1 Key environmental trends

This chapter provides a snapshot of Egypt's environmental trends related to climate change, air, waste, water and biodiversity, highlighting some of the major achievements, remaining challenges and key policy responses. Drawing on OECD green growth indicators and national information sources, the chapter reviews national policy objectives and targets, as well as international commitments. Beginning with an overview of the main socio-economic developments, the chapter presents the country's progress in moving towards i) a low-carbon, climate-resilient and energy-efficient economy; ii) a resource-efficient economy; and iii) sustainable management of its natural capital.

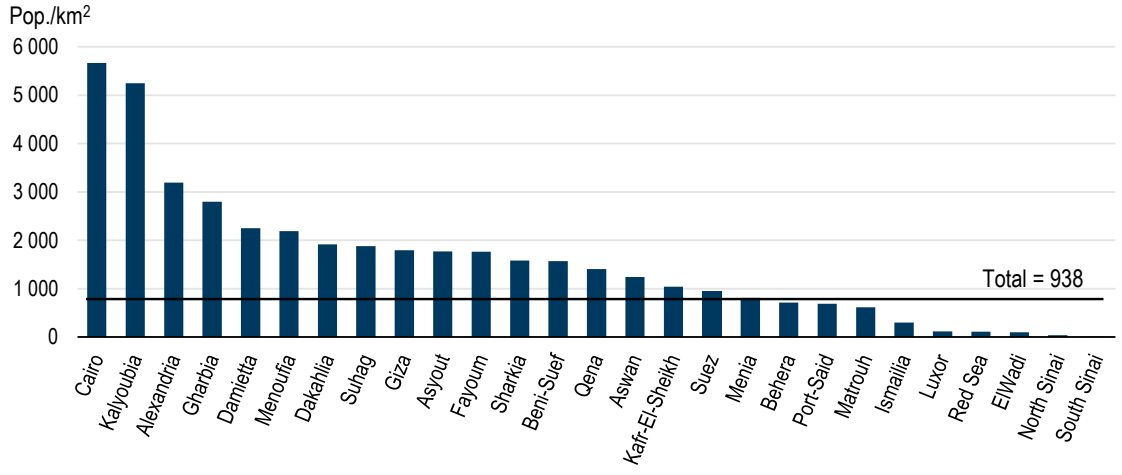
1.1. Main economic and social developments

1.1.1. A demographic heavyweight with a fast-growing population

With over 110 million people, the Arab Republic of Egypt has the third largest population in Africa, following Nigeria and Ethiopia. Nearly 1 out of 12 Africans is Egyptian. Egypt has a sizeable diaspora of some 9 million, making it the fifth largest remittance recipient in 2020 (World Bank, 2023[1]). The country is a top tourism destination with 14.9 million tourists in 2023, ranking first in Africa.[1] Rapid demographic growth amplifies Egypt's multifaceted environmental challenges. On the one hand, it puts additional pressure on already scarce natural resources such as arable land and water. On the other, it increases pollution levels due to increased human activity. Egypt is projected to become one of the most populous countries in the world by 2050. The areas along the Nile River and its Delta are among the world's most densely populated. In contrast, the vast desert areas are sparsely populated or uninhabited (Figure 1.1). Urbanisation is advancing rapidly, with 66% of Egyptians living in urban centres and 27% in semi-dense urban areas in 2015, accounting together for 93% of the population (OECD/European Commission, 2020[2]).

Figure 1.1. Egypt's fast-growing population is concentrated along the Nile River and its Delta

Population density of inhabited areas by governorate, 2023



Note: The areas were calculated by the Egyptian General Authority for Urban Planning. The inhabited area represented about 12% of total land area in July 2023.
Source: CAPMAS (2024), Egypt in numbers, population density, https://www.capmas.gov.eg/Pages/StaticPages.aspx?page_id=5035.

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As typical for many African countries, Egypt's population is young. The country will reach a median age of just above 25 years by 2025, compared to 31 years in Asia and South America, 35 years in North America and 42 years in Europe (Desjardins, 2019[3]). The population is growing at 1.9% annually, with a fertility rate of 2.85 children per women in 2021 (Government of Egypt, 2023[4]). This is below the African average of 4.2 (AfDB, 2022[5]), but Egypt accommodates more than 1.6 million additional people every year (CAPMAS, 2023[6]). This rapid population growth creates major economic and social challenges related to food security, health, education, employment and quality of life (Box 1.1). It also creates daunting challenges for the housing sector in Egypt's fast-growing cities (Chapter 3). National policies need to keep pace with both demographic growth and increased demand from higher living standards that exert growing pressure on Egypt's natural resources. Responding to the needs of a larger population will require more sustainable use of natural resources in the economy.

Box 1.1. The Haya Karima Initiative, a cornerstone of Egypt's social protection efforts

In 2019, Egypt launched Decent Life, or Haya Karima, a presidential initiative to improve livelihoods of most vulnerable people in rural areas and unsafe settlements in urban areas. Key objectives include eradicating poverty, promoting economic empowerment, creating job opportunities and fostering community development. Haya Karima is a cornerstone of Egypt's social protection efforts, in line with Egypt's Vision 2030. It also contributes to achieving the 2030 Agenda for Sustainable Development. A digitalised monitoring system assesses progress towards achieving the Sustainable Development Goals at local level. These efforts will need to be sustained over time to assess the impacts of measures and the efficiency of public spending.

The initiative has three phases. The first phase targets the most vulnerable areas in which the national poverty rate exceeded 70%. The second and third phases focus on locations with a poverty rate of 50-70% and 50%, respectively. The first phase, which has been completed, supported 1 500 villages across 20 governorates, benefiting 18 million Egyptians (17% of its population). With a budget of EGP 350 billion, 23 000 projects were implemented, making the initiative one of the world's largest social protection programmes. Two-thirds of the funds were allocated to governorates in Upper Egypt.

The initiative achieved impressive outcomes within a short time, contributing to various sectoral policies. About half the projects focused on delivering water and sanitation services with a view to providing decent housing. Haya Karima created 170 drinking water stations and 24 000 domestic water connections, expanding the network by 7 500 km. In addition, it built 290 000 sewage connections and nine sewage treatment plans. In the health sector, it increased significantly medical coverage in rural areas. Close to 200 villages were connected to the optical fibre network; over 1 000 mobile towers were built to strengthen Egypt's communications network and thus support its digital transition.

