Republic of Tunisia

Update of the Nationally Determined Contribution of Tunisia

Executive Summary of the 1st updated NDC of Tunisia

October 2021

PARIS AGREEMENT ON CLIMATE CHANGE

Updated NDC - TUNISIA

Contents

List of Acronyms

ANGED	National Agency for Waste Management
ANME	National Energy Management Agency
AFOLU	Agriculture, Forestry and Other Land Use Sector (AFOLU), as established as an IPCC source of emissions/absorptions
PA	Paris Agreement
BaU	Business-as-Usual scenario reflecting a continuation of historical trends in consumption and production practices
LC	Low-Carbon scenario reflecting a proactive and sustained policy to reduce greenhouse gas emissions
UNFCCC	United Nations Framework Convention on Climate Change
COP	Conference of the Parties of the UNFCCC
ETF	Energy Transition Fund
GHG	Greenhouse gases
NIS	National Institute of Statistics
MLAE	Ministry of Local Affairs and Environment
MAHRF	Ministry of Agriculture, Hydraulic Resources and Fisheries
MtCO2e	Million tons of CO_2 equivalent
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
NSO	National Sanitation Office
GWP	Global Warming Potential
TEGC	Tunisian Electricity and Gas Company
OMU	Objective-based management unit, established within MLAE, responsible for monitoring and coordinating the implementation of activities related to the Paris Agreement

A concerted NDC aligned with national priorities

Tunisia formally adopted its first Nationally Determined Contribution (hereafter first NDC) on 17 October 2016, following the ratification of the Paris Agreement by the Tunisian Parliament by the unanimous votes of its members. The achieved greenhouse gas (GHG) emissions trajectory between 2015 and 2020 was relatively identical to that foreseen by the first NDC.

Today, Tunisia is determined to increase its proactive stance in the fight against climate change with the adoption of more ambitious objectives through the update of its first NDC, in accordance with the provisions of Decision 1/CP.21. The updated NDC fortifies Tunisia´s contribution towards the global response against climate change to achieve the global objectives set out in Article 2 of the Paris Agreement, to limit the global temperature rise below the 1.5 °C threshold.

This update is aligned with Tunisia´s long-term climate vision set out in the national low-carbon development strategy (SNBC, according to the French acronym) and the national climate-resilient development strategy (SNRCC, according to the French acronym), both of which are currently undergoing adoption.

The NDC update involved an extensive stakeholder consultation process, including public institutions, the private sector, civil society, and key experts. It also took into account existing sectoral and horizontal strategies, such as the National Strategy on Climate Change developed in 2012, the 2050 Renewable Energy Development Strategy (TUNEREP Project), and the Energy Efficiency Strategy, as well as sectoral strategies in the fields of agriculture, forestry, water and soil conservation, waste management, in addition to various sub-sectoral initiatives concerning cement production, HFCs, and nitric acid, among others.

The updated NDC has also been further aligned with Tunisia's development needs throughout its economic, social, and environmental dimensions, notably through:

- Gender mainstreaming into both the climate change mitigation and adaptation components of the NDC.
- NDC alignment with the United Nations Sustainable Development Goals (SDGs), particularly goals 1, 3, 6, 7, 8, 9, 11, 12, 13, and 17.
- Assessment of the macroeconomic benefits of NDC implementation, in terms of economic growth, job creation, and poverty reduction.

Mitigation objectives of the updated NDC

An increased ambition for mitigation

Despite Tunisia´s precarious economic circumstances and low contribution to global GHG emissions (0.07% in 2010), the updated NDC raises Tunisia's greenhouse gas mitigation ambitions in line with Article 4.3 of the Paris Agreement.

In fact, the updated NDC aims to **reduce the national GHG emissions intensity by 45% in 2030 compared to the reference 2010 level,** as opposed to a reduction of only 41% envisioned under the first NDC.

This heightened ambition translates to a higher unconditional objective, demonstrating Tunisia's willingness to deploy more domestic efforts towards the attainment of its increased commitment to mitigate climate change. The enhanced domestic effort will result in a **28% unconditional reduction in the national GHG emissions intensity in 2030 compared to the reference 2010 level,** as opposed to a reduction of only 13% envisioned under the first NDC.

The objective conditioned by international financial support will permit an **additional conditional reduction in the national GHG emissions intensity of 17% in 2030 compared to the reference 2010 level,** as opposed to the reduction of 28% envisioned in the first NDC.

The augmented ambition is also demonstrated by the intention to cover all emission sources and most of the greenhouse gases (CO_2, CH_4, N_2O, and HFCs) emitted by anthropogenic activity in Tunisia.

With the implementation of the updated NDC, **per capita emissions in Tunisia would reach 2.4 tCO_{2e}/capita in 2030,** well below the global average in 2010 situated at 7 tCO_{2e}/capita.

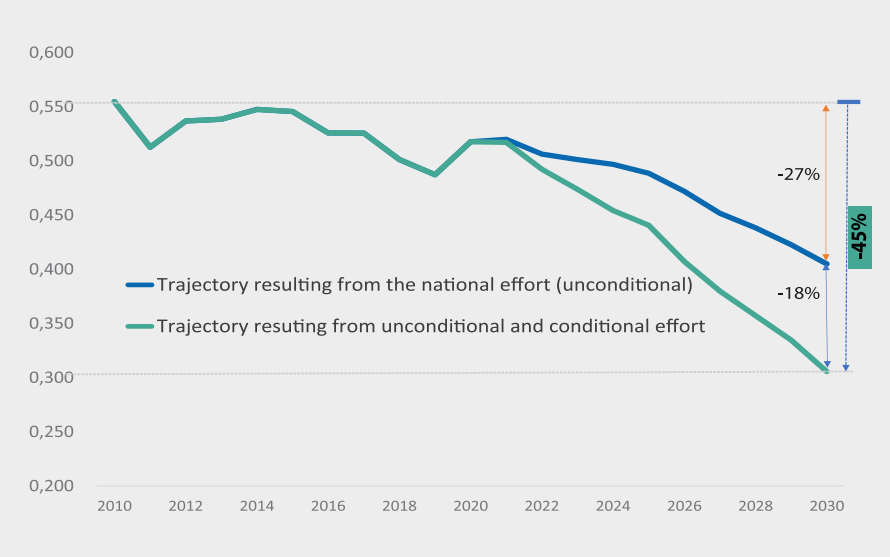

Figure 1: Carbon intensity trajectories according to the conditional and unconditional contribution of and unconditional contribution of Tunisia over the period 2010-2030

