POLICY

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DEPARTMENT OF ENERGY

DEMAND RESPONSE POLICY IN ABU DHABI

EFFECTIVE DATE: 01/01/2024

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Changes History Sheet

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1. Introduction

1.1 Context

1.1.1 The Department of Energy ("**DoE**") is established pursuant to Abu Dhabi Law No. (11) of 2018 as a policy maker and regulatory entity for the energy sector in the Emirate of Abu Dhabi ("**Abu Dhabi**"). The DoE's mandate includes enacting policies and regulations and developing strategies to enable an effective energy transition to ensure the Emirate's sustainable growth while protecting consumers and the environment.

1.1.2 The UAE and Abu Dhabi have set long-term climate and energy targets that will shape the transition of Abu Dhabi's energy system. In 2022, the UAE's Net Zero Emission Pathway set a net zero emissions target by 2050, as well as interim targets of eighteen percent (18%) emissions reduction by 2030, and sixty percent (60%) reduction by 2040. Also in 2022, Abu Dhabi's Clean Energy Strategic Targets set a target for sixty percent (60%) of electricity production to be clean and renewable by 2035.

1.1.3 These targets will drive forward the decarbonisation of the energy system, increased integration of renewables, and increased growth in electricity demand. Combined, these trends will bring significant challenges to the power grid. These challenges include the decommissioning of dispatchable thermal power plants, increased grid instability due to intermittent energy sources, the curtailment of renewables, and significant capital investments in generation and network infrastructure. Addressing these challenges requires assessing new and emerging energy technologies and identifying an optimal mix of generation resources to balance supply and demand.

1.1.4 Demand Response ("**DR**") is a method to shift electricity consumption from customers in response to economic or reliability signals, generally during periods of high demand and high marginal prices. Depending on the customer type and program design, DR can adjust electricity demand down (load

reduction), up (load increase) or move demand to other hours during the day (load shifting).

1.1.5 DR is a proven demand-side resource utilised globally by electric utilities and system operators, and has been highly effective in summer-peaking jurisdictions with similar load profile characteristics as Abu Dhabi.

1.1.6 DR is a highly flexible demand-side resource that can have several broad applications and can be highly beneficial given the unique structure, generation portfolio and dynamics within the Abu Dhabi electricity sector. These applications include, but are not limited to:

(a) Capacity service; ensuring adequate supply resource capacity to meet demand during high-demand periods through load control and curtailment, when required;

(b) Balancing service; ensuring balancing of demand and supply in real-time while ensuring the security and quality of electricity supply; and

(c) System stability service, ensuring system stability and integrity through the provision of ancillary services with (near) real-time demand adjustments.

1.1.7 In the future, DR can play an integral part in the operation of Abu Dhabi's electricity system, and can support the achievement of Abu Dhabi's long-term energy and climate targets. For example, DR can maximise the use of demand-side flexibility for grid balancing, thereby offsetting the need for thermal power plants. DR can also offer operating reserve capacity to deal with the intermittency of renewables. Finally, DR can also maximise the utilisation of existing generation and network assets to reduce peak demand and avoid expensive capital investments.

1.2 Purpose

1.2.1 The purpose of this policy is to support Abu Dhabi to meet its clean energy targets efficiently and cost-effectively. Establishing a policy and 2030 strategic

target for DR aims to provide certainty and direction in capacity resource planning, encourage the consideration and assessment of DR, and encourage implementation and innovation by the sector.

1.3 Scope

1.3.1 The DR policy establishes a strategic capacity target for DR as well as guiding principles associated with that target, guidance on the prescriptive nature of the target (strategic vs. binding) and a reasonable timeline for the achievement of that target.

1.3.2 The policy also defines two supporting mechanisms to support the development of DR in Abu Dhabi including the execution of the DR pilot and the introduction of a regulatory framework for DR.

