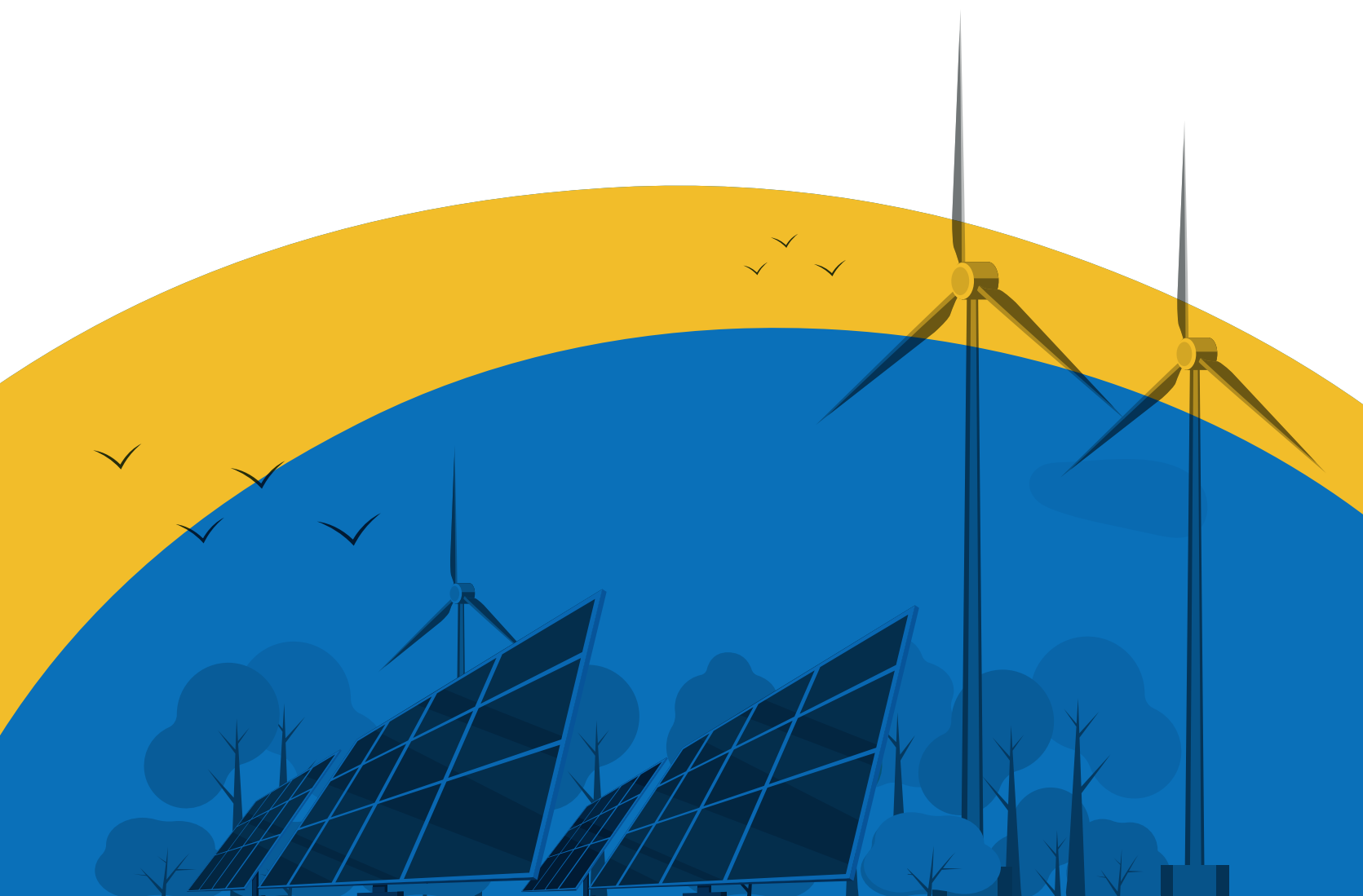


QATAR National Renewable Energy Policy



1-EXECUTIVE SUMMARY

Qatar has adopted a National Renewable Energy Policy to ensure that the transition of the nation's power mix takes place in an environmentally sustainable manner that also keeps electricity affordable. The plan envisions a significant expansion of renewable electricity backed by low-cost natural gas-fired generation. As aging thermal generators are retired, they will be replaced by new high-efficiency combined cycle generators that burn natural gas.