The objective of capping emissions

The emissions trajectory recommended by the updated NDC ensures a peak in emissions before 2020, which sets Tunisia on the path towards capping its emissions, as required from the developed Annex 1 country Parties to the United Nations Framework Convention on Climate Change (UNFCCC). The following figure presents the respective GHG emissions trajectories to 2030 from the baseline emissions in 2020, highlighting the business-as-usual scenario (hereafter "BaU"), the unconditional national effort of the updated NDC, and the low-carbon scenario conditioned to international support under the updated NDC (hereafter "BaC").

The BaC scenario achieves lower 11% emissions by 2030 compared to the 2020 emission levels of about 34.9 Mt CO_{2e}. Compared to the BaU scenario, the updated NDC aims to reduce emissions by 38% in 2030, including an 18% reduction from the unconditional national effort and a 20% reduction from the additional actions conditioned to international support.

In cumulative terms, the **reduction in emissions compared to the BaU scenario would be 85.8 $MtCO_{2e}$ over the 2021-2030 period**, of which 46% corresponds to the national unconditional efforts and the remaining 54% from the conditional actions.

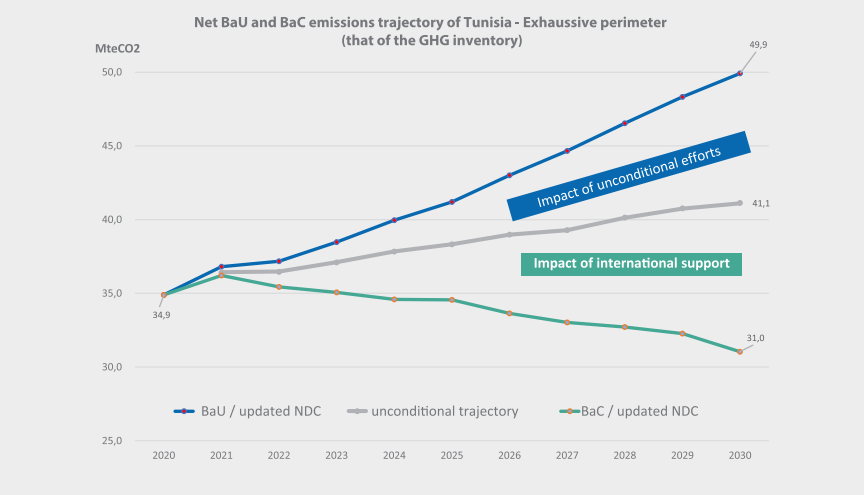

Figure 2: GHG Emissions Trajectories under the Baseline, Unconditional baseline, unconditional effort and NDC scenarios

An active contribution from all emitting sectors

The attainment of the updated NDC objectives will require mobilization from all the major emitting sectors, namely: Energy, Industrial Processes, Agriculture, Forestry, and Other Land Uses (AFOLU), and Waste.

In cumulative terms, over the 2021-2030 period, emissions reductions would come predominantly from the energy sector (72%), followed by AFOLU (13%), and industrial processes (9%). The rest of the mitigation results (6%) will result from the low-carbon policy of the waste sector (see the adjacent figure).

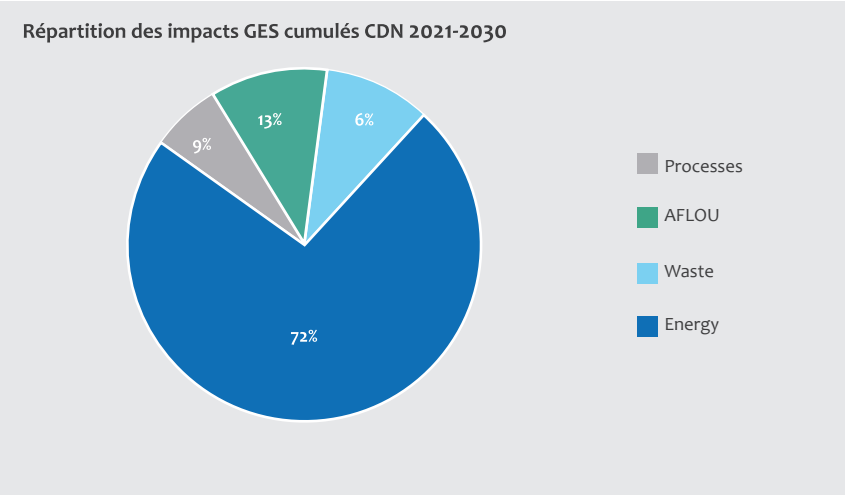

Figure 3: Sectoral distribution of cumulative reductions (2021-2030) of GHG emissions resulting from the implementation of the updated low-carbon scenario

Energy sector : Emissions reductions come from the implementation of energy conservation programs, featuring the following objectives:

- An average -3.6% annual decrease in primary energy intensity between 2020 and 2030.
- A 12% share of renewable energy in Tunisia's primary energy consumption in 2030.

Tunisia plans to reinforce its Tunisian Solar Plan (PST, according to the French acronym), which aims to install about 3800 MW of renewable energy (RE) production capacity and 1,000,000 m² of solar thermal for water heating. Energy efficiency (EE) will also be improved through specific programs in the industrial, transport, and tertiary sectors, the installation of around 450 MW additional cogeneration capacity, specific programs for efficient lighting and roof insulation in the residential sector, as well as the improvement of energy efficiency in public buildings and in transport (electric cars), among other programs.