1.4 Responsibility for Implementation

1.4.1 The following stakeholders are responsible for supporting the implementation of this Policy:

- Emirates Water and Electricity Company (EWEC)
- Abu Dhabi Transmission and Dispatch Company (TRANSCO)
- Abu Dhabi Distribution Company (ADDC)
- Al Ain Distribution Company (AADC)

1.5 Principles

1.5.1 The 2030 strategic target is defined in capacity terms as it is considered more appropriate and less uncertain than targets set in percent terms. Further, framing the 2030 target as contracted capacity ensures that the target can be automatically tracked and related to the procurement of DR capacity over time. Finally, the 2030 target is defined as incremental to past and existing arrangements agreed upon between EWEC and other parties.

1.5.2 The 2030 strategic target will be reviewed periodically by the DoE and adapted, as required, based on changing electricity supply and demand projections, technology and cost developments, and energy and climate commitments.

1.5.3 The implementation of this policy, and procurement of DR capacity, is to be done in line with EWEC's economic purchase obligations, taking into consideration the costs of existing available capacity, the costs of extending the contract life of existing capacity, and the cost of new entry.

1.6 Analysis undertaken

1.6.1 To determine how DR could respond to the challenges faced by the electricity system and to inform the development of a DR policy target, the DoE carried out an assessment of Abu Dhabi's DR market potential and a review of Abu Dhabi's future electricity system needs. This assessment identified the realistic and cost-effective, achievable DR market potential in Abu Dhabi.

1.6.2 The DR market potential assessment explored the deployment of a portfolio of prototypical DR programs through 2030 across the residential, commercial, industrial, and agricultural sectors. These prototypical programs were selected based on a review of DR program portfolios across several North American jurisdictions.

1.6.3 The assessment took into consideration Abu Dhabi's electricity load mix across each customer sector, its distinctly flat load profile during the year, as well as the wide variety of types and commercially available DR technologies. The assessment explored Abu Dhabi's DR potential under various scenarios of market adoption and speed of development. These scenarios modelled alternative views on the level of adoption achieved by each prototypical DR program.

1.6.4 The assessment also explored the cost-competitiveness of each of the prototypical DR programs when compared with traditional thermal resources on a levelised cost basis.

1.6.5 The findings of this DR potential assessment were complimented and validated by benchmarking comparable international, summer-peaking jurisdictions. This assessment showed that the DR market potential estimated for Abu Dhabi by 2030 is comparable to that of international summer-peaking jurisdictions, and represents an achievable target.

1.6.6 The assessment also explored how Abu Dhabi's DR potential could grow further into the future to support Abu Dhabi's decarbonisation goals over a longer timeframe, including by 2035 (in alignment with the 2035 Clean Energy Strategy Target), by 2041 (in alignment with Abu Dhabi's 2041 strategic aspirations) and by 2050 (in alignment with the federally defined UAE net zero targets).

1.7 References

1.7.1 This DR policy is established by the DoE pursuant to:

(a) Law No. (2) of 1998 concerning the organisation of the Water and Electricity Sector in the Emirate of Abu Dhabi and its amendments.

(b) Law No. (11) of 2018 concerning the establishment of the Department of Energy, and in particular:

(i) Article 4.1 related to the strategy and implementation of plans for the energy sector in the Emirate; and

(ii) Article 4.4 related to the regulation of the energy sector through development of policies and regulations.

1.8 Distribution

1.8.1 The approved version of this Policy will be distributed to the Executive Management of the following entities:

(a) Ministry of Infrastructure and Energy (MOIE)

(b) Environment Agency - Abu Dhabi (EAD)

(c) Department of Municipalities and Transport (DMT)

(d) Abu Dhabi Development Holding Company (ADQ)

(e) Abu Dhabi National Energy Company (TAQA)

(f) Emirates Water and Electricity Company (EWEC)

(g) Abu Dhabi Transmission and Dispatch Company (TRANSCO)

(h) Abu Dhabi Distribution Company (ADDC)

(i) Al Ain Distribution Company (AADC)

(j) Abu Dhabi National Oil Company (ADNOC)

