



DEWA CLIMATE CHANGE REPORT 2021





By His Excellency Saeed Mohammed Al Tayer
MD&CEO, Dubai Electricity & Water Authority

FOREWORD

Cities around the world are increasingly suffering from the harmful effects of climate change; such as floods, droughts, sea level rise, heatwaves, landslides, and storms. In the UAE, we have set clear strategies and plans to deal with climate change and address its overall impact. Building a climate-resilient economy to combat climate change is a prerequisite for the UAE and Dubai in acceleration towards a carbon neutral economy.

The UAE has recently announced a strategic initiative to achieve climate neutrality by 2050 driven by a clear strategy and a roadmap to achieve net zero carbon emissions and reach 100% of clean energy by 2050; making the UAE the first country in the Middle East and North Africa to do so. We will do this by intensifying the nation's efforts to achieve sustainable economic growth with a direct positive impact on the GDP.

Locally, Dubai Government works closely with organisations that are addressing climate change and its impact, and has also set mitigation and adaptation plans for the Emirate such as: Dubai Clean Energy Strategy 2050 and Dubai Climate Change Adaptation Strategy. Moreover, Dubai also achieved significant reductions in carbon emissions. Net CO₂ emissions in Dubai were decreased by 33% in 2020 compared to BAU, exceeding the target of the Dubai Carbon Abatement Strategy 2021 by more than double. Also, the Dubai Demand Side Management Strategy 2030, which has 11 programmes, achieved significant results between 2011 and 2020. In 2020, the annual per capita consumption of electricity was decreased by 23%, and water consumption was lowered by

21% compared to 2010. The total savings were 25 TWh of electricity and 40 billion imperial gallons of desalinated water, equivalent to a reduction of 11.5 million metric tonnes of carbon dioxide emissions for the same period. Dubai has also joined the world's C40 Cities Climate Leadership Group, becoming part of an elite group of the world's cities committed to fighting climate change. This is a recognition of the city's advanced role in environmental protection.

As the sole provider of electricity and water for the Emirate of Dubai, we recognise the impact that DEWA has not only in the UAE but on the region and the world. At DEWA, we are committed to support the objectives for all relevant climate change strategies of the UAE and the Emirate of Dubai by setting clear mitigation and adaptation action plans to ensure a climate-resilient economy for the power and water sector of Dubai. Sustainability continues to lie at the heart of our strategy at DEWA, stemming from the directives of the leadership of the United Arab Emirates and Dubai.

Despite the pandemic, we maintained our business continuity by implementing our sustainable projects and initiatives, as well as mitigating climate change by balancing economic development and preserving a clean, healthy, safe, and sustainable environment.

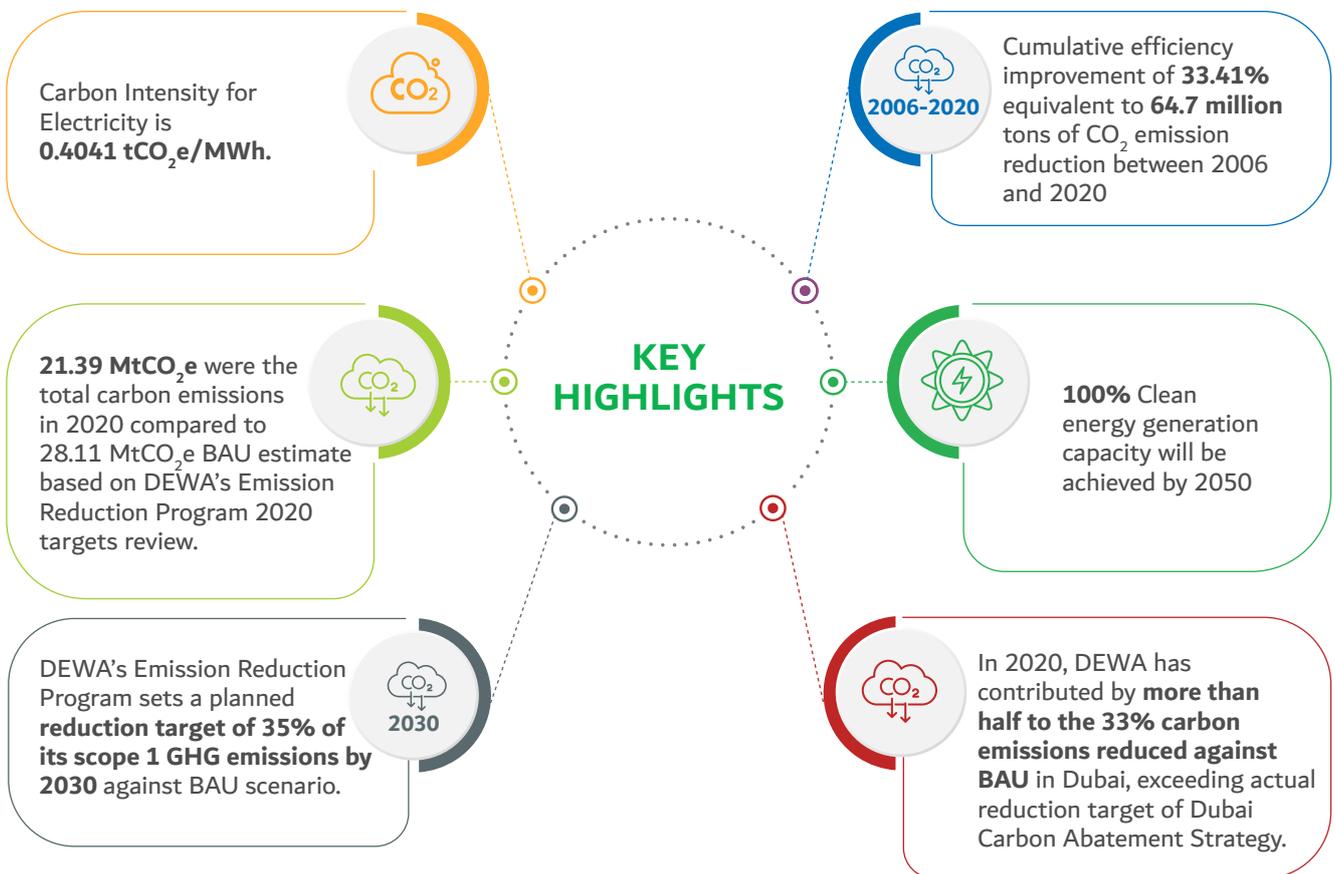
Even in the face of world-shaking events, we can take pride in the results we have achieved working hand-in-hand with all our stakeholders. We remain committed to our goals, for the citizens and residents of the UAE, and for generations to come.

ABOUT THIS REPORT

The purpose of the DEWA Climate Change Report is to communicate our climate actions, performance and management practices to our stakeholders. The report provides an overview of all DEWA's climate change action plans and initiatives. The performance data provided in the report covers the reporting period 1 January to 31 December 2020, unless otherwise stated. Ongoing initiatives and activities commenced in earlier years have also been included in this report. Additionally,

this report could be subject to modifications and improvements if deemed necessary. Please refer to DEWA's Sustainability report for more information.