The following two figures respectively show the expected emissions reductions due to energy efficiency measures according to the sectors they are applied (buildings, industry, and transport), as well as the expected emissions reductions due to the different renewable energy technologies to be installed (wind, solar photovoltaic (PV), concentrated solar power (CSP), biomass, and solar water heaters).

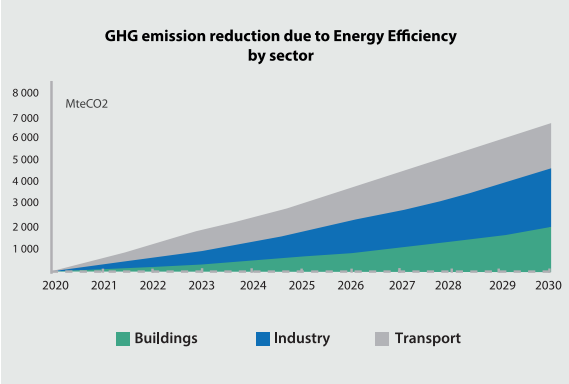

Figure 4: Future trajectories of GHG emissions reductions due to energy efficiency by sector

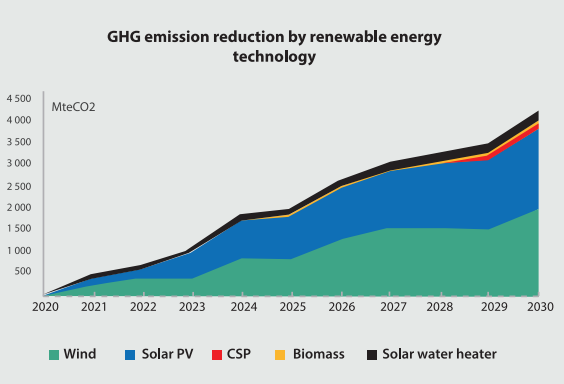

Figure 5: Future trajectories of GHG emissions reductions from renewable energy by technology

Emissions reductions due to energy efficiency efforts over the period 2021-2030 would primarily result from policies and measures for the rational use of energy in the industry (38%). The transport sector comes next in terms of mitigation (37%) through organized urban travel in large cities and the introduction of electric vehicles. The building sector contributes up to a quarter (25%) of the emission reductions resulting from energy efficiency.

Thanks to this energy transition policy, **GHG emissions from the energy sector will be 34% lower than those of the BaU scenario**, which would represent a 9% drop compared to 2010 emissions. It also helps to reduce the sector´s GHG emissions intensity by 44% in 2030 compared to that of 2010, equivalent to an average decrease of 4.7% per year.

Industrial processes : The mitigation plan for the industrial processes sector will target the three main emission sources (87% of the sector's emissions): cement production, HFCs, and N_2O emitted by nitric acid plants. The BaC scenario for the industrial processes sector considers three main actions:

- The launch of the "Cement NAMA"
- The launch of carbon pricing instruments, with four components: energy efficiency, renewable energies, alternative fuels (RDF), and better segmentation of the cement market to lower the clinker/cement ratio.
- The launch of the project for the catalytic destruction of N_2O in the nitric acid production plant in Gabes, starting in 2023.
- The launch of the program to reduce the use of HFCs to comply with the objectives of the Kigali Amendment.

The ensemble of these measures would limit GHG emissions from the industrial processes sector to 7.2 Mt CO_{2e} in 2030, a 13% decrease (1.1 Mt CO_{2e}) compared to the same year under the BaU scenario.

Agriculture, Forestry, and Other Land Use (AFOLU) : The mitigation plan of the AFOLU sector seeks to intensify actions concerning biomass and soil carbon absorption. The BaC scenario for this sector is based on the implementation of the following actions:

- Substantial strengthening of fire-fighting plans, whose scale has been multiplied by a factor of 10 over the 2011-2021 decade.
- Reinforcement of actions already considered in the BaU scenario, such as incorporating poultry manure in composting processes, consolidating arboriculture, implementing organic farming techniques, and optimizing synthetic mineral fertilizer use, among others.
- Development of new mitigation actions such as food additions supporting livestock productivity and decreased enteric fermentation emissions, conservation agriculture techniques, as well as energy recovery from droppings, bovine manure, and vegetable water.

Net AFOLU emissions appear in the form of negative balances for both the BaU and BaC scenarios. Compared to net absorptions in 2030 under the BaU scenario, the net additional absorptions in 2030 under the BaC scenario would surmount to 2.5 Mt CO_{2e}, that is, a 58% increase in GHG absorptions. Total reductions in the sector will be 9 Mt CO_{2e}, of which 35% would result from emission reduction measures and 65% from carbon absorption measures.

Waste : The mitigation plan for the waste sector includes an ambitious program to reduce upstream waste generation, to boost selective sorting, and to promote sustainable waste treatment and recovery practices.

The BaC scenario for solid wastes is centered on the reduction and controlled management of household waste. This will involve the following measures: reducing the amount of waste at source, increasing the recycling rate of household waste and its energy and organic recovery, producing, and recovering RDF, degassing landfills, and setting up recovery systems for electricity production, and implementing mechanical biological treatment (MBT), among others.

The BaC scenario for wastewater treatment considers six main actions, namely: improving the rate of wastewater treatment, improving the management of wastewater treatment plants and their energy efficiency, improving sewerage connectivity of industries and the chemical oxygen demand (COD), implementing sludge recovery methods, increasing cogeneration, and installing photovoltaic systems.

Thus, over the 2021-2030 period, the BaC scenario would reduce emissions from the waste sector by 5.5 Mt CO_{2e} compared to the BaU scenario, 92% of which would result from actions targeting solid waste.

Adaptation objectives of the updated NDC

The adaptation component of Tunisia's updated NDC has three main sections. The first section presents the vulnerability to climate change. The second section presents the vulnerability of each of the 8 branches of the "Star of Resilience". The last section presents an estimate of the financing needs for the implementation of adaptation measures. The 2030 objectives of the revised NDC are aligned with the strategic vision developed in the National Strategy for Climate Resilient Development (NSRD).

