MIDDLE EAST AND NORTH AFRICA

Tunisia

Executive Summary

World Bank Group

COUNTRY CLIMATE AND DEVELOPMENT REPORT

November 2023

Executive Summary

Tunisia can reconcile a new economic model with the foundations for a durable, resilient development to accelerate economic recovery, secure jobs, and livelihoods in line with the government's strategies.

Tunisia is navigating a delicate economic situation amidst a changing political context. The political reforms that followed the 2011 revolution led to a lack of economic reforms and support to tackle pervasive barriers to investment, innovation, and economic activity. A series of negative shocks—including the conflict in Libya, terrorist attacks, and, more recently, the COVID-19 pandemic and commodity price increases linked to the Russian invasion of Ukraine—exacerbated this fragility. As a result, economic growth slowed (averaging 1.4 percent between 2011 and 2022, down from 3.5 percent between 2000 and 2011), and progress on reducing poverty slowed. Rising unemployment and inflation exacerbated social demands and political instability, eventually leading to political changes in July 2021 that include a new constitution and the introduction of a presidential system. With a stagnating economy, Tunisia has increasingly relied on recurrent public expenditures to meet citizens' needs without sufficiently tackling the root causes of economic problems. This rapid rise of recurrent expenditures, exacerbated by recent shocks, has led to growing fiscal and current account deficits as well as a mounting stock of debt that is increasingly difficult to finance.

Tunisia's economic challenges have been compounded by an increasing vulnerability to climate change. The country's location makes it one of the most exposed to climate change in the Mediterranean region, with temperature increases expected to be accompanied by reduced and more variable precipitation; a rising sea level with saltwater intrusion; an increase in forest fires; and escalating extreme weather in the form of floods and droughts. These climate-linked effects will deplete natural resources, exacerbate water scarcity, and drive losses of agriculture and coastal infrastructure. Some of these effects are already taking a toll. Four years of drought conditions culminated in a significant drop in Tunisia's agricultural production in 2022/23. Vulnerability to increasingly frequent and severe extreme weather events (especially flooding) and sea-level rise will also increase, as will the costs of coping with these risks. Some of these issues will drive energy demand (for example, for desalination, pumping, and cooling), resulting in higher emissions and air pollution while increasing dependency on imports.

This Climate Change and Development Report (CCDR) establishes the case for a new economic model to address Tunisia's challenging economic and social context and vulnerability to climate change. Building on extensive analyses and consultations (see Box 1 for our approach), the CCDR calls for a new model that emphasizes the role of the private sector in generating most jobs, while the state focuses on its regulating function, funding expenditures with the highest social and economic returns, and directing resources to interventions that are both economically and environmentally sustainable. The proposed model would involve major changes, such as using pricing to rationalize the consumption of resources and creating economic conditions that support private investments in climate adaptation and decarbonization. It would also involve a shift from recurrent public expenditures to public investments in adaptation and decarbonization.

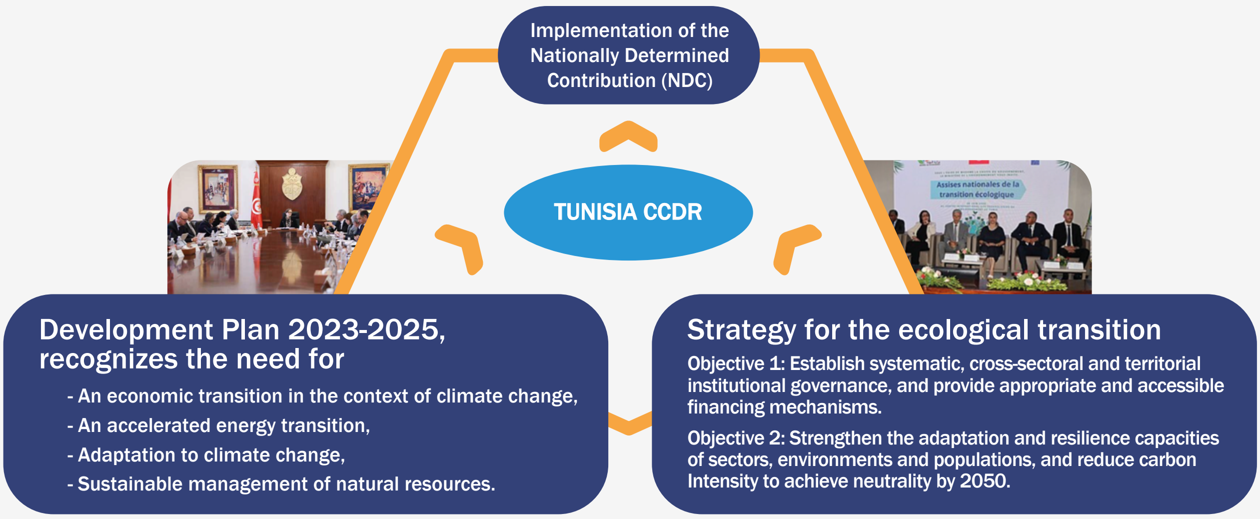
Box 1: About this Climate Change and Development Report

This Climate Change and Development Report (CCDR) explores the relationship between Tunisia's development goals and climate change, in terms of both risks and opportunities. Building on a body of quantitative and qualitative research as well as on modeling exercises, it analyzes the interplay between the country's development goals and climate change, examining the risks that climate change poses to development, as well as the opportunities stemming from the global trend toward decarbonization. Finally, it explores public policy and investment options that could achieve both climate and inclusive development objectives in a synergistic manner. The scenarios and policy options presented in the CCDR are informed by, but may differ from, national energy and climate policies and strategies. For example, the CCDR reference scenario for the energy sector is based on a least-cost optimization scenario that shows more ambitious results than the national strategy objectives.