Haya Karima also includes some green elements, notably introduction of green building standards, rehabilitation of irrigation canals, promotion of organic agriculture and use of renewable energy sources. Within the Green Village Initiative, the government targeted 175 villages, including pilot projects across 20 governorates. These projects promote eco-friendly practices such as solar-powered lighting for government buildings and energy-efficient LED street lighting. According to government estimates, green investment accounted for 30% of funding allocated to Haya Karima.

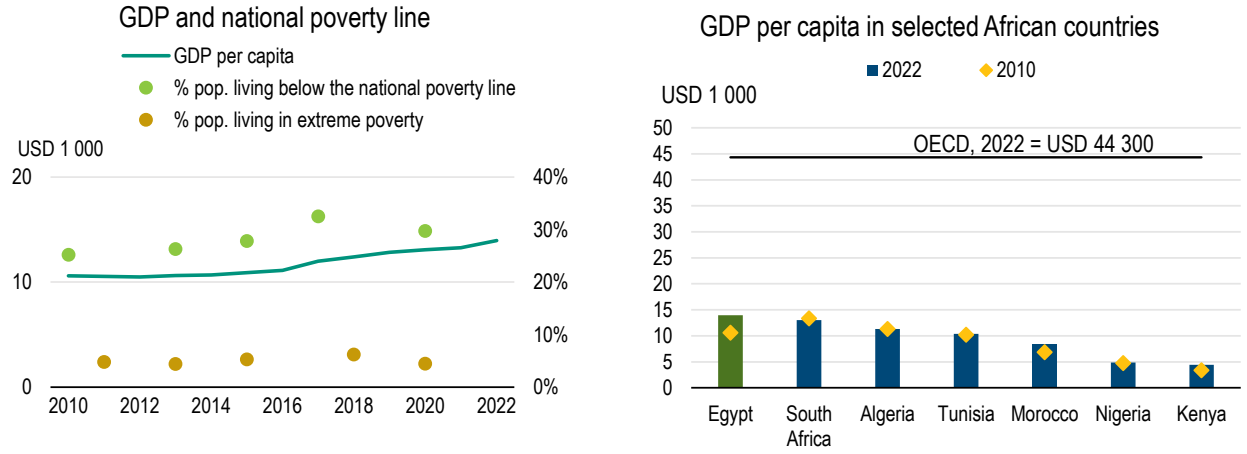
Source: (Government of Egypt, 2023[7]).

The government recognises the critical challenges related to the country's high population growth (Government of Egypt, 2021[8]). In 2023, it launched its first National Population and Development Strategy 2023-30 (Government of Egypt, 2023[4]). Its strategic goal is to reduce the fertility rate to 2.1 children by 2030. The scope has been progressively broadened from family planning and birth control (e.g. "Two Is Enough" initiative) to the economic empowerment of women.[2] The National Project for the Development of the Egyptian Family, launched in 2021, represents a step change.[3]

1.1.2. Economic performance

Egypt is among the best economic performers in the North Africa region. It had a five-year average real growth rate of 4.9% between 2018 and 2022, compared to 1.7% in OECD countries (OECD, 2024[9]). Egypt's gross domestic product (GDP) per capita reached USD 14 600 (current PPP) in 2021, approaching the level of some recent OECD members (e.g. Colombia, Costa Rica). However, 29.7% of the population were living below the national poverty line in 2020 (Figure 1.2). Regional and spatial inequalities persist. The informal economy plays an important role in nearly all economic sectors.[4]

Figure 1.2. Economic growth has not benefitted all Egyptians equally



Note: On the left panel, the left axis shows GDP per capita. The right axis shows the percentage of population living in poverty using data provided by CAPMAS. GDP data are expressed in 2015 PPP.
Source: (Government of Egypt, 2021[8]); Government of Egypt (2021), Egypt's 2021 Voluntary National Review; World Bank (2023), World Development Indicators (database), https://databank.worldbank.org/source/world-development-indicators.

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Over the past decade, Egypt has undergone structural reforms to restore macroeconomic stability and sustainable public finance. The overall budget deficit declined, but the central government gross debt is projected to remain high (80.6% of GDP in 2025/26) (OECD, 2024[9]); the resulting heavy interest burden significantly reduces the country's fiscal space. Egypt committed to a flexible exchange rate under an International Monetary Fund (IMF) agreement. The Egyptian pound has been devaluated several times and lost half of its value against the dollar in 2022/23 in light of tightening financial conditions in international financial markets.

Egypt is highly vulnerable to global shocks. Inflation surged to record highs (39.7% of core inflation and 74.2% for food and non-alcoholic beverages prices in September 2023). This undermined purchasing power and triggering high costs of living (OECD, 2024[9]). While the country managed to maintain growth and mitigate the social impacts of the COVID-19 pandemic remarkably well, it has been hard hit by the impacts of the war of aggression by the Russian Federation (hereafter "Russia") against Ukraine. As the world's largest importer of wheat, Egypt depends heavily on wheat from both countries. It imported 11.3 million tonnes of wheat in 2021, representing nearly half of its total wheat consumption (OECD, 2024[9]). About 40% of food needs are covered through imports. The government announced plans to expand wheat cultivation and scaled up social protection to reduce the impact of high food and energy prices on vulnerable households.

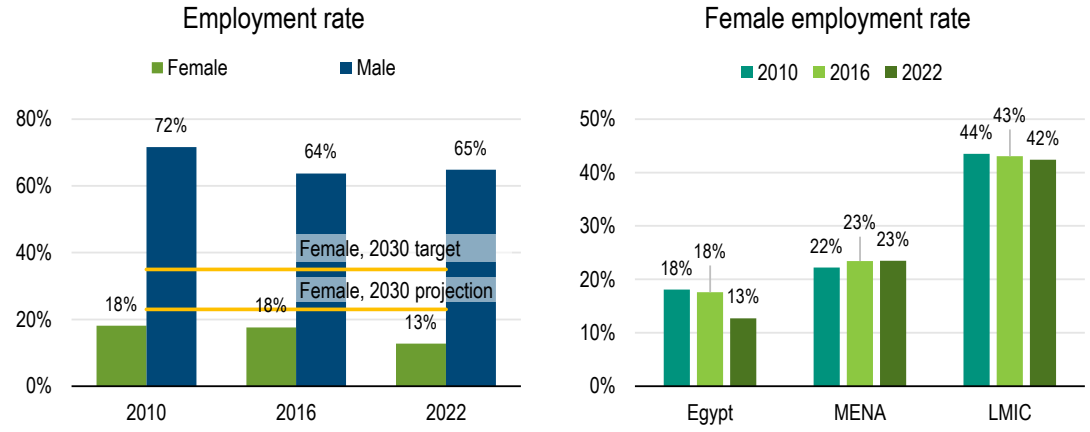
1.1.3. Structure of the economy and employment

Egypt's economy is among the most diversified of the Middle East. Its strong service sector accounts for over half of national GDP (53.9%). Industry, including the booming construction sector, has been growing rapidly. It represented about 34.6% in 2022, above the OECD average of 26.6% (2021) (OECD, 2024[9]). The agricultural sector accounted for about 11.5% of GDP and continues to provide livelihoods for rural populations. The tourism sector represents an important source of income, alongside the Suez Canal transit revenue.