Our goal in this policy is to ensure that the Qatari quality of life continues to improve for current and future generations. The vision behind this policy emphasizes that our country is committed to protecting the environment as the nation develops economically.

Currently, thermal electricity generating stations account for most of Qatar's electricity generating capacity. To meet future electricity demand growth, and to reduce emissions of CO₂ while also fulfilling our commitment to the Paris Accord of 2015, Qatar will significantly increase its use of renewable electricity, mainly solar photovoltaic (PV) and wind resources.

Renewable energy has emerged as a competitive source of electricity compared to thermal power plants fuelled by hydrocarbons. Renewable energy is a critical element in helping Qatar deliver on its 2nd National Development Strategy (NDS) goals. Another critical element is the introduction of efficiency measures and tariffs that dampen electricity demand growth.

Qatar's National Renewable Energy Policy aims to develop a sustainable and affordable energy system that leverages renewable energy as well as Qatar's abundant supplies of natural gas. Leveraging renewable electricity means growing not only large-scale renewable generation but smaller-scale generation as well.

Increased reliance on renewable electricity generation has three critical benefits:

- Realization of economic benefits due to the competitive costs of renewable technologies
- Improvement of environmental impact through reducing greenhouse gas (GHG) emissions, and
- Promotion of energy security through the diversification of generation sources.

There are three key objectives to the country's renewable energy policy:

- Reducing CO₂ emissions through sustainable policies and trends,
- Increasing renewable energy penetration while maintaining network reliability, and
- Maximizing socio-economic contributions from renewable energy.

Integrating a large share of variable renewable energy in the power mix can lead to challenges in maintaining the reliability and stability of the electric network. To ensure that the national grid remains reliable, several clusters of actions are needed.

As Qatar transitions and decarbonizes its electricity system, it also must stake steps to build and capture the socio-economic benefits that are associated with such renewable electricity. That includes growing the local renewable energy value chain while also monetizing the environmental attributes of renewable energy.

Achieving Qatar's renewable energy ambitions also requires developing a robust and transparent policy and regulatory framework that can provide the necessary strategic and technical guidance. The nation needs laws and regulations to support innovation, the deployment of new technologies, the creation of public-private partnerships, and the empowerment of renewable energy players.

Finally, an effective governance structure needs to be created to promote the integrated, long-term pursuit of a renewable, sustainable, and affordable energy future.

2-QATAR NATIONAL RENEWABLE ENERGY POLICY

Sustainable national development has become an important focus globally, with the United Nations General Assembly Agreement defining an ambitious set of sustainable development goals. In its 2030 vision, Qatar aims to transform into an advanced country that can achieve sustainable development while ensuring the continuation of decent living standards for its people, generation after generation. To achieve this vision, the country must also commit to making its future path of development compatible with the requirements of protecting the environment.

It will be essential to create new sources of renewable wealth to compensate for the depletion of non-renewable resources and to preserve the rights of future generations. In fact, renewable energy is critical for Qatar to deliver on its 2nd NDS goals. Part III of the 2nd NDS, "Sustainable Economic Prosperity," establishes two goals: (1) to develop a sustainable, high-quality infrastructure and (2) to optimize and sustain natural resources. Renewable energy plays an important part in achieving both goals. It can help us meet growing electricity demand, generate economic returns, and decrease the amount of gas used in desalination and power generation while lowering environmental emissions. Part VI of the 2nd NDS focuses on "Sustainable Development to Preserve the Environment" with a goal of sustaining the environment for future generations.

Renewable energy can support that goal by reducing CO2 emissions and limiting pollution. Renewable energy will be key to helping Qatar deliver on its NDC commitment, which aims to reduce Qatar's GHG emissions by 25% by the year 2030, relative to the baseline scenario (business as usual). This effort will be complemented by the adoption of carbon-capture technology to arrive at the optimal energy mix considering Qatar's specific national circumstances and resource endowment. These benefits will help strengthen and boost Qatar's position and image as a global supplier of low-carbon energy.

Indeed, Qatar's leadership emphasized the need to integrate renewable energy in the energy mix during the Opening Forum of the 6th Summit of Gas Exporting Countries in February 2022. There, HH the Amir of Qatar emphasized the transition to low-carbon energy: "This pandemic has constituted a supportive factor for renewing the global dialogue on the challenges facing humanity as a whole, namely climate change and the transition to low-carbon energy."