This CCDR adopts an inclusive approach. To develop a better understanding of the on-the-ground effects of climate change already experienced in Tunisia today, the team engaged with a broad pool of stakeholders including the government, civil society, and key segments of the private sector. These engagements highlighted the potential benefits, impacts, and trade-offs for ecosystems and the most vulnerable pockets of society. They also validated the need for a two-pronged approach towards climate change resilience, adaptation, and mitigation that includes strengthening the legal framework to address Tunisia's needs in the energy, water, and urban sectors, and improving tangible and effective coordination between institutional, private, and civil-society actors.

The multisectoral engagements helped the team identify and verify the assumptions underlying the climate and development scenarios modeled in this report. The assumptions consider national and local economic and sectoral conditions (including financing options and the availability of technical skills); existing climate strategies, initiatives, and technologies; and opportunities emerging beyond Tunisia's borders in the context of a decarbonizing world.

Alignment with and contribution to country strategies



Source: Country Climate and Development Report

The Government of Tunisia has been developing high-level strategies to address climate change and foster an ecological transition, but the implementation of these strategies remains elusive. The country recently launched its National Strategy for Ecological Transition (SNTE, 2023/35/50), which seeks to implement a resilient, sustainable, socially fair, and inclusive development model that changes existing ways of consuming, producing, working, and living while promoting conservation, carbon neutrality and circularity. In addition, Tunisia's 2023–2025 Development

Plan recognizes the need for economic transition in the context of climate change, identifying the investment that will be needed to achieve the transition (TD 6.7 billion, or US$2.2 billion).[1] Tunisia has further committed to the ambitious goals of reducing unconditional 2030 emissions intensity by 27 percent and conditional emissions by 45 percent (against a 2010 baseline). Despite these commitments, funding shortages, frequent changes in government, public sector constraints, and an escalating fiscal deficit (driven in part by the limited efficiency in the energy public spending) have restricted state implementation of climate action.

Water scarcity, coastal erosion and flooding, and the energy sector's dependence on fossil fuels are Tunisia's most important development and climate challenges. Failing to address them would be costly for the economy in the near term.

Failing to take urgent and decisive action on the above objectives could result in significant socioeconomic, political, and humanitarian repercussions (summarized in Figure 1).

Figure 1: Summary of economic development and climate challenges

Objective: Secure sufficient water resources

Challenge: The water scarcity situation will likely deteriorate as climate change progresses, leading to a ripple effect for ecosystems and across all sectors of the economy, especially in agriculture, with consequences for food security.

Objective: Enhance resilience to flooding and sea-level rise

Challenge: Tunisia's vulnerability to coastal erosion and disaster impacts will put people and infrastructure at risk, which could lead to the destruction of assets and business disruption.

Objective: Decarbonize energy supply and demand

Challenge: Tunisia's increasing dependence on fossil-fuel imports undermines its macro-fiscal framework. energy security, affordability for households, and competitiveness for companies.

Objective: A "whole of society" and "whole of government" approach for a just transition

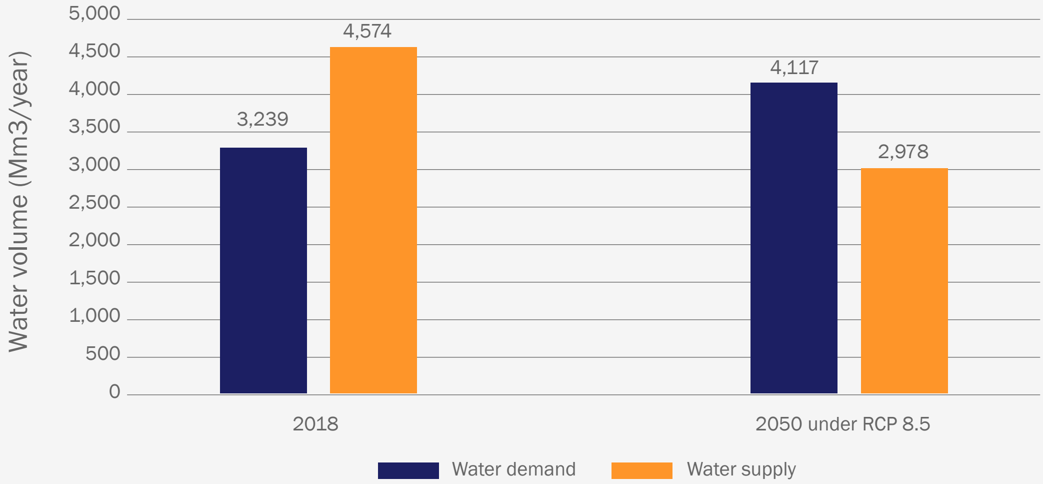
Challenge: Climate change has profound impacts on the people of Tunisia. Vulnerable groups (such as the poor, youth, and women) will be particularly affected due to limited access to resources (financial, food, and water), and limited economic capacity to withstand shocks. Climate change is also a driver of migration and internal conflict. Marginalized and economically disadvantaged populations, especially those in rural areas, will be particularly affected, triggering migrations to urban centers in search of better opportunities. In North Africa, it is estimated that 19 million people will move for climate reasons.