Vulnerability to climate change

The review of the exposure of national and sectoral vulnerabilities is based on finer climate projections downscaled to the level of territories. The update of the adaptation component of the NDC integrates three new transversal dimensions (gender, land use planning and natural disaster risk reduction).

Sector	Vulnerability to climate change
Water resources	Climate projections indicate that water resources will be particularly exposed to i) increased demand for water (in particular via an increase in agricultural needs following the rise in temperatures and evapotranspiration) and conflicts of use; ii) overexploitation of groundwater; iii) a drop in water stocks, and iv) degradation of water quality, including salinization of coastal water tables. The total loss of water resources from these aquifers by 2050 has been evaluated at about 220 million m3 per year, which represents about 75% of all coastal water resources.
Agricultural production	Climate projections foresee an increase in the frequency and intensity of prolonged drought episodes. These will particularly affect cereal production, which would drop by nearly 40% by 2050 according to the RCP 8.5[1] scenario. The decrease in yields that will affect olive production could reach 32%. The share of agricultural production in the national GDP would decrease by 5% to 10% in 2030, according to the scenarios of the economic opening of the agricultural sector.

1 . Op. cit 19.

Natural ecosystems	Climate projections predict more hot days, greater water stress, and irregular rainfall. These impacts would lead to an increase in the frequency of forest fires, a decrease in opportunities for biological recovery, multiplication of natural species and renewal of seed stocks in rangeland, steppe, and forest soils. These impacts will also affect the yields of wood and non-wood forest products and fodder in natural ecosystems. Heavy losses are expected in southern Tunisia where most of the available pastoral land is located. In particular, the areas favorable to pastoral plants are likely to decrease by an average of 19% and to move northwards in Tunisia.
Coastal	On the Tunisian coast, climate change will be accompanied by a rise in sea level (SLR) as well as an increase in water temperature, salinity, and acidity. These effects of climate change will lead to other impacts such as the loss of built-up areas, coastal and agricultural infrastructure, erosion of the coastline and the degradation of coastal ecosystems. Thus, in the coastal zone, more than 3100 hectares of urban areas are considered vulnerable and threatened by submersion. 44% of the Tunisian coasts are classified as vulnerable to very highly vulnerable, while the moderately vulnerable coasts represent 24% and those with low to very low vulnerability are around 32%.
Health	The health impacts due to climate change include the emergence of vector-borne diseases; increased incidence of water-borne and food-borne diseases; the aggravation of diseases related to atmospheric pollution; and the increase in the frequency and intensification of the health effects of floods. Flooding and the destruction of the infrastructure can impact the distribution of drinking water and sanitation and the contamination of surface and ground water. The interactions between the COVID-19 pandemic and climate change are presented in several reports as cumulative effects: human populations with limited resources and capacities would tend to be more vulnerable to their combined impacts.

Tourism	The acceleration of the SLR constitutes a major threat to tourism, which remains essentially seaside in Tunisia. The coastline is retreating at a rate of between 0.5 and 1.5 m/year. Although the sector consumes less than 1% of the country's water resources, the water stress that Tunisia is already experiencing will further increase, with repercussions on tourist facilities in terms of operating costs and health safety. The intensification of heat waves should also financially affect the sector in terms of energy management, particularly for the air conditioning of buildings. Finally, the fragility of jobs is a direct consequence of the disruption of tourist activity. The average loss of jobs due to the phenomenon of climate change by 2030 is estimated at 1000 jobs per year.

New cross-cutting sectors

This update of the NDC is enriched by the inclusion of three areas that were not sufficiently addressed in the first NDC, namely: gender, land use planning, and climate change disaster risk reduction (DRR).

▶ Gender

Gender mainstreaming has received a real boost since 2015, whether in national policies, strategies, and development plans. Gender disaggregation is also becoming a well-established approach in all sectors. These developments have taken place in a context of economic crisis, slow growth, persistent unemployment, and declining investment. Despite economic conditions that have been severely damaged by the impact of the Covid-19 pandemic, Tunisia has shown its willingness to pursue legal and institutional advances for sustainable economic and social strengthening, thus maintaining its status as a leading country in the Arab world for women's rights and emancipation. This status implies that women have a key role to play in the fight against climate change.

▶ Land use and urban planning

Past and recent floods have significantly raised the importance of taking the climate issues into account in land-use planning in Tunisia. The effects of climate change are more significant in cities where the urbanization movement is accelerated by the extension of urban areas. The increase in intensity and frequency of extreme events under the effect of climate change (torrential rains in a limited time, waves of extreme heat, marine submersion, storms, etc.) has shown the limits of the traditional conception of urban spaces in Tunisia. The Tunisian territories do not all have equal capacities to adapt to climate change. These territorial disparities are likely to be strongly accentuated by climate drift in the coming decades, which calls for strong and immediate responses.

▶ Disaster Risk Management, including Disaster Risk Reduction (DRR-DRM) related to climate change

Vulnerability studies show that the effects of climate change will significantly increase the country's exposure to the risks of flooding, especially in urban areas, rising sea levels and flooding along the coast, more frequent and severe droughts in the south, and the occurrence of forest fires, especially in the north and center-west. In addition to the danger to human lives that need to be protected, or the risk of social conflicts that could

threaten the country's political stability, the impacts of these extreme events are already threatening and will weigh more heavily on the national budget due to the very high costs of response and rehabilitation/reconstruction measures.

Building national resilience by 2030

The general adaptation objective of the updated NDC is to **"promote a Tunisia that is resilient to climate change, that has significantly reduced the vulnerabilities and strengthened the adaptive capacities of its ecosystems, its population, its economy, and its territories, and that has carried out the necessary transformations, capable of ensuring an inclusive and sustainable socio-economic development model, and in so doing, contribute to a more resilient world"**.

The adaptation component of the updated NDC is structured around the "Star of Resilience" approach, designed as a structuring framework to guide Tunisia in its quest for future resilience (see figure above). The eight resilience components of this approach are food, water, society, territory, economy, health, ecology, and natural disasters. This objective is fully in line with the SNRCC resilience trajectory over the 2050 horizon.

