Department of Energy Chairman's Decision No. (20) of 2022

Regarding the Adoption of the 2035 Clean Energy Strategic Targets

for Electricity Production in the Emirate of Abu Dhabi

The Chairman of the Department of Energy

– Having reviewed Law No. (1) of 1974 on the Reorganization of the Governmental Body in the Emirate of Abu Dhabi and its amendments,

– And Law No. (6) of 2016 on Human Resources in the Emirate of Abu Dhabi and its amendments,

– And Law No. (11) of 2018 on the Establishment of the Department of Energy,

– And the Chairman of the Executive Council's Decision No. (26) of 2018 on Additional Competencies for the Department of Energy,

– And the 2035 Clean Energy Strategic Targets Policy for Electricity Production in the Emirate of Abu Dhabi,

Hereby decides the following:

Article (1)

The attached "2035 Clean Energy Strategic Targets for Electricity Production in the Emirate of Abu Dhabi" Policy is hereby adopted.

Article (2)

All concerned individuals, entities, and public and private companies related to the clean energy strategic targets in the Emirate of Abu Dhabi shall adhere to the provisions of this Policy.

Article (3)

This Decision shall come into force from the date of its issuance and shall be communicated to whomever is concerned for its implementation and to act accordingly.

Eng. Awaidha Murshed Al Marar

Chairman

Issued in Abu Dhabi on: 1/8/2022

Attachments:

– Policy on the 2035 Clean Energy Strategic Targets for Electricity Production in the Emirate of Abu Dhabi.

Policy

2035 Clean Energy Strategic Targets for Electricity Production in the Emirate of Abu Dhabi

Effective Date: 19/07/2022

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1. Introduction

1.1 Preamble

1.1.1 The Department of Energy ("the Department") was established under Law No. (11) of 2018 in the Emirate of Abu Dhabi as the policymaker and regulator for the energy sector in the Emirate of Abu Dhabi ("the Emirate"). The Department's competencies include developing policies, preparing regulations, and devising strategies to enable an effective energy transition to ensure the Emirate's sustainable growth and protect consumers and the environment.

1.1.2 The UAE National Energy Strategy 2050 aims to increase the share of clean energy (primarily through renewable and nuclear energy sources) to fifty percent (50%) of the generation capacity mix by 2050.

1.1.3 As part of its adoption of the Paris Agreement (an international treaty on climate change), the UAE issued its second Nationally Determined Contributions, committing to reduce its greenhouse gas emissions in 2030 by 23.5% compared to the business-as-usual scenario, starting from 2016.

1.1.4 In October 2021, the UAE announced its goal to achieve Net Zero emissions to reach climate neutrality by 2050 through an ambitious strategic initiative to reduce carbon emissions.

1.1.5 Renewable or clean energy targets are an integral part of the global energy landscape. By the end of 2020, (137) countries had some form of vision or target for electricity generation from renewable energy sources.

1.2 Objective:

1.2.1 The purpose of this Policy is to establish the Emirate's general regulatory framework to enable Abu Dhabi to achieve the UAE's decarbonization goal. These strategic targets are an additional criterion to be considered when planning and procuring the required generation capacity and grid reinforcement investments needed to meet the Emirate's electricity needs.

1.3 Principles:

1.3.1 Setting the 2035 Clean Energy Strategic Targets for Electricity Production in the Emirate of Abu Dhabi (the "2035 Strategic Targets") will create an atmosphere of confidence to attract investment and encourage the implementation, technological development, and innovation for power generation from all types of clean energy sources.

1.3.2 The "2035 Strategic Targets" are set based on production outputs, which is considered more accurate than targets set based on capacity. Structural targets based on output help ensure that the target value automatically tracks the overall growth in energy demand over time.

1.3.3 The Department of Energy will regularly monitor clean electricity production in the Emirate to ensure the desired progress is made based on the "2035 Strategic Targets."

1.4 Analyses Performed

1.4.1 The use of photovoltaic solar and nuclear energy systems in the operation of the Emirate's electricity grids presents significant challenges arising from the constant requirements of balancing supply and demand and transitioning from grids reliant on conventional thermal power plants to grids reliant on nuclear and renewable power plants. Furthermore, the current thermal coupling of the electricity and water sector will increase these challenges facing the Emirate.

1.4.2 Addressing these challenges will require maximizing the benefits of the fully integrated electricity and water grid by employing a least-cost solution principle. In addition, the increasing proliferation of innovative power grids based on time-of-use pricing, smart grids, demand response, energy storage, and other emerging technologies will increase the need for higher and better levels of alignment across grid components to respond to these challenges from a policy and regulatory framework perspective. The integration of the renewable and nuclear energy grid has

been studied by the Department of Energy, which will enable it to prepare a well-founded proposal on how to set the 2035 Strategic Targets.

1.4.3 In this study, various expected scenarios were developed and techno-economic analyses were conducted, taking into account all other technical aspects that would affect the relevant results.
The alternative scenarios and significant sensitivities identified have led to optimal options that will help increase the share of renewable energy sources in the future energy mix. The various perspectives considered include the following:
(a) On the energy supply side, technologies included solar "photovoltaic" (PV), carbon stock "carbon capture project," battery energy storage solutions, or low-carbon hydrogen.
(b) On the demand side, the use of smart energy and the optimal utilization of renewable energy sources based on the expected proliferation of new technologies over the proposed timeline (distributed generation, smart microgrids) or by activating specific measures (energy efficiency).

(c) Regarding the gas grid subsystem: gas price sensitivity and flexibility of gas production, including decoupling of electricity and water, "take-or-pay" gas contract terms, and the availability of gas storage capabilities.