Water scarcity is already impacting almost every aspect of Tunisia's socioeconomic development. Water demand has increased in recent years due to urban growth, a rising population, and increased irrigation needs. By 2050, a simultaneous increase in the frequency and the intensity of climate change-induced extreme weather events is expected to drive a decline in water availability, with demand outstripping supply by 28% under a representative concentration pathway of 8.5 (RCP 8.5), which is the worst-case climate change scenario (Figure 2).[2] In all climate change scenarios, water quality and the storage capacity of dams decrease, while the incidence of water-borne diseases increase. Agricultural losses, especially in Tunisia's main agriculture systems (olive, oasis, cereal, and livestock), also increase, as do the incidence of disease, with the poor being the most vulnerable to these compounding impacts.

[1] See the preliminary version of the development plan 2023-2025.

[2] While long-term greenhouse gas emissions under an RCP 8.5 scenario are widely considered overly pessimistic, the Coupled Model Implementation Project (CMIP) climate change scenarios with RCP 8.5 (CMIP 5) provides a useful (and not implausible) high-warming forecast that is consistent with continued GHG emissions and high climate-change sensitivity or positive feedback from the carbon cycle.

Figure 2: Water supply and demand in 2018 (no drought conditions) and under RCP 8.5 with no action

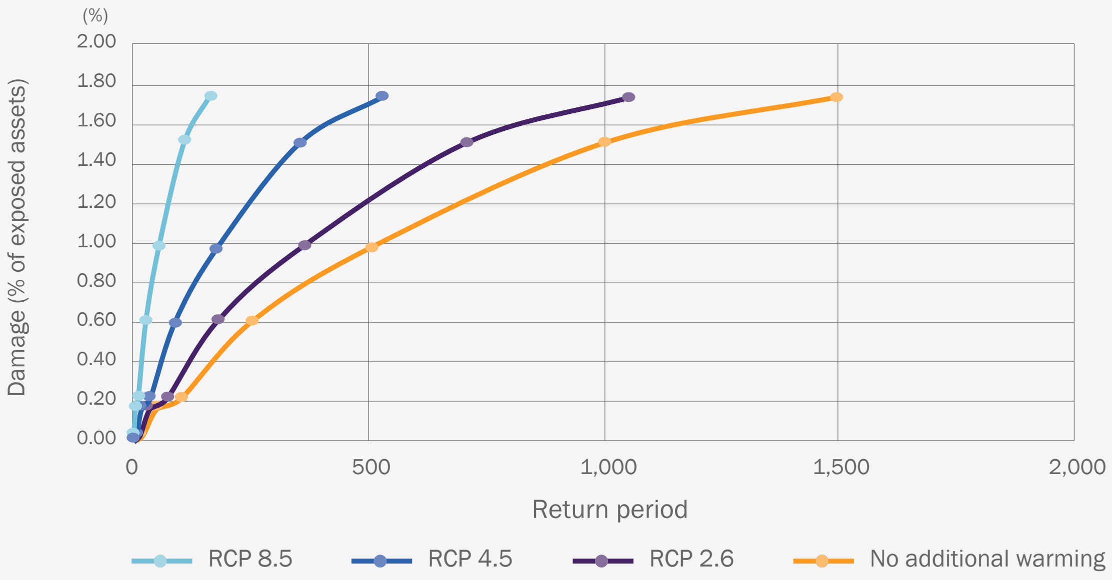


Source: World Bank staff estimation.

A significant share of Tunisia's land is exposed to climate-induced risks of shoreline erosion, permanent submersion from sea-level rise, and flooding. Climate change is expected to drive greater variability of precipitation, which increases the likelihood of catastrophic floods and associated asset damages as a one-in-1,500-years flood becomes a one-in-163-years flood under RCP 8.5 (Figure 3). Under both Shared Socioeconomic Pathway 2 (SSP2) and SSP3, 0.4 percent of the total land area in Tunisia—which includes 24 percent of the populous linear coastal distance—are likely to be affected by sea-level rise by 2050. Land losses[3] due to sea-level rise could amount to US$1.6 billion (SSP3), although this figure may reduce to US$44 million under SSP1 while adopting a strong integrated coastal zone management approach.

[3] Land losses have been evaluated using the discounted unit cost/coastal land market price (without considering the value of the lost economic activities on the land). The valuation has been done for each type of land use using different sources, including Heger and Vashold 2021, cited in Heger et al 2022.

Figure 3: Likelihood of flooding under different RCP scenarios



Source: World Bank staff estimation.

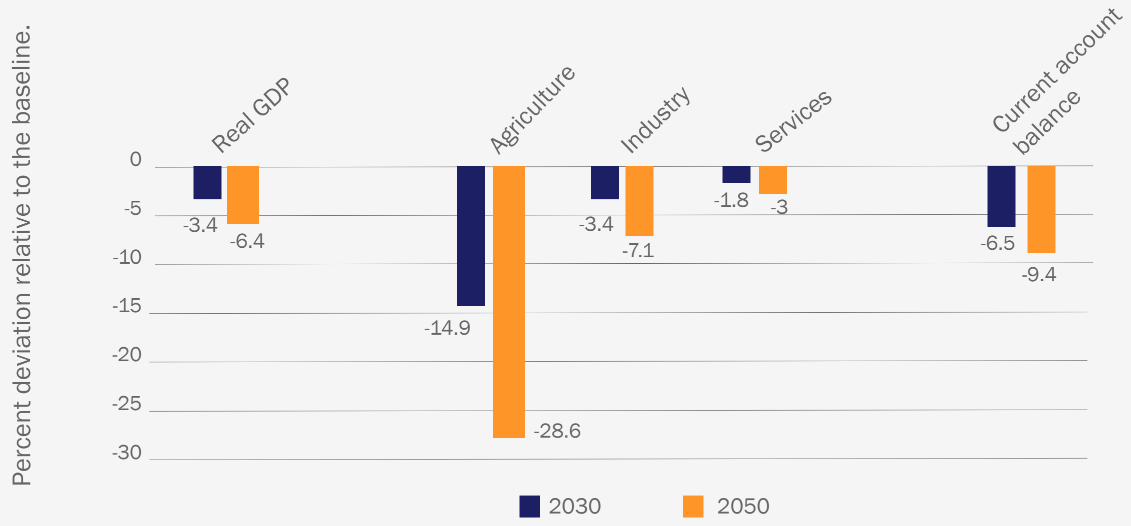
Surface area loss will result in pronounced indirect losses, with the tourism sector being among the worst affected. Assuming no adaptation measures are taken to protect the tourism sector in coastal zones, the direct and indirect consequences of surface area loss by sea-level rise would cost the Tunisian economy up to 6.9 percent of 2020 GDP by 2050 due to cascading impacts on hotel, restaurant, and catering activities; public revenue; tourism-related economic activities; and jobs.

