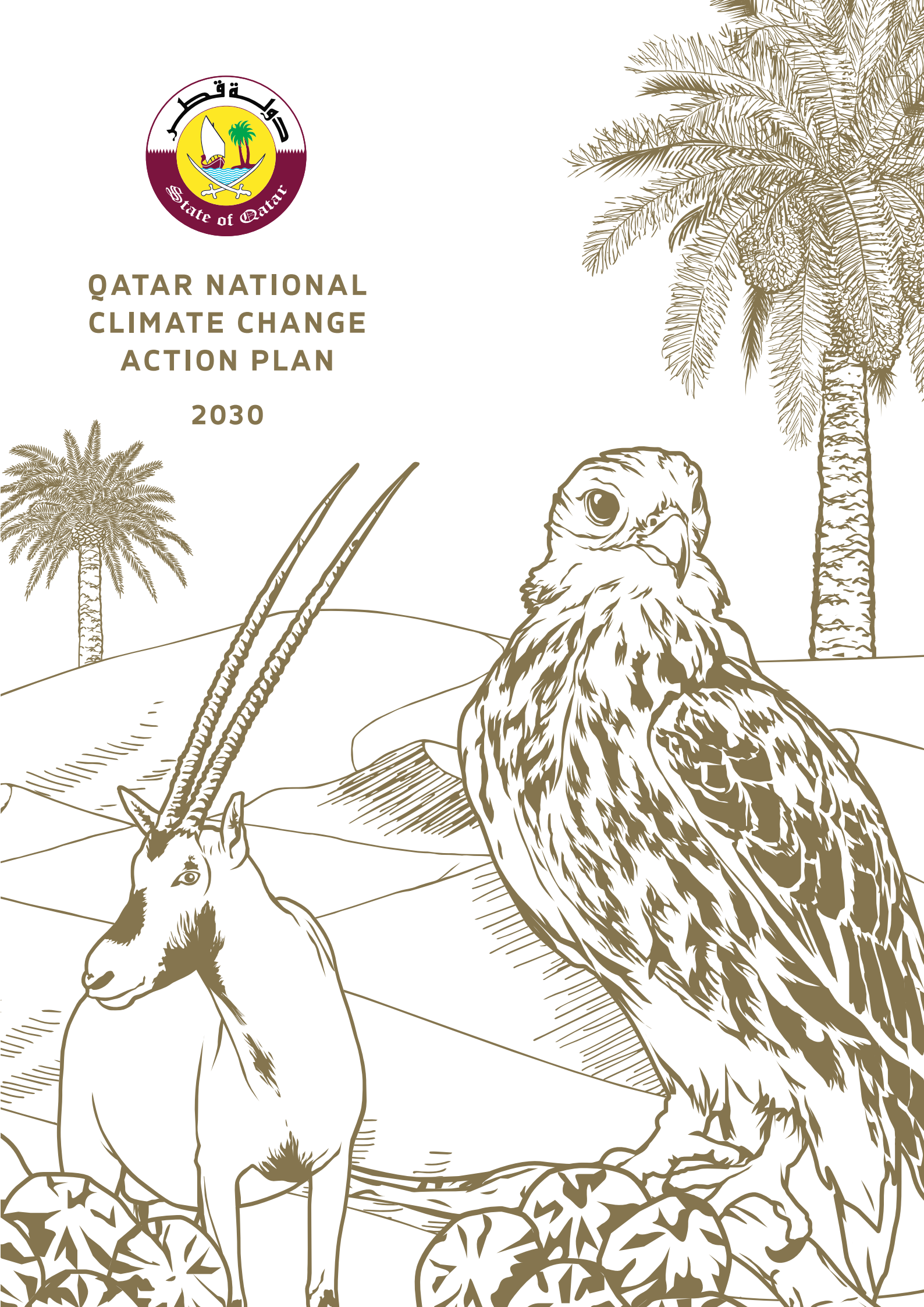




QATAR NATIONAL CLIMATE CHANGE ACTION PLAN

2030





OUR STORY

This report has been carefully written and produced to tell a story of sustainability in Qatar.

The recycled material used for the book cover represents the thobe, the traditional robes worn by Qatari men for generations. The gold ink on the cover represents traditional zari embroidery. The entire book is made of recycled paper, with dividers showcasing Qatar's biodiversity.

The use of these materials represents a bridge between our past and our future, and our shared commitment to a sustainable future for the generations that follow.



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**QATAR NATIONAL
CLIMATE CHANGE
ACTION PLAN
2030**

ABBREVIATIONS

BAU	Business-as-Usual
BTR	Biennial Transparency Report
CAFE	Corporate Average Fuel Economy
CCS	Carbon Capture and Storage
CCUS	Carbon Capture Utilization and Storage
CHP	Combined Heat and Power
CNG	Compressed Natural Gas
CDM	Clean Development Mechanism
EDPSD	Economic Diversification and Private Sector Development
ESC	Environmental Science Center
ESS	Environmental Sustainability Sector
FDI	Foreign Direct Investment
GGFR	Global Gas Flaring Reduction
GHG	Greenhouse Gas
GORD	Gulf Organization for Research and Development
GSAS	Global Sustainability Assessment System
GTL	Gas-to-Liquid
HAB	Harmful Algal Bloom
HBKU	Hamad Bin Khalifa University
ICT	Information and Communication Technology
INDC	Intended Nationally Determined Contributions
IEEEES-12	12th International Exergy, Energy, and Environment Symposium
JBOG	Jetty Boil-Off Gas
KAP	KAHRAMAA Awareness Park
LDAR	Leak Detection and Repair
LEED	Leadership in Energy and Environmental Design
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
MENA	Middle East and North Africa
MEPS	Minimum Energy Performance Standard
MCM	Million Cubic Meters
MME	Ministry of Municipality and Environment
MOCI	Ministry of Commerce and Industry
MOEHE	Ministry of Education and Higher Education
MOPH	Ministry of Public Health
MOTC	Ministry of Transport and Communications
Mt CO ₂ eq	Million tons of CO ₂ equivalent
NAF	National Action Framework
NCCAP	National Climate Change Action Plan
NCCC	National Climate Change Committee
NDC	National Determined Contributions
NDS	National Development Strategy
OGI	Optical Gas Imaging
QEERI	Qatar Environment and Energy Research Institute
QGBC	Qatar Green Building Council
QNV	Qatar National Vision
QF	Qatar Foundation
QPEERU	Qatar Plan for Energy, Efficiency, Optimization, and Resource Utilization
QTA	Qatar Tourism Authority
QU	Qatar University
RLIC	Ras Laffan Industrial City
SCDL	Supreme Committee for Delivery and Legacy
SDG	Sustainable Development Goals
TSE	Treated Sewage Effluent
UNFCCC	United Nations Framework Convention on Climate Change
UNSDG	United Nations Sustainable Development Goals
WHO	World Health Organization
WISH	World Innovation Summit for Health

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MESSAGE FROM HIS EXCELLENCY THE PRIME MINISTER

“We must act today, to make a difference for tomorrow”



Qatar recognizes the threat of man-made climate change and the need to act now. This commitment is seen in the Qatar National Vision 2030 and National Development Strategy 2022, both of which emphasize the importance of environmental protection and combating climate change by improving preparedness, building resilience, and adapting society.

Man-made climate change already negatively impacts the environment and destroys livelihoods all over the world. Year after year, we see record-breaking temperatures. Projections show hot weather and extreme weather patterns will increase in frequency and intensity through the 21st century. These extreme events are happening now, with the greatest impact often seen in developing countries as they are least able to mitigate and adapt to the effects of climate change.

Qatar has made and continues to make real progress in critical sectors, especially oil and gas, electricity and water, construction and infrastructure, transportation and other key areas.

Qatar is party to the UNFCCC, and has ratified both the Kyoto Protocol and the Paris Agreement. In line with its international commitments, Qatar recently submitted its second National Determined Contribution report to the UNFCCC with ambition to reduce greenhouse gases by 25% by 2030, against business-as-usual.

Echoing the call to action made by other world leaders, we must do all we can to meet the Paris Agreement's pledges and to help and encourage others to do the same.

H.E. Sheikh Khalid bin Khalifa bin Abdulaziz Al Thani
The Prime Minister and Minister of Interior

The State of Qatar has developed a national vision that defines its aspirations for the future, and is based on four pillars. Among these is environmental development, and its foundation is environmental management in a manner that ensures harmony and consistency between economic and social development and environmental protection. Our objective is to support international efforts to reduce and adapt to the harmful effects of climate change.

At the direction of His Highness Sheikh Tamim Bin Hamad al Thani, Emir of the State of Qatar, Qatar prepared this National Climate Change Action Plan 2030 (NCCAP). The NCCAP aggressively pursues new solutions and technologies, embraces new ideas and projects, and seeks new partners for collaboration on climate change and environmental protection efforts. Cabinet has approved the NCCAP together with its implementation plan and governance structure and will closely monitor progress towards achieving NCCAP goals.

There is truly no greater threat to the survival of our species and all life on Earth. Qatar's geographical location and prevailing desert environment makes it extremely vulnerable to climate change, and we have already experienced noticeable adverse effects in recent years.

MESSAGES FROM KEY STAKEHOLDERS



Message From H.E. Deputy Prime Minister and Minister of Foreign Affairs

The National Climate Change Action Plan 2030 (NCCAP) sets a clear roadmap on how Qatar will meet its international commitments to help fight the causes and mitigate the effects of manmade climate change, and in particular to reducing emissions of greenhouse gases. It will naturally form a key part of Qatar's policy and practice for international engagement on climate change for many years to come.

We have a compelling national interest in championing faster and more ambitious global action on climate change. Qatar is acutely vulnerable to rising sea levels and extreme weather events. In addition, the well-being and livelihoods of all of humanity is at stake and depends on the speed and effectiveness of our global effort to decarbonize and reduce emissions.

Qatar will spare no effort in achieving its desired role in facing the serious threat of climate change, and stands ready to extend a helping hand to its partners in the international community. The provision of \$100 million to support the Global Environmental Facility is just one example of this commitment being seen in practice, and we will strive to do more in the coming years. Qatar will also use its unique position as a major capital investor, both locally and internationally, to build the foundations of inclusive and sustainable growth.

H.E. Sheikh Mohammed bin Abdulrahman Al Thani
Deputy Prime Minister and Minister of Foreign Affairs



Message From H.E. Minister of Municipality And Environment

The State of Qatar considers climate change to be one of the biggest challenges of our time, which calls for urgent and dedicated measures at the local, regional and global levels. Therefore, the State treated environmental development as one of the four pillars of Qatar National Vision 2030.

In the context of supporting the international efforts in combating climate change, the State has developed the National Climate Change Action Plan, and was approved by the Cabinet. The NCCAP is built on strategic plans for economic diversification set out in the

Qatar National Vision 2030, the National Development Strategy, and is aligned with United Nations Sustainable Development Goals.

This NCCAP is a blueprint for a greener and more sustainable future. It includes:

- more than 30 mitigation measures across all key sectors to reduce emissions and contribute to a sustainable future;
- more than 300 climate change adaptation measures that will reduce the impact of climate change on our communities, natural resources, and lives; and
- a set of key enablers (awareness programmes, incentives and legislation) to allow the implementation of a joint vision for our sustainable future and a commitment to an emission reduction target of 25% by 2030.

I would like to express my deepest gratitude to all the organizations, public and private, that contributed to the NCCAP. We are hopeful of producing fruitful results, and a vision that leads us towards preserving the environment and achieving sustainable development within this action plan. I offer sincere thanks and appreciation for the leadership, support and guidance of His Highness Sheikh Tamim Bin Hamad Al Thani, the Emir of the State of Qatar, and His Excellency Sheikh Khalid bin Khalifa bin Abdulaziz Al Thani, Prime Minister and Minister of Interior.

H.E. Dr. Abdulla bin Abdulaziz bin Turki Al Subaie
Minister of Municipality and Environment and Acting Minister of State for Cabinet Affairs



Message From H.E. Minister of State for Energy Affairs

The publication of this National Climate Change Action Plan 2030 (NCCAP) is a significant landmark that reflects the State of Qatar's continuing efforts in support of the global fight against the causes and the effects of climate change. QatarEnergy is proud of its contributions to the NCCAP and is committed to continue its efforts in implementing the NCCAP programmes and initiatives.

The energy sector is one of the main contributors to global greenhouse gas emissions. Therefore, it is important that the sector carries its share of the burden in mitigating climate change, which is what we are doing along with many others. On its part, QatarEnergy is working diligently to meet the present and future challenges associated with climate change, whilst helping others to meet their commitments under the NCCAP.

One of our key objectives is cutting the carbon intensity of our operations by 25% by 2030, with an additional focus on reducing methane emissions. We will achieve this ambitious goal by addressing every part of the way we do business in the oil and gas sector. Our "4C" framework sets out a high-level strategy to "consolidate our leading position in the LNG market, curb our emissions, create low carbon energy, and compensate for residual emissions". The NCCAP sets out in detail the programmes and initiatives that will help us deliver on these targets.

It is clear that the increasing risks of climate change require accelerated global decarbonization efforts. QatarEnergy is an active partner in this effort; displacing higher greenhouse gas emitting fuels with cleaner gas, promoting lower carbon solutions and technologies with our customers, and working to meet the goals of the Paris Agreement. At the same time, QatarEnergy is continuing to be a key driver of Qatar's sustainable economic and social development. The NCCAP strikes the right balance between environmental protection and climate change, Qatar's sustainable economic and social needs, and Qatar's unique circumstances.

H.E. Saad Sherida Al-Kaabi
President and CEO of QatarEnergy



Message From H.E. Minister of Commerce and Industry and Acting Minister of Finance

Man-made climate change is impacting the world faster and more severely than anticipated, with a real risk that these effects may become irreversible. Qatar recognises and acknowledges the threat and the need for bold and immediate action. This National Climate Change Action Plan 2030 (NCCAP) shows that Qatar backs these words with real and measurable plans and initiatives. The Ministry of Finance welcomes the crucial role it plays in implementing the NCCAP.