Employment patterns are evolving, but the employment market failed to create sufficient additional jobs, particularly for a growing number of educated youth. Many new jobs are irregular and informal. The total employment rate (39.8%) has been shrinking and is below the OECD average (56.1%) (OECD, 2024[9]). Agriculture continues to be the largest employer with about 19% of total employment, but its share has declined. According to government estimates, public administration represents about 6% of employment. Employment in the retail, transport, accommodation and food sector has increased rapidly due to urbanisation and will soon become the largest sector in terms of employment (OECD, 2024[9]).

The rate of unemployment has been cut in half since 2014, reaching 7.2% in 2022. Employment has been boosted by mega projects in the construction sector, also absorbing many informal workers. However, more than 800 000 young Egyptians enter the job market every year and struggle to find employment in the formal sector (CAPMAS and IOM, 2024[10]).. Informal employment was estimated at 62.5% in 2023, slightly below the MENA average (Lopez-Acevedo, 2023[11]). With raising educational attainments, Egypt will need both more and better jobs (OECD, 2024[9]). Unemployment is high among highly educated people as high-skills sectors such as information and communication technology, finance and other professional services remain weak. The quality of jobs remains poor, indicating a growing mismatch between skills and labour market requirements.

Figure 1.3. Female labour participation is weak, below the MENA average



Note: Employment rate is employment to population ratio. MENA: Middle East and North Africa; countries include Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen. LMIC: lower middle-income countries; the LMIC group includes 54 countries classified as lower middle-income economies by the World Bank.
Source: Government of Egypt (2021), Egypt's 2021 Voluntary National Review; World Bank (2024), World Development Indicators (database, https://databank.worldbank.org/source/world-development-indicators.

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Female labour participation is weak, below the average of MENA and other lower middle-income countries (Figure 1.3). The share of female participation in industry and entrepreneurship is particularly low. In contrast, women represent about 40% of employees in the informal sector, which usually provides limited social benefits (OECD, 2024[9]). Women are increasingly present in public administrations and the political empowerment of women is advancing. The government projects it could reach a female labour participation of 23% by 2030 with an SDG push (Government of Egypt, 2021[8]). This is far below the national target of 35% set under the economic empowerment pillar in Egypt's National Strategy for the Empowerment of Egyptian Women 2030 (Government of Egypt, 2017[12]). Broader participation of women in the labour force could considerably boost Egypt's economic performance. Expanding childcare facilities, access to health care and transport facilities could help women participate in the work force. However,

cultural barriers and social norms and practices also impede women's entry into the job market. More gender-equitable transport could help remove additional barriers.

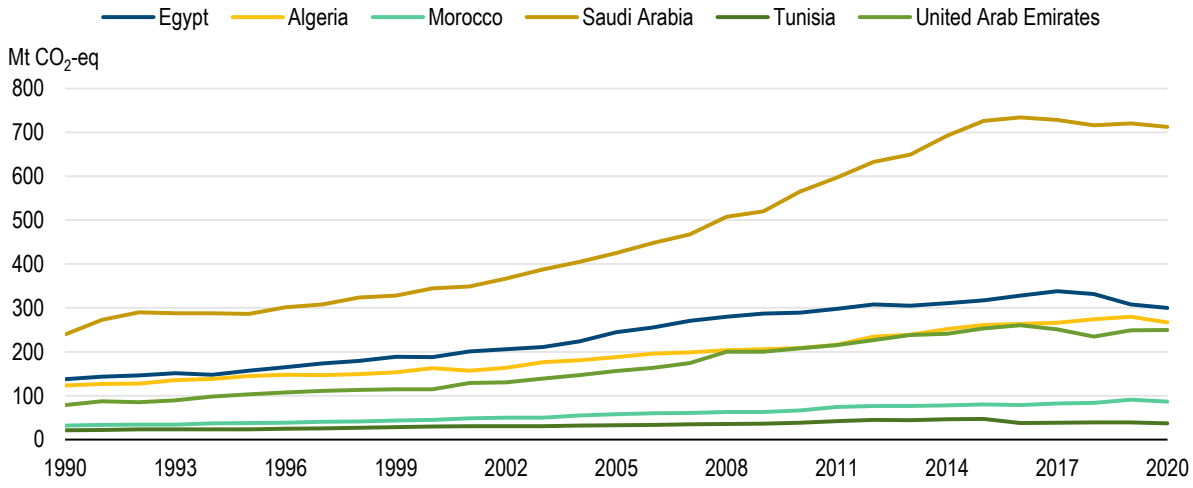
1.2. Transition to a low-carbon, climate-resilient and energy-efficient economy

1.2.1. Greenhouse gas emissions profile and trends

Egypt's greenhouse gas (GHG) emissions more than doubled from 116 million tonnes of carbon dioxide equivalent (CO_2-eq.) in 1990 to an estimated 325 million tonnes of CO_2-eq. in 2015 (Government of Egypt, 2018[13]). Emissions increased at a much faster rate than the world's average. The country recorded a gradual decline in emissions since 2017. It achieved relative decoupling of GHG emissions from economic and population growth, notably thanks to efficiency gains in energy industries (e.g. power plants) and support for renewable energy projects (Figure 1.4).

Figure 1.4. Egypt's GHG emissions grew rapidly over the past decades

Total GHG emissions, including LUCF



Note: LUCF: land-use change and forestry.
Source: World Resources Institute (2022), Climate Watch, Historical GHG Emissions, www.climatewatchdata.org/ghg-emissions.