Our approach to managing and reporting our sustainability performance continues to evolve. DEWA greatly values feedback from its stakeholders, so please send your comments and queries to sustainability@dewa.gov.ae



DEWA AT A GLANCE

Dubai Electricity and Water Authority (DEWA) is a Public Joint Stock Company with a majority of shares owned by Dubai Government, and is the sole provider of electricity and water in the Emirate of Dubai. DEWA's core business is to operate and maintain its power stations, and desalination plants, aquifers, power and water transmission lines and power and water distribution networks in Dubai. Its power generation and water desalination stations are mainly fueled by natural gas, with a target to reach 100% clean energy by 2050.

DEWA operates as an independent authority regulated

by the Dubai Supreme Council of Energy. The Supreme Council of Energy is responsible for energy policy development, planning and coordination in Dubai and has broad regulatory powers, including the power to set the water and electricity tariffs charged by DEWA.

In 2020, DEWA's workforce consisted of 11,489 employees (11,398 Permanent and 91 Temporary) who constantly endeavour to ensure that both the quantity and quality of services provided are of the highest standards in consistency and reliability. In Dubai, DEWA provides over 990,258 customers with electricity and over 884,404 customers with water.



990,258

ELECTRICITY CUSTOMERS



884,404

WATER CUSTOMERS



11,489

EMPLOYEES



12,300 MW

POWER GENERATION
Installed Power Capacity



470 MIGD

WATER PRODUCTION CAPACITY



45,712 GWh

SYSTEM ENERGY DEMAND

CLIMATE CHANGE AND SUSTAINABILITY **AT DEWA**

Climate Change and Sustainability is a vital part of DEWA's culture. DEWA is one of the first government organisation in Middle East and North Africa (MENA) region to include sustainability within its vision. Sustainability is also embedded in all DEWA's operations, processes and business decisions. Its top

management are committed to fostering a culture of sustainability within DEWA and amongst all its stakeholders. DEWA is also working to understand and balance their varied expectations and work with them to achieve the UAE's and Dubai's agenda for sustainability.



Undertaking these steps advances DEWA's progress towards becoming an industry leader. These steps include fully embedding the three pillars of sustainability: economic, environmental, and social within its strategy. It also requires a commitment to the wellbeing of the community of Dubai and the UAE; creating sustainable value for everyone.

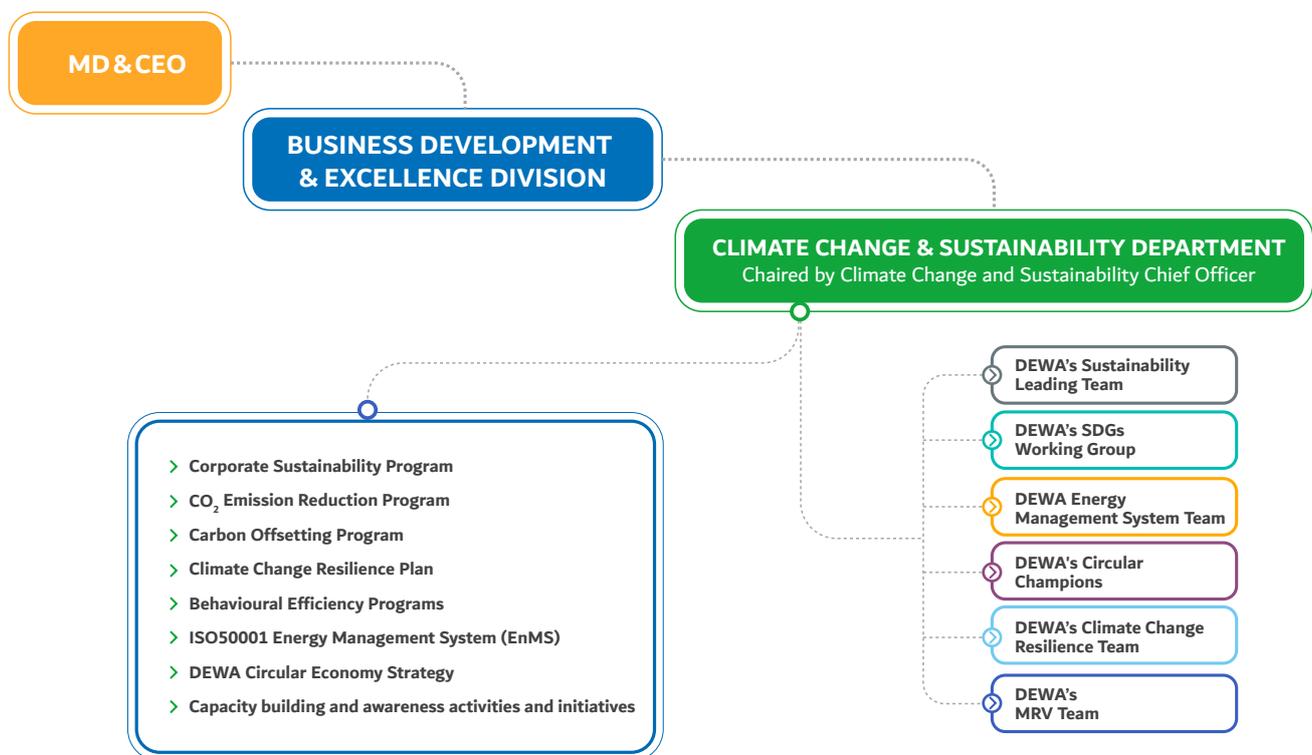
DEWA continuously works to be a globally leading utility by attaining global and local expertise in adopting the latest and best industry standards and practices in sustainability. It also seeks to create a safe and sustainable environment and a brighter future, for generations to come.

CLIMATE CHANGE AND SUSTAINABILITY GOVERNANCE

DEWA's top management considers sustainability as an integral and core form of the organization. DEWA established the Climate Change & Sustainability Department (CC&S), under the Business Development & Excellence Division. Its main objective is to establish, develop, and lead DEWA's corporate sustainability programme and climate change initiatives to address the needs of all stakeholders in a balanced manner, while highlighting the actions and practices that demonstrate DEWA's approach to sustainability and recognition of climate change and its impacts. The department works to align DEWA's strategy and objectives with international goals towards sustainable development.

The Climate Change & Sustainability (CC&S)

Department is able to deliver on any of the above objectives due to its linkage, coordination, and collaboration with all DEWA's divisions and departments. To support CC&S Department, the following structure are established to obtain, review and verify data and information relevant to each topic identified in the below. The teams mainly consist of representatives from each division at DEWA and they support in providing valuable insights and expertise for the above-mentioned projects and programmes led by CC&S Department. The following teams are chaired by the Climate Change and Sustainability Chief Officer, which collates updates for the Executive Vice-President of Business Development & Excellence and present them to DEWA management.