In the face of more frequent and intense climatic hazards, a resilient Tunisia must be able to:

- Ensure renewed and shared economic growth can lead to progress and create jobs for all.
- Anticipate climatic disturbances (sudden or slow).
- Reduce or absorb the effects.
- To rise and bounce back through adaptation, solidarity, and innovation.
- To evolve towards a new state of dynamic balance and to transform itself while preserving the functionality and performance of its natural and human systems.

To be achieved, this objective must be supported by a comprehensive and cross-cutting framework for adaptation that addresses all aspects of the nation and its development. The updated NDC therefore proposes a paradigm shift and the adoption of a systemic and cross-sectoral approach, making it possible to define resilience in its eight dimensions. This approach forms the «Resilience Star» (Figure 6), which is designed as a structuring framework to support Tunisian actors and their technical and financial partners in their efforts to strengthen their capacities for adaptation, risk reduction and anticipation. This "star" must serve as a guiding mechanism for the country in its quest for future resilience by 2050, with 2030 as the transformative deadline for putting Tunisia on this trajectory.

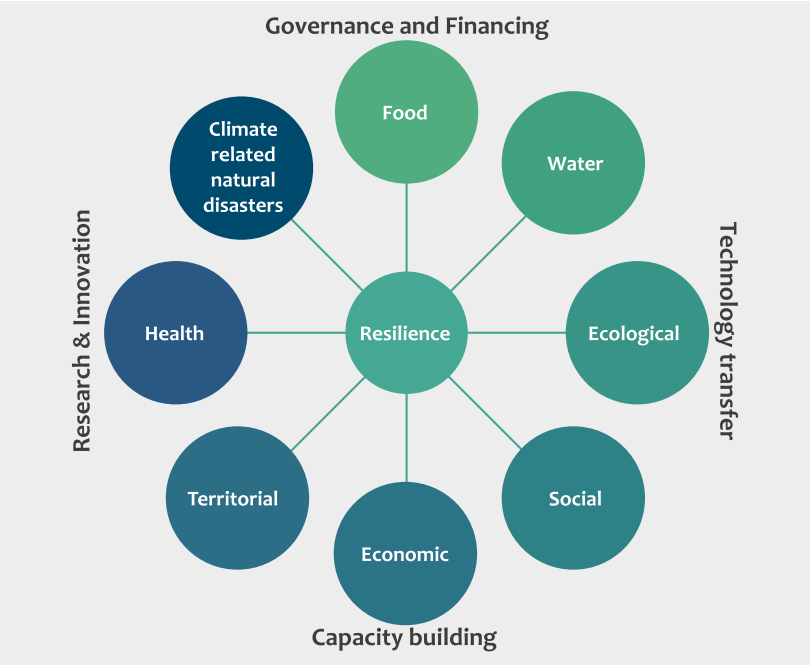

Figure 6 : The Tunisian « Star of Resilience »

The following table summarizes the general goal and priorities for adaptation in the 8 branches :

▶ Food resilience

- **Goals of Food Resilience by 2030 :** Enabling the agricultural, livestock and fisheries sector to ensure food security for the Tunisian population in a sustainable manner, in sufficient quantity and with the required quality.
  This objective will be achieved through the implementation of adequate and adapted measures to improve the resilience of production systems, sectors, markets, and of producers and other actors. The aim is to modernize the sector by digitizing it, to create process and share information with stakeholders to improve monitoring and reaction to the effects of climate change.

- **Food Resilience Priorities (FRP)**
  FRP 1: Achieving the digital transition of agro-sylvo-pastoral, livestock, fisheries, and aquaculture production systems, improving the sharing of information, data, and knowledge for greater resilience to the effects of climate change on territories and societies.

  FRP 2: Anticipate and support the transition to an agriculture resilient to the effects of climate change (agricultural products, livestock, fisheries and aquaculture, territories, and farmers)

▶ Water resilience

- **Goals of Water Resilience to 2030 :** Providing the Tunisian population and the sectors using water resources with an adequate, sustainable, and quality water supply by 2030. This involves mobilizing all the resources still available in the country, improving the management of stocks, ensuring the balance between the demand sectors (including

ecological water), and avoiding and preventing potential conflicts, improving the quality of treated wastewater, and increasing the use of non-conventional water in a gradual but reasoned manner for the benefit of sectors that do not require green water.

- **Water Resilience Priories (WRP)**
  WRP 1: Improving water governance and the quantitative and qualitative management of conventional water resources in the face of climate change impacts.
  WRP 2: Increase the controlled use of non-conventional waters to face the scarcity of the resources under the effect of climate change.
  WRP 3: Strengthen the technical, scientific, and institutional capacities of water users and operators to adapt to climate change.

▶ Social resilience

- **Goals of Social Resilience to 2030 :** Reducing social disparities for just and resilient development. This should support systemic integration of a strong and institutionalized gender transformational approach in all key adaptation sectors. Resilient and fair development strengthens the democratic foundation for sustainable progress towards a resilient society for everyone.
  The social resilience aimed at by 2030 must be accompanied by fair adaptation measures that create jobs for young people and generate economic growth that is redistributed to the most vulnerable, while ensuring that no one is left behind and that social disparities are reduced in favor of resilient, fairer and more gender-sensitive development.

- **Social Resilience Priorities (SRP)**
  SRP1: Endorse the national policy on gender mainstreaming and climate change.
  SRP2: Integrate an inclusive and systemic approach to gender in the sectoral measures of agricultural policy, water resource management, ecosystem preservation, areas of intervention of the DRR, health and sanitary policy and alternative and sustainable tourism offer.
  SRP3: Limit the impacts of climate change on poverty, strengthen social protection and ensure access to sustainable employment for households and communities most vulnerable to climate change «leave no one behind»

▶ Territorial resilience

- **Goals of Territorial Resilience to 2030 :** Reducing territorial disparities for a just and resilient development . Social resilience must be reinforced by its transversal corollary, which is linked to the living environment of populations, namely territorial resilience. To this end, it is imperative to integrate adaptation into decisions and planning instruments, considering the aspirations of communities and the territorial disparities that have grown in recent years due to a lack of resources to deal with the effects of climate change in the most vulnerable regions.

