

IESO Transmission-Distribution Coordination Working Group (TDWG)

Glossary of Working Terms and Definitions

Revised Draft Based on Discussions at TDWG Meeting on
December 8, 2023

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. 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 resources that generate electrical energy, store, and discharge electrical energy, or dynamically modify load, and that are connected directly to a utility 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 controllable.

Distributed energy resource aggregator: Private non-utility entity responsible for grouping individual DERs together to form a **DER Aggregation (DERA)** that can act as a single resource to provide wholesale market and/or distribution services. See also definition for **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 electric distribution system operational functions, including provision of distribution network services to network users, and operational coordination with IESO at the T-D interfaces. The functions of a DSO could also include the activation and coordination of DER/As in response to market or operator signals. This entity may be either the incumbent distribution utility or a separate, independent entity (see definition of **Independent DSO**). See also the definitions of **Dual Participation DSO**, **Independent DSO**, and **Total DSO**.

Distribution system operator aggregator (DSO aggregator): A DSO which, in addition to its operational functions, also aggregates DERs to form DERAs to provide wholesale market and/or distribution services.

Distribution system operator aggregation (DSO aggregation): A DERA created by a DSO under its **DSO aggregator** function.

Dual participation DSO (DP-DSO): A DSO that facilitates direct participation by DERs and DERAs in the wholesale market, as well as DER and DERA provision of distribution services. DER/As participate directly in the wholesale markets and the **TSO** (IESO) optimizes and dispatches DER/As to meet bulk system needs. The **TSO** does not, however, model the distribution system in its network model, but rather, each DER/A is modeled as though it were connected at the T-D interface. Simultaneously, the DSO could schedule and/or activate DER/As to meet local system needs.

Independent distribution system operator (IDSO): A DSO that is functionally and legally separate from buyers and sellers of wholesale or retail energy or capacity, and from the owners of physical distribution assets.

Local Distribution Area (LDA): The set of all distribution system facilities associated with a single IESO system node or transmission-distribution interface substation.

Shared platform: The shared platform is an information technology (IT) solution that simplifies interfaces and coordination between power system actors. The platform also establishes a secure interface between the wholesale market operator, LDCs, the DSOs and DER/As. The platform's functions can support:

- Procurement: The acquisition of DER/As for delivering services to the **TSO** (IESO) and/or DSO.
- Trade: Process of buying and selling DER/A services through submission of DER/A bids/offers and selection of bids/offers based on defined rules and processes.
- Market Coordination: Management of **DER/A** registration and day-ahead (DA) and real-time (RT) dispatch.
- Operational Coordination: Management of dispatch and DA and RT coordination of services between the IESO, LDCs, **DSOs**, and **DER/As**, including resolution of any conflicting dispatch instructions from the DSO and IESO to a particular DER/A.
- Settlement: Support and management of financial reconciliation between IESO, LDCs, **DSOs**, and **DER/As**.
- Scheduling: Planning and committing the operation of **DER/As** to meet anticipated demands for energy or system services.
- Dispatch: For dispatchable **DER/As**, the **TSO** (IESO) instructs participating **DER/As** to modify their power output to provide wholesale energy or bulk system services.
- Activation: For dispatchable **DER/As**, the **DSO** instructs participating **DER/As** to modify their power output to provide energy or distribution services.

Total DSO (T-DSO): A DSO that coordinates all wholesale market services provided by DER/As and thus eliminates the need for their direct participation in the wholesale electricity market. For the distribution facilities the T-DSO operates at any given T-D interface, the T-DSO is the sole

counterparty to the wholesale market operator. The T-DSO would submit a single wholesale market bid/offer that reflects the combined bids and offers of all participating DER/As within its portion of the given LDA, reflecting the attributes of each individual DER in the bid. The T-DSO would receive wholesale market schedules and dispatches that result from the wholesale market operator's market clearing and would disseminate those results to the participating DER/As. The T-DSO would be subject to the same market rules, obligations, and penalties that apply to all wholesale market participants.

