NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

EV Task Force (EVTF) Terms and Definitions Working Document

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Purpose

This document provides a preferred set of working definitions and acts as a useful reference for terms describing or related to transportation electrification (TE) systems, loads, electric vehicles (EVs), and the relationship to distributed energy resources (DERs). The document is intended to provide working definitions that should lead to consistent use of terms in NERC Electric Vehicle Task Force (NERC EVTF) deliverables and discussions on the impact of aggregate EVs on the Bulk Power System (See **Figure 1**). Many different societies and standards organizations define these terms, and other industry definitions are included for the readers' convenience in Appendix D. Some of the major standard development entities are the Institute of Electrical and Electronics Engineers (IEEE)[1], International Organization of Standards (ISO)[2], Society of Automotive Engineers (SAE) [3], and UL Solutions UL)[4]. These groups have historically independently defined their terms, the rise in EV adoption by end-use consumers has necessitated a bridging of these independent entities and this document aids in that merging.

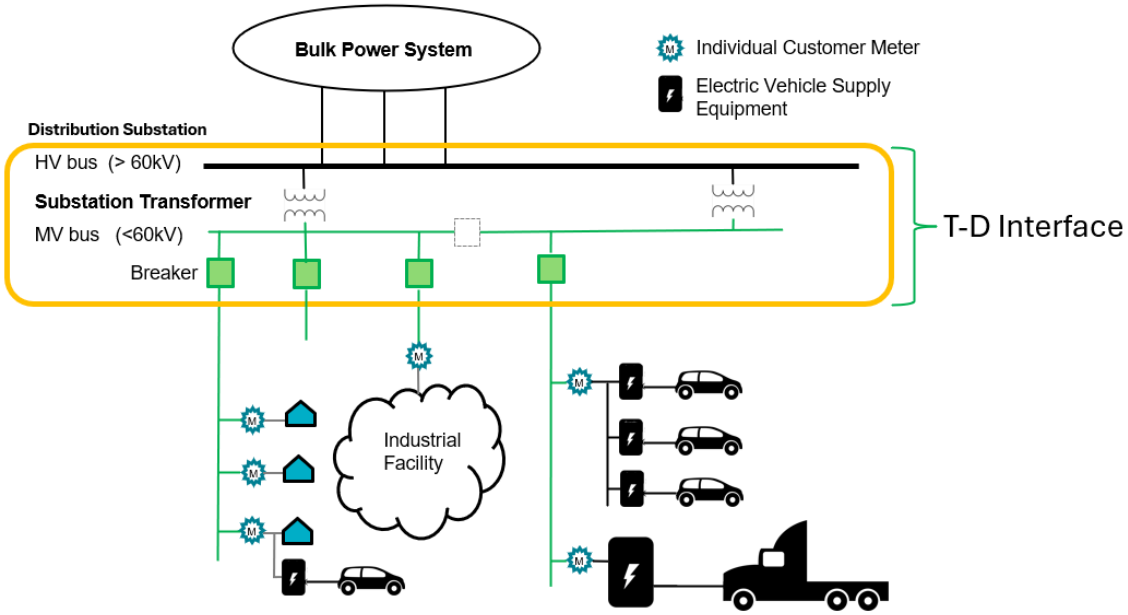


Figure 1: Example of Aggregate EV Impacts on the Bulk Power System

[1] https://www.ieee.org/
[2] https://www.iso.org/home.html
[3] https://www.sae.org/
[4] Formally called Underwriters Laboratories. Website available here: https://www.ul.com/

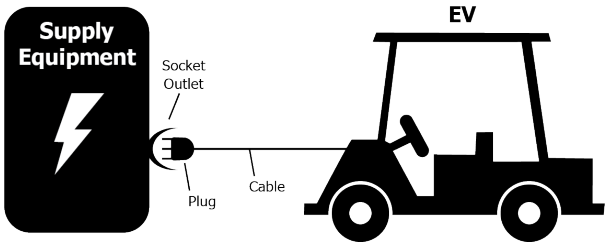
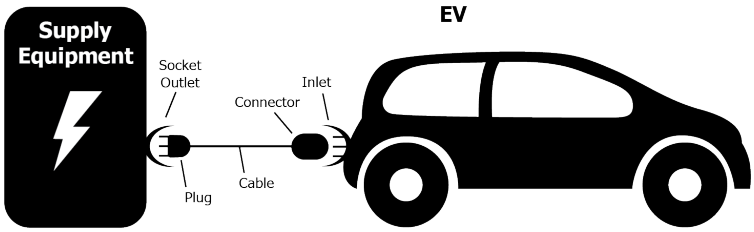
Disclaimer

The definitions in this document may not represent official definitions adopted in the *NERC Glossary of Terms.* [5] The terms also may not be appropriate in all contexts and may not apply to all sectors of the industry or regions. While EVTF has adopted these preferred terms for its use, further discussion may be needed prior to incorporation into the *NERC Glossary of Terms*. Terms may continue to change and be added during the development of EVTF activities, and these terms may be used as future reference for any updates to the *NERC Glossary of Terms*.

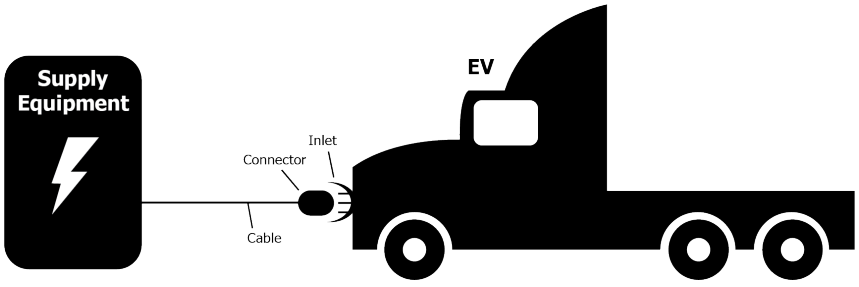
Terms related to Transportation Electrification Technologies

The following terms in **Table 1** are deemed the preferred working definitions for TE related technologies including electric vehicles and chargers. Some definitions have been adapted from existing terminology used in other industry groups/standards such as the Society for Automotive Engineers. Supporting informative diagrams are provided in **Appendix A** to clarify use of the definitions. **Appendix C** provides other definitions used by other agencies or organizations and are identified with an "*" in **Table 1**.