Qatar also aims to be the catalyst for change in others, and in particular to establish a green economy and a sustainable finance system at home and internationally. Such transformation requires a careful balance between sustainable economic growth and climate protection. Qatar and the Ministry of Finance in particular will continue to collaborate closely with our international partners and to share their knowledge and experience.

H.E. Ali bin Ahmed Al Kuwari
Minister of Commerce and Industry and Acting Minister of Finance



Message From H.E. Minister of Transport and Communications

One of MoTCs core priorities is developing and promoting environmentally friendly and sustainable mobility strategies and solutions for Qatar. Much has already been achieved towards this goal. The first phase of the Doha Metro is complete and will soon be joined in operation by the Lusail Tram. We are also seeing greater use of private tram systems, for example in Msheireb Downtown and Education City. These projects will, together with our expanded provision of bus services, promote public transport as an alternative to private vehicles, reduce greenhouse gas emissions, and improve air quality and quality of life for all.

Emissions will be reduced further by stricter regulations for fuel efficiency, greater use of private electric vehicles, and the electrification of public buses. Work has begun on executing the electric vehicle strategy that aims at the electrification of 25% of public transit buses by 2022, with a gradual transformation of all public transit buses, thus reducing carbon emissions caused by conventional buses by 2030.

The state-of-the-art Hamad International Airport is one of the busiest airports in the world and won several awards, the latest of which was the Best Airport in the World 2021. The airport was designed from the outset to the highest levels of sustainability, and builds on this by using environmentally friendly ground support equipment and electrified airside buses. HIA is home to Qatar Airways; the first airline in the Middle East to secure accreditation to the highest level in the IATA Environmental Assessment Program. In the field of ports and maritime transport, the Ministry of Transport and Communications preserves the marine environment through the use of electric cranes and locomotives for transporting containers. This does not emit any pollution or carbon.

H.E. Jassim Saif Ahmed Al Sulaiti
Minister of Transport and Communications

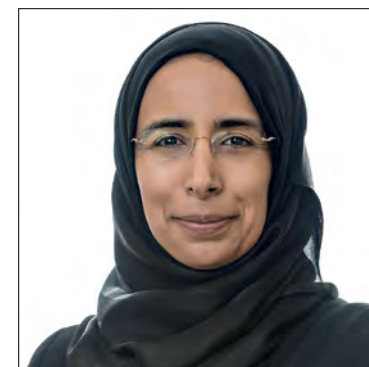


Message From H.E. Minister of Education and Higher Education

Qatar showed its commitment to national environmental protection and stability in the Qatar National Vision 2030, which prioritises the development of an environmentally aware population. To realise this vision, we have established environmental education and sustainable schools in Qatar. We have also implemented educational and vocational programmes at all levels to provide the knowledge, skills and workforce needed to meet the demands of a greener and more sustainable future. Our institutions will play a crucial role in developing future technologies

to reduce greenhouse gas emissions, better understand and mitigate the causes and effects of manmade climate change and improve protection of the environment. We will actively pursue emerging and new technologies with the potential to help the fight against manmade climate change, both independently and through collaboration with governmental organisations and with other institutions.

H.E. Dr. Mohammed Abdul Wahed Al Hammadi
Minister of Education and Higher Education



Message From H.E. Minister of Public Health

The publication of this National Climate Change Action Plan 2030 is a landmark achievement. Climate change has the potential to hugely affect public health both in Qatar and globally. Increasing temperatures, lower air and water quality, food and water scarcity, increased conflict over resources, and greater incidences of disease are just some of the impacts that are already being seen across the world. Mitigating the causes and effects of climate change will also mitigate the public health impacts, but we must nevertheless be ready to meet these challenges. We will continue our work to ensure that the health system in Qatar meets the needs of current and future generations.

H.E. Dr. Hanan Mohamed Al Kuwari
H.E. Minister of Public Health

EXECUTIVE SUMMARY

Climate change is mankind's most pressing challenge. This challenge requires shared vision, bold ideas and committed leadership. Qatar is aware of its responsibilities as a member of the global community, and further aims to be a leader in the fight against climate change. These are more than just words, they are an integral part of Qatar's basic laws. Qatar's permanent Constitution obliges the State to protect the environment, addresses climate change, minimize pollution, conserve natural resources, and preserve its cultural heritage and biodiversity.

Environmental development is one of the four pillars of nation-building that form the basis of the Qatar National Vision 2030. Qatar must balance its economic and social development needs with those of environmental protection, conservation and management. The Qatar National Vision 2030, and the first and second National Development Strategies include targets, projects and initiatives that contribute to Qatar's sustainable future and environmental protection. These projects and initiatives are already reducing emissions, contributing to climate change adaptation, and improving quality of life and environmental protection. Qatar will continue these efforts, strengthen and add to them in order to meet its treaty obligations and its duty to future generations.

Qatar has long been a world leader in highly efficient gas production, and will continue to play a key role in the global economy as an energy provider. Qatar's LNG provides cleaner and safer energy when compared to other fossil fuels, and can be a bridge to renewable energies. New LNG expansion projects in Qatar will reduce international consumption of higher-polluting fuels such as coal, resulting in fewer and less harmful emissions, particularly in developing countries.

This National Climate Change Action Plan 2030 consolidates Qatar's climate change efforts under a single framework, with stakeholder engagement across all sectors. Qatar is aggressively pursuing additional measures within the implementation framework provided by the National Climate Change Action Plan. Qatar's target is a 25% reduction in greenhouse gas emissions by 2030, one of the most ambitious in the region. This target is calculated against Qatar's estimated business-as-usual in 2030 of 146 Mt CO₂ eq. In quantitative terms, this requires reduction of 37 Mt CO₂ eq. The National Climate Change Action Plan details more than 35 measures to achieve these reductions, backed by detailed implementation plans.

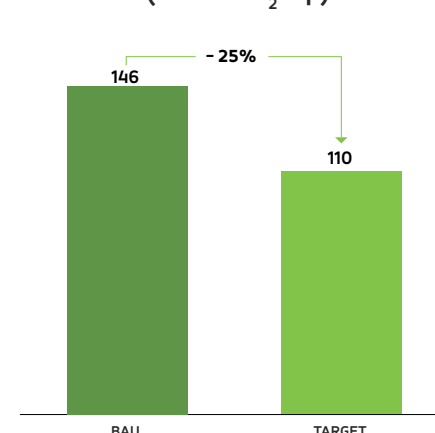
The National Climate Change Action Plan also provides details of how Qatar is adapting itself to the effects of climate change. Qatar is extremely vulnerable to these effects. More than 300 adaptation measures are identified, with detailed plans for rapid implementation. These include measures to preserve biodiversity, ensure food security, improve healthcare, and increase the resilience of Qatar's infrastructure and economy.

Education, research and development will improve our awareness and understanding of climate change and help create new and improved technologies that will aid our ability to fight climate change and adapt to its effects. This greater awareness, coupled with incentives and legislation, will reduce emissions and aid adaptation by driving necessary societal and behavioral changes.

These measures require timely and accurate data to support monitoring and decision-making at the national and international level. Qatar is implementing a robust measurement, reporting and verification programme. This programme will greatly improve transparency on climate change actions by providing better, more accurate and timelier emissions data to decision-makers in Qatar, and from Qatar to the UNFCCC.

The governance and monitoring set out here allows the State of Qatar to adapt to new opportunities and challenges up to 2030 and beyond. The NCCAP should therefore be seen as a basis and a benchmark. The State of Qatar will periodically update the NCCAP to reflect emerging challenges and opportunities. It may be, for example, the State of Qatar move faster in some areas and slower in others and the State of Qatar therefore reserves the right to amend the NCCAP as needed.

Reduction target 2030 vs BAU
(in Mt CO₂ eq)



OIL AND GAS



TRANSPORTATION



POWER AND WATER



OTHER MEASURES



QATAR FOUNDATION



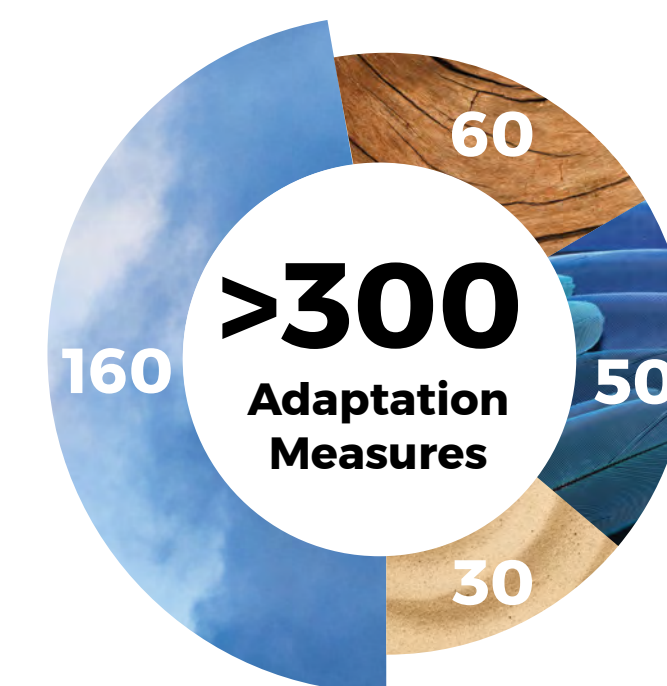
QATAR UNIVERSITY



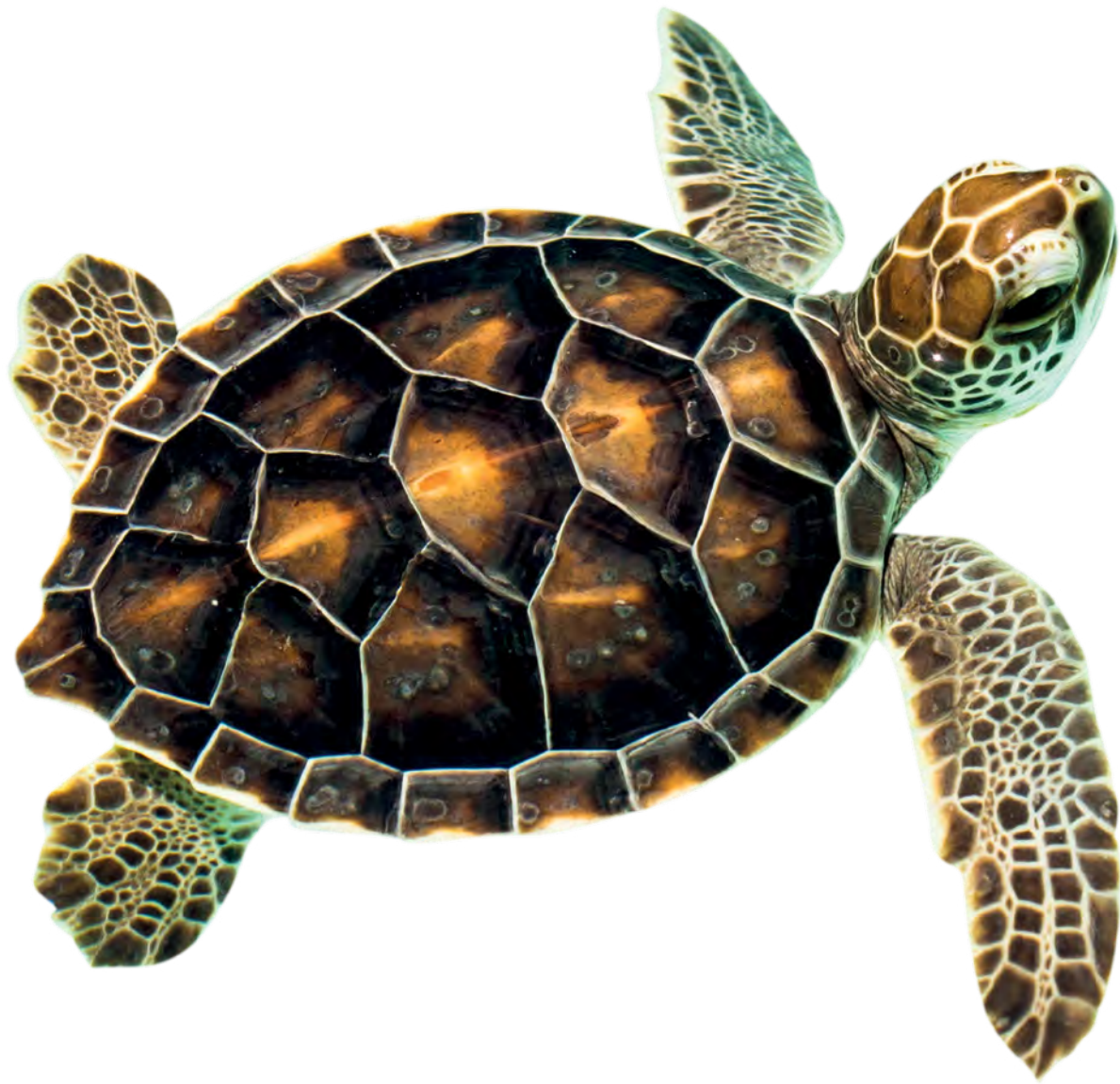
MINISTRY OF MUNICIPALITY AND ENVIRONMENT



OTHER STAKEHOLDERS



INTRODUCTION



HAWKSBILL SEA TURTLE

Every year, one of Qatar's most popular beaches, Fuwairit Beach, is closed to the public to protect the endangered sea turtles during the hatching season.



1. INTRODUCTION

Global climate change is one of the most significant challenges facing the world today. Major ecological degradation spurred by climate change has occurred in regions and communities across the globe. Increasing natural and man-made destruction of the Earth's environment has produced harmful effects, threatening populations and habitats alike.