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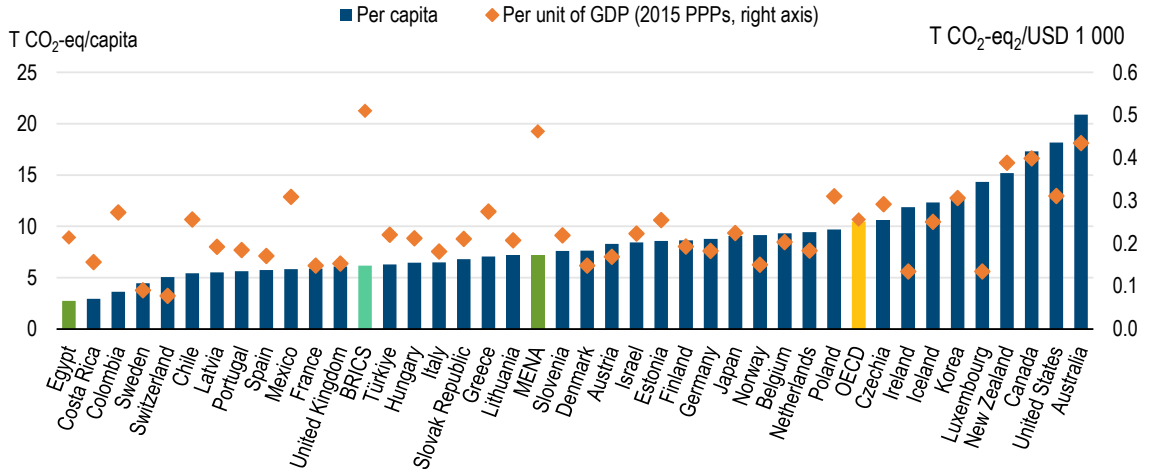
With less than 0.7% of total global emissions, Egypt remains a small emitter by international comparison. Its annual emissions per capita are estimated at 2.8 tonnes in 2020, less than half of the world average of 6.3 tonnes. It was more than three times below the OECD average of 10.5 tonnes in 2021 (Figure 1.5).

Figure 1.5. Per capita emissions in Egypt are low in international comparison

Per capita emissions, excluding LULUCF



Note: LULUCF: land use, land-use change and forestry; LUCF: land-use change and forestry for Egypt, BRICS and MENA; MENA: Middle East and North Africa; countries include Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen. BRICS includes Brazil, the Russian Federation, India, the People's Republic of China and South Africa. OECD includes the 38 member countries.
Source: OECD (2024), Environment at a Glance; World Resources Institute (2024) Climate Watch Historical GHG Emissions, www.climatewatchdata.org/ghg-emissions.

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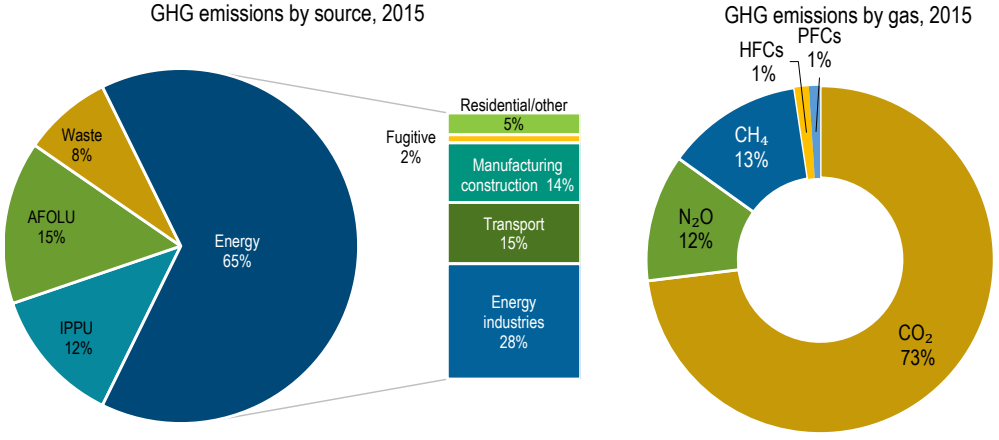
Energy industries remain the sector with the highest GHG emissions (28%) (Figure 1.6). Transport-related emissions have been growing quickly over the past decade, reflecting a larger population and urban sprawl, and triggering a rapidly increasing demand for mobility. The share of agriculture has been shrinking.

Figure 1.6. Egypt's GHG emissions mainly come from the energy sector



Note: AFOLU: agriculture, forestry and other land use. IPPU: industrial process and product use. The left panel shows shares of emissions sources classified according to the IPCC guideline. The right panel shows the share of emissions by gas. The percentage shares are calculated excluding LUCF.
Source: Government of Egypt (2018), Egypt's First Biennial Updated Report to the UNFCCC.

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1.2.2. Main climate policies and targets

Over the past decade, Egypt has considerably increased its national and international climate commitments. Egypt's Vision 2030 sets out the country's overarching Sustainable Development Strategy, including climate goals. An updated version, prepared in 2023, promotes a whole-of government approach with a view to further mainstreaming climate considerations into all policy areas. Several sectoral strategies support implementation of the updated Vision in different policy areas (e.g. Integrated Sustainable Energy Strategy 2035, National Strategy for Green Hydrogen, Water Resources Development and Management Strategy 2050, Seawater Desalination Strategy 2050).

The National Climate Change Strategy 2050, launched in 2022, provides a comprehensive framework for Egypt's climate mitigation and adaptation priorities. It includes measures for advancing Egypt's transition towards a low-carbon development pathway and enhancing the country's climate resilience. Egypt has initiated work on a National Adaptation Plan (Box 1.2).

The Ministry of Environment (MoE) plans to develop a new Environment Law to cover climate, biodiversity and pollution management; the 1994 Law of Environment does not cover any climate issues explicitly. Drawing on lessons learnt with the elaboration of the 2020 Waste Management Law, the MoE intends to conduct an inclusive process. This will engage relevant sectoral ministries at an early stage to gain buy-in. In so doing, it will accelerate preparation of a consensual draft law within the next two to three years. This updated law provides an immense opportunity to set a unifying legal framework for environmental protection and climate action in line with Egypt's national and international commitments.

Box 1.2. Policy framework for Egypt's climate action

2015 Establishment of National Council of Climate Change (NCCC)

2016 Sustainable Development Strategy: Egypt's Vision 2030

2017 Ratification of Paris Agreement

2017 National Strategy for Disaster Risk Reduction 2030

2018 Submission of Biennial Update Report to the United Nations Framework Convention on Climate Change (UNFCCC)

2019 Restructuring of NCCC, now headed by the Prime Minister

2022 National Climate Change Strategy 2050

2022 First updated Nationally Determined Contribution (NDC)

2023 Second updated NDC

2023 Update of Egypt's Vision 2030

2025 National Adaptation Plan within UNFCCC process – *work in progress*

2027 New Environmental Law covering climate, biodiversity and pollution – *work in progress*

Strengthening implementation capacity is paramount to ensure an efficient rollout of climate measures and monitor progress towards strategic goals. Line ministries translate Egypt's national climate goals into action at sectoral level. This requires upskilling in key ministries (e.g. transport, housing, local development). Stronger use of market-based instruments would help set price signals and accelerate a more cost-efficient transition towards a green economy.