Table 1: Recommended Terms Related to TE Technologies

Term	Definition	Source
AFFILIATION	The process whereby EV and SE share identifying information (such as EMAID, EVCCID, VIN, EVSEID, and SECCID) so the devices and any associated remote management system (RMS) know what is connected and where.	SAE J3068
CASE A	The EV connects to the SE via a cable permanently attached to the EV. 	SAE J3068
CASE B	The EV connects to the SE via an EV cable assembly that is detachable by the driver at both ends 	SAE J3068
CASE C	EV connects to the SE via a connector permanently attached to the SE.	SAE J3068

[5] https://www.nerc.com/files/glossary_of_terms.pdf

Table 1: Recommended Terms Related to TE Technologies		
Term	**Definition**	**Source**
		
CHARGE NETWORK OPERATOR (CNO)	EV Charging Network platform and services provider. Also known as charge point operator (CPO).	IEEE 2030.13
CHARGE STATION OPERATOR (CSO)	An entity that operates one or more charge station locations. The CSO may be the charge station owner or a host.	IEEE 2030.13
CHARGER	The charger can either be on-board the vehicle or off-board. On-board chargers require AC energy transfer to the vehicle (either 120 or 240 V single phase) and Off-board chargers are within the EVSE and require DC energy transfer to the vehicle.	SAE J2836
CHARGING LEVEL	Level 1 (120V connection, 1.92 kW) , Level 2 (240V system 4.5 kW to 19.2 kW), Level 3 (50kw – 1MW is a guide), but is not common. Level 3 is not defined consistently and is used as a "catch-all" and typically is DC. Fast DC is a better term as a Level 3 AC system exists outside of North America.	NERC EVTF
CHARGING STALL	An unenclosed or enclosed, open or covered, space designated for EV charging	IEEE 2030.13
CHARGING STATION	The charging station is the physical system where an EV can be charged. A charging station has one or more EVSEs.	IEEE 2030.13; OCA
COMBINED CHARGING SYSTEM (CCS)	A system where dedicated DC contacts are added to AC charging couplers. CCS1 refers to SAE J1772 (IEC 62196-2 type 1) couplers with DC functionality added. CCS1 is called "configuration EE" in IEC 62196-3 and "DC Level 2" in SAE J1772. CCS2 refers to SAE J3068 (IEC 62196-2 type 2) couplers with DC functionality added. CCS2 is called "configuration FF" in IEC 62196-3 and "SAE J3068 DC8" in SAE J3068. CCS couplers may or may not include AC contacts. CCS connectors always use a case C (connector fixed to the EVSE).	SAE J3068
CONNECTION SESSION	A connection session starts when the connector is inserted into the inlet and ends when the connector is removed from the inlet. A normal connection session may contain one or more periods of charging.	SAE J3068
CONNECTOR[6]	A conductive device that by insertion into a vehicle inlet establishes an electrical connection to the electric vehicle for the purpose of transferring energy and exchanging information. This is part of the coupler.	SAE J1772; IEEE 2030.13; OCA

[6] See Appendix A for illustrations on Connector types.

Table 1: Recommended Terms Related to TE Technologies		
Term	**Definition**	**Source**
	In some cases, an EVSE may have multiple physical socket types and/or tethered cable/connector arrangements (i.e., connectors) to facilitate the connection of different vehicle types (e.g., four-wheeled EVs and electric scooters).	
CONTROL PILOT (CP)	An electrical signal that is sourced by the SE, controlled by the EV and the SE, and used for the following functions: • Verifies that the EV and SE are present and connected • Controls energization/de-energization of the charging power supply • Transmits operating parameters and constraints between SE and EV Monitors the presence of the equipment ground	SAE J3068
CONTROL SEQUENCE	A sequence of automated tasks performed by the EV and the SE during a connection session for the purpose of charging the EV. A new control sequence occurs at the beginning of a connection session and after a restart.	SAE J3068
CORE INVERTER SYSTEM	The onboard inverter function is performed by a distributed system of vehicle components and is not a self-contained device within the PEV. The core inverter system is a subset of the inverter system and consists of only those onboard hardware, software, and firmware components that the vehicle manufacturer considers to be directly associated with communication with the EVSE for the purpose of setting up the inverter system for the site and authorization of discharging, for meeting the requirements of IEEE 1547 and IEEE 1547.1, and for the execution of smart inverter functions.	SAE J3072-defined term
COUPLER, EV	A physical and electrical mating system connecting the SE to the EV. The coupler includes the connector at the end of the flexible cable of the SE, and the inlet on the EV.	SAE J3068
DC FAST CHARGER (DCFC)	DC fast chargers utilize direct current and typically range in power output from 50 kW to 350 kW and higher.	IEEE 2030.13
ELECTRIC VEHICLE (EV)	A vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source.	U.S. Department of Energy[7]
ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)	This is the generic term used to describe the device that is physically connected and provides energy to the vehicle. EVSEs may take several physical forms, and their logical function may likewise differ substantially. Physical forms include a mobile cord for 120 VAC charging, a fixed or wall-mounted 240 VAC charger, or an off-board DC charger. An EVSE may also support reverse power flow (discharging).	SAE J2836

[7] Adapted from their Alternative Fuels Data Center referring to Vermont's regulation for electric vehicles. Available here: https://afdc.energy.gov/laws/12660

Table 1: Recommended Terms Related to TE Technologies		
Term	**Definition**	**Source**
EV CHARGING PROFILE	The aggregate charging (or discharging) power for EVs while connected to the electric system.	NERC EVTF
FAST CHARGING STATION (FCS)	The fast-charging station is the physical system where an EV can be charged using a DCFC. A fast-charging station may have one or more DCFCs.	IEEE 2030.13
HEAVY-DUTY VEHICLE	A vehicle with a gross vehicle weight of greater than 26,000 pounds. The U.S. Department of Transportation designates heavy-duty vehicles as Class 7 or Class 8 trucks.	U.S. Department of Transportation
INLET	The component on the EV into which the connector mates. This is part of the coupler.	SAE J3068
INVERTER SYSTEM	Used in this standard to generically refer to both bidirectional and four-quadrant power conversion systems used to interface the electrical system of the PEV with the grid. The term inverter system is used to represent a distributed system, not a self-contained device within the PEV.	SAE J3072-defined term
INVERTER SYSTEM INFORMATION	The information provided by the Vehicle Manufacturer (VM) for an authorized person to set and store the values for the inverter system model number, the SAE J3072 certification date, and the SAE J3072 certification. The inverter system model number shall correspond to the actual installed inverter system model in the PEV.	SAE J3072
INVERTER SYSTEM MODEL NUMBER	This is a unique 32-character string that is assigned by the VM to each non-interchangeable configuration of the core inverter system, which is approved by the VM for use within one of their vehicle models.	SAE J3072-defined term
LIGHT-DUTY VEHICLE	Any motor vehicle with a gross vehicle weight rating of 10,000 pounds (4,500 kg) or less. The U.S. Department of Transportation designates light-duty vehicles as Class 1 through Class 2 vehicles.	U.S. Department of Transportation[8]
MEDIUM-DUTY VEHICLE	A vehicle with a gross vehicle weight of greater than 10,000 pounds and less than 26,000 pounds. The U.S. Department of Transportation designates medium-duty vehicles as Class 3 through Class 6 vehicles.	U.S. Department of Transportation
PLUG-IN ELECTRIC VEHICLE (PEV)	This is the generic term used to describe any vehicle that plugs in to receive electrical energy. This includes many different classifications of vehicles, such as Battery Electric Vehicle (BEV), Plug-in Hybrid Electric Vehicle (PHEV)), Extended-Range Electric Vehicle (E-REV), and so on.	SAE J2836
TIME CHARGE IS NEEDED (TCIN)	Time Charge Is Needed is the identification of the end of the potential charge session. This is when the customer wants to use their vehicle for the next drive cycle and the expected recharging is complete.	SAE J2836
WORLD MANUFACTURER	The first section of the vehicle identification number (VIN), which designates the manufacturer of the vehicle and is assigned to a vehicle	SAE J3072

[8] The terms for Light-, Medium-, and Heavy-Duty all stem from this link: Department of Transportation. These weights alter depending on the agency defining the vehicle use as well as the focus of the agency. Alternative weight limits for these classifications exist.