*MRV: Monitoring, Reporting and Verification
 *SDGs: UN Sustainable Development Goals

DEWA'S COMMITMENT FOR A SUSTAINABLE FUTURE

Guided by our values, we strive to achieve our vision to become a globally leading sustainable innovative corporation by implementing our strategy to ensure the happiness of everyone involved, adopt best practices and provide electricity and water as per the highest international standards. DEWA is committed to improving its climate change and sustainability performance and therefore has set the following commitments:

- DEWA has long recognized the urgency of addressing climate change and is committed to pursue climate mitigation and adaptation objectives underpinned by The UAE and Dubai steady economic diversification and growth in line with national circumstances and capabilities.
- DEWA is committed to constantly support The UAE and Dubai climate change and sustainability plans by adhering to local, federal and international policies and legislation to transform Dubai into a global hub for clean energy and green economy.
- DEWA is committed to adopting the highest standards of climate change and sustainability governance, business ethics and social responsibility to serve its stakeholders.
- DEWA is committed to engage with its stakeholders, understand and balance their varied expectations and work with them to promote and achieve The UAE and Dubai climate change and sustainability agenda.
- DEWA is committed to ensure the highest level of operational reliability and efficiency and to deliver sustainable profitable growth and ensure happiness of our stakeholders through innovative smart solutions.
- DEWA is committed to promote sustainability internally and within its supply chain, thus creating value for all its stakeholders.
- DEWA is committed to develop a talented workforce by continuously supporting their growth and development and promote a working culture that encourages equality, integrity and fairness.
- DEWA is committed to regularly monitor and manage its climate related risks and opportunities, including physical and transitional risks across its business and operations.
- DEWA is committed to monitoring and managing its environmental impact, by integrating environmental considerations into its business operations and strategy.
- DEWA is committed to support the UAE and Dubai's transition into a low carbon economy by deploying initiatives critical to decarbonization.
- DEWA is committed to ensure transparency and accuracy in measuring and reporting of environmental commitments across its business and operations.
- DEWA is committed to promote circular economy in its value chain by focusing on optimal resource use creating social, economic and environmental value.

TACKLING CLIMATE CHANGE

Climate change is one of the major challenges of our time and adds considerable stress to our societies and to the environment. From shifting weather patterns to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale. Without drastic actions today, adapting to these impacts in the future will be more difficult and costly.

At DEWA, we recognize that utilities play a crucial

role in a decarbonizing societies. We also recognize the impact of our operations on the climate and how tackling climate change may present key benefits for our business by improving our brand reputation, cost reduction, resilience against harmful impacts, alignment with regulations and increase investors' confidence. Our leadership continues to advocate for strong climate actions. DEWA established itself as a regional leader in climate change mitigation and adaptation efforts over the past years.

Below is a snapshot of DEWA's climate change mitigation and adaptation efforts:

DEWA's Mitigation Efforts and Initiatives

- DEWA's CO₂ Emission Reduction Program aligned with Dubai Carbon Abatement Strategy 2021
- Comprehensive Monitoring, Reporting and Verification (MRV) framework for DEWA's carbon emissions in compliance with ISO 14064
- Main stakeholder for the UAE Climate Change Taskforce and international climate change negotiations.
- Driving the transition towards a low carbon economy by deploying initiatives critical to decarbonization.
- Key stakeholder in implementing the Demand Side Management Strategy 2030
- Supply side energy efficiency improvements and optimization projects

DEWA's Adaptation Efforts and Initiatives

- Comprehensive climate change resilience plan
- Setting adequate reserve margin for power generation and water production
- Diversification of generation & desalination sites
- Planning considerations and operational feats for reliability, security and stability
- Asset management planning and framework
- Managing quality of source water
- Reducing unaccounted water losses

OUR STRATEGIC ALIGNMENT

The UAE has taken great strides towards addressing climate change and mitigating its impacts on the environment and economic sectors. Climate change remains a priority on the UAE Federal agenda. In 2017, the UAE Federal Government introduced a National Climate Change Plan, as a roadmap to mitigate and adapt to climate change in the UAE until 2050. DEWA has played an active role as part of the UAE Climate Change Task Force since 2012, attending the annual pre-COP and COP negotiations and taking the lead in technical negotiations on the matters related to the Clean Development Mechanisms and Mitigation under the Kyoto Protocol and the Paris Agreement, Article 6.

The Government of Dubai has set its own ambitious strategies, such as the Dubai Carbon Abatement Strategy, with a target to reduce carbon emissions by 16% by 2021. DEWA played a pivotal role in achieving the targets of Dubai Carbon Abatement Strategy and reduced carbon emissions by 33% in 2020 against BAU, exceeding the target of the Dubai Carbon

Abatement Strategy 2021 by more than double. This also supports the UAE Vision 2021 and the Dubai Demand Side Management Strategy to reduce consumption of electricity and water by 30% by 2030. It also supports the Dubai Clean Energy Strategy 2050, and the Green Economy for Sustainable Development Initiative launched by His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai. In 2017, Dubai was certified by the C40 Cities Climate Leadership Group, a leading global network of cities committed to tackling climate change and protecting the planet. This is an acknowledgement of Dubai's strategy to reduce Greenhouse Gas (GHG) emissions.

As Dubai's sole provider of power and water, we recognise that we have an integral role in helping to achieve the objectives set by the international, national and local climate change related strategies and policies. At DEWA, we ensure our strategies and roadmaps are well aligned to the climate agendas, agreements and strategies set on a global, national and local level:



DEWA'S CLIMATE CHANGE RESILIENCE PLAN

Climate change has emerged as one of the leading priorities worldwide and one of the main issues facing the international community. Climate change globally is leading to extreme heat, extreme rainfall, floods, droughts and tropical storms & hurricanes. The latest global risks report by the World Economic Forum, ranked extreme weather events, natural disasters, and failure of climate change mitigation and adaptation among the top five risks for the world in 2018. Environmental risks, which have grown in prominence over the 13-year history of the World Economic Forum's Global Risks Report, are an area of particular concern.

is a crosscutting risk that can have both, physical impact on our operations, and an economic, regulatory and reputational impact on our business. This is why climate change action is one of DEWA's top priorities, and in efforts to evaluate, understand and respond to the potential climate change impacts on our assets and operations, DEWA has developed a comprehensive Climate Change Resilience Plan. DEWA one of the first entities in the region to develop such a Resilience Plan that identifies existing mitigation measures, preventive controls and future resilience actions that address potential impacts of various climate change drivers.

Regionally, the power and water sectors in the UAE are also vulnerable to the adverse effects of climate change. At DEWA, we understand that climate change

DEWA's Climate Change Resilience Plan is driven by a vision, guiding principles, approach and goals to ensure power and water sector resilience.



