – generator* requirements, the *DER - storage* requirements will have the following additional functionality:

Function	Requirements
DER asset aggregated setpoint control	• Manage the gross generation/load of the DER system to meet a defined power setpoint for a duration of time.
Energy storage asset aggregated setpoint control	• Manage the gross generation/load of the storage components of a DER system to meet a defined power setpoint for a duration of time.

Storage asset nameplate ratings	• Report on aggregated nameplate ratings of the storage component for,
	  • Charge/discharge rate
	  • Energy storage capacity (Wh)
	  • Support for various setpoint controls.

9.2 Listing process

Synergy will maintain a list of supported utility clients and hardware solutions that meet the requirements of Synergy's *Utility interconnection handbook*.

The certification requirements and listing process[5] for devices and solutions will depend on the nature of the listing that a technology provider is seeking and are outlined in Synergy's *Utility interconnection handbook*.

Customers should select products from Synergy's *Supported solutions list* to ensure compatibility.

9.3 Loss of communications

Where communications between the utility server and the DER communication client/s is lost, the asset will continue to operate in line with its current active control. On completion of the control the asset will revert to its default export limit setting of 1.5kW as a protective measure.

Synergy implementations will provide clients with forward visibility of controls to meet the requirements of the service being delivered and to minimise unintended instances of devices reverting to default behaviour under momentary loss of communications.

[5] Synergy is actively engaged in national harmonisation of testing and certification requirements and expect that *DER - generator* base requirements will align with other jurisdictions. *DER - storage* will be initially a superset requirement and undertaken by Synergy until such time as national certification is available.

9.4 Export limit

For Tier 1 and 2 customer sites - before an asset is onboarded to Synergy's utility server and commissioned at a site, all new DER installations shall be configured to have a 1.5kW export limitation as a default.

As a part of onboarding and commissioning testing with Synergy's utility server, the export limit is removed from the asset and any applicable export limitation for a site shall be communicated by Western Power to Synergy and relayed to the asset by Synergy's utility server.

10 Installation requirements

All embedded generation installations must comply with all relevant Australian standards and Western Power requirements.

All installed inverters must comply with Australian and New Zealand standard AS/NZS4777.2.

Battery installations must comply with Australian and New Zealand standard AS/NZS 5139 *Electrical Installations – Safety of battery systems for use with power conversion equipment*.

10.1 Internet access

All Tier 1 and 2 customer sites registering with Synergy for DER management products will require connectivity to the internet. All connectivity must be achieved by means of a password protected private network connection. This should be the responsibility of the customer to provide and maintain to remain eligible to participate in Synergy's DER product offerings.

Persistent loss of communications from a customer site to the utility server will render the system to its default export limit setting of 1.5kW as a protective measure.

10.2 Availability

All Tier 1 and 2 customers shall remain online and available >95% of the time. For a system to be available it must be connected to the grid and connected to a reliable internet connection. Unavailability is typically caused by internet connectivity issues.

Synergy will monitor availability and provide notification if the system is not meeting availability requirements.

10.3 Export monitoring device

DER installations are required to be fitted with an export monitoring device. This device must be capable of monitoring point of connection voltage and active and reactive power flows as per the requirements of Synergy's *Utility interconnection handbook*.

10.4 Interoperability

New installations under remote management containing multiple DER assets will require local communications and interoperability. Synergy's *Utility interconnection handbook* specifies implementation requirements for solutions that include multiple assets. Interoperability may be achieved through direct DER-DER communications (where compatible) or through use of a gateway device.

Where a site has existing assets that are not interoperable with existing or new assets, however, are independently compliant to Synergy's *Utility interconnection handbook*, Synergy will allow these assets to be connected to and managed as separate IEEE2030.5 end devices under a grandfathering arrangement. Exemptions for on-site interoperability will be provided in the eligibility and requirements for each individual Synergy product. Where a customer site contains devices that are not interoperable with other devices on site there may be limitations to the customer's ability to participate in certain products.

11 Connection and commissioning processes

11.1 Registration and testing

After installation of a compatible product, the installer will be required to commission the asset and register to the Synergy utility server. The installer will execute commissioning tests and the outcome of the tests (pass/fail) will be provided to the installer.

The installer will also report on the customer site national metering identifier (NMI) and other minimal site and asset details, through the commissioning/asset registration process at the time of onboarding to Synergy's utility server.

Synergy will undertake ongoing monitoring and assessment of Installers asset commissioning to ensure systems are being successfully registered and operating as per the requirements of this document.

11.2 Connection application

All installations shall comply with Western Power and Synergy embedded generation connection application requirements. Refer to the respective authority website for details.

12 Appendices

12.1 Appendix A: Connection types

Category	Tier 0	Tier 1	Tier 2
Asset	On *Supported solutions list*	On *Supported solutions list*	On *Supported solutions list*
Export	1.5kW local hardware configured limit	1.5kW remote managed limit[6]	As per product
Visibility	No visibility	Low granularity telemetry	High granularity telemetry
Control	No control	Emergency control (ESM)	As per product
Internet access required	No	Yes	Yes
Export monitoring device	Yes	Yes[7]	Yes

[6] Customers participating in the Western Australian Government's Distributed Energy Buyback Scheme (DEBS) will be permitted to export up to 5kW, except under ESM or fail-safe behaviour response listed in section 9.3.
[7] Legacy ESM assets installed prior to the date specified in Section 4 will not require retrofit of an Export Monitoring Device to register to the Synergy Utility Server where only ESM services are being provided.

12.2 Appendix B: Derogations

As the transition in technology capability occurs, some existing installations may encounter significant limitations in the ability to achieve various site-wide compliance requirements, therefore derogations from the requirements of this document may be granted by Synergy in exceptional cases.

The following situations have been identified to provide guidance on the type of derogations that may be considered by Synergy. Note this advice does not constitute a deemed exempt installation and Synergy may remove or alter these exemptions as the transition progresses.

A request for derogation may be made following Synergy's engineering derogation process by contacting der-support@synergy.net.au.

Locational Constraints

Sites in which an existing non-compliant DER is physically installed in a location that would be cost-prohibitive to integrate into the communications capability of the new DER installation.

Existing Capability Constraints

Sites in which the existing non-compliant DER OEM confirms the asset is unable to be made compliant to the requirements of this document and a feasible gateway solution is not available to integrate the asset.

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