While Qatar has, over the years, demonstrated an ability to reliably supply electricity to consumers in the nation, until recently, power supply relied almost exclusively on gas turbines, given that the nation is endowed with an abundance of natural gas that can be produced at a relatively low cost. Renewable energy was then considered more expensive to produce. For instance, in 2022 thermal energy plants comprised over 90% of Qatar's electricity generation capacity. This new policy aims to enable the development of a sustainable and affordable energy system, leveraging renewable energy technologies that have emerged as competitive sources of energy as compared to conventional fuel-

powered plants.

Qatar is endowed with significant renewable energy resources. In fact, the country commenced its renewable energy program through the development of the 800-MW Al Kharsaah plant, which leverages the highly attractive solar global horizontal irradiance levels in the country. Additionally, certain regions have sufficient wind speeds to render wind energy attractive for adoption as well.

The new policy aims to establish the strategic direction for the renewable energy sector while also providing a framework for the implementation of the Qatar National Renewable Energy Strategy and its accompanying action plan. The plan includes four key objectives:

- Reduce CO2 emissions through sustainable policies and trends,
- Increase renewable energy penetration while maintaining network reliability,
- Maximize socio-economic contributions from the renewable energy program, and
- Support sector ambitions by developing appropriate policies, regulations, and standards and by adopting an effective institutional structure for guidance.

Introducing renewable energy to the energy mix will enable three key benefits:

- Realization of economic benefits due to the competitive costs of renewable technologies,
- Improvement of environmental impact through reducing greenhouse gas emissions, and
- Promotion of energy security through the diversification of the generation sources.

The Qatar National Renewable Energy Strategy shall be reviewed periodically, and its implementation will be closely monitored.

3- CO2 EMISSIONS REDUCTION MANAGEMENT

The introduction of efficiency and conservation measures to dampen energy demand growth as well as renewable energy electrification interventions that optimize natural resources will be key to reducing CO2 emissions from the energy sector. This policy suggests the following measures for the sector:

- Energy emissions shall be reduced by increasing the use of renewable energy resources. (Aligned with the NDC objective and the Qatar National Environmental Strategy to reduce GHG emissions by 25%; also aligned with the NDS point on introducing renewable energy to decrease CO2 emissions — Qatar Second NDS Part 3, Chapter 1, Section 4, Intermediate Outcome 3)
- Electricity tariffs for all customer segments shall be used as a tool to promote efficiency and conservation of energy use, providing incentives and disincentives that incorporate true cost of providing electricity.
- Tariff subsidies, when employed, will need to ensure efficient and sustainable management of energy resources, and should be adequately targeted to specific consumer segments. (Aligned with the NDS point on continued revision of government subsidies for goods and services to reflect their economic cost — Qatar Second NDS Part 2, Chapter 1, Section 3)

- Initiatives, incentives, and standards shall be introduced to optimize energy consumption by reducing overall demand and encouraging consumers to use less electricity during high production-cost hours. (Aligned with the NDS point on reducing per capita electricity consumption through the Tarsheed Program – Qatar Second NDS Part 3, Chapter 3, Section 4, Intermediate Outcome 2, Target 1)
- Innovative technologies and programs to increase efficiency and optimize energy resources shall be adopted and incentivized. (Aligned with the NDS policy on improving and implementing energy efficiency – Qatar Second NDS Part 3, Chapter 1, Section 4, Intermediate Outcome 3, Target 1)
- Interventions to electrify hydrocarbon-fueled end uses, such as transport, shall be leveraged to reduce final energy demand.

4- INCREASING RENEWABLE ENERGY PENETRATION

Renewable energy capacity can be deployed at utility scale or at small scale.