1.1 Global climate change and the Paris Agreement



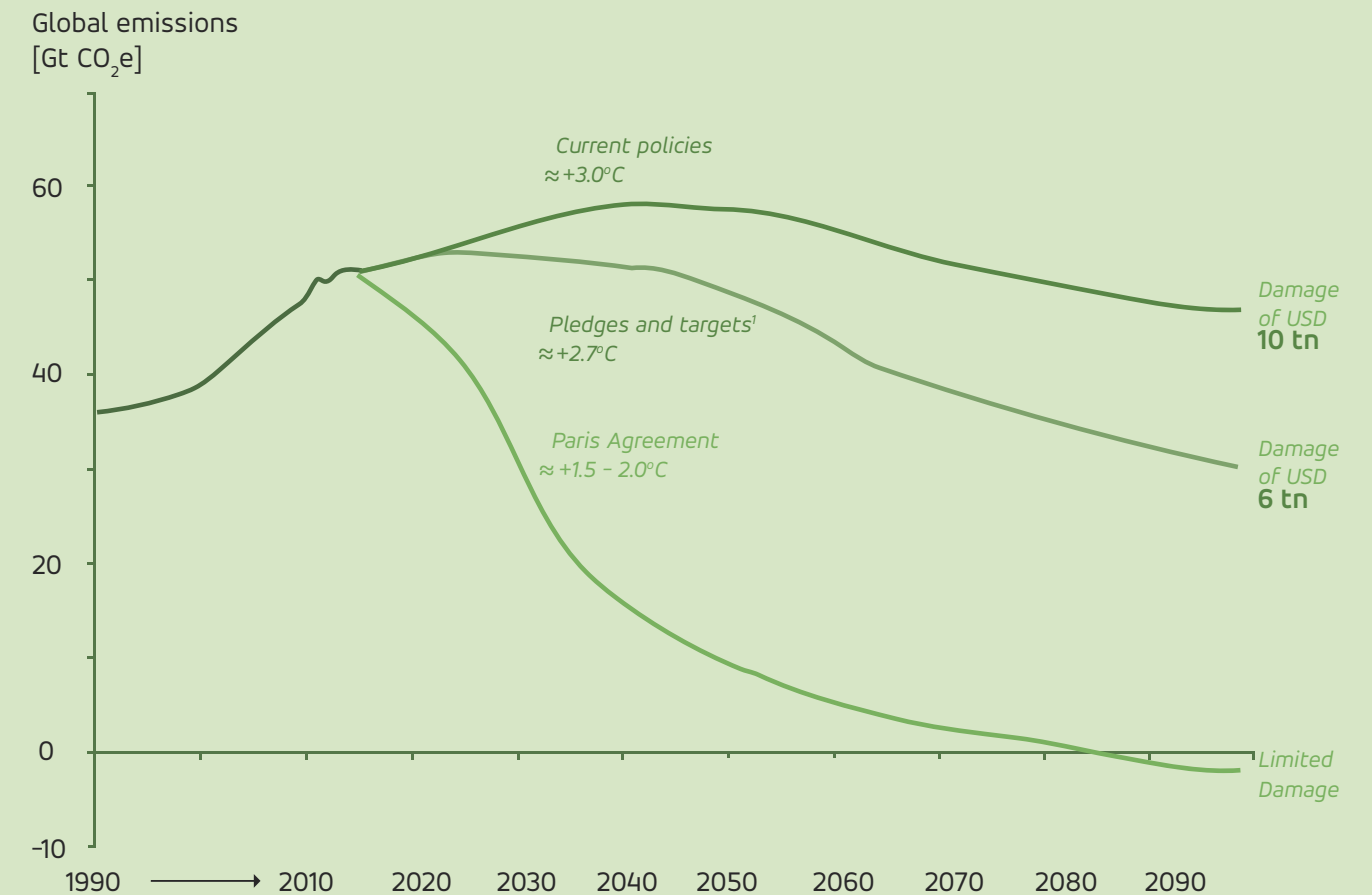
There is a global consensus, backed up by science, that human-generated emissions are responsible for global warming. The concentration of heat-trapping gas has increased substantially since preindustrial times. Global warming threatens climate systems due to shifting weather patterns leading to deadly droughts, heat waves, floods, wildfires, and storms, including hurricanes. As climate change causes temperature increases and extreme weather events, it endangers human health and puts at risk the Earth's air, water, and food supplies; spreads disease; imperils homes,

and threatens the safety of the human species, and all flora and fauna.

With the Paris Agreement, world leaders collectively agreed and committed to keeping temperature change to below 2°C, and to making efforts to prevent a change greater than 1.5°C. In addition, the Paris Agreement created a clear framework for all countries, especially large emitters, to make emissions reduction commitments and strengthen those actions over time. It also asks countries to work to reduce global greenhouse gas emissions as soon as possible and to become greenhouse gas emissions neutral in the second half of this century.

Qatar recognizes the urgency of combating the threat of man-made climate change and is committed to its pledges under the Paris Agreement. Qatar has recently submitted its second National Determined Contribution report to the UNFCCC with an ambition to achieve a reduction of greenhouse gas of 25% by 2030 relative to business-as-usual.

Climate change is the biggest challenge of 21st century where commitment is required to protect the global economy from cumulative potential damage of USD 10 trillion by year 2100



Heavy rainfall and strong winds affecting central Doha.



Sandstorms affect local neighbourhoods throughout the year.

1.2 Climate change in Qatar

The countries hardest hit by climate change are low-lying nations, uniquely vulnerable to rising sea levels, and developing countries that lack the resources to adapt to temperature and precipitation changes. Developing countries like Qatar are especially vulnerable to rising sea levels along its coasts, air temperature increases, severe water shortages, with associated risk to marine biodiversity and food security. Qatar is a peninsula almost entirely surrounded by the sea; the risk of flooding potentially affects 1% of urban land, leading to infrastructure relocation. An increase of one meter in Qatar's marine waters could impact 2% of the population and negatively affect Qatar's GDP by posing a threat to the wealth-generating industrial and commercial clusters situated in coastal areas.

Given the prevailing desert environment, surface temperatures in the Gulf are predicted to rise to at least 2°C above 2015 levels by 2100, with summer water temperatures around Qatar warming by over 4°C, and with increasing air humidity. Worsening heat, humidity, and dust storms will make the outdoor environment essentially uninhabitable for most of the year. Freshwater supplies will be affected, causing greater reliance on costly and energy-intensive desalination plants. There will also be a significant risk to food security due to disruptions in the global food supply chain.

Climate change poses significant risks to Qatar's biodiversity ecosystem as rising temperatures will adversely impact marine flora and fauna. Other biological impacts include increased incidences of harmful algal blooms, larger numbers of invasive non-native species, increased jellyfish, changes in fish stocks and distribution, changes in the distribution of sea turtles, and changes to the migration patterns of other marine species. In addition, potential adverse impacts on habitats include damage to and loss of coral reefs, coral bleaching, disease, storm damage, impacts on salt marshes (sabkhas), and mangrove distribution.

Climate change also poses a threat to the tourism industry of Qatar, mainly due to increases in temperature, humidity and the frequency of

dust storms, but also through the destruction of infrastructure and transportation systems, deteriorating air quality, and impacts on human health.

Qatar strongly supports increased research and development to find the most viable solutions that best match its core strengths. Qatar positions itself as one of the leaders for green transformation. More specifically, Qatar sees opportunity in new, sustainable business models, investment in green value chains, and delivery of technology solutions for reducing or using carbon emissions.



Climate change risks in Qatar

Sea level rise

- Risk of flooding potentially pushing the country towards relocation of infrastructure e.g. desalination
- 1 meter increase could impact 2% of Qatari population, lower GDP, and 1% of urban land

Endangered bio-diversity

- Potential adverse impact on marine habitats
- Extinction of marine fauna such as whales, dolphins, turtles, coral reefs, etc.
- Adverse changes in fish distribution and increase of harmful algae blooms
- Prolonged periods throughout the year with water temperature above 31°C
- Growth of invasive non-native species

Risk to food security

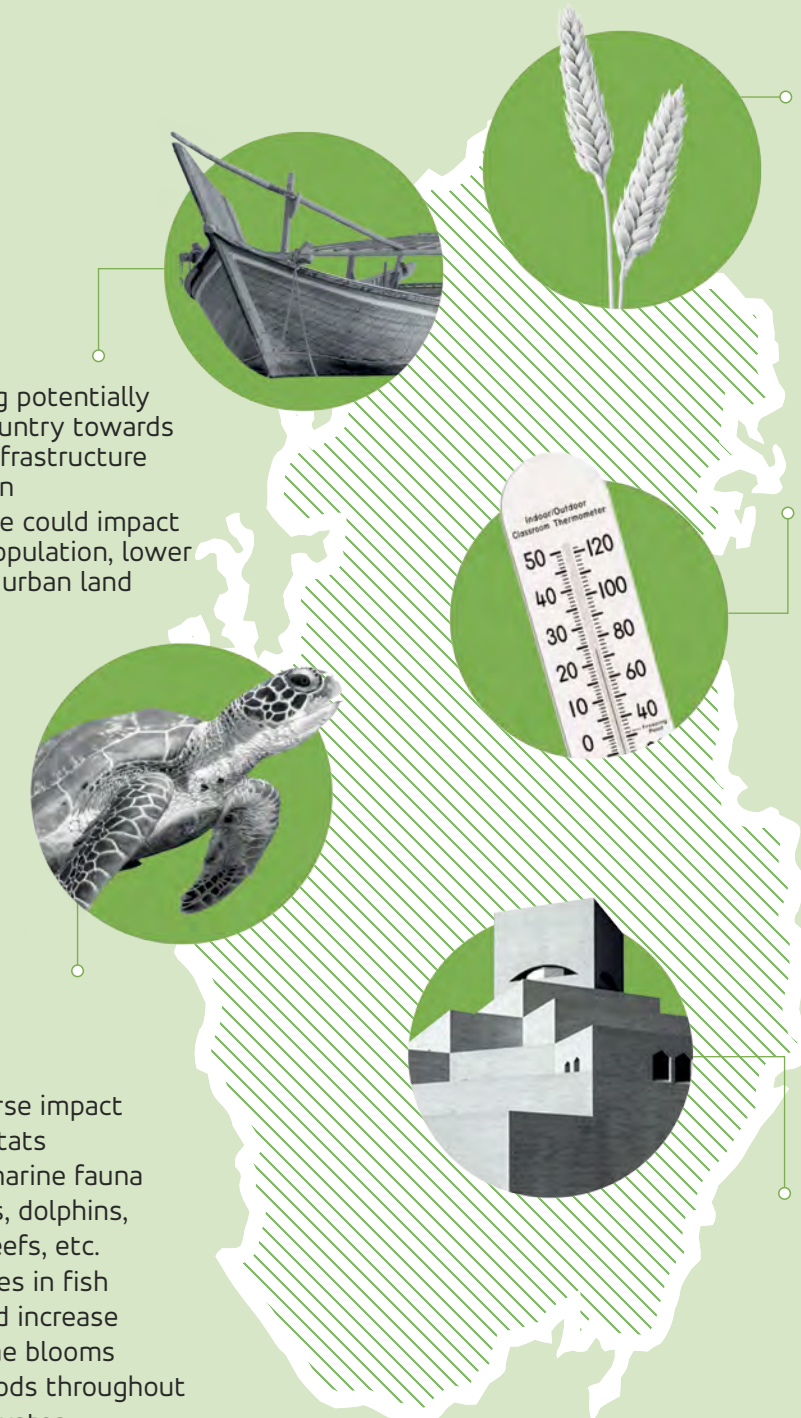
- Potential changes in supply chain
- Changes in fisheries resource distribution and depletion

Increase in temperature

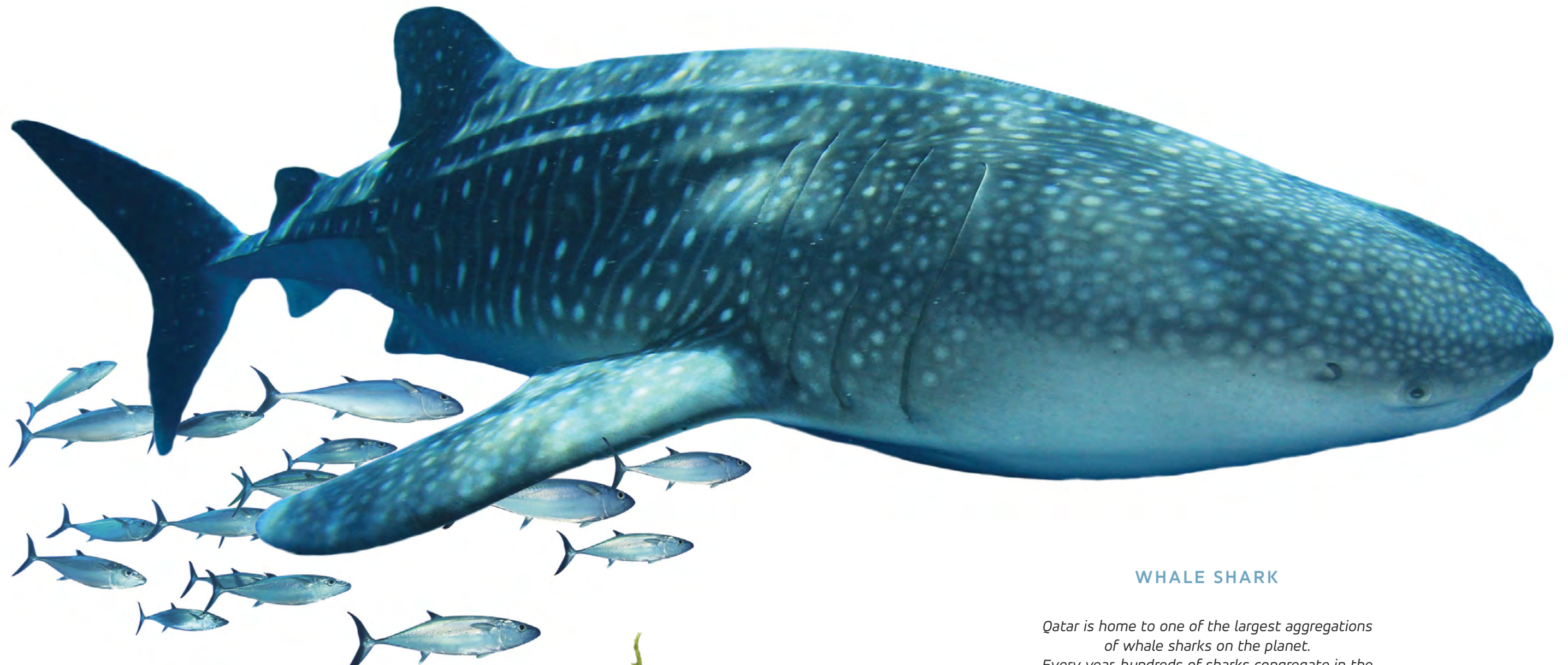
- Risk of heat exhaustion and increased air pollution
- Shift in rain patterns leading to scarcity of water
- Adverse impacts on freshwater supply and quality of desalination plants

Impact on tourism and heritage

- Adverse effects on infrastructure, transportation and health will negatively impact tourism



QATAR'S COMMITMENT TO CLIMATE ACTION



WHALE SHARK

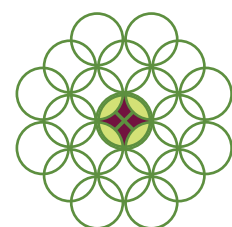
Qatar is home to one of the largest aggregations of whale sharks on the planet. Every year, hundreds of sharks congregate in the Al Shaheen region off the north east coast of Qatar between April and September.