Table 1: Recommended Terms Related to TE Technologies		
Term	**Definition**	**Source**
IDENTIFIER (WMI) CODE	manufacturer to allow identification of that manufacturer. Defined by ISO 3780:2009.	

Terms related to Device and System Interoperability

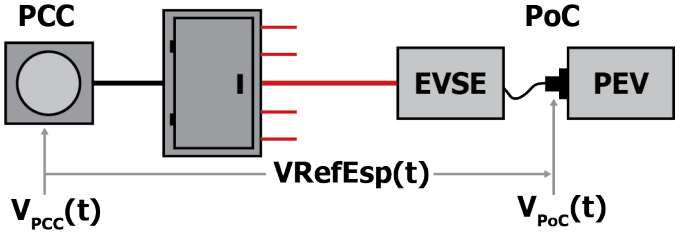
The following terms in **Table 2** are deemed the preferred working definitions for EV charger interoperability and communications. Some definitions have been adapted from existing terminology used in other industry groups/standards such as the Society for Automotive Engineers (SAE), IEEE, Open Charge Alliance (OPA). **Appendix C** provides other definitions used by other agencies or organizations and are identified with an "*" in **Table 2.**

Table 2: Recommended Terms Related to TE Communications and Interoperability		
Term	**Definition**	**Source**
CHARGING STATION MANAGEMENT SYSTEM (CSMS)	Manages charging stations and has the information for authorizing users to use its charging stations. It can be used in place of a Charge Management System (CMS) when operated independently of the FCS EMS.	IEEE 2030.13; OCA
COORDINATED CHARGE/ DISCHARGE MANAGEMENT FUNCTION	The PEV shall provide a means for the vehicle operator to designate a target "time charge is needed" and an associated "target SOC." This could be by explicit data entry at the PEV at the time of parking at the charge station or other means, such as a calculated default value. But at the time of connection of the PEV to the EVSE, the PEV shall present a target SOC and Time Charge is Needed to the DME.	SAE J3072
ENERGY MANAGEMENT SYSTEM (EMS)	[In the context of EV charging stations], a device that manages the local loads (consumption and production) based on local and/or contractual constraints and/or contractual incentives. It has additional inputs, such as sensors and controls from e.g., PV and battery storage.	IEEE 2030.13, OCA
Initial Transfer of EVSE Parameters to PEV	After peer-to-peer communication is established, the PEV shall acquire the following parameters from the EVSE.	SAE J3072 – Table 2
Initial Transfer of PEV Configuration Information to EVSE	PEV shall provide the parameters listed below to the EVSE after it has received and processed the EVSE parameters. The table is based on IEEE 1547-2018 Table 28 Nameplate Information, except the 61850 term (IEC 61850-7-420 ED2 data object names) shown is generally that used for Configuration Information (settings). (Nameplate (N) or Configuration (C) Information)	SAE J3072 – Table 3

Table 2: Recommended Terms Related to TE Communications and Interoperability		
Term	**Definition**	**Source**
INTEROPERABILITY	The ability of two or more systems or components to exchange information and to use the information that has been exchanged.	IEEE[9]
INTEROPERABILITY	The condition where components of a system, relative to each other, are able to work together to perform the intended operation of the total system. Information interoperability is the capability of two or more networks, systems, devices, applications, or components to share and readily use information securely and effectively with little or no inconvenience for the user.	SAE J2836
LOCAL CONTROLLER	A device that can send messages to its charging stations, independently of the CSMS. A typical usage for this is for local smart charging or local charge session authorization.	IEEE 2030.13, OCA
OPEN CHARGE POINT PROTOCOL (OCPP)	OCPP is a two-way communication protocol between a back office Charge Station Management System (CSMS), Energy Management System (EMS), or Local Controller, and a charging station.	IEEE 2030.13, OCA

Terms and Definitions Related to Vehicle Grid Integration (VGI)

The following terms in **Table 3** are deemed the preferred working definitions for VGI. Some definitions have been adapted from existing terminology used in other industry groups/standards such as the SAE. Supporting informative diagrams are provided in **Appendix A** to clarify use of the definitions. **Appendix C** provides other definitions used by other agencies or organizations and are identified with an "*" in **Table 3**.

Table 3: Recommended Terms Related to VGI		
Term	**Definition**	**Source**
DYNAMIC CALIBRATION FUNCTION	Refer to Appendix H – Ability of the PEV software to dynamically calculate the calibration parameter VRefEsp(t).  For SAE J3072 purposes that VRefOfs is the difference in voltage between the PCC and PoC when the PEV is discharging at 20 A rms. The PEV can internally use VRefOfs/20 for the resistance value and perform the dynamic calibration function.	SAE J3072

[9] See *IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries* (New York, NY: 1990).

Table 3: Recommended Terms Related to VGI		
Term	**Definition**	**Source**
FORWARD POWER FLOW (FPF) – CHARGING	Forward power flow (FPF) means the direction of energy for charging a vehicle. While the term "forward" suggests a positive sign convention, care must be used with any communications because the convention for DER devices is to use a positive sign to designate energy produced (discharged) by the DER.	SAE J2836/3
GRID-TO-VEHICLE (G2V)	G2V means the transfer of energy from the electrical grid to charge a vehicle	SAE J2836/1
REVERSE POWER FLOW (RFP) – DISCHARGING	Reverse power flow (RPF) means the direction of energy for discharging a vehicle. While the term "reverse" suggests a negative sign convention, care must be used with any communications because the convention for DER devices is to use a positive sign to designate energy produced by the DER.	SAE J2836/
VEHICLE GRID INTEGRATION (VGI)	This is a very broad term that encompasses the many ways in which a vehicle can provide benefits or services to the grid, to society, the EV driver, or parking lot site host by optimizing plug-in electric vehicle (PEV) interaction with the electrical grid. VGI includes both active management of electricity (e.g., bi-directional management, such as vehicle-to-grid [also known as V2G] or unidirectional management such as managed charging [also known as V1G]) and/or active management of charging levels by ramping up or down charging. VGI also includes passive solutions such as customer response to existing rates, design of improved utility rates (e.g., time-of-use (TOU) charges, demand charges and customer fees), design of the grid to accommodate EVs while reducing grid impacts to the degree possible, and education or incentives to encourage charging technology or charging level (e.g., rebates for lower-level charging, modifying current allowance policy).	SAE J2836
VEHICLE TO GRID (V2G)	When vehicle power is fed into the bulk electric grid or a microgrid, we refer to it as "Vehicle-to-Grid" power, or V2G. A PEV in V2G operation is considered by utilities to be a Distributed Energy Resource (DER). V2G is about bidirectional flow and not just reverse flow. The term V2G includes the special case where only the rate of charging can be dynamically controlled - sometimes this is referred to as V1G. V2G-AC designates the use of an onboard inverter feeding AC power back through the EVSE. V2G-DC designates the use of DC current from the PEV battery with an inverter located in the EVSE	SAE J2836
VEHICLE TO HOME (V2H)	V2H describes the capability of a vehicle to act as a backup "generator" for selected critical loads in a home isolated	SAE J2836

