IESO Transmission-Distribution Coordination Working Group (TDWG)

Glossary of Working Terms and Definitions

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This document organizes the terms into two groups. The first group of "key definitions" includes the terms and concepts that are specifically relevant for the current set of TDWG deliverables. These definitions are intended for use within the context of this working group and do not imply broader acceptance or application. The second group of "standard definitions" includes terms that are more standard elements of the electricity system and market vocabulary in Ontario.

Note: Terms in bold font within the text of a given definition are defined elsewhere in this glossary.

1. Key Definitions

Distributed Energy Resource (DER): DERs are electricity resources that generate electrical energy, store and discharge electrical energy, or dynamically modify electric load, and that are connected directly to an electric distribution system or to an end-use customer's premises within a distribution system. They can include but not be limited to solar photovoltaics (PV), combined heat and power plants, backup generators, energy storage, electric vehicles, and consumer devices that can reduce or increase electricity use on demand. Energy efficiency measures are excluded from the definition of DER because their performance is not dynamically variable.

Distributed Energy Resource Aggregator (DER Aggregator): An entity that coordinates the operation of multiple individual DERs to form a **DER Aggregation (DERA),** which can perform as a single resource to provide wholesale market and/or distribution services. See also **DSO Aggregation.**

Distributed Energy Resource Aggregation (DERA): A resource comprised of multiple DERs that are coordinated to act as a single resource to provide wholesale market and/or distribution services.

DER/A: Abbreviation to denote the inclusive category of individual DERs and DERAs.

Distribution System Operator (DSO): The entity responsible for operation of the electric distribution system and operational coordination with IESO at the transmission-distribution (T-D) interfaces. The DSO's capabilities may include advanced operational functions, such as operational planning, active management of **DER/A** to ensure distribution system reliability, and procurement and activation of DER/As for provision of distribution services. See also the definitions of **Dual Participation DSO**, **Market Facilitator DSO** and **Total DSO**.

Distribution System Operator Aggregation (DSO Aggregation): A DERA created and managed by a DSO. The term is specifically intended to contrast with commercial aggregation managed by private entities.

Dual Participation DSO (DP–DSO): A DSO that facilitates direct participation by DER/As in the wholesale market as well as DER/A provision of distribution services. DER/As participate directly in the wholesale markets and the IESO schedules and dispatches DER/As to meet bulk system needs. The IESO models each DER/A that participates in the wholesale market as though it were connected at the appropriate T-D interface. The DP-DSO assesses the impacts of IESO dispatches of DER/As and applies operational limits on the DER/As if needed for distribution system reliability. The DP-DSO communicates such limits to the DER/As, and the DER/A is responsible for notifying the IESO of its reduced capability or unavailability. Simultaneously, the DSO can schedule and activate DER/As to meet distribution system needs based on their locations on the distribution system.

Market Facilitator DSO (MF-DSO): A DSO that facilitates the direct participation of DERs and DERAs in the wholesale market through two distinct features. First, the MF-DSO acts as an intermediary between the DER/As and IESO by gathering DER/A bids and offers and providing these to the IESO, and by relaying IESO schedules and dispatches to DER/As. In executing these actions, the MF-DSO assesses the reliability impacts of the bids and IESO dispatches on the distribution system and applies operational limits on the DER/A if needed. The MF-DSO does not otherwise adjust the DER/As' wholesale market bids/offers or schedules/dispatches. Second, the MF-DSO optimizes the distribution system to minimize the curtailment of the DER/As, with the aim of improving the DER/As' ability to participate in the wholesale market (in the context of the MF-DSO, the objective of the DSO's optimization activity is to minimize DER/A curtailment while maintaining distribution system reliability and security of supply). DER/As also provide distribution services to the MF-DSO, which schedules and activates DER/As to meet distribution system needs.

Neutrality: A property of the DSO's operating framework to ensure fair, non-discriminatory treatment of all market participants without bias towards any party. The DSO operates transparently and in a neutral manner to promote fair competition among DER/As and trust and confidence among stakeholders. Neutrality can be reinforced through separation of DSO functions or full independence of DSOs, ensuring autonomy from undue influence or conflicts of interest. While neutrality is a key feature of each DSO model, the types of measures implemented to ensure neutrality may differ amongst the DSOs.

Shared Platform: The shared platform is a centralized information technology (IT) solution that facilitates and streamlines information exchanges and coordination among the IESO, DSOs, and DER/As. The platform establishes a secure interface that these actors use to enable the information exchanges required to implement relevant operational coordination protocols.