On the international scene, Egypt became a party to the United Nations Framework Convention on Climate Change (UNFCCC) back in 1994. It ratified the Kyoto Protocol in 2005[5] and the Paris Agreement in 2017. Egypt submitted three national communications to UNFCCC in 1999, 2010 and 2016, as well as one

biennial report in 2018. At the time of writing, the fourth national communication was being finalised, including updated GHG emissions data. As host of the 27th Conference of the Parties to the UNFCCC (COP27), Egypt's climate commitment gained international attention.

COP27 also raised awareness within Egypt, catalysing its domestic climate agenda. Regular preparatory meetings involving more than a dozen ministries contributed to mainstreaming climate change issues across sectors. Many new initiatives have been launched with the support of international development partners (e.g. Nexus of Water, Food & Energy Platform, global initiative on Action for Water Adaptation and Resilience) (Chapter 2). Egypt should continue to capitalise on this political momentum by updating policies and designing new ones in various areas. It should continue to revise sectoral strategies and upgrade programmes through a climate lens while strengthening subnational capacity. A comparison of existing strategies with new climate ambitions could be a starting point for revising sectoral strategies and upgrading of programmes. This process has started in some but not all areas and needs to be pursued.

The first updated Nationally Determined Contribution (NDC), published ahead of COP27, represented a major step forward. For the first time, the government has set tangible national GHG emissions reduction targets for three sectors: -33% for electricity, -7% for transport and -65% for oil and gas[6] by 2030 compared to business-as-usual, conditional on more international financial support (Government of Egypt, 2022[14]). The electricity target was tightened to -37% in the second updated NDC in 2023 (Figure 1.7). These three sectors cover less than half of Egypt's GHG emissions.

Table 1.1. Emissions reduction targets and estimated funding needs in selected MENA countries

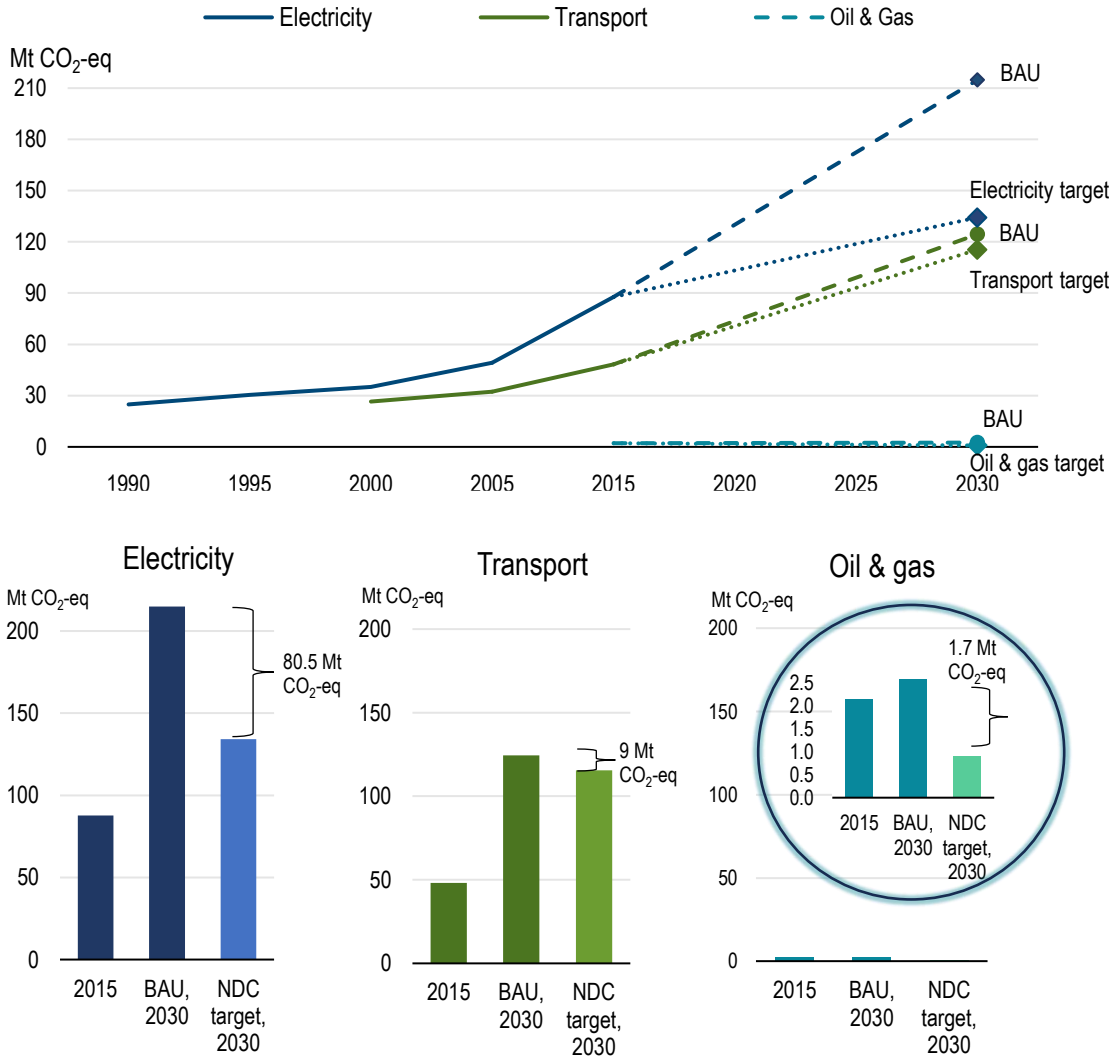
Country	Net-zero target	Updated NDCs	Emissions reduction targets by 2030	Coverage	Funding source	Estimated funding needs by 2030
Algeria	None	None; NDC submitted in 2015	Between -7 and -22% compared to BAU levels	Economy-wide target for GHG emissions	7% emission reductions with domestic funding; 22% emission reductions, conditional on external funding	n/a
Egypt	None	2022 and 2023	-37% in the electricity sector -7% in the transport sector -65% in the oil and gas sector compared to BAU levels	< 50% of GHG emissions	Fully conditional to external funding	USD 196 billion for mitigation measures
Morocco	Within this century	2021	Up to -45.5% relative to 2010 levels	Economy-wide target	18.3% with domestic funding and 45.5% conditional to external funding	USD 17.3 billion (domestic means) USD 38.8 billion (additional resources)
Tunisia	2050	2021	Carbon intensity reduction target: -45% by 2030 relative to 2010 levels	Economy-wide target, covering CO_2, CH_4, N_2O and HFCs	27% with domestic funding and 18% conditional on external funding	USD 14.3 billion for mitigation measures (2021-30)
United Arab Emirates	2050	2023	19% by 2030 relative to 2019 levels, equivalent to 182 Mt CO_2-eq. in 2030	Economy-wide target, covering CO_2, CH_4 and N_2O	Domestic funding – unconditional	AED 134 billion for investment (USD 36.5 billion) (2023-30)