VISION

A climate resilient utility ensuring sustainable, innovative and resilient operations and assets to withstand the impacts of climate change



GUIDING PRINCIPLES



Robustness



Resourcefulness



Rapid Recovery



Adaptability



APPROACH

- Risk Assessment
- Adaptive Practices
- Prevention and Management
- Stakeholder Engagement



GOALS

- ① Integrate climate change considerations into business practices
- ② Align with local and national climate change resilience plans
- ③ Maintain an evidence based resilience plan
- ④ Ensure safe and sustainable operations
- ⑤ Build and maintain resilient infrastructure
- ⑥ Maintain a business model aligned with national and international strategies and policies
- ⑦ Improve DEWA's Adaptive Capacity

DEWA's Climate Change Resilience Plan was developed based on a detailed risk assessment and in line with best practices. The Climate Change Resilience Plan is well integrated with DEWA's Enterprise Risk Management

(ERM) system and plays a key role in our strategic planning. The annual management of Climate Change Resilience Plan is developed following DEWA's ERM framework:



IDENTIFYING CLIMATE-RELATED RISKS

To cope with an uncertain future where climate change may have wide-ranging effects on the environment, and on socio-economic conditions, we have analyzed and assessed climate change trends and projections, using climate models to provide an overview of observed climatic trends and projections at the global and local levels; which are essential in shaping an effective climate change resilience plan for DEWA. The output of these projections helped indicate the climate change conditions that could impose potential physical and transitional risks on DEWA's business and operations.

There are several ways of classifying climate change risks; either based on the cause of the risk or its impact. DEWA have assessed two main drivers when identifying Climate-Related Risks: **Policy drivers** and **Climate drivers**.

For the policy driver risks, the global, national and regional climate change policies and strategies relevant

to DEWA were assessed to identify potential risks for each policy driver that DEWA may face in the coming years and decades.

As for the climate drivers, we have considered the climate variables identified based on available regional climate change trends and projections aligned with Dubai Climate Change Adaptation Strategy. This is due to variations in geography and climate conditions across the different Emirates in the UAE. Furthermore, variations in the risks associated with the specific power facilities result from factors such as location, age, design, and the adaptive capacity of facilities.

In 2020, DEWA has identified and introduced a “**Climate Change Risk**” driven by climatic and policy drivers in its ERM and governed by the Group Risk & Resilience Committee at DEWA. After analysis and classification of potential impacts, various interdependencies, outlining risk heat maps, and identifying key risk indicators, the risk of climate change reflects the

potential impacts of both policy and climatic drivers on DEWA's strategy and operations.

The risk of climate change could potentially affect DEWA across financial and non-financial consequence categories namely: revenue loss, service disruption, H&S, environment and reputation. Climate change

is expected to bring warmer ambient temperatures, rise in sea levels, more frequent and severe extreme weather events, warmer sea-water temperature, decreased availability of natural resources such as fresh water, increase in sea acidity and change in precipitation levels. These may have several impacts on DEWA's business and operations.

CLIMATE CHANGE RISK	DEWA'S KEY PREVENTIVE CONTROLS
PHYSICAL RISKS	
<p>Risks resulting from damage to infrastructure owing to physical effects of climate-related drivers, such as extreme heat, drought, wave and storm surge levels, sea level rise, sea acidity increase and heavy rainfall.</p> <p>Considerations:</p> <ul style="list-style-type: none"> • Overheating and equipment failures • Reduction in generation plant efficiencies • Physical damage of assets • Disruption of fuel supply chain • Quality of source water • Concentration of generation site • Coastal erosion and flooding 	<ol style="list-style-type: none"> 1. Reserve margin for power generation and water production 2. Redundancy and climatic considerations in the master plans 3. Loss Of Load Expectation (LOLE) model for power and water generation 4. Insurance coverage for assets 5. Planning and operational practices to ensure reliability and availability 6. Strategic water bulk storage 7. Power interconnection with neighboring power system 8. Power augmentation and optimization measures 9. Supply side energy efficiency improvements programs
POLICY RISKS	
<p>Risks related to noncompliance to local, national or international policy responses related to climate change.</p> <p>Considerations:</p> <ul style="list-style-type: none"> • Non-alignment with the demand reduction targets • Non-alignment with diversification targets for the energy mix • Non-alignment with climate change strategies and policies of UAE and Dubai 	<ol style="list-style-type: none"> 1. Demand Side Management Strategy 2030 2. Alignment with Dubai Integrated Gas Strategy 2030 3. Alignment with Dubai Carbon Abatement Strategy 2021 4. Dubai Green Mobility Initiative 5. Key stakeholder in UAE Climate Change Taskforce for international climate change negotiation 6. DEWA Sustainability Development Goals alignment program 7. Progress towards decoupling future power and water expansions

In 2021, DEWA was adaptive to the potential impacts of the identified climate change drivers. This is achieved through DEWA's key preventive controls and mitigation measures integrated within DEWA's Enterprise Risk Management (ERM) system, *listed above*.

DEWA is continuously monitoring climate change drivers

to be able to mitigate potential climate change impacts on its physical assets and business operations. Through the established climate change resilience governance and framework, the climate change resilience team analyses climate change drivers and trends, classifies and rank the identified risks, studies vulnerabilities and opportunities from projected climate change scenarios.



DEWA'S CO₂ EMISSION REDUCTION PROGRAMME

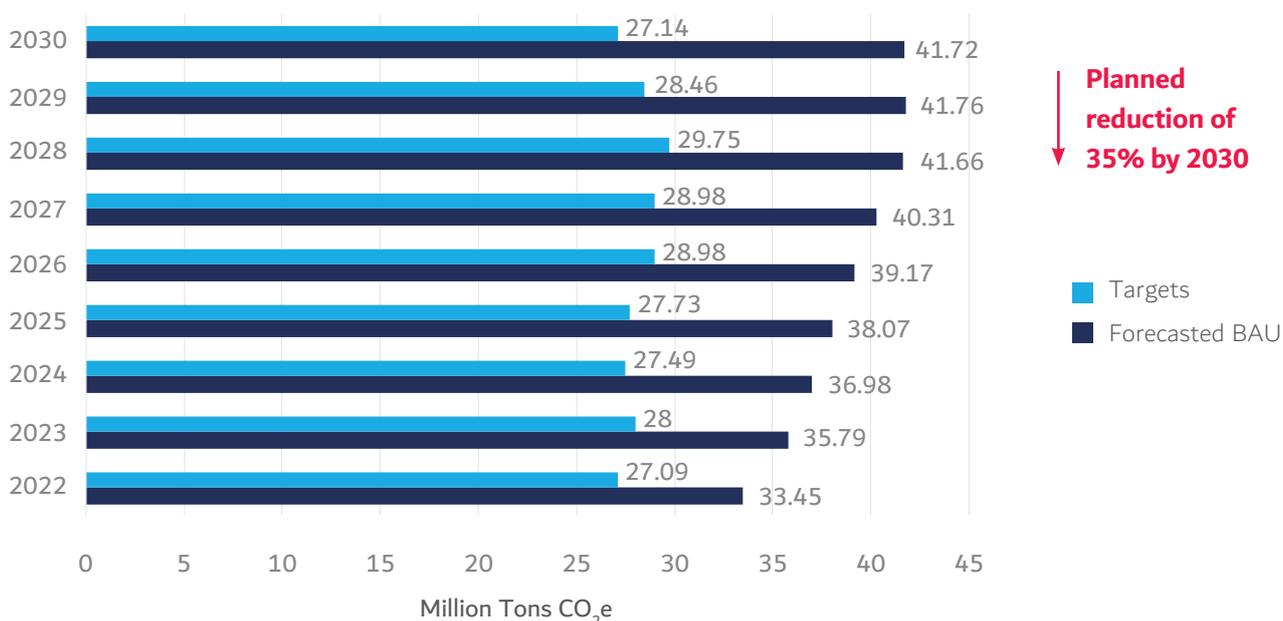
At DEWA, we believe that the challenges posed by climate change demand coordinated and decisive action. Our aim is to reduce our carbon footprint while maintaining a secure, reliable and affordable supply of power and water. DEWA has systematically worked on reducing its emissions through our Carbon Dioxide Emission Reduction Programme launched in 2012. DEWA's CO₂ Emission Reduction Program (ERP) is a long term carbon emissions abatement strategy that provides an extensive analysis of DEWA's current greenhouse gas emissions, sets targets to reduce carbon dioxide emissions up to 2030 from all DEWA's operations, and incorporates proposed emission reduction targets within its business decisions and overall growth strategies. DEWA's efforts have led to a significant reduction in carbon emissions in Dubai. Net carbon dioxide emissions in Dubai decreased by 33% in 2020, exceeding the target of the Dubai Carbon Abatement Strategy 2021.