- **Territorial Resilience Priorities (TRP)**
  TRP 1: Establish a national framework for adaptation to climate change, considering land-use planning.
  TRP 2: Integrate climate change vulnerability and risks into urban and territorial planning processes
  TRP 3: Integrate climate change risks and adaptation needs into local development and urban planning.

TRP 4: Generate and share information, knowledge and understanding to improve the resilience of the urban and territorial planning and coastal sectors to the impacts of climate change and natural disasters.
TRP 5: Develop and integrate innovative processes, methods and tools that incorporate climate change and natural disaster risks into coastal planning.
TRP 6: Develop a program for the management, protection and rehabilitation of coastal and marine landscapes and ecosystems.

▶ Economic resilience

- **Goals of Economic Resilience to 2030 :** Tunisia's action will involve a shared assessment of the risks linked to climate change in the economic sectors, raising the awareness of the actors concerned and then strengthening the technical capacities to adapt infrastructures and services. Limiting the impacts of climate change on economic sectors and support their gradual transformation towards more resilient models to ensure sustainable growth and create job opportunities.
  The objective is to boost the economic sectors to ensure that the economic actors deploy the necessary means to reduce their economic vulnerability and their consequences on employment. Public authorities will support forward-looking work to raise awareness and mobilize economic actors to integrate climate risks into development and investment strategies. The vulnerabilities, costs of inaction and adaptation measures for priority sectors will be thoroughly assessed.

- **Economic Resilience Priorities (ERP)**
  ERP 1: Modernizing information management, facilitating access to, and sharing of knowledge, and forecasting risks related to climate change.
  ERP 2: Increase the resilience of economic sectors, including tourism and its sub-sectors, of their stakeholders and rationalize the use of resources.
  ERP 3: Improve the attractiveness of the territories and diversify the tourism offer by enhancing the value of the territories.

▶ Health resilience

- **Goals of Health Resilience to 2030 :** Controlling health risks related to climate change and integrating their management through a more resilient health system.
  The objective is to strengthen the Tunisian health system to make it more resilient to the impacts of climate change and to give it the capacity to anticipate, react to, cope with, adapt to, and recover from climate-related shocks and stresses, so as to sustainably improve the health of the entire population, especially the most vulnerable groups.

- **Health Resilience Priorities (HRP)**
  HRP 1: Strengthen the surveillance of climate-sensitive diseases and develop the capacity for early detection and early warning of phenomena with epidemic potential.
  HRP 2: Develop and empower the health system to respond to climate change-related health risks.
  HRP 3: Strengthen the role of health in leadership and cross-sectoral collaboration and promote applied research.

▶ Ecological resilience

- **Goals of ecological resilience to 2030 :** Developing biodiversity that is resilient to climate change, safe from threats, conserved and managed to contribute sustainably to the country's socio-economic development.
  Tunisia has set itself a new ecological resilience objective which, in addition to the resilience of productive ecosystems, addresses both the challenges of combating climate change and the loss of biological diversity. To this end, Tunisia wishes to engage in the use of Nature-based Adaptation Solutions (NBS) to implement this resilience objective of the updated NDC.

- **Ecological Resilience Priorities (ERP)**
  ERP 1 (productive ecosystems): monitor, protect, rehabilitate, and rationalize the use of natural resources, achieve land degradation neutrality, and ensure the sustainability of natural ecosystem goods and services.
  ERP 2 (protection and conservation of biodiversity): measures selected from the NBSAP established by Tunisia for the year 2030 in the framework of the Convention on Biological Diversity (CBD).

▶ Resilience to climate-related natural disasters

- **Goals of DRR-DRM to 2030 :** Establishing DRR-DRM as a cross-cutting, multi-level approach to the prevention and management of climate-related natural disaster risks. The objective is to ensure the safety of people and property, protect ecosystems and promote peace and social cohesion. This objective must be articulated with the other cross-cutting objectives and sectoral measures in their implementation at all levels, considering decentralization, and it must be clearly targeted in local plans and land use plans.

- **DRR Priorities**
  DRR1: Develop integrated, multi-level governance of DRR-DRM.
  DRR2: Implementing Early Warning Systems (EWS).
  DRR3: Strengthen, raise awareness and share knowledge about risks.

Cross-cutting issues of mitigation and adaptation

Significant investments to be mobilized

The implementation of the Tunisian mitigation contribution requires the mobilization of important financial resources, estimated at around USD 14.3 billion to cover all investment needs of the low-carbon trajectory over the 2021-2030 period. The resources to be mobilized at the national level have been estimated at USD 3.3 billion (covering 23% of total needs), compared to the USD 11 billion to me mobilized from international support (covering 77% of total needs). This international support could be provided in various forms: concessional lines of credit, grants, foreign direct investment, and innovative financing via carbon markets.

About 82% of the financial resources needed to implement the updated NDC should be directed to the energy sector, of which 40% would be needed for energy efficiency measures, 30% for renewable energies, and 11.5% for strengthening the electrical infrastructure (see figure above).

The financial needs for the adaptation component of Tunisia´s updated NDC could amount to more than USD 400 million as early as 2021 (i.e., nearly 1% of Tunisia´s Gross Domestic Product) and reach an annual cost of USD 475 million by 2030. Based on these annual simulations, the financing needs for the period 2021-2030 could amount to over USD 4.4 billion.

The review of the achievements of the 1st NDC reveals that the adaptation funds implemented during the period 2015-2019 is insufficient compared to the existing needs. The needs of the revised NDC are estimated according to two methods: the bottom-up approach, which is based on the sum of the costs of priority adaptation measures estimated by the sectors, and the top-down approach, which estimates the adaptation needs at 1% of GDP.