Note: BAU: business-as-usual scenario. CO_2: carbon dioxide. CH_4: methane. GHG: greenhouse gas. HFCs: hydrofluorocarbons. N_2O: nitrous oxide. NDC: Nationally Determined Contribution.
Source: (République Algérienne Démocratique et Populaire, 2015[15]; Government of Egypt, 2023[16]; Republic of Tunisia, 2021[17]; Royaume du Maroc, 2021[18]; United Arab Emirates, 2023[19]).

Egypt's total GHG emissions are projected to grow over the next decades. Therefore, the government will need to amplify efforts to decouple GHG emissions from economic growth. At the same time, it needs opportunities to leapfrog the fossil-intensive energy regime to adopt renewable energy sources. Setting more ambitious targets across various sectors could inform long-term planning and send strong price signals in favour of low-carbon investment. This would also prevent further investment in stranded high-carbon assets (e.g. state-owned fossil fuel companies) and help reduce dependence on fossil fuel.

Figure 1.7. Egypt has set three sector-specific targets to reduce emissions

GHG emission trends, 1990-2015, and sectoral targets for 2030



Note: This figure shows sectoral GHG emissions from 1990 to 2015 and projected trends to 2030 and 2030 targets using official GHG emissions data provided by Egypt. BAU: business-as-usual; GHG emissions: data are shown in solid lines and linear projections are represented by dotted lines. BAU projections of 2030 are indicated with circular marker and 2030 targets are indicated with diamond marker.
Source: Government of Egypt (2023), Egypt's second Updated Nationally Determined Contribution; Government of Egypt (2018), Egypt's first Biennial Update Report to the UNFCCC.

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As in many emerging economies, Egypt's climate targets are not legally binding and remain conditional on additional external funding (Table 1.1). The country has attracted a significant share of Africa's global climate finance (Chapter 2) and has also implemented numerous national climate action projects with public funding. In line with the three categories of funding sources identified in Egypt's National Climate Change Strategy (national budget, international finance and private sector financing), it would make sense to improve accountability. In fact, Egypt already takes many national measures that contribute to reducing GHG emissions. Furthermore, it would be useful to further mainstream climate issues in various economic sectors using a policy mix of tools such as budgetary planning, as well as market and non-market-based instruments.

Climate governance

The government is committed to improving its climate governance. It has developed a detailed institutional framework within its National Climate Change Strategy 2050. It has started operationalising this framework by developing action plans for the strategy's five goals and conducting capacity-building workshops at sectoral and governorate level. For instance, it has strengthened activities of the Centre of Excellence for Research and Applied Studies of Climate Change and Sustainable Development at the National Research Centre. An action plan for improving climate action governance is under development. However, full implementation of the National Climate Change Strategy will require adequate financial resources to expand capacity at all levels. The launch of the domestic measurement, reporting and verification system is still conditional on funding.

The National Council for Climate Change (NCCC), headed by the Prime Minister, is the highest decision-making body on climate issues. It is well positioned to facilitate inter-ministerial co-ordination. However, more key ministries (e.g. energy, transport, industry, housing) need to be represented at the executive level within the Supreme Committee of the Council. It would be useful to clearly communicate on NCCC activities, decisions and outcomes.

A climate-specific co-ordination mechanism for subnational governments could help create engagement and opportunities for mutual learning across governorates. As in other countries, an independent Council of Climate Experts could provide targeted advice for policy makers to inform the country's climate action. This would contribute to strengthening the scientific base of climate action.

Data availability and monitoring capacity

In Egypt's first biennal update report, submitted to the UNFCCC in 2018, the government highlights major bottlenecks related to data availability, access and quality. Most recent official GHG emissions data were submitted to the UNFCCC in 2015. In line with commitments under the Paris Agreement's Enhanced Transparency Framework, Egypt needs more regular GHG emission updates to help analyse the impacts of mitigation and adaptation measures. Achieving this would require strengthening capacity of the Egyptian Environmental Affairs Agency (EEAA) and the Central Agency for Public Mobilization and Statistics (CAPMAS). Efforts to incorporate a Climate Change GHG Unit within CAPMAS go in the right direction. Access to data needs to be improved and made more user-friendly. For example, it should be possible to download data in spreadsheets rather than reading them as non-editable reports.

The National Climate Change Strategy 2050 lays out a series of performance indicators, as well as enabling policies and tools to achieve national climate-related objectives. Sectoral ministries report annual progress in their respective areas of work within the NCCC. Sectoral monitoring tools, which integrate adaptation and climate information, need to be further developed. Digitalisation offers many opportunities to harmonise monitoring practices and make the process less resource-intensive and more efficient.