Table 3: Recommended Terms Related to VGI		
Term	**Definition**	**Source**
	from the power grid, for example, after the failure of the power grid. SAE defines two types. For V2G-EPP the inverter is onboard the PEV and power is routed to an exportable power panel on the PEV. The PEV is connected to the same home backup power port used for portable generators. For V2H-DC the inverter is in the EVSE and can change modes from a V2G-DC to V2H-DC when the home is disconnected (islanded) from the grid.	
VEHICLE TO LOAD (V2L)	V2L describes the capability of a PEV with an onboard inverter to provide power to tools or other loads which are not connected to a home or the grid. The inverter regulates the amplitude and frequency of the AC voltage and the power is routed to NEMA receptacles on an exportable power panel.	SAE J2836

Terms and Definitions Related to TE Modeling and Energy Concepts

The following terms in **Table 4** are deemed the preferred working definitions for TE modeling for planning assessments including the implementation and utilization challenges associated with transportation electrification modeling. Some definitions have been adapted from existing terminology used in other industry groups/standards such as the SAE. Supporting informative diagrams are provided in **Appendix A** to clarify use of the definitions.

Table 4: Recommended Terms Related to TE Modeling, Implementation and Utilization		
Term	**Definition**	**Source**
CAPACITY VALUE	the ratio of the electrical energy produced by a generating unit for the period of time considered to the electrical energy that could have been produced at continuous full power operation during the same period	U.S. Energy Information Administration[10]
COINCIDENT FACTOR	The ratio of the coincident system maximum load to the sum of the individual non-coincident maximum loads. The coincident factor is the inverse of the diversity factor	IEC 60204-1
COINDICENT LOAD	The demand of the composite group, as a whole, of somewhat unrelated loads over a specific period of time	*Electric Power Distribution Engineering*[11]
DER_A DYNAMIC MODEL	Dynamic model used in RMS positive sequence stability simulations used to represent either individual U-DERs or aggregate amounts of R-DERs.	NERC SPIDERWG[12]

[10] https://www.eia.gov/
[11] Adapted from the coincident demand definition in this book by Turan Gönen. Book is available here: https://students.aiu.edu/submissions/profiles/resources/onlineBook/Z7e5T7_Electric_Power_Distribution_Engineering-_Third_Edition.pdf. The definition appears on Page 37.
[12] https://www.nerc.com/comm/PC_Reliability_Guidelines_DL/Reliability_Guideline_DER_A_Parameterization.pdf

Table 4: Recommended Terms Related to TE Modeling, Implementation and Utilization		
Term	**Definition**	**Source**
DIVERSITY FACTOR	The ratio of the sum of the individual non-coincident maximum loads to the coincident system maximum load.	IEC 60204-1[13]
RETAIL-SCALE DISTRIBUTED ENERGY RESOURCE (R-DER)	Typically Behind-the-Meter DER that reduces customer load demand. These DER include residential, commercial, and industrial customers. Typically, the residential units are single-phase while the commercial and industrial units can be single- or three-phase facilities.	NERC LMTF
UTILITY-SCALE DISTRIBUTED ENERGY RESOURCE (U-DER)	DER directly connected to the distribution bus or connected to the distribution bus through a dedicated, non-load serving feeder. These resources are specifically three-phase interconnections, and can range in capacity, for example, from 0.5 to 20 MW although facility ratings can differ.	NERC LMTF[14]

Terms and Definitions Related to DER

The following terms in **Table 5** are deemed the preferred working definitions for DER and related terminology used to describe DERs. These definitions come from the System Planning Impact of DER Working Group's terms and definitions[15] and are reproduced in the table below.

Table 5: Recommended Terms Related to DER		
Term	**Definition**	**Source**
BEHIND-THE-METER GENERATION (BTMG)	A generating unit or multiple generating units at a single location (regardless of ownership), of any nameplate size, on the customer's side of the retail meter that serve all or part of the customer's retail load with electric energy. All electrical equipment from and including the generation set up to the metering point is considered to be behind the meter. This definition does not include BTMG resources that are directly interconnected to BES transmission.	NERC DERTF[16]
BULK POWER SYSTEM	(A) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and (B) electric energy from generation facilities needed to maintain transmission system reliability.	NERC Glossary of Terms

[13] The 2016 version with latest amendment is available here: https://webstore.ansi.org/standards/iec/iec60204ed2016
[14] https://www.nerc.com/comm/PC_Reliability_Guidelines_DL/Reliability_Guideline_-_Modeling_DER_in_Dynamic_Load_Models_-_FINAL.pdf
[15] Available here: http://nerc.com/comm/RSTC/SPIDERWG/SPIDERWG%20Terms%20and%20Definitions%20Working%20Document.pdf
[16] https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/Distributed_Energy_Resources_Report.pdf

Table 5: Recommended Terms Related to DER		
Term	**Definition**	**Source**
	The term does not include facilities used in the local distribution of electric energy. (Note that the terms "Bulk-Power System" or "Bulk Power System" shall have the same meaning.)	
COGENERATION MICRO-GRID *	Production of electricity from steam, heat, or other forms of energy produced as a by-product of another process. May range in size and complexity from a single "smart" building to a larger system such as a university campus or industrial/commercial park. Typically refers to a system that is connected at distribution primary or secondary voltage.	NERC Glossary of Terms Used in NERC Reliability Standards[17]
COGENERATION*	Production of electricity from steam, heat, or other forms of energy produced as a by-product of another process.	NERC Glossary of Terms
DEMAND RESPONSE* (DR)	Changes in electric usage by demand-side resources from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.	Federal Energy Regulatory Commission (FERC)[18]
DISTRIBUTED DEMAND MODIFYING RESOURCE	Distributed energy resources combined with other demand-side programs that modify the net demand at the customer meter ** Note: This equates to DERs plus Load Modifiers at the transmission-distribution interface.*	Altered from 2020 CEC Demand Forecasting practices
DISTRIBUTED ENERGY RESOURCE (DER)*	Any Source of Electric Power located on the Distribution System. **Note: Loads and Demand Response do not produce electric power and are therefore not included in the definition of DER.*	NERC SPIDERWG
DISTRIBUTED GENERATION* (DG)	Electric generation facilities connected to an Area Electric Power System[6] through a Point of Common Coupling; a subset of DER.	IEEE 1547-2003[19]

[17] https://www.nerc.com/files/glossary_of_terms.pdf
[18] https://www.ferc.gov/power-sales-and-markets/demand-response/reports-demand-response-and-advanced-metering
[19] https://standards.ieee.org/standard/1547-2003.html