2. QATAR'S COMMITMENT TO CLIMATE ACTION

Qatar's National Vision 2030 and Qatar's National Development Strategy -1 and -2 provide a national framework, strategies, and implementation plans to transform Qatar into an advanced society capable of achieving sustainable development by 2030. The National Vision 2030 sits on four pillars; human development, social development, economic development, and environmental development. The UN Sustainable Development Goals underpin this approach as they put a strong emphasis on diversifying and balancing economic growth with social and human development, and environmental protection.

The environmental pillar is increasingly important as Qatar is forced to deal with the effects of climate change, particularly diminishing water resources, increasing temperatures, pollution, and environmental degradation. The National Vision 2030 prioritizes environmental stewardship to build a more sustainable future and has already seen many programmes and projects implemented towards these goals.



استراتيجية التنمية الوطنية
National Development Strategy



Dukhan Highway, Doha, Qatar

Qatar National Vision 2030 objectives for environmental development

An agile and comprehensive legal system to protect the environment

An urban development plan with a sustainable policy for urban expansion and population distribution

A proactive and significant regional role in assessing the impact of climate change and mitigating its negative impacts

An environmentally aware population

Environmental institutions that build public awareness, employ environmental planning tools, carry out environmental research and encourage the use of environmentally sound technologies

Encouragement of regional cooperation to put in place preventive measures to mitigate the negative environmental effects of pollution arising from development activities

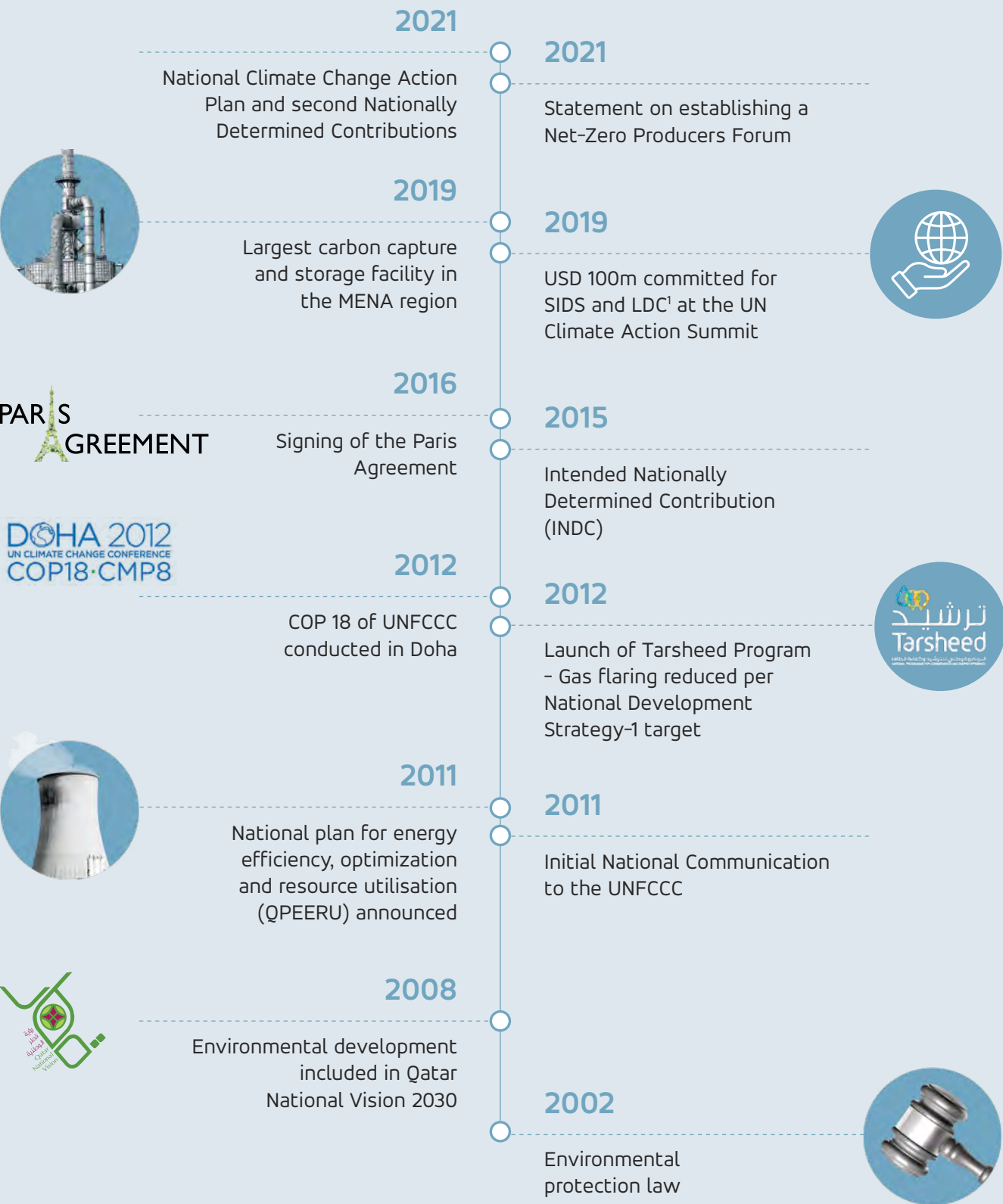
Support for international efforts to mitigate the effects of climate change



National Development Strategy -1 and -2 includes key outcomes, targets and detailed projects as shown below.

Key outcomes	Specific targets	Programmes and projects
A less polluting environment that ensures the health of humans and ecosystems	Reduce levels of air pollutants in accordance with Qatar's ambient air quality standards by end of 2022	Develop and implement a national integrated air quality management plan
	Improve coastal and marine water quality to conform with Qatar's standards by end of 2022	Develop and implement a comprehensive coastal and marine water quality control plan
	Fix domestic waste generation rate under 1.6 kg per capita/day during the period 2018-2022	Develop and implement a solid waste management plan to operationalize recycling mechanisms, rehabilitate contaminated sites and deal with hazardous materials and waste
	Recycle 15% of solid waste by end of 2022	
A less climate-sensitive environment that ensures sustainable development, health and environment safety	Create a green belt around Doha and its surrounding areas by end of 2022	Develop and implement a national plan for adaptation and mitigation of climate change impacts and to promote local, regional and international strategic partnerships
An environment that preserves biodiversity to ensure sustainable development and human health and well-being	Raise awareness of current and future of biodiversity and create a biodiversity database by end of 2022	National Biodiversity Database
	Sustainable management of nature reserves and ecosystems by end of 2022	Develop and implement an integrated plan for management of protected areas and various ecosystems
Promote sustainable environmental practices	Provide required data on the Qatari environment to promote and improve environmental management by end of 2022	Create an electronic and searchable information database
	Build an environmentally aware and supportive society for environmental sustainability	Promote environmental awareness, especially for future generations

Qatar's climate change journey under Qatar National Vision 2030



1) SIDS - Small Island Developing States, LDC - Least Developed Countries

2.1 Key achievements and progress

Qatar has long provided global markets with access to cleaner energy through export of LNG. LNG has a lower content of carbon and other pollutants, such as sulfur, mercury and particulates compared to coal and oil, enabling stakeholders to reduce their greenhouse gas emissions and enjoy better air quality. In 2019, Qatar had the third largest

global gas reserves, with 24.7 trillion cubic meters of proven deposits. It is the world's largest LNG exporting country, exporting 107.1 billion cubic meters in 2019, and continues to provide the world with a cleaner energy source.

Currently, renewable energy sources cannot meet global energy demand. Therefore, natural gas and other similar cleaner fuels, such as gas-to-liquid fuels derived from natural gas, are an essential

bridge to a low carbon economy. Meanwhile, Qatar continues to improve efficiency in natural gas production and has already undertaken several initiatives to reduce greenhouse gas emissions in all processes from well to LNG tanker. Some projects are already being implemented while others are in the planning phase. These projects include carbon capture and storage, smart leak detection, and the use of more efficient compression pumps.

Qatar developed a national plan for energy efficiency, optimization, and resource utilization aimed at greenhouse gas mitigation. This aims to build capacities and raise public awareness on issues relating to climate change. The objectives and building blocks reflect the current national sectoral emission profiles and the potential for win-win sustainable development.



Optimized energy use for production operations, and minimize wasted energy in flaring and venting

Increased energy efficiency and reduced energy consumption and wastage per unit of output through improved technology

Established policies and regulations to manage energy conservation throughout the process of energy production, transport, processing, and utilization

Improved efficiency for conservation of water and power

Established energy-efficient building codes and energy-efficient appliance standards

Implemented energy auditing and energy management in enterprises

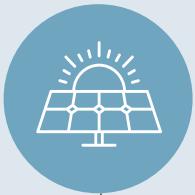
Raised public awareness of energy conservation initiatives

TOP FIVE ACHIEVEMENTS PER SECTOR



Oil and gas

- 1 Carbon capture and storage plant
5 Mt CO₂ eq by 2027
- 2 Al Shaheen flare reduction project
2 Mt CO₂ eq per year
- 3 Hydrocarbon efficiency improvement
1 Mt CO₂ eq per year
- 4 Jetty boil-off gas recovery project
1.6 Mt CO₂ eq per year
- 5 Guiding principles on methane reduction



Power and water

- 1 Solar photovoltaic plant at Al Kharsaah
800 MW capacity
- 2 Specification improvement standards
770 GWh savings
- 3 Tarsheed Program (electricity reduction)
17% per capita
- 4 13,000 solar rooftop panels in Education City
5,000 MWh savings
- 5 Upgrade of sewage treatment plants



Transportation

- 1 Doha Metro and Lusail Tram
- 2 Level 3 accreditation for Hamad International Airport
- 3 Electric tractors for Hamad Port
22 tractors
- 4 Electrification of buses
25% of public buses
- 5 Electric Vehicle policy and charging infrastructure



Building, construction and industry

- 1 Centralized district cooling
- 2 Smart city implementation
- 3 Recycling construction waste
60m tons
- 4 Implementing GSAS standards
- 5 Circular economy in construction (recycling, re-use)



KEY ACHIEVEMENTS IN RESEARCH AND EDUCATION SECTOR

QATAR FOUNDATION

- Design, grid integration, and cost quantification of electric vehicle charging infrastructure
- Understanding carbonate reservoirs for carbon capture and storage
- CO₂ mineralization and brine management by chemical reaction
- Renewable energy generation and application (e.g., in Education city)
- Waste management with focus on plastics and e-waste



GULF ORGANISATION FOR RESEARCH AND DEVELOPMENT

- Global Sustainability Assessment System (GSAS) standard – 1406 buildings registered
- GSAS certified 'Energy and Water Auditor Program' – to reduce consumption
- Set-up of MENA region's first voluntary carbon market programme – Global Carbon Council
- Mathematical optimization model for carbon capture and storage
- Research on carbon capture and utilization from small scale Combined Heat and Power



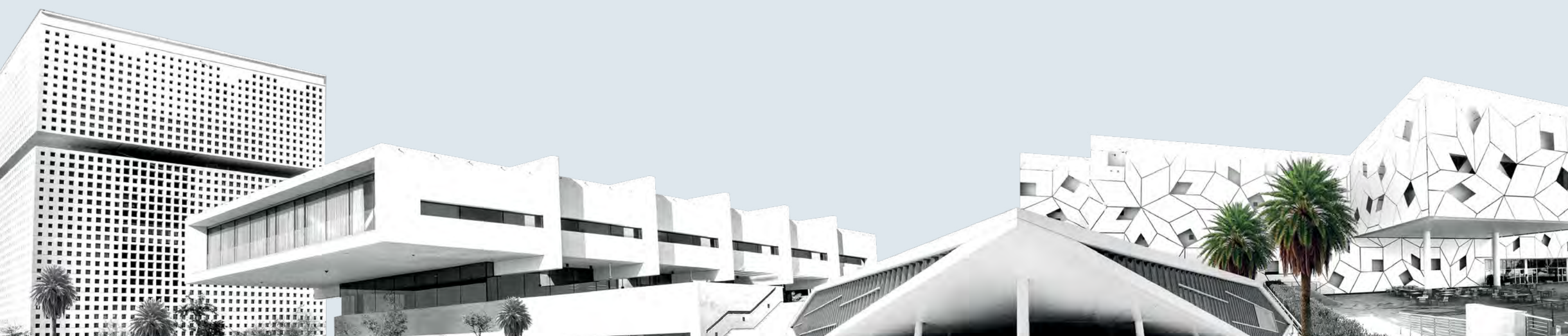
QATAR NATIONAL RESEARCH FUND

- Development of highly efficient and practical carbon management system
- Graphene carbocatalysts (electrocatalytic reduction of CO₂ to fuels)
- Enabling efficient integration of electric vehicles In Qatar's Smart Grid
- Forward osmosis seawater pretreatment (thermal desalination plants)
- Enhancing vegetable production in greenhouses



QATAR COMPUTING RESEARCH INSTITUTE

- Sustainable heat harvesting (water treatment and power generation)
- Enhanced water recovery from brine streams
- Development of building and food supply chain carbon footprint calculator
- Assessment of climate change impacts on humidity, rainfall variability, temperature etc.
- Circular economy potential for high lifetime photovoltaic modules



A National Action Framework to build capacity and raise public awareness on issues relating to climate change will be developed by the National Climate Change Committee (NCCC).