Three strategic pillars have been identified within ERP to ensure that the strategic objectives are met:

climate change functional strategy, emission reduction targets long term forecast model, robust monitoring reporting and verification system aligned with annual performance management system.

DEWA's ERP is a comprehensive programme that considers reductions from both the demand and supply side. It considers several key factors: Dubai's energy and water growth requirements, Dubai's water and electricity consumption rationalization initiatives, DEWA supply side efficiency improvements, and the diversification of its energy mix. The ERP targets were developed for both emission intensity (tCO₂e/MWh) and the absolute emissions (tCO₂e) for the short, medium and long term emissions reduction actions leading up to 2030, with 2010 used as the baseline. DEWA's actual emission reduction performance is measured annually against Business As Usual (BAU) scenario. **DEWA's ERP sets a planned reduction target of 35% of its scope 1 greenhouse gas emissions by 2030 against BAU scenario.** This is based on DEWA's 2020 Power and Water Master Plans updated annually.

Power and Water (BAU vs. Targets)



DEWA'S CARBON FOOTPRINT

DEWA is one of the first entities in the region to develop a comprehensive Monitoring, Reporting and Verification (MRV) framework of its Greenhouse Gas (GHG) emissions since 2012, establishing that year as the baseline for reporting on emissions. The MRV framework enables reporting of emissions through DEWA's Carbon Footprint Report, which is prepared in accordance with the Greenhouse Gas (GHG) Protocol and compatible with the ISO 14064-1, which also allows for integration with national and international GHG registries.

DEWA annually reports on its Carbon Footprint Report, which quantifies and calculates DEWA's annual direct GHG emissions (Scope 1), covering CO₂, CH₄, N₂O, SF₆, HFCs and PFCs and indirect GHG emissions (Scope 2) from electricity imports. The Scope 1 emissions' sources include fuel combustion during power generation and water desalination, sulphur hexafluoride (SF₆) usage in circuit breakers, fuel combustion in vehicles, and refrigerants usage for air conditioning and maintenance operations. In addition to emissions from small emissions sources:

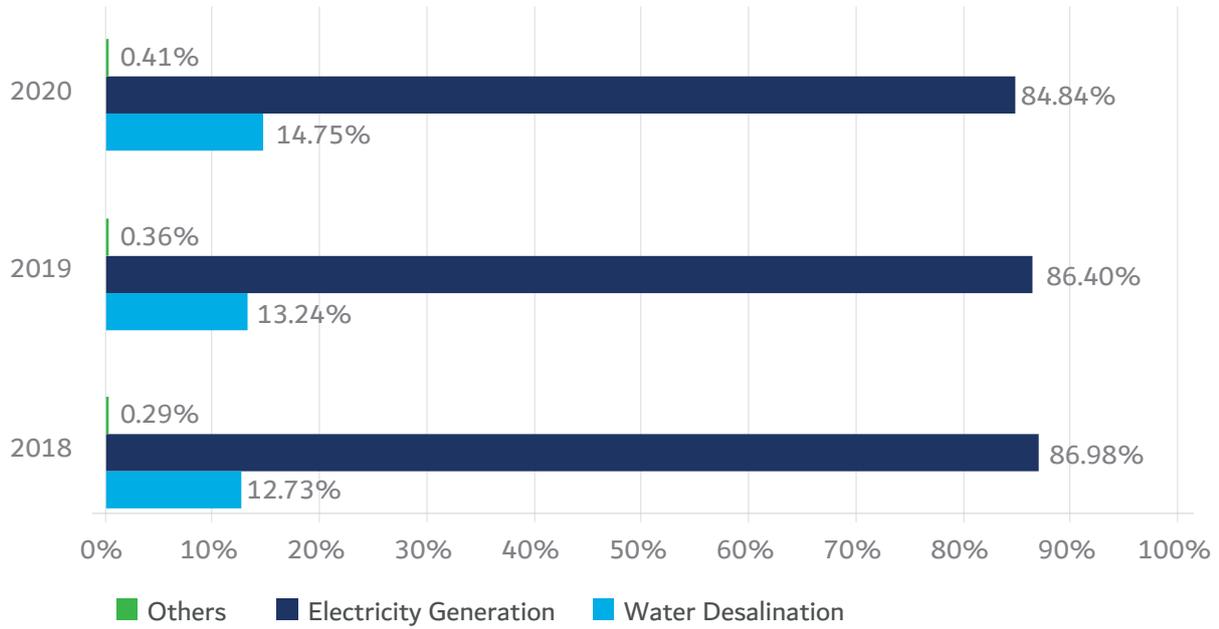
- CO₂ usage in fire protection systems and labs
- Diesel usage during emergencies (back-up generators)
- Acetylene usage for maintenance activities
- LPG usage for cable termination works
- Process emissions due to desalination
- Laboratory acetylene usage

DEWA follows an operational control approach in consolidating, monitoring and reporting on its GHG emissions, quantifying them in terms of CO₂ equivalent, and therefore the DEWA subsidiaries or affiliates were not considered. DEWA has gone to all reasonable lengths to ensure the relevance, completeness, consistency, accuracy and transparency of its Carbon Footprint Report. The quantification methodology employs "GHG activity data multiplied by GHG emission factor" model.