If Tunisia does not urgently address these climate change-related risks, particularly water shortages, the economy could shrink by 3.4 percent of GDP by 2030 (close to TD 5.6 billion a year [US$1.8 billion] in net present value). Our modeling suggests that, compared with a baseline based on past trends, unaddressed water shortages, coastal erosion, and flooding could reduce real GDP by 3.4 percent in 2030 (under RCP 8.5). These annual losses could grow to 6.4 percent of GDP by 2050, or TD 10.4 billion (US$3.4 billion) in net present value terms. A large share of these losses is driven by the impacts of water shortages. The agricultural sector would therefore be particularly affected, with its value added expected to fall by 15 percent by 2030 (and by 29 percent by 2050). A decline in agricultural production would reduce net exports, while imports would increase to bridge the resulting supply-demand gap. Under this scenario, the current account deficit could deteriorate by more than 6 percent in 2030. This would exacerbate Tunisia's already fragile external balance. In addition, by 2030 the poverty rate would increase to 21.3 percent, which is a 1.5 percent increase relative to the baseline scenario.[4]

[4] Based on the official poverty line calculated in the 2015 Household Budget Survey of Tunisia's National Statistics Institute.

Figure 4: The economic costs of climate inaction

(Percent deviation of the scenario if no action is taken to reduce climate stressors in a business-as-usual scenario)



Source: World Bank staff estimation.

Decarbonizing the energy sector, which is 99 percent fossil-fuel based, would enhance Tunisia's energy security and consequently reduce its current account deficit, making it less vulnerable to international price fluctuations. The CCDR analysis indicates that energy import dependency would be reduced from 50 percent in 2022 to 2 percent in 2050 in a "deep decarbonization" scenario (see scenarios discussion under "Decarbonized energy supply", below). Decarbonizing the energy sector would help to reduce energy costs, making energy more affordable for households and companies while supporting Tunisia's ambition of becoming a regional energy hub for clean energy trade between African countries and Europe. Failing to decarbonize the energy sector, which accounts for 58 percent of the country's greenhouse gas (GHG) emissions, would make it difficult for Tunisia to comply with its Nationally Determined Contribution (NDC) obligations. The country's current account deficit and financing conditions would limit its ability to import the energy it needs to meet growing demand, and economic activity would be stifled.

Addressing water scarcity, enhancing the resilience of urban and coastal areas to climate stressors, and decarbonizing the energy sector would yield substantial developmental gains for Tunisia in the near term.

Enhanced water management and increased water supply

Managing water demand and improving efficiency are essential for maximizing existing conventional water resources. The country would benefit from prioritizing, among other measures, the regulation of water demand and targeted awareness campaigns. Iinstitutional reforms and establishing a water-monitoring and early-warning system would further enhance water governance and management. Strengthening the technical and financial capacities of institutions—including professional organizations and those in rural areas—will likely be critical for the effectiveness of water policies. Since water-related challenges in rural areas particularly affect women, this group should play a more active role in making decisions relating to the management of water resources.

Tunisia would benefit from drawing on non-conventional water sources to cope with demand-supply imbalances. Conventional water resources are almost fully utilized, and the development of additional built water storage will require thoughtful and purposeful design. Combining desalination with wastewater reuse could increase water supply by 693 million cubic meters (Mm^3), according to Tunisia's Water 2050 strategy.[5]

[5] Tunisia's Water 2050 strategy is available here: http://www.onagri.tn/uploads/Etudes/ITES-eau2050.pdf

Increased resilience and efficiency of the agricultural sector including through nature-based solutions

As the main consumer of water, the agriculture sector has an important role to play in improving irrigation efficiency to reduce water demand. The implementation of nature-based solutions can further increase water availability. To protect rural areas from climate-induced income stress, smallholder farmers (including herders) would benefit from upgrading their operations with climate-smart practices to increase productivity and promote more resilient, rainfed agriculture. Nature-based solutions—especially those that support the recharge of groundwater reservoirs by conserving and restoring forests, watersheds, wetlands, and oases landscapes—will play a crucial role in mitigating the anticipated decline in surface water.

Coastal zones defended against sea-level rise

Targeted interventions to protect coastal zones and their economic activities may help prevent some of the damage that could be caused by sea-level rise. The type of intervention depends on the coastal zone. For natural areas with assets (such as beaches), primary interventions would usefully focus on soft defense measures like adding sediment or sand along the shoreline (beach nourishment), conserving dunes, or implementing nature-based solutions such as increasing vegetation cover to stabilize soil. Developing a diversified tourism value chain—that is, one that offers year-round tourism that takes advantage of unique inland landscapes and heritage assets as well as coastal attractions—would further reduce risks to the tourism sector.