The framework aims to address the most critical challenges and opportunities posed by climate change with the following main elements:

- strengthen technical and institutional capacities
- establish a web-based climate change information center;
- raise public awareness; and
- other elements identified by the UNFCCC.

Under National Development Strategy -1 and -2, Qatar has already implemented several initiatives for environmental development and sustainability, including:

- Advanced air quality monitoring, reporting, and verification programmes to provide necessary environmental data.
- Updated regulations and standards on air quality and implementation mechanisms to reduce pollution and increase compliance with environmental regulations.
- Implemented the Tarsheed Program, which successfully reduced harmful carbon emissions through lower per capita consumption of electricity and water.
- Green Car initiative to transform 4% of transport vehicles into electric vehicles by 2022 reaching 10% by 2030.
- A regional air quality convention through the GCC Green Initiative.
- Projects to reduce flaring during industrialization and extraction of oil and gas.
- Implemented programmes to keep domestic waste generation at not more than 1.6 kg per capita per day.
- Launched a tyre recycling project in Umm Al Afai, with a recycling rate of >60%.
- Adopted construction specifications that include greater use of recycled materials.

- Developed and issued national instructions on the management of medical and radioactive waste.

Qatar has also undertaken several projects to preserve its biodiversity.

Examples of key projects include:

- A study on biodiversity of wild birds through the Qatar Birds Project at the Friends of the Environment Center, and a project on biodiversity of lizards by the Ministry of Municipality and Environment and Qatar Foundation.
- An MME project to count and characterize the genetic resources of domestic animals.
- A pioneering and successful programme for the breeding and resettlement of endangered animals in captivity, especially the Arabian oryx, goitered gazelle, ostrich and houbara.
- Qatari Wildlife Rehabilitation Project to preserve the vegetation cover, rehabilitate natural areas (rawdat), and cultivate wildlife areas with localized plants.
- The project to identify, record, and conserve wild plants.



Flamingos in the north of Qatar

One key highlight in Qatar's efforts to fight climate change is QatarEnergy's Al-Shaheen Oil Field Gas Recovery and Utilization Project, which aims to reduce associated gas flaring.

The project has been accredited as a Clean Development Mechanism project since 2007 within the framework of the Kyoto Protocol. The UNFCCC approved the project for the crediting period from 2014 to 2021. The project is expected to abate approximately 1.2 Mt CO₂ eq each year during that period. In 2019, QatarEnergy also inaugurated the largest carbon capture and storage facility in the MENA region with a capacity of 2.2 Mt CO₂ eq annually.

Total future carbon capture and storage potential for Qatar is more than 9 Mt CO₂ eq annually. Further, in early 2021, QatarEnergy joined the World Bank's

Global Gas Flaring Reduction partnership. To showcase its commitment to climate action, Qatar hosted the COP 18 meeting of the UNFCCC in Doha in 2012, and has also committed to a carbon-neutral FIFA world cup in 2022. Many countries are shifting towards renewable methods of energy production. However, Qatar faces both natural and economic limitations regarding its ability to follow this pathway. Qatar is eager to decarbonize its economy while securing economic prosperity and efficiently managing its natural resources. Therefore, Qatar will strengthen its efforts to develop and apply state-of-the-art technologies to make the exploration and production of natural gas more efficient, safer, and environmentally friendly.

To achieve carbon mitigation goals, Qatar will employ a variety of policies and levers including the activities of stakeholders-institutions, corporations, and private citizens:

- Upstream: green energy and resources;
- Midstream: climate-friendly production processes; and
- Downstream: climate-friendly end-user products.



CLIMATE POLICY GUIDING PRINCIPLES



ARABIAN ORYX

The natural range of the Arabian Oryx covered most of the Arabian Peninsula, but hunting pressure resulted in the species being declared extinct in the wild by 1972. Oryx have been reintroduced to the wild from captive animals in a number of countries, and there are managed populations at several locations in Qatar.



3. CLIMATE POLICY GUIDING PRINCIPLES

The National Climate Change Action Plan incorporates relevant elements from pillars of environmental development, economic development and human development. It focuses on natural resource efficiency and supports Qatar’s implementation of green technologies. The approach to developing the NCCAP consisted of three main building blocks;

- 1. Balancing economic growth and climate protection
- 2. Optimizing regulation to accelerate change
- 3. Engaging stakeholders in a shared future vision

3.1 Balancing economic growth and climate protection

Qatar’s economic growth depends on the oil and gas sector, which is also the main contributor to greenhouse gas emissions. Therefore, economic development must be achieved by responsibly balancing the needs of economic growth and social development with requirements for environmental protection.

Qatar’s hydrocarbon-based economy faces double jeopardy due to the challenge of price volatility and the threat of depletion. Therefore, renewable energy strategies are crucial to maintaining a stable economy that will continue to thrive in the future. The adoption of renewable energy projects and other green initiatives will reduce greenhouse gas emissions, decrease the amount of oil and gas used in desalination and power generation, and satisfy growing energy demand. It will also provide opportunities to spur economic growth.

Innovative technologies and business models are essential to meeting Qatar’s environmental and economic diversification goals as it transitions to a low carbon global economy, while still maintaining the highest standards of safety, security and environmental protection.

Qatar sees an opportunity to build a diversified economy, fuelling growth and bringing Qatar into a new phase of economic prosperity. However, this requires investment now in both people and infrastructure. Schools and universities need to deliver the right mix of courses and research to provide necessary human capital, while the government and other stakeholders must ensure that national and local infrastructure supports new and emerging technologies (such as charging infrastructure for electric vehicles).

Qatar can begin to set the foundation for future generations by investing in future-proof technologies today. In many industries with long-lived assets, the year 2050 might be just one investment cycle away. This is especially relevant for assets with long operating lifetimes such as housing stock, gas networks, gas production facilities, and heavy machinery. Many of today’s capital investments will therefore influence greenhouse gas emissions for decades.

3.3 Engaging stakeholders in a shared future vision

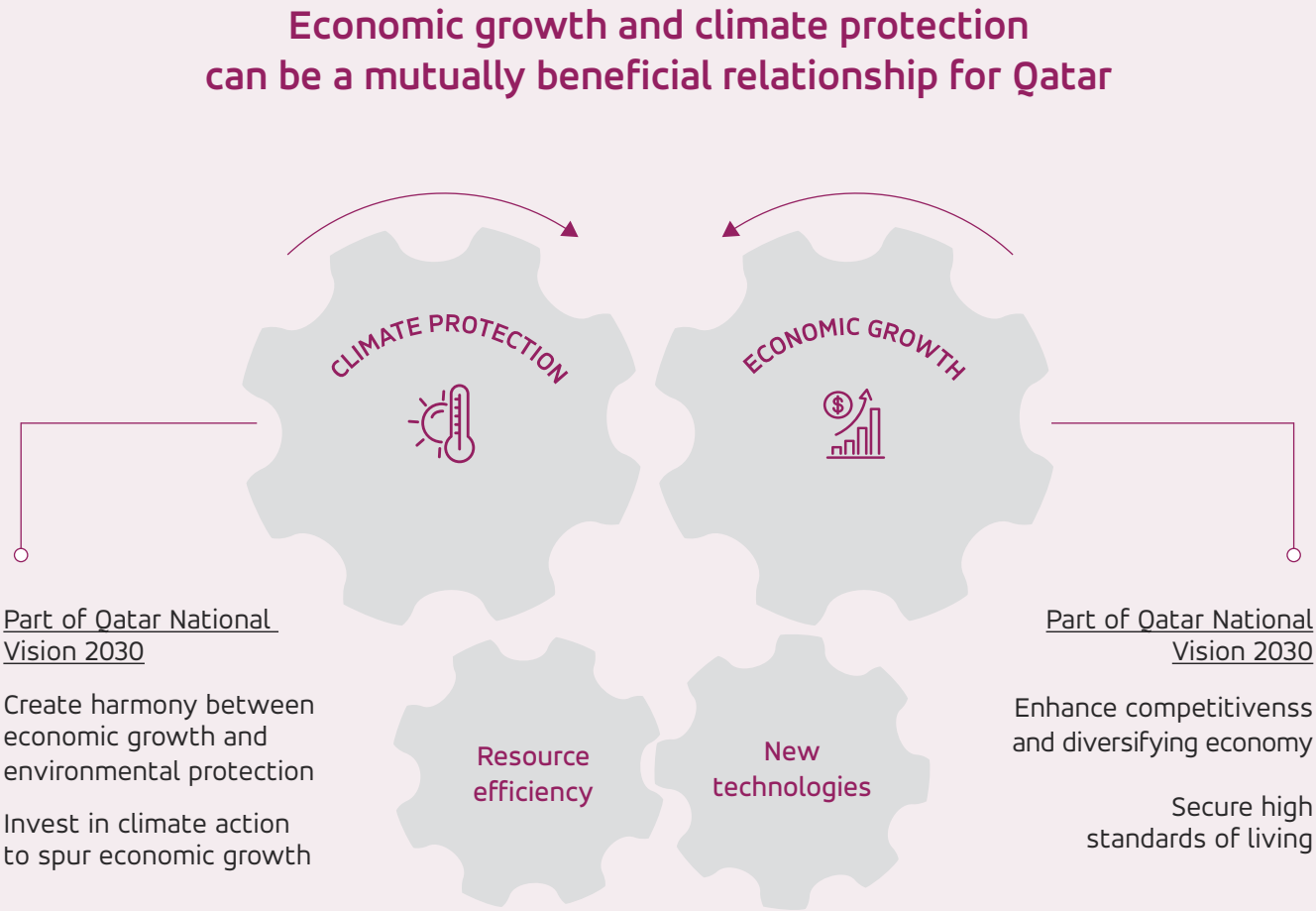
A shared future vision requires sector-wide and inter-sector dialogue, and communications between stakeholders at every level. It is important to achieve buy-in and consider climate change action as a joint undertaking by all. Rules and regulations alone are not sufficient to reach Qatar’s ambitious targets. Raising awareness is the first but perhaps the most important step to generating a shared understanding. Climate change action is a complex undertaking that requires continuous, long-term effort. Traditional methods such as media campaigns can help spark attention and interest but are not sufficient to drive long-term sustainable change.

Environmental education is key to understanding the specifics of climate change and developing potential countermeasures. Qatar therefore continues to invest in building the knowledge, skills and human capital necessary to develop and implement sustainable solutions. The employment market in Qatar will shift significantly as a result of the transition to green sectors. Some current roles will become obsolete, while others will be in strong demand and require a steady supply from the workforce. The rapid scaling of fast-growing sectors and industries related to climate change mitigation and adaptation will only be successful if the education and training system is well-prepared to support this shift.

Qatar’s National Climate Change Action Plan was prepared with strong participation and engagement from more than 50 organizations comprising public and private sector, and research institutions who will be closely involved in implementing the measures as set out in the National Climate Change Action Plan.

3.2 Optimizing regulations to accelerate change

Sustainable economic expansion depends on efforts to strengthen policies and related legislation. Enacting regulations and standards, fostering market development, and capacity building will accelerate the transition to a more sustainable economy. Regulations and standards provide a foundation for climate change action as they provide a framework for the behavior of citizens and corporations. Qatar has already passed ambitious legislation (for example, for water conservation) and continues to focus on developing regulations that further promote climate change action. Key sectors and areas will be targeted and prioritized to incentivize businesses and the population to embrace climate-friendly behaviour and accelerate environmental progress.



A shared vision and joint efforts focusing solely on Qatar will also not be enough to meet the global threat.

Moving towards global environmental sustainability requires effective and responsible institutions, and a culture of evidence-based policies supported by appropriate information systems. Strategic government-to-government partnerships are extremely important and useful, as are potential

partnerships with non-governmental stakeholders in other countries.

The global impact of climate change calls for global solutions. No country alone can solve the climate crisis. Hence, Qatar will continue to contribute to the global discussion by participating in international dialogue and hosting events where stakeholders share and exchange knowledge and solutions.

The National Climate Change Action Plan is based on intense involvement of key stakeholders across all sectors, with more than 50 organizations involved

SELECTION



CURRENT GREENHOUSE GAS EMISSIONS, TARGETS AND MITIGATION STRATEGIES

CAMEL

Arabian camels have been domesticated for approximately 3,500 years and have been long valued as pack animals. Today, nearly all of the world's camels are domestic animals.



4. CURRENT GREENHOUSE GAS EMISSIONS, TARGETS AND MITIGATION STRATEGIES

Qatar is steadfast in its commitment to combating climate change. The Paris Agreement is a strong motivator for policy development to address climate change and reduce carbon emissions. As a result, efforts are focused on limiting the Earth’s temperature increase to under 1.5°C, while also improving adaptation and resilience against an inevitably changing climate.