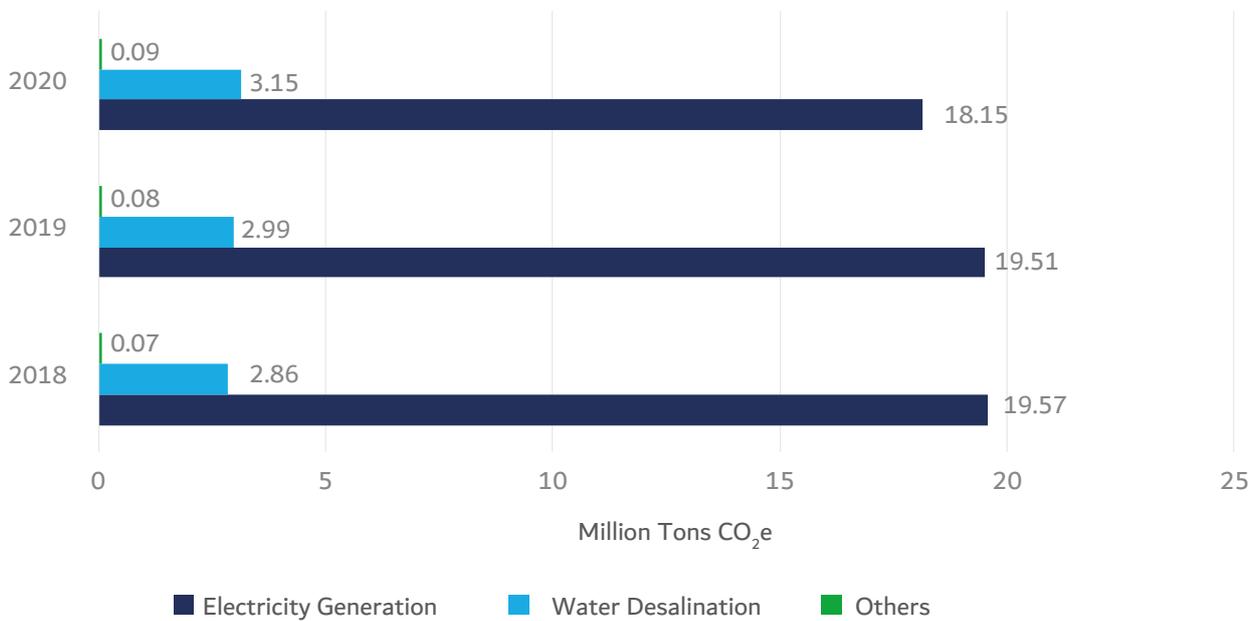
In 2020, DEWA's total carbon emissions from Scope 1 were **21.39MtCO₂e** against **BAU 28.11 MtCO₂e** and the carbon intensity based on Grid Emission Factor for Electricity is **0.4041 tCO₂e/MWh**. Since DEWA itself is the producer of the electricity it consumes, Scope 2 emissions from the own consumption are part of Scope 1 emissions to avoid double counting. Indirect emissions from the power purchased is reported under Scope 2 emissions only. In 2020, no power was purchased by DEWA from other electricity grids.

To comprehensively manage its GHG related activities, DEWA has quantified scope 3 GHG emissions resulting from DEWA's Business Travel activities in 2020 which is 114.29 tCO₂e.

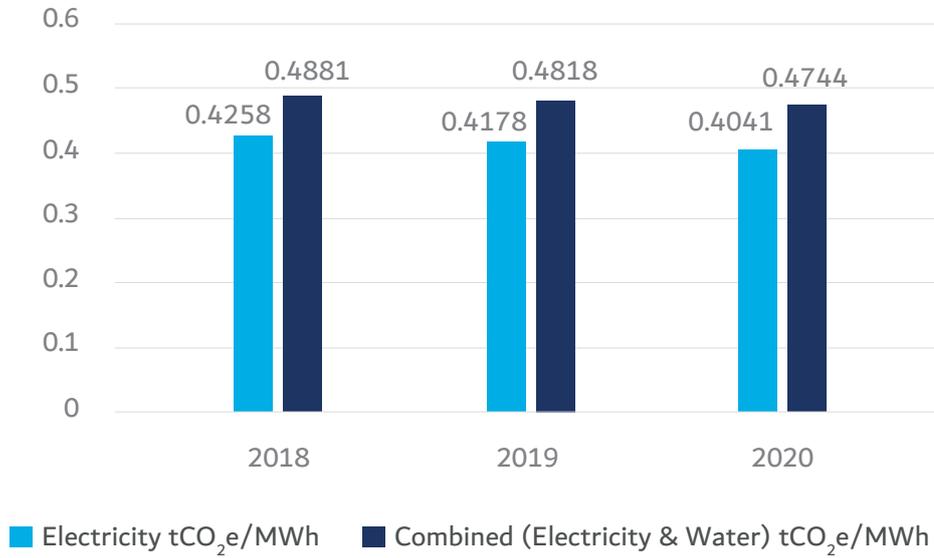
Emissions by Source from Scope 1 Percentage of CO₂ 2018-2020



Emissions by Source from Scope 1 MtCO₂e 2018-2020



Carbon Intensity
tCO₂e/MWh
2018-2020



**Others include: Fleets, refrigerants, SF₆ usage in circuit breakers, fire protection, emissions due to desalination process, acetylene usage in laboratories, diesel usage in backup generators and LPG usage for welding*

**GHG sinks have not been considered and therefore GHG removals have not been quantified or reported.*

**Exclusions: No emission sources have been excluded from the inventory.*

DEWA'S EMISSION REDUCTION INITIATIVES

One of the challenges faced throughout implementation of ERP has been identification and prioritization of projects that should be accelerated based on their energy and GHG benefits, whilst maintaining the cost efficiency aspect. A systematic and strategic approach to energy and GHG emissions planning as established by ERP can reduce both DEWA's and its client's costs.

For DEWA, understanding the energy and GHG profile of our facilities can provide immediate benefits through the identification of low-cost opportunities to reduce energy consumption. Hence, DEWA is continuously implementing innovative solutions to improve its supply side efficiency, reduce transmission and distribution losses and diversify energy sources to support sustainable economic growth without damaging the environment and natural resource. DEWA's strong emission reduction track record via implemented ERP has positively impacted the overall emission of Dubai and UAE.