Table 5: Recommended Terms Related to DER		
Term	**Definition**	**Source**
DISTRIBUTION SYSTEM*	The electrical facilities that are located behind a transmission-distribution transformer that serves multiple end-use customers.[20]	NERC SPIDERWG
EMERGENCY, STAND-BY, OR BACK-UP GENERATION (BUG)	A generating unit, regardless of size, that serves the customer's standby requirements, typically when there is an outage, and is not normally operated in parallel with the Area Electric Power System. This definition only applies to resources on the utility side of the customer retail meter.	NERC DERTF[21]
END-USE CUSTOMER	Any entity with an individual meter that is interconnected to the distribution provider's system for the purpose of receiving or exporting electric power.	NERC SPIDERWG
ENERGY EFFICIENCY (EE)	Programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided.	US Energy Information Administration (EIA)[22]
ENERGY STORAGE FACILITY	An energy storage device or multiple devices at a single location capable of receiving electric energy from the grid and storing it for later injection of electric energy back into the grid. May be any of various technology types, including electric vehicles with bidirectional supply equipment.	NERC DERTF[23]
INTERRUPTIBLE LOAD	Demand that the end-use customer makes available via contract or agreement for curtailment	*NERC Glossary of Terms*
LOAD MODIFIER*	Load reduction or load modifying activities or controls that include: energy efficiency, demand response, loads providing ancillary services, and interruptible loads	Adapted from 2020 CE Demand Forecasting practices[24]
MICROGRID*	A localized group of electricity sources and loads that normally operates connected to and synchronous with the traditional wide area synchronous grid (Macro grid), but can also disconnect to "island mode" — and function autonomously as physical or economic conditions dictate.	LBNL
SOURCE OF ELECTRIC POWER	Resources that inject or exchange power[25] (e.g., Distributed Generation and Energy Storage Facilities)	NERC SPIDERWG
SUBTRANSMISSION SYSTEM	The networked Bulk Power System operated at less than 100 kV, but still above primary and secondary distribution voltage levels (e.g., greater than 35 kV).	NERC SPIDERWG
TRANSMISSION SYSTEM	An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for	NERC Glossary of Terms

[20] Refer to Figure A.1 for an illustration to support this definition.
[21] https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/Distributed_Energy_Resources_Report.pdf
[22] https://www.eia.gov/tools/glossary/index.php?id=D
[23] https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/Distributed_Energy_Resources_Report.pdf
[24] https://efiling.energy.ca.gov/getdocument.aspx?tn=226392
[25] In this case, onto the distribution grid.

Table 5: Recommended Terms Related to DER		
Term	**Definition**	**Source**
	delivery to customers or is delivered to other electric systems.	

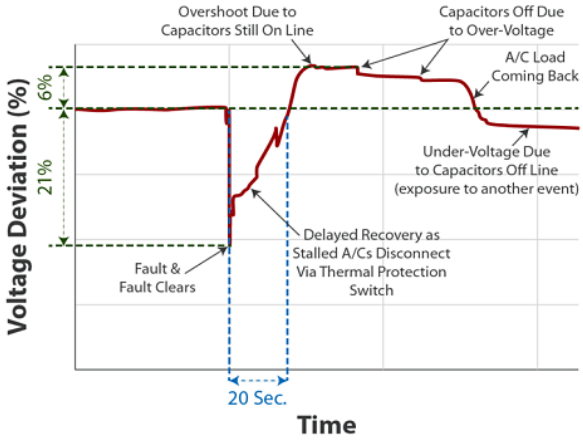
* Appendix D provides other definitions used by other agencies or organizations.

Terms and Definitions Related to DER Governance

Table 6 provides terms that are commonly used and associated with DER-related concepts. Some of these items are from the SPIDERWG terms and definitions, and others were added due to the merging with the transportation sector. Table 6 lists each term, its associated definition, and the source of that definition.

Table 6: Terms for DER Governance		
Term	**Definition**	**Source**
AUTHORITY GOVERNING INTERCONNECTION REQUIREMENTS (AGIR)	A cognizant and responsible entity that defines, codifies, communicates, administers, and enforces the policies and procedures for allowing electrical interconnection of DER to the Area EPS. This may be a regulatory agency, public utility commission, municipality, cooperative board of directors, etc. The degree of AGIR involvement will vary in scope of application and level of enforcement across jurisdictional boundaries. This authority may be delegated by the cognizant and responsible entity to the Area EPS operator or bulk power system operator.	IEEE 1547-2018[26]
CEASE TO ENERGIZE	Cessation of active power delivery under steady-state and transient conditions and limitation of reactive power exchange.	IEEE 1547-2018
CLEARING TIME	The time between the start of an abnormal condition and the DER ceasing to energize the Area EPS. It is the sum of the detection time, any adjustable time delay, the operating time plus arcing time for any interposing devices (if used), and the operating time plus arcing time for the interrupting device (used to interconnect the DER with the Area EPS).	IEEE 1547-2018
CONFIGURATION INFORMATION	IEEE 1547-2018 10.4 defines Configuration Information, which shall be available through a local DER communication interface. These are "as-configured" values for associated Nameplate Information. IEEE 2030.5 considers these as attributes for its DERSettings object.	SAE J3072, IEEE 1547
CONTINUOUS OPERATION	Exchange of current between the DER and an EPS within prescribed behavior while connected to the Area EPS and while the applicable voltage and the system frequency is within specified parameters.	IEEE 1547-2018
CONTINUOUS OPERATION REGION	The performance operating region corresponding to continuous operation	IEEE 1547-2018
DER AGGREGATION	A virtual resource formed by aggregating multiple DG, BTMG, or ES devices at different points of interconnection on the distribution system. The BES may model a DERA as a single resource at its "virtual" point of interconnection at a particular T-D interface even though	NERC DERTF

[26] https://standards.ieee.org/standard/1547-2018.html

Table 6: Terms for DER Governance		
Term	**Definition**	**Source**
	individual DER comprising the DERA may be located at multiple T-D interfaces.	
DER MANAGING ENTITY (DME)	an entity that monitors and manages the DER through the local DER communication interface and could be, for example, a utility, an aggregator, a building energy management system, or EVSE. SAE J3072 (for V2G AC, with Roaming) considers the EVSE to be the sole DME for provisioning of Configuration Information and providing permission to discharge. There can be more than one authorized DME for a specific DER, in which case the DER must have well-defined prioritization logic to arbitrate potentially conflicting commands.	IEEE 1547, SAE J3072
DER SERVICE PROVIDER (DSP)	A DER service provider aggregates and monetizes DER resources by providing grid services to energy markets.	IEEE 2030.13
ELECTRIC POWER SYSTEM (EPS)	The EPS consists of equipment or facilities that deliver electric power to a load.	IEEE 1547, SAE J3072
ENTER SERVICE	Begin operation of the DER with an energized Area EPS	IEEE 1547-2018
FAULT-INDUCED DELAYED VOLTAGE RECOVERY (FIDVR)	Unexpected delay in the recovery of voltage to its nominal value following the normal clearing of a fault. 	Lawrence Berkley National Labs[27]
ISLAND	A condition in which a portion of an Area EPS is energized solely by one or more Local EPSs through the associated PCCs while that portion of the Area EPS is electrically separated from the rest of the Area EPS on all phases to which the DER is connected. When an island exists, the DER energizing the island may be said to be "islanding"	IEEE 1547-2018
MANDATORY OPERATION	Required continuance of active current and reactive current exchange of DER with Area EPS as prescribed, notwithstanding disturbances of the Area EPS voltage or frequency having magnitude and duration severity within defined limits.	IEEE 1547-2018
MOMENTARY CESSATION	Temporarily cease to energize an EPS, while connected to the Area EPS, in response to a disturbance of the applicable voltages or the system	IEEE 1547-2018