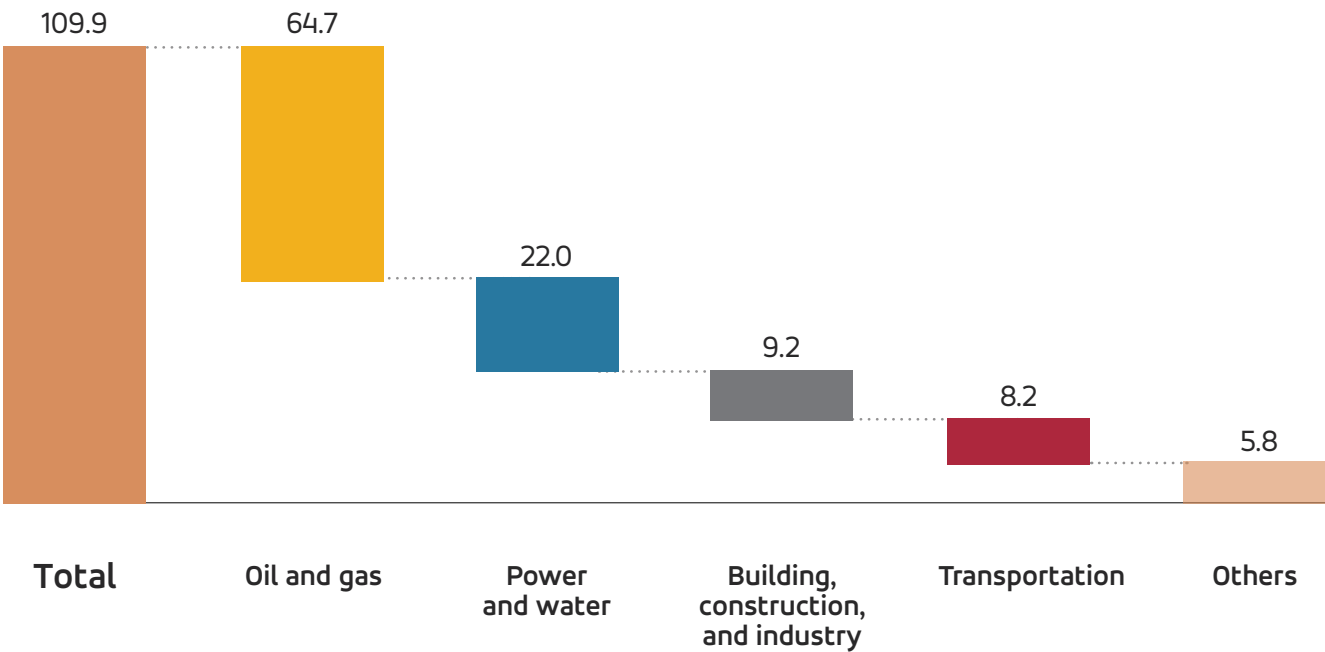
In 2019, Qatar recorded an annual carbon footprint of 109.9 Mt CO₂ eq. Oil and gas accounted for the largest share with 64.7 Mt CO₂ eq, followed by power and water at 22 Mt CO₂ eq, transportation at 8.2 Mt CO₂ eq, building, construction, and industry representing 9.2 Mt CO₂ eq, and 5.8 Mt CO₂ eq from all other sources.

Qatar’s target is to reduce greenhouse gas emissions by at least 25% by 2030 relative to business-as-usual. This will be achieved by specific measures in key sectors. These measures were developed after a thorough review of existing policies and programmes with key stakeholders.

Priority actions, when taken together, represent a significant step towards a climate-resilient future for Qatar. The National Climate Change Action Plan identifies 36 mitigation measures and over 300 adaptation measures. These are the result of consultations with more than 50 stakeholders across the country. To achieve the overall climate target for 2030, it will be necessary to reduce emissions in the oil and gas sector and energy-related emissions in the transport sector and in building, construction and industry.

The National Climate Change Action Plan follows on from four main documents: the Qatar National Vision 2030, the National Development Strategy-1 and -2, and National Determined Contributions. The National Climate Change Action Plan is a living document that will continue to be developed even while it is being implemented. Qatar is determined to lead, implement and inspire ambitious rapid climate change action in the region and beyond.

2019 Total emissions (Mt CO₂ eq)



4.1 Current greenhouse gas emission and targets

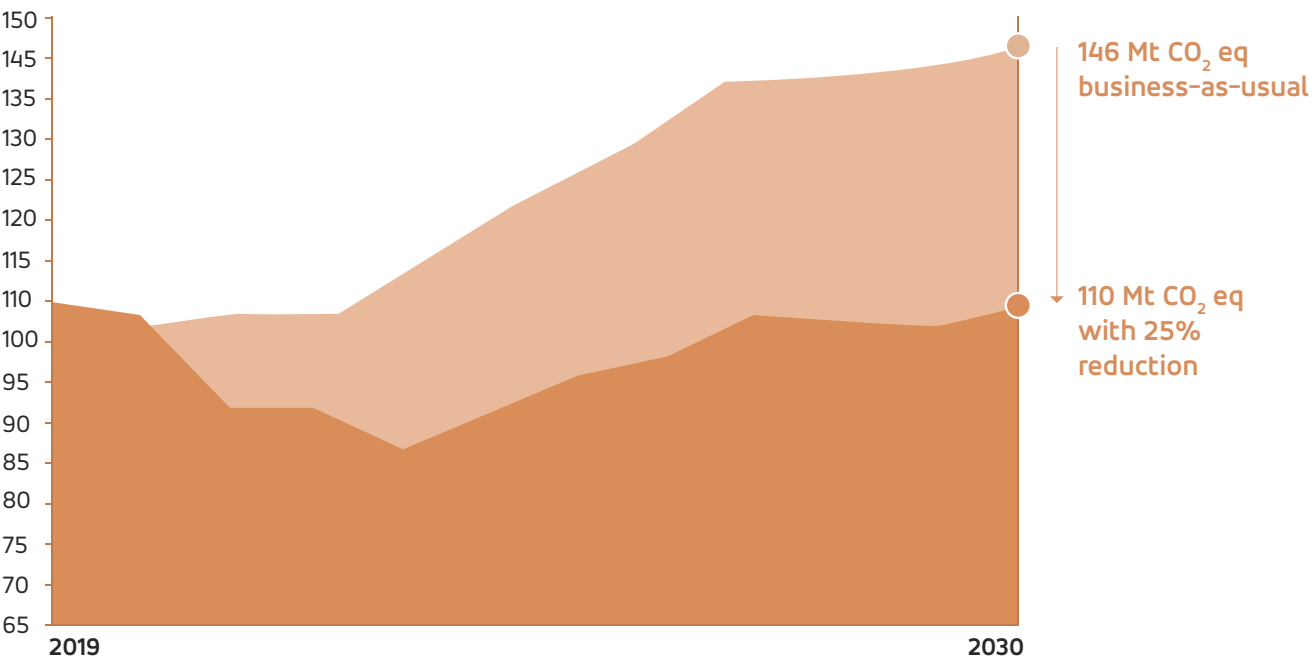
Greenhouse gas emissions in 2019 were 109.9 Mt CO₂ eq. Without any action, business-as-usual would increase the emissions by 33% to 146 Mt CO₂ eq by 2030.

This is primarily the result of increased global demand for natural gas products and a rising population in Qatar, leading to greater emissions from:

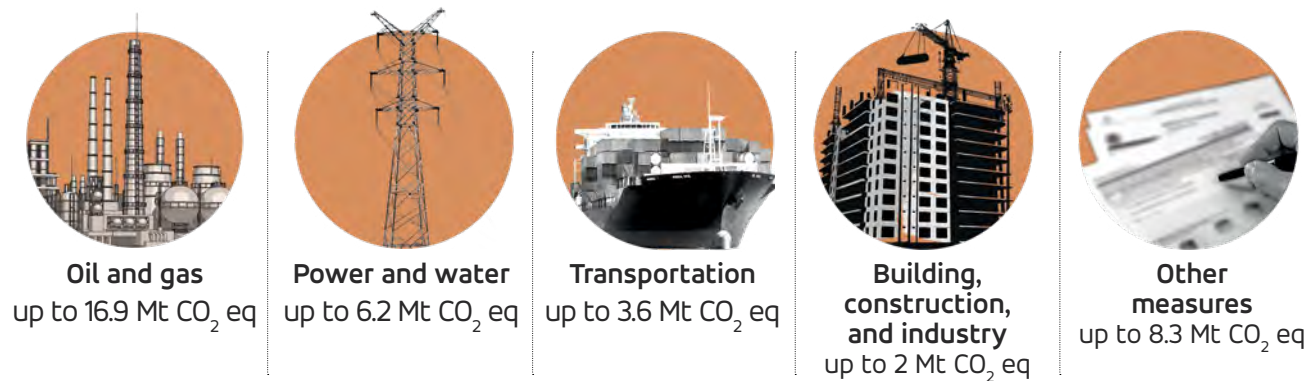
- strategic Northfield expansion projects;
- power generation and water desalination; and
- transportation.

A 25% reduction relative to business-as-usual would see a reduction of 37 Mt CO₂ eq by 2030. The National Climate Change Action Plan identifies 36 mitigation measures and over 300 adaptation measures. These have been validated across the various sectors and include reductions ranging between 13.8-16.9 Mt CO₂ eq in the oil and gas sector, 5.1-6.2 Mt CO₂ eq in the power and water sector, 3.0-3.6 Mt CO₂ eq in the transportation sector, and 1.6-2.0 Mt CO₂ eq in the building, construction, and industry sector. There are additional measures being validated and prioritized with the potential impact of up to 8.3 Mt CO₂ eq.

Qatar’s emissions in BAU estimated at 146 Mt CO₂ eq in 2030 -25% reduction is equivalent to 110 Mt CO₂ eq



Reduction targets by sector



4.2 Oil and gas



Energy production and consumption is the primary contributor to global greenhouse gas emissions. The energy sector is responsible for two-thirds of these emissions, with oil and coal accounting for nearly 60% of that figure. The energy sector therefore plays a central, critical role in climate change mitigation – driving change throughout the energy chain and accelerating decarbonization. Qatar relies heavily on the energy sector for economic growth and social development, and must strike the right balance between providing clean, accessible, and affordable energy while also being environmentally responsible.

Oil and gas contributes about 65% of total energy-related emissions in Qatar. This includes exploration, production, processing, marketing, and sales of oil and gas, liquefied natural gas (LNG), natural gas liquids (NGL), gas to liquids (GTL) products, refined products, synthetic fuels, fuel additives, petrochemicals, fertilizers, steel, and aluminum.

QatarEnergy, plans to reduce the carbon intensity of its LNG facilities by 25% by 2030, achieve zero routine flaring, and a 0.2% weighted methane intensity by 2025. To mitigate greenhouse gas emissions from their operations, QatarEnergy has invested heavily in advanced technology to increase energy efficiency and reduce flaring, and plans to introduce renewables over the coming years.

The following measures have been validated and will be implemented over the short to mid-term leading up to 2030, with targeted reductions of up to 16.9 Mt CO₂ eq in the sector.

Carbon capture and storage (CCS)

In 2019, Qatar successfully inaugurated the largest CO₂ recovery and sequestration facility in the MENA region with a design capacity of approximately 2.2 Mt CO₂ eq per annum. The facility exports CO₂ to the Dukhan oil field for enhanced oil recovery under the carbon capture, utilization, and storage (CCUS) model. Qatar has also completed a CO₂ injection project in QG-South. The project successfully injected approximately 1.2 Mt CO₂ eq into the reservoir by the end of its first year. Qatar is growing its carbon capture and storage projects with a plan to store more than 9 Mt CO₂ eq per annum by 2030, and plans for CCS facilities as part of the North Field expansion.

Flare reduction projects

QatarEnergy has implemented flare reduction projects since 2007, and commits to zero routine flaring for offshore facilities by 2030, and to reduce flaring for onshore facilities to the absolute minimum including non-routine flaring.

Key projects include:

- The Al-Shaheen Clean Development Mechanism (CDM) project expects to abate approximately 1.2 Mt CO₂ eq annually. Launched in 2007, it is one of the most significant flare reduction projects in the world and the first in the region to be registered with the United Nations Framework Convention on Climate Change (UNFCCC).
- The Ras Laffan Jetty Boil-Off Gas (JBOG) project reduces emissions by approximately 1.6 Mt CO₂ eq per annum by recovering boil-off gas during LNG loading. The facility started operations in October 2014, and now recovers over 90% of previously flared boil-off gas.

Methane emissions reduction

Methane is the second most abundant greenhouse gas after carbon dioxide, accounting for about 20% of global emissions. Methane is more than 25 times more potent at causing global warming than carbon dioxide. In 2018, QatarEnergy signed guiding principles and committed to reducing methane emissions across the natural gas value chain, including production and transportation.

These principles aim to measure and reduce methane emissions over time, improve accuracy of data on methane emissions, implement effective policies and regulations on methane emissions, and improve transparency. In 2019, QatarEnergy implemented a smart leak detection and repair (LDAR) programme in all upstream and downstream oil and gas industry facilities, and plans to move towards a fully integrated fugitive methane monitoring and repair programme across all assets in the country and have set a target of 0.2% weighted methane intensity for operated and non-operated facilities by 2025.

In addition, QatarEnergy has joined other leading energy players on the second phase of the Oil and Gas Methane Partnership (OGMP 2.0) for a more detailed and transparent methane reporting which provides a roadmap to meet the expectations of the gold standard.

Energy efficiency programme

Greater energy efficiency is a key element of the National Development Strategy-1 and -2. Qatar aims to improve efficiency in extracting, processing, and producing hydrocarbons and to achieve maximum energy efficiency while at the same time lowering greenhouse gas emissions.

Improved energy efficiency will see higher productivity, lower operational costs, and lower energy consumption. It also contributes to the conservation of finite natural resources. This energy efficiency programme includes several projects in LNG upstream and downstream facilities, as well as projects in GTL. Manufacturing processes have also undergone structural adjustments to boost energy efficiency.

Qatar successfully developed an in-house energy efficiency tool that monitors energy use relative to design specifications, and identifies areas for improvement.

The following initiatives will be implemented by 2025:

- seasonal optimization of gas turbine generators and boilers;
- improved measurement, balancing for fuel gas, steam; and
- improved reliability of heat recovery steam generators (HRSG).

In the future, Qatar aims to further increase efficiency using innovative technologies and processes including energy efficiency performance monitoring, improved waste heat recovery systems, and recycling of excess fuel gas / off-gas.



4.3 Power and water

Power and water are the second largest contributors to Qatar's greenhouse gas emissions. Demand for water and electricity will rise as the population and economy grow, and as major infrastructure development continues.

The region historically has one of the highest rates of power and water consumption per capita. Qatar is no exception – with harsh climatic conditions and scarcity of natural resources being the main drivers for high demand. The energy sector plays a crucial role in meeting these challenges, generating electricity using natural gas and urban water through energy-intensive seawater desalination. These challenges are addressed in the Qatar National Vision 2030 and the National Development Strategy-1 and -2, which prioritise sustainable consumption of scarce natural resources and preservation of the environment for future generations.