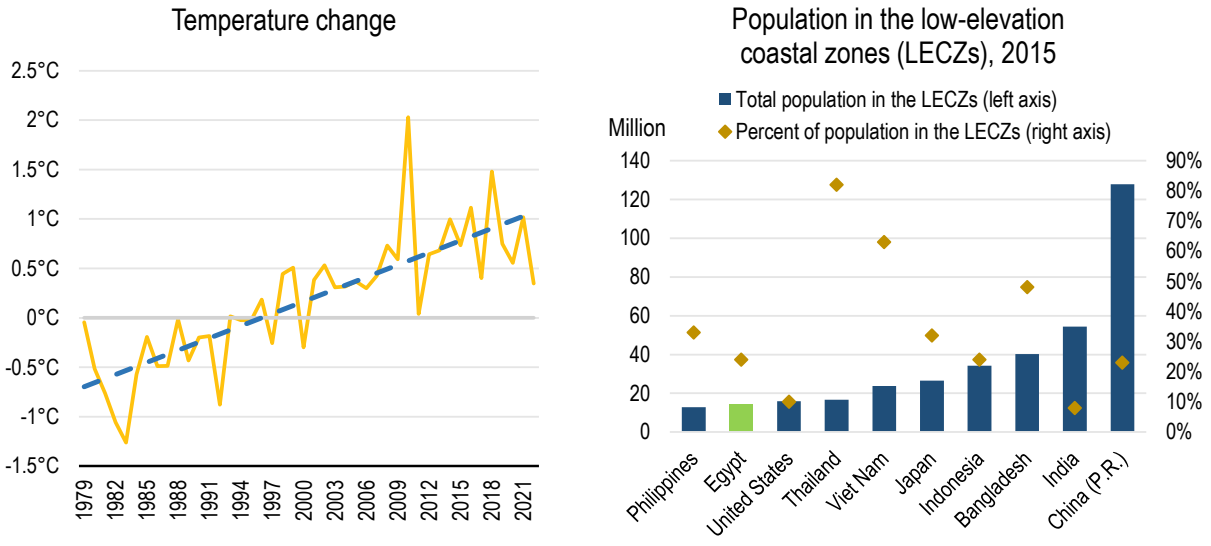
1.2.3. Climate change adaptation

Climate impacts and risks

Egypt is highly vulnerable to the impacts of climate change, which are already affecting human health, ecosystems and the economy. Over the past decades, mean annual temperature has been increasing (Figure 1.8). The country is also heavily affected by water scarcity, drought, desertification, sea level rise and extreme weather events (World Bank, 2022[20]). With less than 80 mm of annual rainfall in most areas,[7] Egypt has an arid climate with hot and dry summers and a mild winter season. Extreme weather events, such as heatwaves, flash floods, and sand and dust storms, exacerbate the impacts of this already difficult climate, particularly in urban agglomerations (Chapter 3).

Low-income households are generally more vulnerable to climate change impacts. They are often more exposed to climate risks, such as heatwaves, and have lower capacity and fewer resources to adapt to a changing climate. This requires targeted support to counterbalance adverse impacts on most vulnerable people.

Figure 1.8. Egypt is significantly affected by climate change and projected sea level rise



Note: Low elevation coastal zones (LECZs) are areas below 10-metres.
Sources: Left panel, IEA/OECD calculations using ERA5 Reanalysis data (Copernicus Climate Data Store) and methodology from Maes et al. (2022), "Monitoring exposure to climate-related hazards: Indicator methodology and key results", OECD Environment Working Papers, No. 201. Right panel, OECD/European Commission (2020), Cities in the World: A New Perspective on Urbanisation, OECD Urban Studies.

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The Intergovernmental Panel on Climate Change identified the Nile Delta as one of the world's extreme vulnerability hot spots (IPCC, 2022[21]). If climate change is not mitigated, sea level rise is projected to provoke the loss of a sizeable proportion of the northern part of the Nile Delta and Sinai, possibly displacing a large percentage of the population. The risk of coastal flooding and erosion heavily affects Egypt's coastal cities (Ali, 2022[22]) (Chapter 3).

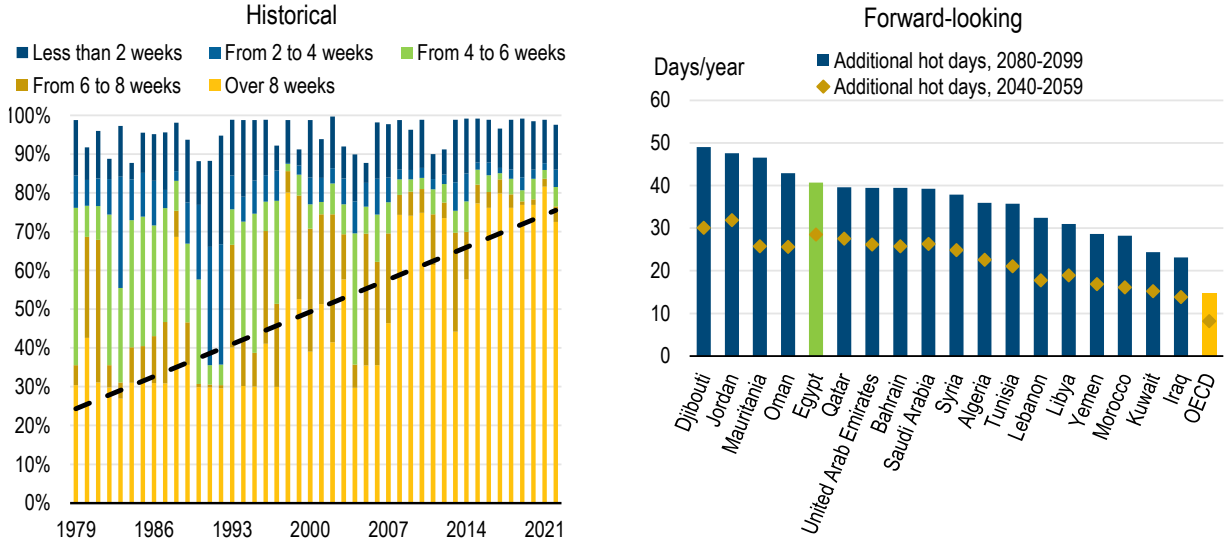
The agricultural sector is particularly at risk as the impacts of climate change raise concerns over food security and the deterioration of rural livelihoods. According to Egypt's second updated NDC, reduced water allocation for agricultural purposes will affect at least one of four farmers (Government of Egypt,

2023[16]). Saline water intrusion reduces the fertility of soils in the Nile Delta. Rising temperatures lead to stronger evaporation, which will place additional pressure on already scarce water resources. For several decades, development partners have supported adaptation of farmers in Upper Egypt. They have built on traditional, local knowledge and privileged easy to adapt, low-cost measures and the expansion of early warning systems and more efficient irrigation methods.

Raising energy demand for cooling during the summer will also affect the resilience of the energy sector. Over the past decades, the population has been increasingly exposed to longer periods of extreme heat, and these extreme temperatures are expected to worsen (Figure 1.9). Rising ambient temperatures could negatively affect power generation efficiency and add stress to power generation from natural gas, solar and wind (IEA, 2023[23]). Plans for energy infrastructure should draw on accurate information on climate risks and impacts to avoid building in high-risk areas (Chapter 3).