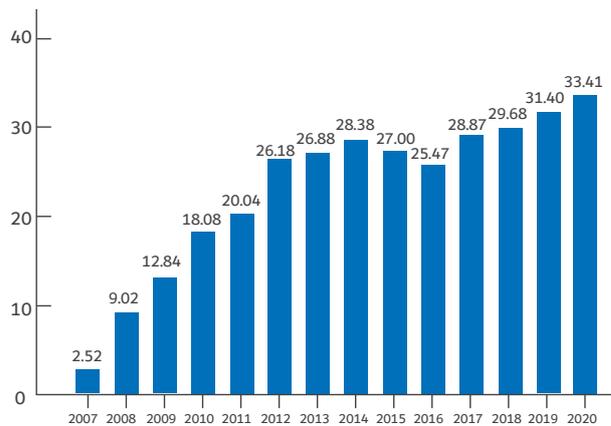
SUPPLY SIDE ENERGY EFFICIENCY

DEWA produces electricity and water through cogeneration. HRSGs (Heat Recovery Steam Generators) are used by DEWA to produce steam by utilising the waste heat from gas turbines. The steam is used for generating the additional free power for producing the water by multi-stage flash. The backpressure steam turbine is used for producing it. In recent years, DEWA invested a considerable amount for improving efficiency and converting simple cycle gas turbine plants into more effective cogeneration cycle plants. It is done by installing the cooling system in gas turbines. The gross efficiency (Power Only) was 45.09%, and overall efficiency was 95.45% in 2020 for DEWA. From 2006 to 2020, DEWA achieved the milestone of improving the cumulative efficiency of 33.41%, which is equivalent to 64.7 million tonnes of CO₂ emission reduction. The combination of

optimum power plant design, innovative upgradation of gas turbines, optimised outage planning, power augmentation and optimised operations are the main factors for DEWA to achieve it effectively. It signifies that DEWA is improving continuously through reducing carbon emission and efficiency measurements.

OPTIMUM POWER PLANT DESIGN

To achieve a minimised cost and the highest efficiency of plant's lifecycle, the optimum power and water production design would be in a hybrid system where water production is shared between several technologies including multi-stage flashing desalination and reverse osmosis.



Graph: Efficiency Gains from improvement % in Gross Heat Rate 2007-2020 with respect to 2006



Graph: Carbon reduction (Million Tons CO₂) due to efficiency improvements with respect to 2006

POWER AUGMENTATION

In the summer months, with ambient temperatures reaching 45°C, gas turbine generation capacity typically drops by around 20%, which reduces power output and efficiency, and increases emission intensity and costs. The recovery of this power loss and efficiency is possible using several cost effective and proven power augmentation options. Through the use of these technologies, DEWA has cost-effectively increased capacity by over 720 MW by 2020 with respect to 2006 and improved efficiency in the process, which reduced our emission intensity.

UPGRADES FOR GAS TURBINES

After installing any gas turbine, DEWA continuously follows up with the original equipment manufacturers with regards to any new proven and cost-effective technologies and upgrades that have become available during the lifecycle of the gas turbine, to increase capacity as well as improve efficiency and reliability.

OPTIMISED OPERATION

During times of low demand, some electricity generation units are shut down to avoid running inefficiently at low load levels..

OUTAGE PLANNING

DEWA uses a management tool that coordinates all maintenance outage requests to minimise outages and meet demand with the highest efficiency and minimum fuel cost.

DEMAND SIDE MANAGEMENT

The supply-side efficiency programmes of DEWA are crucial for adopting the best practices in generation and desalination for reducing power and water consumption. It is also significant for diversifying the fuel mix. Demand-side management is considered as one of the energy-efficient and consumption targets of DEWA. In 2013, the Dubai Supreme Council of Energy implemented the Dubai Demand Side Management strategy to increase the efficiency of energy by reducing

electricity and water consumption to influence Dubai's sustainable development. The strategy has been updated and enforced for implementation in January 2020 through the Supreme Council of Energy's Directive number 1 of 2020.

The updated strategy speeds up efforts to achieve or exceed the electricity and water consumption savings of 30% by 2030. The updated DSM strategy includes 11 DSM programmes, namely P1-Green building Regulations, P2-Building Retrofits, P3-Outdoor Lighting, P4- Efficient Cooling, P5-ESMA Standards and Labels, P6-Consumer Behaviour, P7-Shams Dubai, P8-Electricity and Water Tariffs, P9-Recycled & Ground Water Demand Management, P10- Efficient Mobility and Smart Charging and P11-Fuel and Engine Efficiency. The first 9 programmes target electricity and water savings while the last two programmes target emission reduction in the transportation sector.

Each programme has a Programme Owner (a member company of the Supreme Council of Energy) which is responsible for the programme implementation under the management of the DSM Project Management Office (PMO) - Taqati and supervision of the Supreme Council of Energy. DEWA is the owner for the Shams Dubai Programme and Tariff Rates. In 2020, both programmes achieved 240 GWh and 1,449 GWh in electricity savings respectively, and 2,667 MIG water savings from Tariff Rates programme.

DEWA contributes to DSM through the following initiatives and programs:

Program / Initiative	Program / Initiative
<p>Tariffs Program</p>	<p>The Tariffs program has been part of the Dubai DSM strategy 2030 since its inception in 2013. Since the initial years of the DSM Strategy implementation, the program has been a significant contributor to the DSM savings.</p>
<p>Shams Dubai Program</p>	<p>The Shams Dubai Program is also a part of the Dubai DSM Strategy 2030. The program was launched in 2015, and by the end of 2020, about 262 MWp have been installed, with Photo Voltaic (P.V.) systems in over 6,620 buildings connected to DEWA's grid.</p>
<p>EV Green Charger</p>	<p>Since the initiative was launched in 2015, 275 stations have been installed across Dubai, as of 2020, with plans to reach 300 stations in 2021. The initiative is incorporated in the updated Dubai DSM strategy 2030, which was enforced in 2020, under "Program 10: Efficient Mobility & Smart Charging".</p>
<p>My Sustainable Living Program (MSLP)</p>	<p>The Smart Living initiative aims at promoting a sustainable energy consumption lifestyle among citizens and residents of Dubai. Under the Smart Living Initiative, My Sustainable Living Program was launched in 2018 and is a behavioral efficiency program, which targets all eligible residential customers in Dubai. The program was incorporated in the updated Dubai DSM strategy 2030, which was enforced in 2020, under "Program 6: Consumer Behavior".</p>
<p>Awareness Campaigns and Events</p>	<p>DEWA conducts annually numerous awareness campaigns and events such as the Conservation Awards, Earth Hour Event, Ideal Home Initiative and Green Summer Program that all aim to encourage individuals, communities, households, and businesses toward adopting sustainable behaviors.</p>
<p>Energy Management of DEWA Premises</p>	<p>This initiative targets the internal consumption of DEWA by ensuring energy efficiency of the DEWA buildings and other assets.</p>



MEETING FUTURE DEMAND

To ensure meeting Future Demands, DEWA forecast the demand for power & water for the short-, medium- and long-term demand and Master Plans up to 2030. DEWA updates demand forecasts every year using recognised international practices and state-of-the-art tools considering demographic and econometric growth, and captures the effect of future uncertainties through scenario planning. This ensures that DEWA maintains its world-class level of reliability, efficiency and safety and optimises its resources. Based on these demand forecasts, DEWA develops all its Master Plans, which are updated annually to meet Dubai's power and water demands while maintaining a reserve margin of minimum of 15% for water and 25% for power. Master

Plans set the course for the technical planning of future infrastructure expansions of electricity and water production, transmission and distribution systems.

The plan takes into consideration Dubai's future developments in commercial and industrial sectors and major future events such as Dubai Expo 2020, as well as, projected normal growth of power and water demand associated with increases in population. The plans include power generation and water desalination capacity expansion plans and power and water transmission network expansions plans up to 2030 as well as DEWA's power distribution network over the next 7 years.