4.1 Large-scale renewable energy

Defining a long-term vision of the energy mix encompassing all potential resources is key to supporting the optimization of energy system cost, reliability, and environmental impact. To determine the optimal energy mix, including renewable energy capacity that should be integrated into the network, this policy recommends the following principles for consideration:

- An assessment of renewable energy technologies should be conducted to identify attractive options for Qatar and to estimate their cost and potential. This review should be refreshed every three years or so and whenever technology breakthroughs occur.
- The energy sources price structure shall consider cost-reflective assumptions during the optimization assessment to ensure sustainable management of the energy system. (Aligned with the NDS point on continued revision of government subsidies for goods and services to reflect their economic cost – Qatar Second NDS Part 2, Chapter 1, Section 3)
- Meeting Qatar’s international commitments, such as emission-reduction share of the power sector in Qatar’s NDC, should be considered during the energy mix design.
- Practical constraints, such as land availability, tendering, and development capabilities, shall be considered during planning.
- The energy mix optimization should be repeated and refined every three to five years, to reflect latest market and technology developments.
- Progress shall be monitored against the capacity deployment plan, and rectifying actions should be taken if needed to enable reaching the committed targets.
- The strategy shall define short medium- and long-term renewable energy targets based on a least-cost optimization assessment that considers both the cost of generation and the cost of integration.

4.2 Distributed renewable energy

Distributed renewable-energy generation includes systems that are connected to the MV/LV network (on-grid) or isolated from the network (off-grid). Distributed generation can support Qatar in achieving its renewable energy goals by allowing consumers to set up renewable energy systems for self-use. This policy defines the following key guidelines for designing the distributed generation program:

- A prosumer (an electricity customer with distributed generation who can sell excess electricity back to the utility) incentive mechanism shall be introduced as part of the distributed generation program.
- The incentive program could be used as a tool to promote the adoption of distributed generation, but it must be appropriately designed to prevent financial burden on the sector.
- The incentive program shall be tailored by consumer segment, considering the unique technical and financial considerations of the different customer types.
- Technical parameters, such as an annual cap on total new distributed generation capacity, shall be defined to protect the national grid.
- The distributed generation program should be re-evaluated and refined on a regular basis, considering market uptake as well as developments and impact on the sector.
- Supporting enablers including policies, laws, and regulations shall be developed to activate and enable the program.
- Incentives to promote off-grid renewable energy applications in remote areas (e.g., farms) shall also be introduced to reduce grid infrastructure costs and reduce emissions from small-scale diesel generation.

5- MAINTAINING POWER NETWORK RELIABILITY

Integrating a large share of variable renewable energy in the power mix can lead to challenges in maintaining grid stability. To ensure that the national power network remains reliable, this policy highlights the following considerations:

- Technical challenges associated with increased VRE shall be identified based on the generation fleet and the transmission and distribution network status in Qatar.
- An assessment of maximum VRE that can be hosted within the network in its current state shall be maintained.
- As electric vehicles are expected to become a major electricity consumer category, their impact on the power system and renewable energy integration should be assessed and addressed.
- The grid code shall be updated to incorporate renewable energy.
- Technical requirements for an efficient interface between the power producers and the electrical grid need to be recommended.

- Methodologies, processes, instruments, and technologies that should be built to facilitate the coordinated planning of the electricity transmission and distribution networks shall be defined.
- Renewable energy forecasting methods shall be defined, as well as the required capabilities needed to mitigate against rapid changes in renewable energy supply.
- Studies shall be conducted to assess the transmission and distribution network expansion, to upgrade requirements considering the targeted renewable energy shares in the mix, and to specify how the network should be upgraded accordingly.
- Other studies and measures needed to ensure a reliable power system shall be identified and implemented.

6- MAXIMIZING SOCIO-ECONOMIC CONTRIBUTIONS

As Qatar is planning for a major long-term renewable energy program, the country should aim to optimize the socio-economic benefits that are associated with such a program.

Local economic value could be created through localizing segments within the renewable energy sector value chain. In addition, renewable energy generation is associated with “environmental” attributes that can be monetized.

6.1 Renewable energy localization

Qatar plans to support the development of the local supplier base and private sector (including small and midsize enterprises) by providing preference in procurement for national products and local service providers and by encouraging knowledge transfer, in line with the local content requirements outlined in various government rules and regulations. To deliver on the aspirations and objectives of the Qatar's in-country value (ICV) initiative these principles will be essential:

- Opportunities for localization should be assessed across the entire renewable energy value chain, including manufacturing, project development, and plant operation. (Aligned with the NDS policy on fostering innovation development, adoption, and localization -Part 3, Chapter 2, Section 4, Target 2)
- Value-added creation, ease of localization, and potential cost competitiveness will be key principles for determining attractiveness for localization.
- The localization assessment shall take into consideration not only the direct financial contribution of the investment, but also the indirect and induced impact on the economy.
- Government enablers should be introduced to support localization if the impact on the overall economy is positive; potential enablers should be identified and optimal ones selected.
- For manufacturing, lessons learned from local and international experiences should be extracted when assessing localization potential in Qatar.
- For development and operations, opportunities and means to enable local small players to grow should be investigated, including implementing a supportive tendering strategy.