[27] Particularly their Consortium for electric Reliability Technology Solutions (CERTS). Available here: https://certs.lbl.gov/index.html

Table 6: Terms for DER Governance		
Term	**Definition**	**Source**
	frequency, with the capability of immediate Restore Output of operation when the applicable voltages and the system frequency return to within defined ranges.	
MOMENTARY CESSATION OPERATION REGION	The performance operating region corresponding to momentary cessation.	IEEE 1547-2018
PERMISSIVE OPERATION	Operating mode where the DER performs ride-through either in mandatory operation or in momentary cessation, in response to a disturbance of the applicable voltages or the system frequency.	IEEE 1547-2018
POINT OF CONNECTION (PoC)	This is the point that the DER connects to the local electric power system. For V2G-AC, the PoC is the connection of the PEV to the EVSE charging cable.	SAE J3072
POINT OF STANDARD COUPLING (PCC)	The point of connection between the Area EPS and the Local EPS	IEEE 1547-2018
REFERENCE POINT OF APPLICABILITY (RPA)	The location where the interconnection and interoperability performance requirements of IEEE 1547 apply. This is generally the point of common coupling (PCC), but under certain circumstances the point of connection (PoC) can serve as the RPA.	SAE J3072
RIDE-THROUGH	Ability to withstand voltage or frequency disturbances inside defined limits and to continue operating as specified. The modes of operation for ride-through include: Mandatory Operation, Permissive Operation and Momentary Cessation.	IEEE 1547-2018
TRIP	Inhibition of immediate return to service, which may involve disconnection. NOTE—Trip executes or is subsequent to cessation of energization	IEEE 1547-2018
UNDER FREQUENCY LOAD SHEDDING PROGRAM	Programs which are meant to arrest declining frequency and assist recovery of frequency following underfrequency events and provide last resort system preservation measures.	FERC Order No. 763
UNDER VOLTAGE LOAD SHEDDING PROGRAM	An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Centrally controlled undervoltage-based load shedding is not included.	NERC Glossary of Terms Used in NERC Reliability Standards

Appendix A: Descriptive Figures

This appendix includes descriptive figures that are used to describe DERs and associated terms. **Figure A.1** demonstrates the illustrative example for the System Planning Impacts of DER Working Group for what is considered the distribution system. Note that the team has largely identified that any connection less than 60kV to be the distribution system to correspond with medium voltage stations. **Figure A.2** demonstrates the different types of connectors for AC or DC connections.

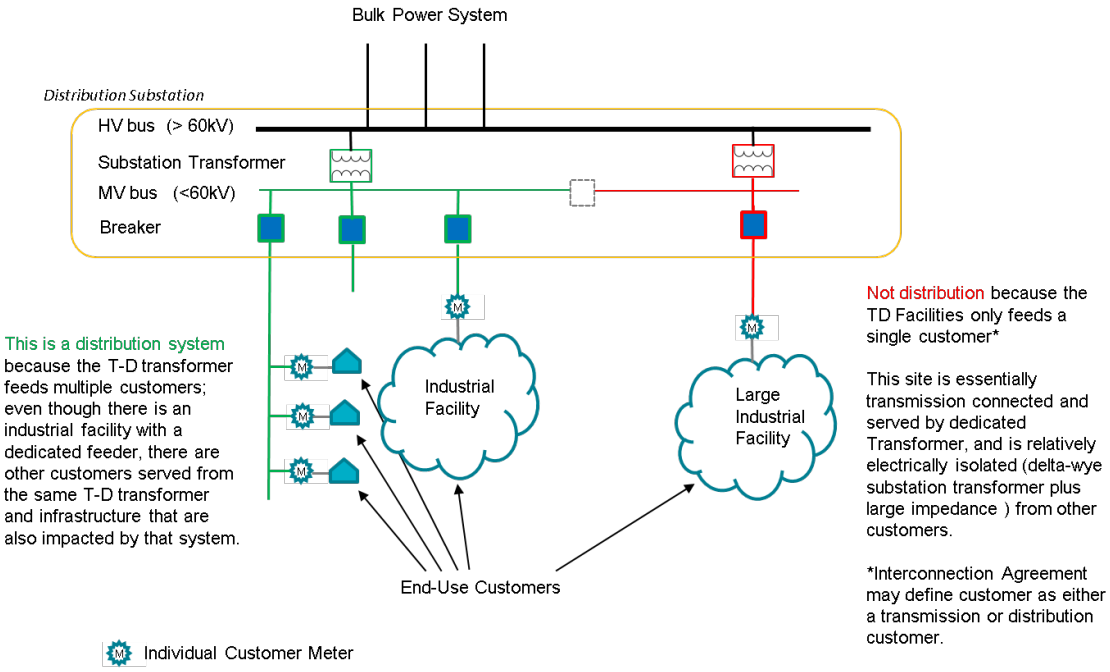
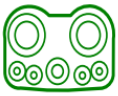


Figure A.1: Illustrative Example of a Distribution System (SPDERWG)

	CHADEMO	CCS-1	CCS-2	GB/T	TESLA	CHAOJI	MCS
MAXIMUM POWER[1]	400 kW	350 kW	350 kW	237.5 kW	350 kW	900 kW	4500 kW
TYPICAL POWER[2]	50 kW	312 kW	350 kW	60 kW	250 kW	900 kW	3750 kW
OUTPUT VOLTAGE	5 – 1000 V	200 – 1000 V	200 – 1000 V	250 – 950 V	300 – 480 V	1500 V	1250 V
MAXIMUM CURRENT	400 A	500 A	500 A	250 – 450 A	800 A	600 A	3000 A
COMMUNICATION	CAN	PLC	PLC	CAN	CAN	CAN	PLC
REGION	Global	United States, South Korea	Europe, Australia	China, India	Global	China, Japan	USA, Europe
RELATED STANDARDS	• IEC 61851-23/24 • IEC 62196-3 • JEVS G105-1993	• IEC 61851-23/24 • IEC 62196-3 • SAE J1772-2017	• IEC 61851-23/24 • IEC 62196-3	• GB/T 20234-3-2015 • IEC 62196-3	• IEC 62196-3	• IEC Ongoing • CCS Ongoing	• ISO 15118/-20-/6 • UL 2251/ UL 2231/ UL 2022 • SAE J3271 • ISO 5474 • IEC 61851/-23-3/-23-1/-1 • IEC 62196-1/-3 • IEC TS62196-3-1 • IEC TS 63379
VEHICLE TO DEVICE	Yes	Under development	Under development	Under development	No	Yes	Yes
PLUG TYPE							
TIME/100 KM[3]	13.73 min	4.4 min	1.96 min	11.44 min	2.74 min	3.43 min	0.33 min
RANGE/5 MIN[4]	36.4 km	113.54 km	254,73 km	43.67 km	181.95 km	145.69 km	1500 km
EXAMPLES	Delta Ultra Fast Charger: 50 – 550 V, 125 A (CHAdeMO); 170 – 1000 V, 300 A (CCS), 150 kW maximum	Charge Point Express Plus: 200 – 1000V, 390 A, 156 kW	ABB Terra HP: 150 – 920 V, 500 A, 350 kW	ABB Terra GB 184 MVZ: 200 - 750 V, 300 A 3 x 60 kW	V3 Supercharger: 450 V, 250 kW	State Grid Tianjin Electric Power Company ChoaJi Charging Stations, 900 kW	A test of seven EV inlets and eleven connectors test at NREL held September 2020.