Critical infrastructure protected against flooding and sea-level rise

Tunisia would benefit from investing in enhancing multimodal transport to increase the resilience of the transportation network. Increased investment in railways would strengthen Tunisia's transport network resilience because having multiple modes of transport introduces alternatives into the overall transportation system. Seaports play a critical role in importing essential goods and present opportunities to improve resilience by upgrading infrastructure and strengthening connectivity with land transport, particularly railways. Resilience could be integrated into transport policies and mainstreamed in investment planning, programming works, the design and engineering of infrastructure assets, and the operation and maintenance of facilities, including when this is done by public-private partnerships.

Institutional mechanisms could usefully ensure that climate change risks are systematically included in infrastructure, land use, and urban planning. Tunisia has taken significant steps to improve its resilience to disasters, including publishing the 2030 National Disaster Risk Reduction Strategy and its Action Plan. Nonetheless, opportunities remain to improve its resilience, including updating and enforcing building codes and design standards, especially of key public infrastructure. Improving infrastructure resilience involves strengthening the capacity and authority of local institutions to manage and protect assets. Integrated coastal zone management (ICZM) has proven to be a successful tool for managing coastal erosion.

Social protection enhanced and insurance schemes developed

Improving the financial resilience of households, farmers, and businesses can protect the population's well-being in the face of climate risks. Disaster risk financing and insurance can address residual risk after disaster risk reduction efforts have reduced the impacts of disasters. Updating the social registry of the country's main social assistance program, AMEN, to include all vulnerable households would help with the issue of early warnings and would support a speedy response to potential future climate shocks.

Decarbonized energy demand in end-use sectors

An "avoid-shift-improve" framework is useful when considering decarbonization measures for the transport sector. "Avoid" refers to meeting mobility needs with fewer vehicular travels (for example, by digitalizing services, reforming the trucking industry to encourage the consolidation of demand, or by urban planning). "Shift" refers to switching from the currently dominant model of using private cars to more sustainable modes of transport that include walking, cycling, and using public transport or rail. "Improve", meanwhile, refers to improving the energy efficiency of vehicles and promoting electromobility and the integration of green hydrogen. Concrete policies and initiatives would send clear signals to the market to encourage the transition to a sustainable transport system that uses less fossil fuel and more clean energy.

For the industrial sector, cost-effective measures include improving production efficiency; increasing the use of alternative, cleaner fuels (including renewable energy through electrification and green hydrogen); reducing waste along product lifecycles; and using carbon capture and storage (CCS). Despite being aware of climate mitigation requirements, few companies demonstrate climate preparedness. Decarbonization would require scaling up energy audits and energy management systems; implementing new regulatory and innovative finance models to increase energy efficiency investments; and adopting new approaches to electricity demand management, including the use of demand-side response, behind-the-meter battery storage, renewable energy self-generation, and co-generation.

Greening the building sector requires scaling up and strengthening existing government programs, including those that focus on rooftop solar photovoltaic (PV) panels and solar water heating for poor and vulnerable households. Existing programs, while promising, experience financial, technical, and communication-related challenges that prevent them from reaching their full potential. The most important decarbonization measures for the building sector would focus on improving energy efficiency through better insulation and the use of natural cooling and heating techniques as well as more efficient appliances for lighting, cooking, heating, and cooling.

Decarbonized energy supply

Given the importance of electrification and green hydrogen in achieving net-zero emissions in the energy sector, decarbonizing electricity supply through renewable energy is highly recommended. This report explores potential pathways through three scenarios:[6] an "unconstrained optimized" scenario where electricity demand is assumed to follow a business-as-usual (BAU) trajectory (Scenario A), a scenario with imposed net-zero emission target in the electricity sector by 2050 (as Scenario B), a scenario with the same emission target as in Scenario B and the decarbonization of demand in the end-use sectors with increased electrification and the deployment of green hydrogen in the building, industrial, and transport sectors, which displaces the use of fossil fuels.

All scenarios entail a massive switch from natural gas to renewables, with solar and wind being the least-cost solutions for electricity production. A decline in thermal generation would reduce the need for natural gas, with positive outcomes for energy security and the trade balance. Due to the large penetration of renewables in the power sector, which are cheaper than thermal generation, and improvements in the efficiency of power plants, the average cost of electricity generation would decrease significantly in all scenarios. The current renewable power generation capacity of 467 MW is far from both the government of Tunisia's target of 4,800 MW and the optimal capacity of 5,900 MW (Scenario A) by 2030. The rapid expansion of renewable energy depends on initiating an integrated reform program that restores the sector's financial viability, including reforming public energy spending and financially restructuring and improving the performance of the Société Tunisienne de l'Electricité et du Gaz (STEG, the Tunisian Company of Electricity and Gas) to regain investor confidence.

Decarbonizing the energy sector would generate significant economic gains by helping Tunisia address its external imbalance and reducing energy costs, while driving large emission reductions. These mechanisms are captured in the results of macroeconomic modeling for the three scenarios (presented in Table 1). All scenarios lead to economic gains relative to the baseline inaction scenario, with the economy expected to be larger by between 1.1 percent (Scenario A) and 1.7 percent (Scenario C) by 2030. The GDP impact of Scenario C is largest in the short run (GDP 1.7 percent larger by 2030) because end-user sectors benefit from enhanced decarbonization, resulting in lower energy costs.