6.2 Environmental attributes for renewable energy

Energy Attributes Certificates (EAC) systems are based on the exchange of certificates proving the renewable origin of 1 MWh of electricity. Various systems have been developed around the world with a few standards emerging such as RECs in North America, Guarantees of Origin in Europe, and I-RECs in the rest of the world. EACs offer many advantages, including enforcing and monitoring compliance, increasing transparency through verified tracking of energy production, offsetting the carbon footprint of purchased power emissions, enhancing renewable energy feasibility and diversifying sources of funding, promoting commitment and driving confidence in renewable energy agenda, and optimizing efficiency through flexibility between purchasing EACs and physical power.

- A suitable scheme shall be implemented to enable the monetization of renewable energy environmental attributes.
- The energy attributes scheme shall enable the issuance and trade of certificates that will allow organizations to claim reductions of emissions (potentially scope 2 emissions).
- A suitable regulatory framework needs to be defined for the energy attributes scheme to ensure legitimacy for certificates issued and traded.

7- INTRODUCTION OF REQUIRED POLICIES, REGULATIONS, AND STANDARDS

Developing a robust and transparent policy and regulatory framework will provide a strong strategic and technical oversight for achieving Qatar's renewable energy strategic plans. Qatar has already adopted certain policies and regulations that will help the development of the renewable energy sector, such as the Independent Power Producer (IPP) contractual model, and the Public Private Partnership Law. Going forward, Qatar should also consider the following:

- Laws and regulations shall be developed to enable innovation, the use of new technologies, and public-private partnerships in the renewable energy sector.
- Laws and regulations should be developed to provide a legal basis both for the implementation of the distributed generation scheme and for an effective governance of utility-scale renewable energy production.
- Technical standards for solar PV, wind, and any other renewable energy system installed in Qatar should be developed and issued.
- Guidelines and processes covering distributed generation system design, connection, inspection and testing, and safety should be issued and maintained.
- Guidelines for stand-alone, off-grid renewable energy systems should also be defined and issued.
- A mechanism shall be developed and introduced for qualifying consultants and contractors involved in the design and installation of distributed generation PV systems, and a list of qualified consultants and contractors shall be published.
- A mechanism shall be developed and introduced for qualifying materials/equipment that can be used in distributed renewable energy installation, and a list of approved materials/

equipment shall be published.

- Other guidelines required for renewable energy sector development should also be identified and developed.

8- ADOPTION OF AN EFFECTIVE GOVERNANCE STRUCTURE

The renewable energy sector should be governed through an effective institutional setup. In addition, necessary activities should be conducted to promote renewable energy nationally. Renewable Energy Localization

8.1 Institutional setup

- All key activities that typically drive the development and implementation of a national renewable energy program should be defined and optimally allocated to owners.
- Allocation of renewable energy activities should be based on a framework that maximizes efficiency, the possibility of realizing effective results, the ability to maintain effective control, and ease of implementation.
- Restructuring of the entire power sector should be considered for the long term should it enable a more effective institutional structure.
- The role, mandate, and organization of a dedicated renewable energy entity should be defined and implemented.
- Establishment of an independent regulatory unit that can be hosted within KAHRAMAA in the short term and carved out as a separate body in the long term. (Aligned with NDS policy on the establishment of an independent and integrated electricity and water sector regulator – Qatar Second NDS Part 3, Chapter 3, Intermediate Outcome 2)
- A mechanism for the interaction with external stakeholders to drive the development of Qatar’s renewable energy sector should be defined.

8.2 Promotion of renewable energy

- Policies that enable the participation of foreign investors in Qatar's renewable energy sector should be developed and adopted (i.e., the Independent Power Producer contract model).
- Financing schemes should be designed and introduced to promote the adoption of small-scale renewable energy.
- Programs to create awareness of renewable energy need to be designed and introduced; these programs should target the different economic sectors and the public.
- Research, development, and innovation should be leveraged to overcome challenges and improve outcomes for renewable energy in Qatar.
- A human capabilities development plan should be created and implemented to ensure the availability of resources to deliver on the renewable energy program.