Estimated needs by sector

Following the sectoral consultations conducted during the first half of 2021 (bottom-up approach), the estimated financing needs for the period 2021-2030 amount to more than USD 2,852 million. On an annual basis, compared to the 1st NDC, these requirements have been already doubled (285 million / year versus 127 million).

While this increase in needs is significant, it can be said that it is underestimated, as not all requirements could be accounted after the consultations; more particularly, those sectoral requirements related to social, health and economic resilience as well as the integration of the need for scientific research and technology transfer).

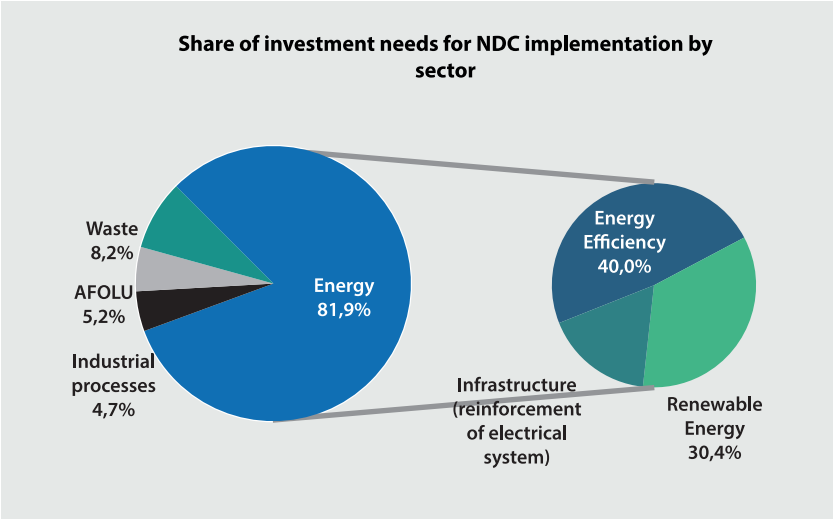

Figure 7 : Share of investment needs for NDC implementation by sector

Table 2 : Summary of estimated adaptation funding requirements by sector (bottom-up approach) (in millions of USD during the period 2021-2030)

Funding requirements for adaptation measures (in millions of USD)	National	International	Total
Food resilience	160,56	438,84	599,40
Water resilience	143,93	510,84	654,77
Social resilience	-	1,50	1,50
Territorial resilience	734,40	373,32	1.107,72
Economic resilience	57,78	142,02	199,80
Health resilience	0,18	3,22	3,40
Ecological resilience	32,00	53,5	85,5
Resilience to natural disasters	80	120	200
Total over the period 2021-2030	**1.208,85**	**1.643,24**	**2.852,09**
Total / year			**285,21**
As a reminder: 1st CDN funding requirements			
Total over the period 2021-2030	**-**	**-**	**1.916,00**
Total / year			**127,73**

Estimated requirements based on macro-economic indicators

Considering the global simulations of adaptation needs developed by UNEP (top-down approach taken from the Adaptation Gap Report), Tunisia's financing needs to respond to the high level of expected climate risks could amount to nearly USD 400 million as of 2021 (i.e., nearly 2% of the State budget or 1% of the Gross Domestic Product) to reach the annual cost of USD 460 million by 2030. Based on these annual simulations, the financing needs for the period 2021-2030 could amount to more than USD 4 223 million.

Table 3 : Summary of adaptation funding requirements (top-down approach) (in millions of USD) over the period 2021-2030)

	National budget		Financing requirements (Millions USD)	% Requirements / National Budget
	Annual growth	(Millions USD)		
2021	1,8%	19.400	388.0	2%
2022	1,8%	19.749	395.0	2%
2023	1,8%	20.105	402.1	2%
2024	1,8%	20.467	409.3	2%
2025	1,8%	20,835	416.7	2%
2026	2,0%	21.252	425.0	2%
2027	2,0%	21.677	433.5	2%
2028	2,0%	22.110	442.2	2%
2029	2,0%	22.552	451.0	2%
2030	2,0%	23.003	460.1	2%
Total			**4 223**	

Although it is still difficult to estimate the additional costs that any delay in financing would generate - including the delay in the implementation of mitigation measures which will have an impact on the magnitude of adaptation measures -

it is unanimously recognized that the longer a country delays investing in its low-carbon and resilience pathway, the higher the costs of adapting to the effects of climate change will be for that country. In macro-economic terms, this could mean a doubling of Tunisia's adaptation financing needs to 3-4% of the national budget by 2050, i.e., more than USD 1 billion per year.

Priority international support required

Without neglecting the importance of national and private sources of financing, international financial contributions from TFPs will have to play a significant role. Priority contributions (in the order of 60% of financing needs) should amount to more than USD 230 million/year as of 2021, rising to more than USD 276 million/year by 2030.

Capacity building and technology transfer

Technology transfer programs are key enablers for securing adequate access to the necessary technological innovations that will support Tunisia´s low-carbon transition. The targets of these programs include:

- Industrial integration of renewable energies, including green hydrogen and chemical storage.
- Implementation of innovative technologies and best practices for sustainable construction and mobility.
- Research and development aimed at preserving ecosystems and increasing their carbon sequestration capacities.
- Agricultural research development aimed at reducing emissions attributable to livestock and agriculture in general.

Capacity building actions are also key for strengthening the necessary skills and expertise of stakeholders in the various fields concerned with the implementation of the updated NDC.

The total cost of the capacity building and technology transfer program for the mitigation component of the updated NDC would amount to approximately USD 744 million over the 2021-2030 period, which will mostly be directed towards the energy sector, followed by AFOLU.