(d) Regarding the operational aspect: land availability and site selection criteria, taking into account security criteria, solar power plant capacity, hybrid systems (PV solar cells + battery energy storage systems), and the system's ability to operate for several consecutive cloudy days.

The techno-economic analysis has yielded several feasible solutions to meet the following requirements:

(a) The target presents an economically viable solution that will not result in undesirable total costs (economic assessment).

(b) The target presents a feasible solution for short-term control under all operational conditions (controllability and ease of control).

(c) The target is feasible from a regulatory, operational, and logistical perspective (feasibility).

(d) The target is compatible with the transmission grid (suitability check through power grid simulation, including static and dynamic analysis).

1.5 References

The Department of Energy developed the "2035 Strategic Targets" based on the following:

- Law No. (2) of 1998 on the Regulation of the Water and Electricity Sector in the Emirate of Abu Dhabi and its amendments.
- Law No. (11) of 2018 on the Establishment of the Department of Energy, particularly:
  - Article (4.1) related to strategic plans and their implementation in the Emirate's energy sector;
  - Article (4.4) related to regulating the energy sector through the development of policies and regulations;
  - And Article (4.7) related to the proposed pricing mechanism for energy.
- Law No. (20) of 2018 on the Establishment of the Emirates Water and Electricity Company.

1.6 Revision and Review

All amendments requested for this document must be made using the "Document Amendment Request Form (05-DoE-QMS-F)".

The Director of the Planning and Energy Markets Department is responsible for amending this document.

1.7 Document Distribution

The approved copy of this Policy shall be distributed to the executive directors of the following entities:

- Ministry of Energy and Infrastructure.
- Environment Agency - Abu Dhabi.
- Department of Municipalities and Transport.
- Abu Dhabi Developmental Holding Company (ADQ).
- Abu Dhabi National Energy Company (TAQA).
- Emirates Water and Electricity Company (EWEC).
- Abu Dhabi Transmission and Despatch Company (TRANSCO).
- Abu Dhabi Distribution Company (ADDC).
- Al Ain Distribution Company (AADC).
- Abu Dhabi National Oil Company (ADNOC).
- Masdar Clean Energy.

2. Definitions and Terminology

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

Clean Energy Strategic Targets: Refers to the support scheme under which the entity acting as the sole buyer of electricity within the Emirate of Abu Dhabi (Emirates Water and Electricity Company) shall include a specified share of electricity produced using clean energy sources in the Emirate's generation mix.

Clean Energy Electricity Production: Refers to electricity produced from nuclear, solar, low-carbon hydrogen, thermal generation from fossil fuels with Carbon Capture, Utilisation and Storage (CCUS) units, wind, geothermal, tidal, hydro, biomass, landfill gas, sewage treatment plant gas, and biogas sources.

Electricity Production in the Emirate: Refers to electricity produced in the Emirate of Abu Dhabi and injected into the Abu Dhabi electricity grid.

The Department: The 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.

[1]Low-carbon hydrogen includes hydrogen produced from renewable energy sources, nuclear energy, electricity, biomass, and fossil fuels using Carbon Capture, Utilisation and Storage (CCUS) units, which includes carbon dioxide gas that is captured for use and distribution.

3. Statement

3.1 2035 Clean Energy Strategic Targets for Electricity Production

3.1.1 The Clean Energy Strategic Targets have been set to reach a level of 60% of electricity produced in the Emirate from clean energy sources by the year 2035.

(a) The target is calculated as a percentage (%) of the electricity produced from clean energy sources in the Emirate in 2035 out of the total electricity production in the Emirate in the same year.

(b) The data required to calculate this percentage shall be obtained from electricity production facilities in the Emirate and reported by EWEC to the Department of Energy.

3.2 Application

3.2.1 Starting from 2023 onwards, EWEC's Future Capacity Statement, TRANSCO's Seven-Year Transmission Plan Statement, and the Five-Year Plan Statements of ADDC and AADC must include the following:

(a) An indicative trajectory that tracks the path towards achieving the "Clean Energy Strategic Targets."

(b) The electricity generation, transmission, distribution, and storage projects required to achieve the "Clean Energy Strategic Targets."

(c) The estimated costs and benefits of the anticipated investments and projects, including the extension or reinforcement of existing grid infrastructure and/or necessary services related to flexibility and operability (frequency, stability, voltage, thermal, and restoration).

(d) The estimated costs and benefits compared to a baseline scenario (based on a future capacity assumptions statement without the Clean Energy Strategic Targets and without any operational interventions).

(e) Potential opportunities and estimated costs and benefits of producing electricity from clean energy sources beyond the level required by the indicative trajectory.

3.3 Grid Operation

3.3.1 EWEC, TRANSCO, and the distribution companies (ADDC and AADC) are committed to taking appropriate steps to establish advanced control systems, transmission and distribution grid infrastructures, smart grids, and storage facilities to allow for the safe and reliable operation of the electricity/water grid, which must accommodate further development and generation of electricity from clean energy sources. All these developments should increase operational capability so that the system can be operated safely or enable clean energy suppliers to provide the services needed by the grid.

3.3.2 Appropriate measures shall be taken regarding grid flexibility and operational capacity to minimize curtailment of electricity generation from clean energy sources. If it is determined that significant measures are necessary—due to unforeseen circumstances—to curtail renewable energy sources to ensure the security of the electricity grid and the security of energy supply, EWEC, in cooperation with TRANSCO and the two distribution companies, shall notify the Department of Energy of these

measures and identify the capabilities and operational assurance services needed to avoid and/or minimize generation curtailment.

3.4 Periodic Assessment

3.4.1 The "2035 Strategic Targets" will be periodically reviewed by the Department of Energy to align them with the international pledges and commitments of the United Arab Emirates and in accordance with the development of energy production and storage technologies.