Total DSO (T-DSO): A DSO that coordinates all wholesale market and distribution system services provided by DER/As, eliminating their direct participation in the wholesale market. The T-DSO serves as the sole wholesale market participant for its distribution system, and the IESO only needs to interact with a single entity for wholesale services provided by DER/As. The T-DSO submits bids/offers that represent the combined bids/offers of the participating DER/As

under each T-D interface node (or multiple nodes, if permitted). The T-DSO receives wholesale market schedules and dispatches from the IESO, and then administers its own instructions to DER/As, making any adjustments that may be appropriate based on changing distribution system conditions. Adjustments may include re-optimization of DER/As to prevent a shortfall in meeting the wholesale market dispatch. The T-DSO would be subject to the same market rules that apply to all wholesale market participants. DER/As also provide distribution services to the T-DSO, which schedules and activates DER/As to meet distribution system needs.

2. Standard Definitions

Behind-the-Meter DER (BTM DER): A DER that is installed on an electricity customer's premises and connected electrically behind the customer's revenue meter, so that the meter registers the total effect of the customer's consumption and the activity of the DER. Compare with **Front-of-Meter DER**.

Capacity: (1) of a generator or energy storage device, its maximum power output capability, also referred to as its installed capacity. (2) of a transmission or distribution facility, its maximum reliable power throughput under normal operating conditions.

Capacity Deferral: The result of procuring a wholesale or distribution service to defer or avoid the need for a transmission or distribution capacity upgrade.

Day-Ahead Market (DAM): Market system and calculation engine, to be implemented as part of the Market Renewal Program, whereby the IESO will create financially binding hourly day-ahead schedules for energy supply, operating reserves, and dispatchable and non-dispatchable load.

DER Identifier: A unique string of characters assigned to each DER.

Dispatchable DERs: DER(s) that bid into the IESO real-time market and receive IESO dispatch instructions every 5 minutes to reach a specified level of generation or consumption. Examples include, but not limited to, generators, storage, large industrial loads, etc.

Distribution Services: The range of services DERs can potentially provide to DSOs. At a high level, DERs providing distribution services are typically required to adjust their power output (active and/or reactive) or reduce energy consumption in response to instructions sent by the DSO.

Embedded LDC: A distributor that is electrically connected within the system of a **Host LDC** and not directly connected to the IESO's system.

Flexibility: The capability of electricity resources such as generation, storage, demand response, etc. to support the dynamic operational requirements of the electricity system.

Flexibility Services: Same as **Grid Services**.

Front-of-Meter DER (FOM DER): A DER that is directly connected to the LDC's distribution system, rather than on an electricity customer's premises, behind the customer's revenue meter (see **Behind-the-Meter DER**)

Grid Services: The range of services electricity resources can potentially provide to DSOs and IESO. At a high level, resources providing grid services are typically required to adjust their power output (active and/or reactive) or reduce energy consumption in response to instructions sent by the DSO or IESO.

Host LDC: A distributor that is directly connected to the IESO system and provides indirect connection for one or more **Embedded LDCs** to the IESO system.

IESO Market Rules: The rules made under Section 32 of the Electricity Act, 1998, together with all market manuals, policies, and guidelines issued by the IESO, as may be amended from time to time.

Local Distribution Company (LDC): The owner and operator of an electric distribution system that is licensed by the OEB as an electricity distributor. Also known as distributor or utility.

Local Energy Market (LEM): A mechanism which enables competitive bids and offers for **Distribution Services** and **Grid Services**, including **Non-Wires Alternatives**. A **DSO** may be the operator of a **LEM**.

Non-Dispatchable DERs: DERs that produce or consume power in real-time and are not responsive to IESO 5-minute dispatch instructions.

Non-Wires Alternatives (NWAs): Solutions that defer or avoid the need for traditional transmission or distribution system upgrades.

Pre-Dispatch Timeframe: In the pre-dispatch timeframe, the IESO computes pre-dispatch energy schedules and projected market prices over a forward-looking time horizon.

Protocols: The required actions to be taken by, and information to be shared among the actors who comprise the electricity system and markets.

Implementation Ready: Transmission-Distribution **Protocols** that provide sufficient detail for LDCs and DER Aggregators to understand the impacts to their operations and the changes to tools/processes that will be needed, and for the IESO and DSOs to develop appropriate rules/manuals.

Real-Time Timeframe: The market and operating timeframe associated with the IESO's 5-minute real-time market. In the real-time timeframe, IESO dispatch instructions reflect the optimization of generation, storage, demand response, operating reserves to meet demand. The IESO runs the market clearing process every 5 minutes to determine prices and dispatches for each five-minute interval.

Operating Reserve: Generation, storage or demand response capacity which can be called upon on short notice by the IESO to replace scheduled energy supply which is unavailable due to an unexpected outage or to augment scheduled energy as a result of unexpected demand or other contingencies. Three types of operating reserves are procured through the operating reserve market: 10-minute synchronized reserve; 10-minute non-synchronized reserve; and 30-minute non-synchronized reserve.

Wholesale Energy Markets: The electricity markets administered by the IESO, as further defined in the IESO Market Rules.