The implementation of the updated NDC, an opportunity for Tunisia

Beyond GHG emissions reductions, the updated NDC constitutes an opportunity for due to the positive economic and social developmental impacts. The following co-benefits will emanate from the implementation of the updated NDC:

- Primary energy savings of approximately 4 Mtoe in 2030, surmounting to a cumulative 20 Mtoe over the 2021-2030 period.
- An approximate gain of 1% in the national gross domestic product (GDP) over the 2021-2030 period, as well as the creation of around 12,000 additional jobs compared to the BaU scenario, attributable to the implementation of energy efficiency measures and the large-scale deployment of renewable energies.
- Heightened efforts in the fights against fuel poverty by reducing consumers' energy bills, especially among the poorest social classes.
- Increased incomes among the rural population through (i) restoration of ecosystems and soils, and improved yields from related activities, (ii) reinjection of significant additional resources supporting the BaC scenario, (iii) improved feed balance for livestock.
- Optimized use of national resources, through the valorization of waste.
- Enhanced preservation of soil and water resources, as well as improved public health through better management of solid and liquid wastes.

Monitoring the implementation of the updated NDC

In accordance with Decision 18/cma.1, effective monitoring, and evaluation of the updated NDC, including the implementation progress and the attainment of its goals, requires the definition and surveillance of a certain number of technical and socio-economic indicators, both at the national and sectoral level. The following table presents the main monitoring indicators and the responsible institution(s) in charge of their monitoring.

Target	Recommendations	Responsible Institution
National	• National GHG inventory • National carbon intensity • Total investment and mobilized national and international funding	UGPO-CC
Energy	• Energy sector GHG inventory • Emissions intensity of the energy sector • Primary energy intensity • Final energy consumption by sector • Share of RE in primary energy consumption • Installed RE capacity • Share of RE in electricity production • Area (m^2) of solar water heater installed • Cogeneration installed capacity • Energy saving and GHG reduction through EE programs • Savings on the country's energy bill • Reduction in the amount of the energy subsidy • Additional jobs created by EE and RE • Investments made and international funding received	ANME
Industrial processes	• GHG inventory of industrial processes • Clinker / cement ratio in the cement sector • Quantity of N_2O destroyed in the Gabes nitric acid plant • HFCs use rate • Investments made and international funding received	Ministry in charge of industry National Chamber of Cement Producers (CNPC)

AFOLU	• GHG inventory in the AFOLU sector • Hectares of arable land covered by conservation and restoration measures • Hectares of forest and protected scrub restored • Hectares of protected routes restored • Investments made and international funding received	The Ministry of Agriculture
Waste	• Emissions inventory in the waste sector • Specific emissions of solid waste (in kg CO_{2e} / t waste) • Quantity of household waste produced per capita per day • Material recycling rate • Organic (compost) and / or energy (RDF / power) recovery rate • Controlled landfill rate • Quantity of gas produced by degassing systems at controlled landfills • Specific emissions of wastewater produced (in kgCO_{2e} / m_3) • Wastewater treatment rate • Coverage rate for industrial discharges • Average COD level of industrial wastewater • Investments made and international funding received	ANGED ONAS

A roadmap for the implementation of the NDC

To facilitate the achievement of the updated NDC, a variety of measures are recommended for the four main axes of implementation, namely:

- Governance, monitoring, reporting, and verification (MRV).
- Finance.
- Awareness raising and capacity building.
- Research and technological innovation.

The following table presents a summary of the actions proposed for each axis mentioned above, with the intended deadlines for their implementation:

Actions	Recommendations	Implementation schedule
Governance, monitoring, reporting, and verification (MRV)		
Action 1	Strengthening the human, financial and technical resources of the UGPO-CC.	2022-2025
Action 2	Give a legal basis (legislative, by a climate law, and regulatory) to the objective of the updated NDC and to its strategic axes, as well as to the principles of integration and progression, and through the creation of planning tools appropriate to the relevant level of intervention (national / local).	2022
Action 3	Regulatory formalization of the monitoring of the implementation of the NDC, and institutionalization of the national technical mitigation committee.	2022-2023
Action 4	Regulatory formalization of the monitoring of the implementation of the NDC, and institutionalization of "mitigation" committees within each institution concerned.	2022
Action 5	Promote sectoral integration of provisions related to mitigation and the implementation of measures to achieve the objectives of the NDC.	2022-2023
Action 6	Integrate the intended measures and orientations in the national climate strategies (SNBC, NDC, sector strategies) in the five-year economic and social development plans (PNDES).	2022-2024
Action 7	Formalization of the framework for launching activities eligible under Article 6 of the Paris Agreement.	2022
Action 8	Formalization of the procedures and modalities required to set up the national transparency system in accordance with Article 13 of the Paris Agreement.	2022

Finance		
Action 1	Position Tunisia as a leader in low-carbon development with a view to channelling international and national investments towards mitigation projects.	2022-2025
Action 2	Mobilize financing to respect the trajectory defined in the updated NDC for the energy sector.	2022-2023
Action 3	Mobilize funding to respect the trajectory defined in the updated NDC for the industrial processes sector.	2022-2023
Action 4	Mobilize funding to comply with the trajectory defined in the updated NDC for the AFOLU sector.	2022-2023
Action 5	Mobilize funding to comply with the trajectory defined in the updated NDC for the waste sector.	2022-2023
Awareness raising & capacity building		
Action 1	Define and implement an Awareness and Capacity Building Program for members of the National Mitigation Technical Committee.	2022-2025
Action 2	Set up a Capacity Building Program for members of the future designated national authority to allow activities eligible under Article 6 of the Paris Agreement.	2022-2023
Action 3	Define and implement a National Awareness and Capacity Building Program on GHG mitigation for the private sector.	2022-2025
Action 4	Define and implement a National Capacity Building Program on carbon finance.	2022-2025
Action 5	Define and implement a National Capacity Building Program in the field of research on GHG mitigation.	2022-2025
Action 6	Communicate with the general public and civil society on the national policy to fight against climate change	2022-2025
Research and technological innovation		
Action 1	Facilitate Tunisia's access to the main technological innovation niches related to the low-carbon transition, as well as to know-how and appropriate industrial resources to ensure the sustainability of its transition.	2022-2025
Action 2	Become part of major research on construction and sustainable mobility, and massively invest in these sectors.	2022-2025
Action 3	Become part of major research on the development of green hydrogen and invest in this sector.	2022-2025
Action 4	Become part of major research on the development of carbon sequestration by tree ecosystems and soils.	2022-2025

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