Mitigation measures in the power and water sector will lower emissions up to 6.2 Mt CO₂ eq through reduced consumption, increased capacity of clean technologies, such as solar, and the adoption of less resource-intensive technologies. Qatar will also begin decommissioning ineffective plants and commercial operations.

Water conservation regulation



Water demand has increased over the last ten years by an average of 10.6% annually. Qatar's water security goals depend on water conservation, effective water usage, and water recycling. In 2012, Qatar launched a National Program for Conservative and Efficient use of Water and Electricity (Tarsheed). The Tarsheed Program has successfully raised long-term awareness of water and energy waste across all sectors, and reduced per capita consumption of electricity and water by 17% and 18% respectively. Qatar has also

strengthened its national conservation laws, and passed laws to reduce domestic consumption and encourage adoption of water and electricity-saving technologies. An example of this is the prohibition on using desalinated potable water for cooling and instead requiring the use of treated sewage effluent or seawater as substitutes.

Energy conservation in buildings

Qatar has implemented improved standards for domestic and industrial electrical and electronic equipment such as air conditioners, thereby reducing electricity consumption in buildings. Qatar also promotes development and use of large-scale centralized district cooling, with a range of energy and infrastructural cost and consumption benefits.

Renewable energy expansion

Renewable energy is the world's fastest-growing energy source, with potential to meet between 36% and 67% of global electricity demand. It is predicted to generate 19% of global energy by 2040. Integrating renewables into Qatar's energy mix is an opportunity to free up energy production for export, lower the quantity of oil and gas required for desalination and power generation, and reduce greenhouse gas emissions. Qatar is developing and implementing a renewable energy strategy and associated projects.

- Qatar General Electricity and Water Corporation-Kahramaa is collaborating with the Emirati Masdar Company and the Qatari Nebras Company to develop renewable and sustainable energy projects. As a result, Kahramaa plans to generate 200 MW of solar energy, increasing to 500 MW in the future as demand rises.
- The Qatar Solar Project will generate 800 MW of power using photovoltaic solar technology in Al Kharsaa. Phase 1 will deliver 400 MW in 2021, with Phase 2 following a year later. Additional solar capacity will be provided by two 400 MW plants planned for QatarEnergy industrial cities. These projects will be operational by 2025 and will benefit LNG and petrochemical expansion projects.

- In 2014, Qatar Foundation installed 13,000 solar panels at Education City with total capacity of 1.9 MW. Qatar Foundation has taken the lead in researching and testing renewable energy solutions, and has established an Energy Monitoring Centre to measure smart grid performance and provide data for research.

Enhanced energy and water production efficiency

The Doha North Sewage Treatment Plant is the largest wastewater treatment facility in the region, and the first to include a thermal drying plant. This process significantly reduces the amount of biosolids sent to landfill and minimizes drinking water waste. From this plant, and others, Ashghal provides its customers with high-quality treated wastewater for non-potable uses, including cooling, landscape irrigation, fodder cultivation, road



Solar Panels at Qatar Foundation Qatar Environment and Energy Research Institute, part of Hamad Bin Khalifa University, outdoor test facility.

beautification, and cleaning sand for construction. The National Development Strategy-2 prioritizes efficient water management as a key adaptation measure. These measures include expanded use of treated sewage effluent and development of water management in industrial zones. In 2015, the volume of treated sewage effluent reached 98.2% of total wastewater.



Kahramaa Battery storage power station.

4.4 Transportation

Qatar aims to provide a safe, efficient, reliable, and environmentally friendly transportation system, with multimodal options to meet the needs of the community. The country is on track to upgrade and develop its transportation systems in line with Qatar National Vision 2030 sustainability goals. These initiatives include the Doha Metro and Lusail Tram projects, expressways, bridges, underpasses, intersections, and several private tram systems – with greater investment planned in the future. Shipping and aviation also play an important role in the country's climate action strategy despite not being directly accounted for in the national emission footprint.

Personal vehicles are still the preferred mode of transport in Qatar and contribute significantly to greenhouse gas emissions in this sector. Qatar is implementing measures to increase the use of public transport and promote the use of clean fuels in private and public transportation. Stricter emission standards and greater use of public transportation will deliver emissions reductions of up to 3.6 Mt CO₂ eq.



Hamad Port

Increased use of public transportation

Qatar will reduce emissions by increasing the share of public transportation, and through the greater use of electric vehicles for public transportation. The new Doha Metro and Lusail Tram projects provide an integrated public transportation network and reduces use of personal vehicle use by commuters. They also contribute to reduced traffic congestion and fewer road accidents. Plans are in place to expand the national railway network beyond current levels.

Improvements in the shipping and aviation sectors

In April 2017, Hamad International Airport (HIA) achieved Level 3 in the Airport Carbon Accreditation programme. The award demonstrates commitment to tackling climate change and improve carbon efficiency per passenger by 30% by 2030 compared to the 2015 baseline. HIA measures and monitors

carbon emissions generated by airport operations, including emissions from air-conditioning, internal and external lighting, wastewater treatment, and use of road vehicles.

Hamad Port Container Terminal 2 has 22 advanced electric tractors for transporting containers within the port. These vehicles are highly efficient and environmentally friendly, emitting no CO₂ and producing almost zero noise.

Fuel economy and tire rolling resistance standards

Qatar is investing in environmentally friendly fuels that can be blended with existing fuels to minimize greenhouse gas emissions. GTL blending and increased use of CNG fuel are two examples of current initiatives.

- Natural gas is becoming increasingly popular as a transportation fuel. This trend is expected to continue due to the economic and environmental benefits, including lower running costs, lower emissions and pollutant levels, and longer engine life. The reduction of carcinogenic particulate matter is another important health benefit of CNG. Furthermore, CNG vehicles do not emit evaporative pollutants because the fuel systems are totally sealed.
- QatarEnergy is at the forefront of promoting CNG as an alternative transportation fuel and encouraging its use in industrial areas. Existing diesel buses operating in industrial areas are being phased out and replaced with a new CNG fleet. The plan includes the use of CNG buses during the construction phase of future LNG projects. Mowasalat (a local provider of public transport) is also operating a pilot CNG station in Doha.
- GTL diesel blending has many positive environmental benefits and helps reduce environmental emissions. GTL diesel fuel has reduced carbon monoxide, hydrocarbon, and particulate emissions. Furthermore, GTL diesel contains almost no sulfur and no aromatic compounds.

Improved efficiency standards for vehicles

Qatar will set new corporate average fuel economy standards for road transportation, addressing fuel economy and efficiency for all new light-duty vehicles. In addition, Qatar will implement tire rolling resistance standards, mandatory retirement for older cars, age restrictions on imported vehicles, and periodic emissions inspections for all vehicles.

New light-duty vehicles sold in Qatar will be required to meet Euro 6 requirements, and heavy-duty vehicles to meet Euro 6 criteria. Fuel efficiency and tire rolling resistance standards will be established for light-duty vehicles to reduce overall fuel consumption and emissions. The future will see the wider adoption of Euro VI emission standards and a shift towards greater use of electric vehicles for private use.

Electrification of private cars, buses and taxis

Currently, greenhouse gas emissions are caused using conventional fuels in the taxi and bus fleet of Qatar's public transport provider Mowasalat.

Qatar will reduce emissions through increased use of electric vehicles for public transport. The current vehicles will be replaced with environmentally friendly alternatives with 100% electrification of the entire fleet. Qatar has already initiated the electrification of 25% of its public bus transport system ahead of the FIFA World Cup 2022.

To achieve this ambition, Qatar is also committed to build the required infrastructure, including charging infrastructure in parking lots and bus depots as well as facilitating battery replacement.

4.5 Building, construction and industry

The construction and building sectors play a significant role in Qatar's development and its response to anticipated population increases and economic growth. This comes with an environmental impact through increased greenhouse gas emissions, solid waste generation, pollution, and increased demand for already scarce natural resources.

Qatar's infrastructure is critical to residents' well-being and safety, and must be adapted to Qatar's extreme weather conditions. Energy requirements for cooling and lighting are high, as is demand for water both during construction and later in operation.

Several initiatives have already resulted in significant energy and water savings. Among these are improved minimum energy performance standards and labeling for air conditioners, phasing-out of incandescent lamps, LED retrofits, and audits of large consumers. Qatar will also begin promoting the use of environmentally friendly battery-powered

generators during construction. These and the other measures identified in the National Climate Change Action Plan have the ability to reduce emissions up to 2 Mt CO₂ eq.

Green building standards

Qatar developed and adopted Global Sustainability Assessment System standards, the region's first performance-based system for rating green buildings and infrastructure. The number of projects registering for GSAS certifications is rapidly increasing, driving a transition to greener and more sustainable buildings. Qatar currently has the highest number of buildings (1406 buildings) with GSAS green building standards.

Qatar Foundation established the Qatar Green Building Council in 2009 as a non-profit organization to promote sustainable infrastructure. The Council advises hotels on improved environmental standards for energy and water conservation, and certifies hotels in accordance with the Qatar Tourism Authority's new hotel sustainability classification system.

The second phase of the expansion of Hamad International Airport will make it the first airport in the MENA region to be awarded a 4-star Global Sustainability Assessment System (GSAS) rating. The terminal will also be a LEED Silver-certified structure with innovative energy-saving measures across the entire building.

There is also a greater emphasis on sustainability in private sector developments, with an increasing number of residential solar panel installations.

Recycling construction and other waste

Qatar is investing in programmes to increase waste recycling rates and raise environmental awareness about reducing the quantity of domestic solid waste, with the goal of recycling 15% of solid waste.

The amount of construction waste is expected to decrease as FIFA World Cup infrastructure and related demolition and rebuilding of enterprises

nears completion. This is nevertheless an important area with potential to reduce emissions and improve environmental protection.

Qatar's Public Works Authority – Ashghal – has several initiatives based on the circular economy concept. These include recycling and reusing construction waste, including asphalt, crumb rubber, steel slag, and demolition and drilling waste. These initiatives saw, for example, 60 million tons of demolition waste used for road projects.

The tire recycling project in Umm Al Afai has a recycling rate of more than 60%, with recycled material used to enrich bitumen. This improves stability and durability of asphalt mixtures, increases flexibility, reduces cracking and road noise, lowers the cost of roadwork, and reduces landfill pollution. Recycling construction waste also reduces demand for new raw materials, lowers environmental impacts caused by landfill, and promotes the efficient use of natural resources.



Qatar Foundation Headquarters



Construction of skyscrapers, Doha

CLIMATE CHANGE ADAPTATION MEASURES



YELLOW-SPOTTED AGAMA LIZARD

*There are more than 21 species of lizards in Qatar,
with the most common being Gekkonidae.*

5. CLIMATE CHANGE ADAPTATION MEASURES

The world is already experiencing changes in average temperature, shifts in seasons and an increasing frequency of extreme weather events and other climate change impacts. Countries and individuals must adapt to these changes as a matter of urgency. Adaptation measures are defined as adjustments in ecological, social, and/or economic systems in response to actual or expected climatic stimuli and their effects or impacts, to moderate potential damages or to benefit from opportunities associated with climate change.

The breadth of activities needed for adaptation requires participation from a wide range of stakeholders. Governments cannot achieve this change without the commitment and involvement of national, regional, multilateral and international organizations, the public and private sectors, civil society and all other relevant stakeholders.

The National Climate Change Action Plan 2030 details more than 300 adaptation measures. A full list of current programmes and initiatives can be found online¹.

5.1 Economy

Qatar's economy is overwhelmingly driven by the availability of natural gas and petroleum resources. However, the National Development Strategy-2 looks to diversify the economy by 2030, making it more knowledge-based and at the same time more resilient to disruption in the petrochemical market. Qatar recognizes the importance of foreign direct investment and domestic private sector participation in economic infrastructure and diversification. Steps are being taken to reprioritize economic projects that meet the goals of the National Development Strategy-2, including a comprehensive overhaul of legislation. In this way, investment and capital will be channeled towards projects and enterprises that support diversification.

Economic diversification also requires diversifying by broadening and strengthening of the national production base, promoting domestic and foreign investment, and creating and exploiting opportunities for entrepreneurialism. Innovation and creativity are key to this objective, along with strengthening of the business environment and market efficiency through institutional, infrastructural, legal, regulatory and procedural improvements.

Qatar's strategy for economic diversification and private sector development focuses on two main areas; (i) productivity and competitiveness, and (ii) private sector-led growth. Priority sectors have been identified to serve as foundations for development of sector-specific and cross-sectoral initiatives.

Priority sectors include:



Tourism



Logistics



Manufacturing



Financial services



Information and communication technology



Professional and scientific activities

Several governmental entities have already adopted measures to encourage sustainable development, economic diversification and the growth of the green economy. The Ministry of Commerce and Industry provides incentives for sustainable foreign

direct investment and is working to develop measures to encourage businesses to become more environmentally focused and sustainable – for example through the exemption of registration fees for electric vehicles.



Pearl Qatar island in Doha

¹www.mme.gov.qa

5.2 Infrastructure

Qatar has a comprehensive urban development policy and plan for sustainable urbanization and population distribution. The Qatar National Development Framework manages growth and helps build sustainable communities in line with the Qatar National Vision 2030 and the National Development Strategy-1 and -2.

Infrastructural improvements focus on sustainability, adaptation and resilience.

The FIFA World Cup 2022 stadiums are designed and constructed to very high standards of sustainability and leave a long term legacy for future generations. Other projects related to sustainability and adaptation include the Qatar Integrated Railway Program, the expressway programme, roads and drainage, sustainable residential complexes in Lusail City and Msheireb Downtown, and the national integrated solid waste management programme.



The Khalifa Avenue Project connects Al Rayyan road with Dukhan Road, as well as Al Gharrafa Street, Huwar Street and Al Furousiya Street.