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[6] The three scenarios were selected to investigate the cost of decarbonisation in the electricity sector. The assumptions used do not necessarily match those of Tunisia's National Energy Strategy and its Low Carbon Strategy. One of the scenarios is a "least-cost solution with no carbon constraint", to be able to compare results with a scenario of decarbonization of the electricity generation sector (with and without increased electricity penetration and the introduction of hydrogen). The present analysis focuses on the electricity sector as a critical sector to reach carbon neutrality and does not assume overall carbon neutrality of the energy sector or the whole economy.

Table 1: Macro impacts of decarbonization scenarios (percent deviation from baseline)

	Scenario C: Deep decarbonization		Scenario B: Green		Scenario A: Least-cost	
	2030	2050	2030	2050	2030	2050
Real GDP	1.1	1.4	1.1	1.4	1.7	1.4
Private consumption	0.5	1.2	0.9	0.9	3.1	7.9
Agriculture	0.3	0.9	0.3	0.8	3.2	5.6
Industry	1.2	1.7	1.3	1.7	1.8	1.2
Services	1.1	1.4	1.2	1.4	1.5	0.9

Source: World Bank staff estimation.

Total investment needs by 2050

This CCDR presents solutions for three key objectives and estimates the total investment needed to achieve a resilient and net zero[7] Tunisia by 2050 in net present value terms. Ultimately, the impact of the transition will depend on how these investments are financed and, more broadly, on the macroeconomic policy choices that will be made in the years and decades to come. Table 2 presents the costs related to sectoral interventions, where estimates were available.

Table 2: Investment and cost of operations until 2050 (in US$ million) [8]

Engagement dimension	Public or private	Investment cost up to 2030	Investment costs 2030-2050	Total investment costs
Addressing the water crisis	Public	3,069	10,505	13,574
	Private	683	2,798	3,481
Enhancing resilience to flooding and sea-level rise	Public	1,536	785	2,320
Decarbonizing the energy sector	Public	4,427	8,683	13,110
	Private	7,383	14,183	21,567
Total costs	Public	**9,032**	**19,973**	**29,004**
	Private	**8,066**	**16,981**	**25,048**

Source: Compiled by World Bank staff.

[7] The CCDR analysis focuses on achieving net zero in the energy sector, which is expected to contribute 59 percent of projected emission reductions to achieve net zero by 2050. It does not include investments required to reduce emissions in other areas such as agriculture, forestry and land use, industrial processes, and waste.
[8] Further information on how the investments were estimated, including assumptions and discount rates can be found in Chapter 3 of this CCDR.

The economic and poverty reduction gains of climate adaptation and decarbonization would be substantial...

Actions and investments to address climate change and decarbonize the electricity sector could increase GDP by 9 percent, reduce poverty by 12 percent, and slash energy emissions by 80 percent by 2030. Macroeconomic modeling suggests that actions to adapt to potential water shortages, flooding, and coastal erosion while decarbonizing energy demand and electricity supply would yield huge benefits to the economy. If all the recommended adaptation and mitigation actions are implemented, GDP could be 8.8 percent larger than in the inaction scenario as soon as 2030. Moderate poverty could be reduced by 2.5 percentage points, a 12 percent reduction relative to the level in the inaction scenario (21.3 percent). These results suggest that there is no trade-off between reducing emissions and maintaining economic growth because decarbonizing the energy sector would allow the country to largely address the external imbalance, generating large emission reductions along with economic gains.

...but the gains crucially hinge on financing the large investment needs of climate action

While the economic and environmental benefits of climate action are clear, identifying how to finance such action is crucial given Tunisia's limited access to international financing. While most of the funding for adaptation and decarbonization will likely come from private or concessional sources, public investments would also need to play a key role. Given the constraints to debt financing, fiscal policies—especially those that aim to reduce expenditure—could help finance the public investment needed for Tunisia's climate actions.

Financing climate investments would require repurposing recurrent expenditures, making public spending more efficient and removing barriers to private investment

Repurposing recurrent expenditures (including energy expenditures) and taxes on carbon and capital income represent the most significant opportunities to fund public investments in adaptation and decarbonization. Tunisia has one of the highest levels of energy public spending relative to GDP in the world, coupled with a relatively low level of environmental taxes. Its public spending on energy generates more negative environmental externalities (such as local pollution and global warming) than those it internalizes through taxation because environmental taxes represent a mere 6 percent of total tax revenues. Modeling suggests that repurposing public energy spending and increasing taxes on carbon and capital income would yield significant economic gains. Such fiscal policies would also prevent the country from needing to resort to costly debt financing for adaptation and mitigation investments. The combined adaptation and full decarbonization scenario, which is funded by improving the efficiency of public energy spending and increases in carbon and direct taxes, yield large economic gains by 2030 (+8.2 percent of GDP) while ensuring the sustainability of public debt. This fiscal policy could also help fund the decarbonization of the economy, achieving both economic and emission reduction benefits.

Tunisia's actions to better integrate climate indicators into public financial management are useful, but more is needed to secure sufficient public climate financing. The Ministry of Environment (MoE), in coordination with the Ministry of Finance's Budget by Objectives Unit, has initiated preparatory work to integrate climate indicators (emanating from national climate policies and targets) into the performance indicators of objective management units in key sectors. However, to effectively attract public finance for climate initiatives, Tunisia would benefit from developing a climate project database and a methodology to prioritize climate projects. Climate change considerations have also not yet been systematically included in Tunisia's public finances, fiscal risk statements, public investments, or procurement. State-owned enterprises are not yet required to report on climate risks, or to have formulated plans to address them. Even with decisive government action, attracting private, bilateral, multilateral, and international market financing remains key to meeting Tunisia's large climate investment needs. These needs are recognized in the NDC and could take the form of concessional lines of credit, grants, foreign direct investment, debt swaps or innovative financing via carbon markets.