1. Based on the maximum rating specified in the standard.
2. Maximum power in the market.
3. The calculation is an approximation, assuming the power is kept constant during the charging process using the commercial example.
4. The comparison is made considering the 50-kWh usable battery capacity of the Tesla Model 3 Standard Range Plus, its 409 km WLTP range, and the rated power of the commercial example.

Figure A.2: EV Charging Connector Types. [Source: IEEE[28]]

[28] https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10810313

Appendix B: List of Relevant Standards

This appendix houses a list of standards development organizations, standard titles, and the year those standards were updated in **Table B.1** for all relevant standards for motor vehicle electrification.

Table B.1: List of Relevant Standards Considered in this Document

Standard Associations and Societies	Title	Year updated
Institute of Electrical and Electronics Engineers (IEEE)	1547: Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces[29] **Note**: Undergoing an update as of February 2025 under the P1547 revision working group. Task Force 2 is looking at EVs for V2G operation.	**2018**
	1547.3: Cyber Security for DERs[30]	**2023**
	1547.9: Guide for Using IEEE Std 1547 for Interconnection of Energy Storage Distributed Energy Resources with Electric Power Systems.[31] **Note**: See at Annex B.	**2022**
	2030.5: Standard for Smart Energy Profile Application Protocol[32]	**2018**
	2030.11: Guide for Distributed Energy Resources Management Systems (DERMS) Functional Specification[33]	**2021**
International Organization of Standards (ISO)	15118-1: Road vehicles - Vehicle to grid communication interface - Part 1: General information and use-case definition[34]	**2019**
	15118-2: Road vehicles - Vehicle to grid communication interface - Part 2: Network and application protocol requirements[35]	**2016**
	15118-3: Road vehicles - Vehicle to grid communication interface - Part 3: Physical layer and Data Link Layer Requirements[36]	**2016**
Society of Automotive Engineers (SAE)	J1772: SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler [37]	**2024**
	J2836: Instructions for Using Plug-In Electric Vehicle (PEV) Communications, Interoperability and Security Documents[38]	**2024**
	J2836/1: Use Cases for Communication Between Plug-in Vehicles and the Utility Grid[39]	**2019**

[29] https://standards.ieee.org/ieee/1547/5915/
[30] https://standards.ieee.org/ieee/1547.3/10173/
[31] https://standards.ieee.org/ieee/1547.9/10875/
[32] https://standards.ieee.org/ieee/2030.5/5897/
[33] https://standards.ieee.org/ieee/2030.11/7259/
[34] https://www.iso.org/standard/69113.html
[35] https://webstore.ansi.org/standards/din/dineniso151182016?gad_source=1&gclid=CjwKCAiA-ty8BhA_EiwAkyoa32w14ZI7OfR3ETrFFqY3yq6nj9wqTglsOkWnA2_GJEKGFGvOvcSajRoCkqwQAvD_BwE
[36] https://webstore.ansi.org/standards/din/dineniso151182016-1636206
[37] https://www.sae.org/standards/content/j1772_202401/
[38] https://www.sae.org/standards/content/j2836_202412/
[39] https://www.sae.org/standards/content/j2836/1_201907/

Table B.1: List of Relevant Standards Considered in this Document		
Standard Associations and Societies	**Title**	**Year updated**
	J2836/2: Use Cases for Communication Between Plug-In Vehicles and Off-Board DC Chargers[40]	**2023**
	J2836/3: Use Cases for Plug-in Vehicle Communication as a Distributed Energy Resource[41]	**2024**
	J2836/4: Use Cases for Diagnostic Communication for Plug-in Electric Vehicles[42]	**2021**
	J2836/5: Use Cases for Customer Communication for Plug-in Electric Vehicles[43]	**2021**
	J2836/6: Use Cases for Wireless Charging Communication for Plug-in Electric Vehicles[44]	**2021**
	J2847/1: Communication for Smart Charging of Plug-in Electric Vehicles using Smart Energy Profile 2.0[45]	**2019**
	J2847/2: Communication Between Plug-In Vehicles and Off-Board DC Chargers[46]	**2023**
	J2847/3: Communication for Plug-in Vehicle as a Distributed Energy Resource[47]	**2023**
	J2847/6: Communication between Wireless Charged Vehicles and Wireless EV Chargers[48]	**2020**
	J2894/1: Power Quality Requirements for Plug-In Electric Vehicle Chargers[49]	**2019**
	J2894/2: Power Quality Test Procedures for Plug-In Electric Vehicle Charge[50]	**2015**
	J2931/1: Digital Communications for Plug-in Electric Vehicles[51]	**2023**
	J2953/1: Plug-In Electric Vehicle (PEV) Interoperability with Electric Vehicle Supply Equipment (EVSE)[52]	**2023**
	J2953/2: Test Procedures for the Plug-In Electric Vehicle (PEV) Interoperability with Electric Vehicle Supply Equipment (EVSE)[53]	**2023**
	J3072: Interconnection Requirements for Onboard, Utility-Interactive Inverter Systems[54]	**2024**

[40] https://www.sae.org/standards/content/j2836/2_202308/
[41] https://www.sae.org/standards/content/j2836/3_202402/
[42] https://www.sae.org/standards/content/j2836/4_202106/
[43] https://www.sae.org/standards/content/j2836/5_202112/
[44] https://www.sae.org/standards/content/j2836/6_202104/
[45] https://www.sae.org/standards/content/j2847/1_201908/
[46] https://www.sae.org/standards/content/j2847/2_202309/
[47] https://www.sae.org/standards/content/j2847/3_202311/
[48] https://www.sae.org/standards/content/j2847/6_202009/
[49] https://www.sae.org/standards/content/j2894/1_201901/
[50] https://www.sae.org/standards/content/j2894/2_201503/
[51] https://www.sae.org/standards/content/j2931/1_202309/
[52] https://www.sae.org/standards/content/j2953/1_202305/
[53] https://www.sae.org/standards/content/j2953/2_202305/
[54] https://www.sae.org/standards/content/j3072_202406/

