Appendix: DR Definitions

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I. Demand response definitions

Here, for completeness, we list all of the definitions considered in Tables I and II of [1].

US Department of Energy (DOE) Report to Congress, 2006 [2]: "Demand response is a tariff or program established to motivate changes in electric use by end-use customers in response to changes in the price of electricity over time, or to give incentive payments designed to induce lower electricity use at times of high market prices or when grid reliability is jeopardized."

US Federal Energy Regulatory Commission (FERC) Order 745, 2011 [3] **and Order 2222, 2020** [4]: "Demand response means a reduction in the consumption of electric energy by customers from their expected consumption in response to an increase in the price of electric energy or to incentive payments designed to induce lower consumption of electric energy."

California Public Utilities Commission (CPUC), 2017 [5]: "The Commission broadly defines demand response as reductions, increases, or shifts in electricity consumption by customers in response to either economic signals or reliability signals. Economic signals come in the form of electricity prices or financial incentives, whereas reliability signals appear as alerts when the electric grid is under stress and vulnerable to high prices. Demand response programs aim to respond to these signals and maximize ratepayer benefit."

European Union (EU) Directive 944, 2019 [6]: "Demand response means the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including in response to time-variable electricity prices or incentive payments, or in response to the acceptance of the final customer's bid to sell demand reduction or increase at a price in an organised market..., whether alone or through aggregation."

UK Office of Gas and Electricity Markets (OFGEM), 2021, [7]: "Smart meters, technologies, tariffs and services will enable consumers to change their consumption patterns to match times of cheap and abundant low carbon electricity, give consumers greater control over their energy use and comfort levels and save money by helping to balance the energy system. This is known as demand side response (DSR)."

Belgium Federal Public Service - Justice, 2022 [8]: (English translation of Dutch definition) "A general or integrated approach geared towards affecting the magnitude and timing of the use of electricity to reduce the primary energy use and peak loads by prioritizing investments in energy efficiency promoting measures or other measures, such as interruptible supply contract, rather than investments to increase production capacity, if the former measures are the most effective and economic option, considering the positive environmental effects of lower energy use and the related aspects of security of supply and distribution costs."

International Energy Agency (IEA), 2024 [9]: "Demand response refers to balancing the demand on power grids by encouraging customers to shift electricity demand to times when electricity is more plentiful or other demand is lower, typically through prices or monetary incentives. Along with smart grids and energy storage, demand response is an important source of flexibility for managing the impact of variable renewables and growing electricity demand on the stability and reliability of electricity grids."

National Grid Electricity System Operator (ESO) for Great Britain UK, 2024 [10]: "Demand Side Response simply involves businesses increasing, decreasing, or shifting their electricity use – in response to a signal – to help balance Britain's electricity system. In return they receive strong financial incentives, lower their bills, reduce their carbon footprint and play an important role in the transition to a low carbon energy system."

National Grid USA, 2024 [11]: "Demand response is when participating customers reduce their electricity usage to help lower the demand for electricity at critical times – during peak periods when energy use is at its highest. The programs help reduce peak-day generator emissions, delay installation of costly utility equipment, and can help reduce the purchase of expensive peak-day energy. Participating customers are eligible for incentives."

Australian Energy Market Commission (AEMC), 2024 [12]: "Demand side response (DSR) is an active, short-term reduction in electricity demand by consumers who decide to respond to price signals throughout the day by shifting their electricity use to another period, or to use another type of generation, or to simply not use electricity at specific times."

Australian Renewable Energy Agency (ARENA), 2024 [13]: "Demand response (DR) is the voluntary reduction or shift of electricity use by customers, which can help to keep a power grid stable by balancing its supply and demand of electricity. It can help to make electricity systems flexible and reliable, which is beneficial if they contain increasing shares of variable renewable energy."

Australian Energy Market Operator (AEMO), 2024 [14]: "Demand response refers to the ability for DER and appliances (including 'smart' pool pumps, electric hot water storage heaters, air conditioners, batteries and electric vehicle supply equipment) to respond to remote communications that increase or decrease the amount of load on the power system."

Independent Electricity System Operator (IESO) Ontario, Canada, 2024 [15]: "With demand response, customers

reduce (or eliminate) their energy use during times when the electricity system is experiencing high demand."

New York Independent System Operator (NYISO) USA (NYISO), 2024 [16]: "Demand Response (DR) is the act of reducing energy consumption from the grid at the direction of the NYISO."

PJM Interconnection USA, 2024 [17]: "Demand Response is a voluntary PJM program that compensates end-use (retail) customers for reducing their electricity use (load), when requested by PJM, during periods of high power prices or when the reliability of the grid is threatened."

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