Private funding will be crucial for ensuring sufficient climate investments. However, the challenging macro-financial and -economic environment is a key barrier to developing Tunisia's green finance market. Tunisia's macroeconomic difficulties and debt sustainability concerns have made it increasingly difficult for the country to access international capital markets. This has increased concerns of capital outflows, which have further limited the convertibility of the local currency. Tunisia's public and private sectors have limited instruments to unleash green finance, and there is a lack of eligible, bankable projects. Tunisia would benefit from a national climate finance strategy that accurately assesses its climate investment needs and provides the market with certainty around regulatory changes. Addressing these issues requires concerted and decisive efforts by both the government and the financial sector. Dismantling rigorous restrictions to investments and competition would also revitalize the private sector and accelerate the climate transition. Decarbonizing key export sectors and integrating into green value chains would be important for ensuring future international competitiveness. The country's new public-private partnerships (PPP) framework may help the private sector partner with the state to develop the infrastructure needed for the climate transition.

Besides providing financing, the private sector is also crucial for developing the technologies and skills required to implement climate actions. This highlights the need to tackle constraints blocking its potential, which are often of regulatory nature. The private sector is likely to be instrumental in making production processes more climate friendly; in developing and maintaining activities that are resilient to the new climate conditions; and in developing the skills and inputs needed for the transition to a more sustainable path.

Human risks and opportunities

Tunisia's people need to be prepared for new climate realities. Tunisia could usefully leverage its existing social protection systems and build capacity to ensure a quick response to climate stressors and shocks. Such responsiveness would minimize the impacts of on people without exacerbating existing vulnerabilities. Emergency preparedness, including prepared health systems, would help maintain basic services while minimizing the negative impacts of quick-onset climate shocks. These measures would play a crucial role in mitigating distributional impacts. However, it is imperative to prioritize vulnerable groups and women. Strengthening social protection systems and ensuring equitable access to resources, health systems, and education would provide a strong foundation for those who are likely to be most affected by climate change.

Tunisia's people also need to be equipped for the jobs needed to realize a green and circular economy. Developing appropriate skills will be important as the country decarbonizes. The current education system appears to favor higher-level "green" skills, with relative gender parity in renewable energy-related programs. However, there is a substantial capacity gap when it comes to medium or low "green" skills, particularly at the technical and vocational education training level. Tunisia would benefit from making a concerted effort across education and training institutions—which should ideally be closely linked to private sector demand to promote quality and relevance—to ensure that there is a suitably qualified workforce to do the jobs required to meet its climate goals.

Policy recommendations

This CCDR makes recommendations to address three main climate and development challenges in Tunisia: water scarcity, sea-level rise and flooding, and decarbonization of the energy sector. It proposes specific sectoral actions as well as horizontal actions to address human capital gaps and create the right macro-financial conditions to finance the needed investments. Figure 6 summarizes these recommendations, framing them through a "whole of society" and a "whole of government" approach that aims to address institutional and political economy constraints. A "whole of society" approach mobilizes all actors and resources in united action while addressing the concerns and needs of vulnerable stakeholders. A "whole of government" approach is needed to tackle the level of complexity that the climate challenge represents. Responsibility for implementing Tunisia's NDC is currently fragmented between several institutions.[9] Greater cooperation across institutional boundaries at both the national and local levels, supported by greater clarity on roles and responsibilities, would support actions to address the three challenges listed above.

In light of Tunisia's current macro-financial constraints, the CCDR also proposes a condensed package of urgent actions that are affordable while delivering high impacts in the near term. The package is built around two key, urgent objectives for the Tunisian economy: addressing water shortages and transitioning the energy sector from fossil fuels to renewables. Because Tunisia cannot currently expand its debt, the country would also need to urgently pursue a third objective: creating the right macro-financial conditions for public and private investments to fund these objectives (Figure 5).

Figure 5: Recommended high-impact actions with near-term benefits for a green, resilient, and inclusive transition

Addressing water scarcity

- **Control water demand** through pricing and metering methods.
- **Modernize, rehabilitate, and extend water networks** to reduce water losses and waste, and improve network monitoring and management through digitalization of the water sector.
- **Incentivize (for example through subsidies and tax incentives) and invest in protection and rehabilitation of ecosystems**, especially watersheds, oasis ecosystems, forests, and wetlands.

Transitioning energy supply from fossil fuels to renewables

- **Enhance coordination and streamline the development of renewable energy,** including coordinating approvals at the Council of Ministers level, limiting the number of authorizations required, establishing clear procedures for land access, securing financing and guarantees for better risk-sharing, and restoring the financial viability of the sector.
- **Develop adequate technical and market conditions to provide flexibility services** to facilitate large-scale renewable energy integration, including storage, demand-side response, regional electricity market integration, and transmission network reinforcement where required.

Creating the right macro-financial conditions for public and private investments

- **Redirect recurrent public expenditures** (including expenditures on fuels and electricity) towards the most urgent public adaptation investments.
- **Enhance private sector entry for green activities, including eliminating preventative prohibitive authorizations, sectoral specifications (cahier de charges), capital outflow restrictions and non-tariff barriers; simplifying investment authorizations, especially around clean energy; and reducing the regulatory power of the sectoral incumbent.**

In the medium to long term, the priority actions summarized in Figure 5 would need to be accompanied by other actions (Figure 6) to fully achieve the three identified objectives while also adapting Tunisia to the other climate stressors. Recommendations with high impact and near-term benefits (featured in Figure 5) are in bold in Figure 6.