Table B.1: List of Relevant Standards Considered in this Document		
Standard Associations and Societies	**Title**	**Year updated**
	J3271: Megawatt Charging System for Electric Vehicles[55] **Note**: this standard is undergoing many different parts. Some current subsections are J3271/1, Electromechanical coupler/inlet requirements (as in see J1772); SAE J3271/2, Physical/software layer communication (as in J2931, J2847, J1939); SAE J3271/3, Charging cables (cooling, cord handling/ automated connection); SAE J3271/4, Use cases including DER/microgrid interconnections (V2G); SAE J3271/5, Interoperability/ testing requirements	**TBD**
	J3068: Electric Vehicle Power Transfer System Using a Three-Phase Capable Coupler.[56]	**2024**
	J3068/1: Identification of Vehicles and Supply Equipment for Conductive AC Charging[57]	**2023**
	J3068/2: Control of Bidirectional Power for AC Conductive Charging[58]	**2024**
	J3400: NACS Electric Vehicle Coupler[59]	**2024**
UL Solutions (UL)	1741: Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources.[60] **Note**: 1741 SC is currently under development, applicable to V2G AC capable EVSEs.	**2021**
	2202: Standard for Electric Vehicle (EV) Charging System Equipment[61]	**2022**
	2594: Standard for Electric Vehicle Supply Equipment[62]	**2022**
	9741: Outline of Investigation for Bidirectional Electric Vehicle (EV) Charging System Equipment.[63] **Note:** Covers V2G-DC and AC. It does not support roaming V2G-AC. Not recognized by Utility industry for interconnection (references UL 1741).	**2023**

[55] https://www.sae.org/standards/content/j3271/
[56] https://www.sae.org/standards/content/j3068/2_202401/
[57] https://www.sae.org/standards/content/j3068/1_202312/
[58] https://www.sae.org/standards/content/j3068/2_202401/
[59] https://www.sae.org/standards/content/j3400_202409/
[60] https://www.shopulstandards.com/ProductDetail.aspx?productId=UL1741_3_S_20210928
[61] https://www.shopulstandards.com/ProductDetail.aspx?productId=UL2202_3_S_20221215
[62] https://www.shopulstandards.com/ProductDetail.aspx?productId=UL2594_3_S_20221215
[63] https://www.shopulstandards.com/ProductDetail.aspx?productId=UL9741_1_S_20230929

Appendix C: Other Applicable Definitions

The following definitions in **Table C.1** are other definition used by industry when describing TE, DER, or DER-related terms. They are provided here as a useful reference for industry.

Table C.1: Alternate Definitions for TE-Related Concepts

Term	Definition	Source
Distributed Energy Resource (DER)	A source or sink of power that is located on the distribution system, any subsystem thereof, or behind a customer meter. These resources may include, but are not limited to, electric storage resources, distributed generation, thermal storage, and electric vehicles and their supply equipment.	FERC Energy Primer[64]
	Any resource located on the distribution system, any subsystem thereof, or behind a customer meter. These resources may include, but are not limited to, resources that are in front of and behind the customer meter, electric storage resources, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment – as long as such a resource is "located on the distribution system, any subsystem thereof or behind a customer meter."	FERC Order 2222 [65]
	A resource sited close to customers that can provide all or some of their immediate electric and power needs and can also be used by the system to either reduce demand (such as energy efficiency) or provide supply to satisfy the energy, capacity, or ancillary service needs of the distribution grid. The resources, if providing electricity or thermal energy, are small in scale, connected to the distribution system, and close to load. Examples of different types of DER include solar PV, wind, Combined Heat and Power plants (CHP or Cogeneration), energy storage, demand response (DR), electric vehicles (EVs), microgrids, and energy efficiency (EE).	National Association of Regulatory Utility Commissions (NARUC)[66]
	Any resource on the distribution system that produces electricity and is not otherwise included in the formal NERC definition of the Bulk Electric System (BES).	NERC DERTF
	A source of electric power that is not directly connected to a bulk power system. DER includes both generators and energy storage technologies capable of exporting active power to an EPS. An interconnection system or a supplemental DER device that is necessary for compliance with this standard is part of a DER NOTE 1—Controllable loads used for demand response are not included in the definition of DER.	IEEE 1547-2018

[64] https://www.ferc.gov/sites/default/files/2020-06/energy-primer-2020_0.pdf
[65] https://www.ferc.gov/sites/default/files/2020-09/E-1_0.pdf
[66] https://pubs.naruc.org/pub/19FDF48B-AA57-5160-DBA1-BE2E9C2F7EA0

Table C.1: Alternate Definitions for TE-Related Concepts		
Term	**Definition**	**Source**
	Distribution-connected distributed generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies, are supported by a wide-ranging suite of California Public Utilities Commission (Commission) policies	California PUC[67]
	DER are resources qualified to participate in NYISO's Energy, Ancillary Services, and/or Capacity markets that are (i) capable of changing its load, or (ii) capable of injecting 20 MW or less onto the transmission and/or distribution system, at the NYISO's direction.	NYISO[68]
Distributed Generation (DG)	A generator that is located close to the particular load that it is intended to serve. General, but non-exclusive, characteristics of these generators include: an operating strategy that supports the served load; and interconnection to a distribution or sub-transmission system (138 kV or less)	US EIA[69]
Cogeneration	A generating facility that produces electricity and another form of useful thermal energy (such as heat or steam), that is used for industrial, commercial, heating, or cooling purposes	FERC[70]
MicroGrid	A group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode.	Lawrence Berkeley National Laboratory (LBNL)[71]
	An aggregation of multiple DER types behind the customer meter at a single point of interconnection that has the capability to island. May range in size and complexity from a single "smart" building to a larger system such as a university campus or industrial/commercial park. Typically refers to a system that is connected at distribution primary or secondary voltage.	LBNL
Controllable Load	The load of particular consumers which under contract must be reduced, for a limited period of time, at the request of the distribution supply undertaking	International Electrotechnical Commission (IEC)[72]
	The participation of customers in electricity markets by changing their electricity consumption patterns in response to the price signals or incentive mechanisms from DR service providers.	IEEE Std 2030.6-2016[73]

[67] https://www.energy.ca.gov/data-reports/california-energy-planning-library/distributed-energy-resources#:~:text=Distributed%20energy%20resources%20(DER)%20refers,premises%2C%20behind%20the%20utility%20meter.
[68] https://www.nyiso.com/documents/20142/2923301/M-38-Aggregation-Final-v1-0.pdf
[69] https://www.eia.gov/tools/glossary/index.php?id=D
[70] https://www.ferc.gov/resources/glossary.asp
[71] https://www.osti.gov/servlets/purl/1340307
[72] http://www.electropedia.org/iev/iev.nsf/display?openform&ievref=603-04-42
[73] https://ieeexplore.ieee.org/document/7784695/

Table C.1: Alternate Definitions for TE-Related Concepts		
Term	**Definition**	**Source**
Demand Response	Demand response programs are incentive-based programs that encourage electric power customers to temporarily reduce their demand for power at certain times in exchange for a reduction in their electricity bills. Some demand response programs allow electric power system operators to directly reduce load, while in others, customers retain control. Customer-controlled reductions in demand may involve actions such as curtailing load, operating onsite generation, or shifting electricity use to another time period. Demand response programs are one type of demand-side management, which also covers broad, less immediate programs such as the promotion of energy-efficient equipment in residential and commercial sectors.	US EIA[74]
Heavy-Duty Vehicle	A four or more-wheeled vehicle propelled by an electric motor drawing current from a rechargeable storage battery or other energy devices for use primarily on public streets, roads, and highways, and rated up to 40000 kg gross vehicle weight (GVW) depending on local requirements.	

[74] https://www.eia.gov/tools/glossary/index.php?id=D