(k) Masdar

2. Definitions

For the purposes of this Policy, the following definitions apply:

- **Demand Response** means shifting electricity consumption from customers in response to economic or reliability signals.
- **Electricity Production in the Emirate** means the electricity produced within Abu Dhabi which is injected into the Abu Dhabi electricity grid.
- **DoE**: Department of Energy
- **EWEC**: Emirates Water and Electricity Company
- **TRANSCO**: Abu Dhabi Transmission and Despatch Company
- **ADDC**: Abu Dhabi Distribution Company
- **AADC**: Al Ain Distribution Company

3. Policy

3.1 2030 Strategic Target

3.1.1 The strategic target for DR is set for two hundred megawatts (200 MW) of contracted capacity by 2030 in Abu Dhabi. This strategic policy target is supported by the execution of a DR pilot, a requirement to develop a regulatory framework for DR and an interim DR target by 2027 ("DR Target").

(a) The 2030 target is to be supported by the implementation of a DR pilot, with the aim of assisting Abu Dhabi's power sector companies in the development of technical and operational expertise by piloting a range of DR program options and targeting various customer types.

(b) The 2030 target is to be supported by the establishment of a regulatory framework for DR defining roles and responsibilities for Abu Dhabi's power sector companies, planning and operational processes, and guidance on a supporting regulatory structure.

(c) The 2030 target is also to be supported by the introduction of an interim target of eighty megawatts (80 MW) by 2027, providing a near-term milestone in the trajectory to achieve the 200 MW target by 2030.

3.2 Implementation

3.2.1 From 2024 onwards, EWEC's Statement for Future Capacity Requirements (SFCR) should incorporate DR as a supply resource in long-term system planning exercises to determine the potential role of DR in least-cost system expansion plans. Further, the inclusion of DR in EWEC's SCFR will also assess the role of DR across various potential applications, including capacity, balancing and system stability services.

3.2.2 EWEC may more explicitly develop scenarios as part of their SFCR that define:

(a) The potential, feasibility, and capability of DR to deliver capacity, balancing and system stability services.

(b) An indicative trajectory tracing a path towards the achievement of the proposed 2030 strategic target.

(c) Assessment of total identified DR potential in Abu Dhabi.

(d) Procurement plans required to achieve the DR Target.

(e) Estimated costs and benefits of the DR resources, highlighting projected savings in the form of delaying investments in generation and transmission capacity projects, and from reduced system operating costs compared against a baseline scenario without DR.

(f) Provide evidence that the recommended scenario, if including DR resources, meets EWEC's licence obligations of economic purchase and system security.

3.2.3 EWEC, ADDC and AADC should review, identify and implement amendments to the Electricity Transmission Code, Electricity Distribution Code, and Metering and Data Exchange Code with respect to DR. Any amendments to these codes should follow the existing change governance processes and collaboration with the respective Code Review Panel

3.3 System Operation

3.3.1 EWEC shall identify optimal periods and applications for the utilisation of DR resources and shall take steps to ensure DR resources can be scheduled and despatched during real-time operations of the power system in a manner similar to generation companies (GENCOs). Scheduling and despatch shall be performed with full understanding of the availability limitations of DR resources to their pre-defined commitment periods and despatch frequency, as well as operational capabilities with respect to response speed, duration and predictability.

3.3.2 EWEC, TRANSCO, ADDC and AADC shall take the appropriate steps to coordinate in the provision of DR asset information – including location, size and operation of DR assets – to ensure all sector companies have visibility and awareness of DR assets across the distribution and transmission network.

3.4 Periodic Assessment

3.4.1 The DR Target will be reviewed and reassessed periodically based on several factors including changing electricity supply and demand projections, the evolution of DR technology and costs, and energy and climate commitments.

3.4.2 The DR Target will initially be revised based on insights and findings obtained through the integration of DR in EWEC's SFCR as well as through the DR pilot. Through these activities, the value of DR resources to Abu Dhabi's electricity system will be better understood and quantified, and may result in the need to revise the targets.