[9] These institutions include the Ministry of Environment; the Ministry of Industry, Energy and Mining; the Ministry of Agriculture, Water Resources, and Fisheries; and their affiliated bodies.

Figure 6: Recommendations for green, resilient, and inclusive transition

"WHOLE OF GOVERNMENT" AND "WHOLE OF SOCIETY" APPROACH

ADDRESS WATER SCARCITY

Increase water supply and enhance water management

- **Control water demand through pricing and metering methods.**
- **Modernize, rehabilitate, and extend water networks to reduce water losses and waste, and improve network monitoring and management by digitalizing the water sector.**
- Strengthen the quality and distribution of non-conventional water sources such as desalinated water, including through public-private partnerships.
- Protect water and groundwater against misuse and agricultural pollution, including by establishing safeguard zones and by revising and implementing the new Water Code.
- Improve water management by developing contingency plans during droughts and by carrying out a water withdrawal inventory.

Increase the resilience and efficiency of the agricultural sector and leverage nature-based solutions

- **Incentivize (for example through tax incentives) and invest in protection and rehabilitation of ecosystems.** Scale sustainable land-use planning, water-management practices, and agroforestry.
- Develop and promote usage of, and research into, climate-smart agriculture and animal husbandry.
- Fight food loss and waste all along the agriculture, fisheries and livestock value chains.

ENHANCE THE RESILIENCE OF URBAN AND COASTAL AREAS

Defend coastal zones against sea-level rise and flooding

- Prepare and implement participatory integrated coastal zone management plans. Protect coastlines through soft and nature-based defense solutions.
- Freeze construction in affected natural space and urbanized areas. If needed, protect urbanized areas through additional sustainable breakwaters.
- Develop sustainable coastal tourism and a diversified tourism offering.

Protect people and infrastructure

- Develop asset management systems for essential infrastructure that incorporate climate risks and optimize lifecycle costs.
- Transfer governance of disaster risk management to municipalities.
- Identify critical infrastructure for retrofitting or upgrades.

Enhance social protection and develop risk-based insurance themes

- Advance disaster risk financing (DRF) by building capacity, formalizing DRF strategy, implementing public finance mechanism, and enabling local private insurance sector to provide coverage.
- Strengthen access to financial risk protection and ensure linkages between social registry and insurance eligibility. Maintain sufficient emergency contingency resources to quickly respond to climate-related shocks.
- Strengthen early warning systems and reinforce emergency preparedness and response plan.

DECARBONIZE THE ENERGY SECTOR

Decarbonize demand in the end-use sectors

- For all sectors: Encourage the use of renewable energy, enforce the existing legal framework for energy efficiency/conservation, and implement energy conservation/efficiency programs with demonstrable effects.
- Transport: Promote alternatives to road and private vehicle transport to reduce congestion, enforce emission standards, retire aged fleet, and establish incentives and infrastructure for electric vehicles.
- Industry: Enforce and scale up energy audits, energy management programs, and energy certification for energy-intensive sectors, accompanied by capacity-building and financing mechanisms (including the Energy Transition Fund). Pilot innovative decarbonization technologies and accelerate the self-generation and co-generation program.
- Buildings: Scale up rooftop solar photovoltaic and solar water heating, and the appliance replacement and retrofitting programs.

Decarbonize supply: focus on electricity generation

- **Enhance coordination and streamline the development of renewable energy.**
- **Develop adequate technical and market conditions to provide flexibility services to facilitate renewable energy integration.**
- Prepare a roadmap for green hydrogen and establish an intersectoral Green Hydrogen Council to implement it.
- Invest in and promote traceability-testing-certification systems, including for green hydrogen and electricity for exports.
- Adopt a whole-system approach for planning and operating the electricity system, including sector integration and coupling.

Enhance human capital

- Expand skilling, re-skilling and up-skilling and on-the-job training programs, especially on the energy transition.
- Higher education and vocational training: Expand climate-related programs; involve industry in developing curricula to ensure relevance.
- Raise awareness about climate change and green practices in the national curriculum. Train teachers and educators.
- Strengthen the capacity of primary health facilities to implement surveillance systems to improve climate responsiveness.

Improve institutions and engagement

- Establish an intersectoral National Climate Council chaired by the head of government and adopt climate change legislation covering existing gaps.
- Adopt climate indicators to measure adaptation progress for publishing on the government's climate portal. Starting with SOEs, adopt international best practice on reporting and disclosure standards.
- Establish climate focal points and provide support for community-based program investments in municipalities.
- Engage with affected stakeholders, including through organizing iterative outreach campaigns on climate change and setting up a national level multistakeholder network on climate change public policy planning and monitoring.

Create macro-financial conditions to support investments

- **Redirect recurrent public expenditures towards urgent adaptation investments.**
- Include climate-related and green criteria for public investment projects. Adopt methodology for integrating climate indicators in program budgets and launch a green taxonomy process.
- **Support private sector entry for green activities by, for example, eliminating prohibitive authorizations.** Simplify investment authorizations around clean energy. Reduce the regulatory power of sectoral incumbent.
- Assess the financial sector's exposure to climate risk and build capacity to diversify funding sources.
- Create an enabling platform to accelerate procedures for climate investments and to aggregate projects into bankable portfolios for concessional funds and blended finance and provide climate finance offering for vulnerable groups.
- Boost private participation, including by developing a regulatory framework for adopting new technologies. Incentivize green certification.