DEWA OFFSETTING PROGRAMME

In 2012, DEWA initiated implementation of its Offsetting Programme by registering several emission reduction projects under Clean Development Mechanism (CDM), of the United Nation's Framework Convention on Climate Change (UNFCCC). DEWA has

issued 10,635 Certified Emission Reduction (CER) from DEWA's 13 MW Mohammed Bin Rashid Al Maktoum Solar Park's PV Plant and 95,197 CERs from Thermal Energy Storage Turbine Inlet Air Cooling (TESTIAC) project.



DEWA has been the first entity in the Middle East and North Africa (MENA) in 2017 to join the renewable energy market via the i-RECs Registry Platform to issue the International Renewable Energy Certificates (i-RECs) from the Mohammed bin Rashid Solar Park 13 MW PV Plant, 200 MW and 800 MW PV Plants. The i-RECs system represents an internationally applicable i-RECs tracking framework allowing end-

users to express demand for specific types of renewable generation and enabling companies to demonstrate renewable energy consumption. i-RECs represent the attributes of electricity generated from renewable energy source. These attributes are unbounded from physical electricity and can be sold or traded separately. As of 2021, DEWA has successfully issued 1,011,000 i-RECs for various international and national clients.

APPENDIX (From IPCC, UNFCCC and others)

° C	Degree Centigrade / Celsius
° F	Degree Fahrenheit
A.C.	Air Conditioner
BAU	Business As Usual
CC&S	Climate Change and Sustainability
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH ₄	Methane
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide Equivalent
CSP	Concentrated Solar Power
DEWA	Dubai Electricity and Water Authority
DSM	Demand-side management
EnMS	Energy Management System
ERM	Enterprise Risk Management
ERP	DEWA Emission Reduction Program
GHG	Green-House Gas(es)
GWh	Gegawatt Hour
H&S	Health and Safety
HFCs	Hydrofluorocarbons
HRSGs	Heat Recovery Steam Generators
IPCC	Intergovernmental Panel on Climate Change
i-RECs	International Renewable Energy Credits
kV	Kilovolt
KWh	Kilowatt Hour
m	Meter
MD&CEO	Managing Director & Chief Executive Officer
MIGD	Million Imperial Gallon per day
mm	Millimetres
MOCCA	The Ministry of Climate Change and Environment
MRV	Monitoring, Reporting and Verification
MtCO ₂ e	Million metric tons of CO ₂ equivalent
MW	Megawatt
NO ₂	Nitrogen Dioxide
PFCs	Perfluorocarbons
PV	Photovoltaic
SF ₆	Sulphur hexafluoride
UAE	United Arab Emirates
UNFCCC	United Nation's Framework Convention on Climate Change

GLOSSARY *(From IPCC, UNFCCC and others)*

Adaptation	Taking action to cope with climate change and environmental degradation.
Adaptive Capacity	The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Carbon Pricing	The price for avoided or released carbon dioxide (CO ₂) or CO ₂ -equivalent emissions. This may refer to the rate of a carbon tax, or the price of emission permits. In many models that are used to assess the economic costs of mitigation, carbon prices are used as a proxy to represent the level of effort in mitigation policies.
Carbon Sequestration	is the long-term storage of carbon in plants, soils, geologic formations, and the ocean. Carbon sequestration occurs both naturally and as a result of anthropogenic activities.
Carbon Tax	A levy on the carbon content of fossil fuels. Because virtually all of the carbon in fossil fuels is ultimately emitted as carbon dioxide (CO ₂), a carbon tax is equivalent to an emission tax on CO ₂ emissions.
Certified Emissions Reductions (CER)	A unit issued for GHG emission reductions from CDM project activities in accordance with the CDM rules and requirements, which is equal to one metric ton of carbon dioxide equivalent.
Climate	Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.
Climate Change	The climatic changes caused by the rise in the earth's global temperature due to human activities, primarily the burning of fossil fuels.
Climate Finance	The term climate finance is applied both to the financial resources devoted to addressing climate change globally and to financial flows to developing countries to assist them in addressing climate change.
COP/CMP	COP stands for 'Conference of the Parties' and is the main authority of the UNFCCC (see below). The CMP is the supreme body of the Kyoto Protocol (see below). Both are made up of representatives of all the countries belonging to each treaty. The COP and the CMP meet each year to negotiate on global solutions to climate change – COP16 took place in Mexico in 2010, COP15 in Copenhagen in 2009 and so on back through to the early 1990s. Sometimes, people refer to the COP as a UN climate summit or UN climate negotiations.

Disaster	An event, either natural or man-made, that causes great distress or destruction. It is a social crisis which occurs when a hazard coincides with a vulnerable situation, resulting in significant loss of life, severe life-threatening disruption and substantial physical damage.
Disaster Risk Reduction (DRR)	Measures taken to make a disaster less likely, such as reducing exposure to hazards, or reducing people’s vulnerabilities and increasing their capacities.
Emission Scenario	A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g., greenhouse gases (GHGs), aerosols) based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change, energy and land use) and their key relationships.
Emissions Trading System (ETS)	A market-based tool to limit GHG by which emissions can be traded between the market players under cap-and-trade schemes or with credits that pay for or offset GHG reductions.
Global Warming	Term used to describe rises in the earth’s global temperature caused by human activities. It is sometimes used interchangeably with the term ‘climate change’. However, the term ‘climate change’ is preferable because it refers to the changes in the climate that result from the earth’s warming. The term ‘global warming’ can be confusing because some of the weather changes it produces can mean colder, not warmer, weather in some parts of the world.
Greenhouse Gases (GHGs)	Gases, including carbon dioxide and methane, which cause climate change.
IPCC	Intergovernmental Panel on Climate Change – a body of 2,500 of the world’s best climate scientists from the leading scientific organisations of more than 130 nations.
Low Carbon Development	Development that is sustainable and that does not rely heavily on burning fossil fuels for heat, light, transport and industry.
Mitigation	Measures to reduce the emissions that cause climate change. (This differs from the way the term ‘mitigation’ is used in the field of DRR (see above) where it means measures taken to limit the adverse impacts of hazards.)
Sustainability	A dynamic process that guarantees the persistence of natural and human systems in an equitable manner.
UNFCCC	United Nations Framework Convention on Climate Change – a treaty agreed by 192 countries to set an overall framework for global efforts to tackle climate change.
Vulnerability	The degree to which people are susceptible to loss, damage, injury and death due to hazards. This is a function of spiritual, physical, economic, social, political, technical, ideological and cultural factors. These factors affect people’s ability to protect themselves, to recover from a disaster and to cope with the impacts of climate change.



DEWAOFFICIAL

customer care@dewa.gov.ae | www.dewa.gov.ae



OFFICIAL SUSTAINABLE ENERGY PARTNER

Our Vision
A globally leading sustainable innovative corporation

P.O. Box 564, Dubai, United Arab Emirates
T: +971 4 601 9999