Neutral Market Facilitator (NMF): The NMF operates a transparent, non-discriminatory market service to enable DERs to offer services to the DSO and TSO. As explained below, the NMF could be a function of either the T-DSO or the DP-DSO, though it would function somewhat differently under each model. The NMF would receive bids and offers from participating DER/As, and be responsible for dispatch, measurement, verification, and settlement for all DER/As that participate in the market service it operates.

- **NMF in the T-DSO model:** The NMF is a core, required function of the T-DSO because, under this coordination model, all DER/A transactions with the IESO market must go through the DSO. The T-DSO framework must therefore ensure that participating DER/A are not in any way disadvantaged by having to transact IESO market services through the DSO rather than being able to transact directly with the IESO.
- **NMF in the DP-DSO model:** The NMF is an optional function of the DP-DSO. It is not a required DSO function because participating DER/A may bid/offer directly into the IESO markets and be dispatched by and settled with the IESO directly. As an optional function of the DP-DSO, the NMF and **DSO Aggregator** functions can provide benefits to both the participating DERs and the DSO as a way for DERs to offer and the DSO to procure distribution services.

2. Standard Definitions

Capacity: Total MW capability of a resource to be dispatched/activated and deliver energy to the power system.

Capacity deferral: A distribution service procured in lieu of a distribution capacity upgrade that can be called to address distribution constraints arising in planned system conditions.

Day-ahead commitment process (DACP): The IESO utilizes a day-ahead commitment process (DACP), which designates the next day's available supply to meet anticipated IESO demand. The DACP uses a day-ahead calculation engine (DACE) to optimize energy and operating reserve for the 24 hours of the next day.

DER Identifier: A unique identifying string of characters assigned to each DER, potentially including each DER within a DERA, that is used in T-D Coordination.

Direct DER: DERs that are directly connected to the DSO's Distribution System.

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

Distributed local MWs: Local MWs or MVAR capabilities based on LDC-based actions or activities that alter/modify the operation of the LDC grid such as conservation voltage reduction, staggering transformers to absorb Vars, etc.

Energy: The core service provided to consumers, which is provided as a product from suppliers and delivered across the transmission to distribution system to end-use consumers.

Embedded LDC: A distributor that is not a wholesale market participant and is electrically connected within the system of a **host LDC**.

Flexibility: The ability of potential distribution services to meet dynamic operational needs such as generation, curtailment, voltage support, etc.

Flexibility services: Same as “grid services”.

Grid services: Range of services DER/As can potentially provide to DSOs and/or TSO. At a high level, DERs providing grid services are typically required to adjust their power output (active and/or reactive) in response to activation and/or dispatch signals sent by the DSO or TSO.

Host LDC: A distributor that provides electricity to an **embedded LDC**.

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 construct which allows open, competitive bids and offers for distribution services. The LEM may be a single market with geographic constraints on DSO buyers, or multiple separate local markets in a geographic region such as an LDA or LDC licensed franchise territory.

Local Reserve: A distribution service intended to be called to address distribution constraints arising in unplanned system conditions. Such conditions may result from a range of contingency events, including distribution equipment failures, or from service providers contracted to provide capacity deferral that fail to meet their obligations.

Non-dispatchable DERs: DERs that produce or consume power in real-time and get paid or are charged at the hourly energy price. Examples include, but not limited to, self-scheduling generator or load etc.)

Non-Wires Alternatives: Utility-driven solutions that defer or eliminate the need for conventional system upgrades to address network constraints.

Pre-dispatch timeframe: In the pre-dispatch timeframe, the ISO computes pre-dispatch energy schedules and projected market prices over a forward-looking time horizon, at an hourly resolution.

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 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 actual generation, reserve allocation and physical demand within the IESO system. The IESO runs market clearing software every 5 minutes to determine prices and schedules for each five-minute interval.

Reserve: The IESO procures operating reserves to balance supply and demand in the event of a contingency, such as a generator or transmission line outage. Three types of operating reserves are procured through the operating reserve market: 10-minute synchronized reserve (also called 10-minute spinning reserve). 10-minute non-synchronized reserve (also called 10-minute non-spinning reserve) and 30-minute non-synchronized reserve.

Transmission system operator (TSO): Transmission system operator, which in Ontario is the IESO, is responsible for managing the operations of high-voltage transmission systems, including continual real-time system balancing, and administers a wholesale energy market.

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