5.3 Water management

Qatar obtains most of its urban water supply from seawater desalination, using energy-intensive technologies. Strategic objectives for water management are to (i) reduce domestic and industrial water consumption, and (ii) improve the energy efficiency of the water supply chain throughout the entire value stream. Qatar has implemented measures to conserve water and reduce consumption, with the additional benefit of also reducing associated emissions. Key measures to reduce water consumption include increasing awareness via direct messaging to residential customers with high consumption, retrofitting and replacing aerators in government facilities, and switching to treated sewage effluent for irrigation in parks. Further improvements have been made by requiring recycled water to be used in district cooling, construction, and for a growing number of other uses.

Qatar has invested significantly in water recycling. For example, in 2015, 98.2% of total wastewater was treated and recycled for non-potable uses. This amounted to 194 million cubic meters of treated sewage effluent, of which around 66 million cubic meters was used in agriculture, around 31 million cubic meters for irrigation of green landscapes and public parks, and about 57 million cubic meters for deep injection into non-freshwater aquifers. Qatar has also strengthened legislative and regulatory controls, passing the National Water Law and associated bylaws. Additional legislative and regulatory measures are being prepared, for example to regulate drilling of groundwater wells. Qatar is also home to delicate marine and littoral habitats. Water management and water conservation measures help protect and preserve biodiversity by reducing, monitoring and controlling water pollution.



Kahramaa Water Reservoir Project

5.4 Healthcare

Qatar recognizes that climate change has a serious impact on national public health and communal well-being. Higher temperatures and humidity, more frequent and more severe extreme weather events, pollution, climate driven migration and increased population densities, and higher incidences of disease are just some of the potential effects. Qatar is meeting these challenges through the National Development Strategy-1 and its National Health Strategy-1 and -2.

Key objectives are:

- a comprehensive world class health system;
- an integrated healthcare system;
- preventive healthcare;
- skilled national workforce;
- national health policy;
- effective and affordable services based on cost-sharing principles; and
- high-quality research.

Qatar's Ministry of Public Health engages continuously and is aligned with the World Health Organisation. The Ministry has initiated studies to identify and better understand the impact of climate change on public health in Qatar and the effects of natural and man-made pollution. Other research is developing tools that will help forecast climate change related disease based on historical data, and develop suitable adaptation measures. The Ministry leads efforts to raise awareness of climate change related impacts on the health sector. For example, in 2021 the Ministry circulated a report among all healthcare institutions giving details on how to improve capacity and improve their ability to deal with climate change related diseases.

Ministry of Public Health also leads an intra-governmental climate change committee, with representatives from all sectors, aimed to obtaining World Health Organisation "Healthy City" certification for Doha ahead of the FIFA World Cup 2022.



Sidra Hospital, Doha, Qatar

5.5 Biodiversity

Biodiversity is a key part of Qatar's heritage, culture, and future. It forms the basis for food security and for sustainable agricultural development by providing food, medicine, clothing, housing, energy, and raw materials. Natural habitats help mitigate the effects of climate change by absorbing excess flood water, acting as barriers against coastal degradation and extreme weather events, and absorbing greenhouse gas.

The National Biodiversity Strategy and Action Plan is based on the Qatar National Vision 2030; it aims to prevent, minimize and offset potential damage to ecosystems while at the same time adapting biodiversity to climate change. Qatar's action on climate change goes hand-in-hand with sustainable resource use and conservation, and the preservation of biodiversity.

Key initiatives include:

- improving scientific knowledge of Qatar's biodiversity;
- raising public awareness and participation in biodiversity conservation;
- conserving Qatar's marine biodiversity and coastal habitats;
- protecting and managing declared protected areas;
- incorporating biodiversity conservation into national planning processes;
- building local capacity for biodiversity conservation; and
- improving and implementing knowledge of biosafety issues.

Qatar has enacted laws to protect wildlife and natural habitats, and has commissioned projects to improve protection and awareness of biodiversity issues. These projects include the establishment of a biodiversity database, research projects to identify and classify new species, breeding and resettlement programmes for endangered animals, and several marine projects.



The Black-Winged Stilt bird in Al Karaana Lagoon

5.6 Food security

Food production in Qatar is challenging due to its hot desert environment, severe lack of rainwater and scarcity of fertile soil. Qatar's national food security strategy optimizes local food production capacity while also protecting domestic food demand from external supply disruptions. This is becoming increasingly important, especially as rising weather-related disasters threaten crop yields and supply chains both abroad at major exporting countries as well as in Qatar.

Key initiatives in the food security strategy include:

- geographically diversifying trade partners for critical food commodities;
- increasing Qatar's levels of self-sufficiency in critical perishable commodities;
- establishing strategic reserves for essential storable commodities; and
- developing transparent and efficient internal food supply chains.

In addition, the annual national Food Security research programme - co-funded by the Qatar National Research Fund and the Ministry of Municipalities and Environment - is promoting research towards the sustainable intensification of local food production and logistics in Qatar: developing innovative irrigation and cooling systems, breeding locally adapted crop varieties

and livestock species, and the development and application of state of the art information technologies. Also taking into account the increasing risks of severe weather events (storms and floods) as well as higher temperatures and humidity levels expected in the very near future.

Qatar has increased domestic self-sufficiency, for fresh dairy and poultry products, vegetables, red meat and fisheries, and is in the process of phasing out groundwater based fodder production towards the use of recycled water. The ongoing shift to protected, climate controlled cropping systems has increased vegetable production yields, contributing to the goal of 70% self-sufficiency, while at the same time reducing overall water consumption and improving the resilience to climate change. The fish farming project reduces stress on local fish stocks and further improves food security. Qatar is also building transparency and efficiency in its domestic market through farmer support programmes, food waste reduction programmes, food safety and food quality standards governance initiatives. These also contribute to more intensive and sustainable agriculture practices including better use of agrochemicals, improved waste management, and better water and energy efficiency.

Finally, all food security initiatives planned and implemented will be reviewed and monitored against climate change adaptation and mitigation criteria.



Locally grown greenhouse tomatoes

Food self-sufficiency in Qatar

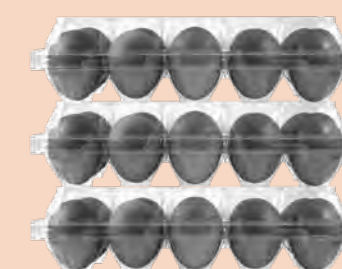
Increase red meat production



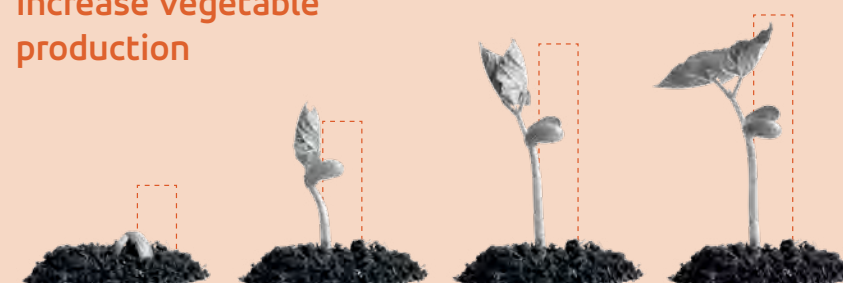
Increase fishery production



Increase dairy and poultry production



Increase vegetable production



Strategic reserves



Develop a hydroponics greenhouse cluster



70% Self-sufficiency on greenhouse vegetables

ENABLERS FOR IMPLEMENTATION



FALCON

Hook-beaked and sharp-visioned, falcons are birds of prey. A crucial part of the rich heritage and culture of Qatar, falcons are highly honoured and celebrated as the national bird of Qatar.

6. ENABLERS FOR IMPLEMENTATION

Implementing adaptation and mitigation measures requires a greater awareness and willingness to act by all community members. Stakeholders also require financial support, knowledge, education and training, and technologies to implement adaptation and mitigation actions and to monitor and report performance.

6.1 Community awareness and communication

Growing dependence on fossil fuels for vehicles and buildings, and rising electricity and water consumption confirm the need for a shared understanding of climate change causes and effects. Promoting environmental awareness allows decision-makers to place climate change in context with other challenges facing Qatar and the world. Better community awareness and understanding also reduces the spread and impact of false and misleading information, promotes necessary societal and behavioral change, and generates a greater willingness to act at every level.

The National Development Strategy-1 and -2 emphasize the need for greater environmental awareness. This requires collaboration and cooperation between all groups and members of society. Decarbonizing the economy requires massively reduced consumption. This can to some extent be achieved by the government through technical and financial measures, but true success requires communities and individuals to change the way they behave with regard to energy consumption.

Qatar has implemented a series of campaigns aimed at making its citizens more aware of behaviors and practices that harm the environment or contribute to climate change.

Key features include:

- programmes in schools and institutions;
- government and employer-led awareness campaigns;
- national and international media presence;
- involvement of Qatar's youth and climate activists;
- engagement of local stakeholders and community leaders; and
- use and exploitation of social media.

Community institutions advocate for climate change by organizing periodic events. This encourages people, groups, and organizations to take responsibility for their actions.

Some examples include:

- The National Program for Conservative and Efficient use of Water and Electricity (Tarsheed) has successfully raised long-term awareness of water and energy waste in the community, and reduced per capita electricity and water consumption.
- Kahramaa Awareness Park, a water and electricity museum, encourages the community to make their homes, workplaces, and lifestyles sustainable using alternative energy sources.
- Qatar Foundation encourages businesses and the general public to adopt more sustainable habits and practices, and promotes discussion and debate on climate change health-related issues by hosting forums such as the biannual WISH conference.
- Qatar Green Building Council has several events and programmes to promote awareness and raise the profile of environmental and climate change issues including the Qatar Sustainability Awards, Green Key Certification, and the Eco-School and Eco-Event Programs.
- Hamad Bin Khalifa University and Texas A&M University hosted the 12th International Exergy, Energy, and Environment Symposium (IEEEES-12) and Energy Education of the Future Forum to discuss sustainability-related topics.



World Innovation Summit for Health at Qatar Foundation

6.2 Environmental education and human capital

More education on the environment and climate change is a key enabler for the National Climate Change Action Plan objectives, programmes and initiatives. It is essential to raising community awareness of climate change and environmental issues, and also to providing necessary skills, knowledge and human capital.

Climate change and environmental subjects are incorporated into school and university curriculums, adult and community education and awareness programmes, and training and workshops for professionals, technical and civil groups. For example, Qatar's Eco-School programme promotes environmental education and awareness in primary and secondary schools by integrating climate change topics into curricular and extracurricular activities.

The Ministry of Education and Higher Education operates several environmental research centers, including the Qatar Environment and Energy Research Institute. These institutions are tasked with improving knowledge and understanding of environmental and climate change science, and developing technical solutions to meet associated needs and challenges. The Ministry also offers accredited courses in environmental and sustainable development related subjects and promotes study of these disciplines.

Other projects combining education and awareness include:

- Qatar Foundation operates green campus and housing facilities that reduce its ecological footprint and raise awareness within the student body. On-campus campaigns are instrumental in developing a generation more aware of climate change and its causes, and capable of developing and implementing sustainable solutions.
- The Supreme Committee for Delivery and Legacy has organised environmental training and workshops on emission reduction projects and carbon pricing, helping to raise community awareness and understanding.



Qatar National Convention Centre in Education City, Qatar Foundation

6.3 Technology, research and development

Technology and innovation supports mitigation and adaptation across all sectors by helping to develop locally relevant solutions. Innovation can improve current technologies and provide new solutions to the challenges presented by climate change, including emissions reduction, environmental degradation, waste management, and water scarcity. In addition, technical innovation often comes with a range of wider social benefits.

Qatar has shown its ability to develop new technology and to quickly adopt existing solutions through global partnerships and a growing set of research and technology development institutions. Examples include carbon capture and storage, liquid biofuels, building efficiency and adaptation to extreme climates, and renewable energy solutions.



Researchers at Qatar Environment and Energy Research Institute (QEERI), part of Hamad Bin Khalifa University

6.4 Incentives and regulation

Effective and appropriate laws and regulations encourage behavioral and societal change amongst individuals and businesses, and are a vital enabler for mitigation and adaptation strategies, programmes and initiatives. Regulations establish minimum levels of conduct and efficiency, and can be effective at ending the use of inefficient technologies. Qatar is comprehensively reviewing and revising its legal and regulatory framework related to climate change and environmental protection to align these with the National Climate Change Action Plan objectives. Other incentive based enablers include subsidies, grants, and rewards (monetary and non-monetary).

Examples include:

- policy and incentive mechanisms to promote private sector participation;
- minimum energy performance and efficiency standards for buildings and industrial systems;
- incentive mechanisms to promote the use of electric vehicles by private individuals and businesses;
- incentive mechanism to promote the use of public transport; and
- environmental protection laws and enforcement.



IMPLEMENTATION



RÜPPELL'S SAND FOX

The Rüppell's Sand Fox is adapted to life in the desert; its ears are longer than its head to help it cool off, and it has soft fur on the pads of the paws to protect itself from the heat of the sand.



7. IMPLEMENTATION

The success of the National Climate Change Action Plan depends on effective execution and proper governance. Qatar formed the National Climate Change Committee at Cabinet level. The Committee oversees and is accountable for implementing the National Climate Change Action Plan and achieving its targets based on the following principles:



Single point of ownership and responsibility

- dedicated delivery unit, based in the Ministry of Municipality and Environment, as overall owner for implementation at national level;
- detailed stakeholder implementation plans for each project and initiative; and
- clear ownership and monitoring of timelines, milestones and performance.



Structured data collection and reporting

- implemented across all stakeholders;
- accurate data collection through National Measurement, Reporting and Verification system; and
- adherence to UNFCCC and international guidelines.



Robust governance, intervention systems and protocols

- capture progress, risks, challenges and opportunities;
- timely identification and response to threats and opportunities;
- efficient coordination between stakeholders; and
- effective escalation and faster decision-making.



Regular review of the National Climate Change Action Plan

- annual review to measure performance against targets and include updates of new programmes and initiatives;
- a comprehensive review every five years prior to publishing Nationally Determined Contributions; and
- updated in accordance with the Paris Agreement and to reflect and incorporate technological, political, social and economic developments.