Climate change will also affect Egypt's ecosystems (e.g. coral reefs, coastline erosion, desertification) and consequently the basis of its tourism sector. The latter can play a role by promoting sustainable tourism practices and expanding activities that improve resilience of local communities and ecosystems, particularly in vulnerable areas. Local tourist destinations, such as Alexandria or Port Said, are threatened by the risk of sea level rise.

Figure 1.9. Population exposure to extreme temperatures is projected to further increase



Note: The left panel shows the observed historical population exposure to hot days across Egypt, indicating an increasingly longer annual exposure. Trendline shows temporal evolution of population exposure to more than eight weeks. The right panel shows the additional population-weighted hot day exposure across OECD and MENA countries under SSP2-4.5 climate scenario as defined in the IPCC Sixth Assessment Report, 2080-99 and 2040-59 compared to the reference period 1995-2014.

Source: Left panel, IEA/OECD calculations using ERA5 Reanalysis temperature data (Copernicus Climate Data Store) and methodology from Maes et al. (2022), "Monitoring exposure to climate-related hazards: Indicator methodology and key results", OECD Environment Working Papers, No. 201. Right panel, OECD calculations using data from the World Bank Climate Change Knowledge Portal (OECD forthcoming, 2024).

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National adaptation priorities

Adaptation has been a government priority. "Enhancing adaptative capacity and resilience and alleviating the associated negative impacts" (Goal 2) is one of five strategic goals of the National Climate Change Strategy 2050 (Table 1.2), alongside climate mitigation and three enabling goals. The strategy articulates links between the goals related to climate change in Egypt's Sustainable Development Strategy and the main goals of its climate strategy. Key measures are outlined for each specific objective. However, performance indicators do not cover all objectives.

Table 1.2. National adaptation objectives

Goal 2. Enhancing adaptive capacity and resilience to climate change and alleviating the associated negative impacts

Number	Objective
Objective (2.a)	Protect citizens from the negative health impacts of climate change.
Objective (2.b)	Minimise loss and damage to country assets and ecosystems by preserving them from the impacts of climate change.
Objective (2.c)	Preserve the country's resources from the impacts of climate change.
Objective (2.d)	Develop resilient infrastructure and services in the face of climate change impacts.
Objective (2.e)	Implement disaster risk reduction concepts.
Objective (2.f)	Preserve and expand green spaces.
Objective (2.g)	Strengthen women's response considerations to help them adapt to climate change.

Source: (Government of Egypt, 2022[24]).

While Egypt recognises the need to mainstream climate change adaptation into all policy sectors, the integration of adaptation measures into sectoral policies is still in its infancy. This is particularly relevant for development of infrastructure projects and local development plans. These should systematically consider adaptation aspects and support the inclusion of vulnerable populations (Chapter 3).

The development of a NAP is under way. The NAP is building on the momentum from COP27 and the 2011 National Strategy for Adaptation to Climate Change and Disaster Risk Reduction. It provides an opportunity to integrate climate change adaptation into all levels of planning while improving vertical and horizontal co-ordination through dedicated mechanisms. The strategy should move beyond a series of individual adaptation measures and conceive adaptation policies as a progressive and iterative process within an integrated and holistic approach (Fracassitti, 2023[25]). Environmental justice considerations merit to be further strengthened.

To date, adaptation measures mainly focus on improving agricultural productivity and promoting sustainable water management (e.g. weather forecasting services, modern agricultural extension, agricultural insurance system against climate risks, more efficient irrigation systems, water desalination) (Government of Egypt, 2022[24]). The second updated NDC, published in 2023, expands the coverage by also outlining measures for coastal zones, urban development, tourism and plans for early warning systems and awareness-raising activities (Government of Egypt, 2023[16]). Other sectors such as transport or housing will also need to implement preventive adaptation measures and adjust sectoral policies.

Adopting a holistic approach will require building capacity at sectoral level to raise awareness of all sectors and integrating adaptation concerns systematically into the planning of infrastructure projects. Existing climate change units could broaden scope and focus more strongly on adaptation matters in sectoral ministries. This could help build expertise within ministries and thereby promote policy coherence.

Development partners are driving many adaptation projects. While these projects usually include some sort of local capacity building component, local expertise in the area of climate change adaptation remains

fragile and is undermined by turnover of local leaders. Local ownership is paramount to make sure that outcomes are sustained beyond the end of project cycles and benefit local communities.

Adaptation financing

Egypt's National Climate Change Strategy 2050 provides an overview of the costs of adaptation programmes for key sectors using different timeframes ranging from 2023 to 2050. The total cost of adaptation programmes is estimated at USD 113 billion (compared to USD 211 billion for mitigation programmes). This leaves a large funding gap of USD 94.7 billion or 84%. The second updated NDC indicates USD 50 billion as conditional financing requirements for adaptation measures until 2030.

New international funding opportunities may open up with the creation of the Loss and Damage Fund and Egypt's Nexus of Water, Food & Energy Platform (Chapter 2). However, Egypt will likely face substantial funding gaps in the short and medium term. The government will need to attract more private sector resources through domestic and international capital markets. Adaptation projects usually face more difficulties in presenting a strong business case for private investors (Green Climate Fund and Government of Egypt, 2022[26]). Evidence from many countries, including Germany, shows that investments in climate adaptation measures are significantly cheaper than addressing loss and damage from extreme weather events (OECD, 2023[27]). Therefore, the government should continue to build national administrative capacity to better tap into international climate and development finance, including for projects at subnational level.

1.2.4. Clean energy transition

The country has great potential for expanding deployment of renewable energy sources, particularly solar, wind and low-carbon hydrogen. Despite significant investment, the potential of renewables remains largely underexploited. However, green investment in renewable energy sources is set to grow massively in the coming years (Chapter 2).

Egypt is endowed with significant oil and natural gas reserves, particularly in the offshore Nile Delta region.[8] Its proven oil and natural gas reserves were estimated at 3.5 billion barrels and 2.2 trillion cubic metres in 2021, making it the third largest natural gas producer in Africa after Algeria and Nigeria. It became a net exporter of natural gas as of 2018 and exported about 8.9 million tonnes of liquefied natural gas (LNG) in 2022. The country aims to position itself as a regional energy hub between Africa, Asia and Europe. Egypt's oil production remains relatively modest compared to Africa's top producers (e.g. Nigeria, Algeria, Angola, Libya). While natural gas production is projected to remain stable, oil production will fall steadily until 2030 due to declines in output at mature fields (IEA, 2023[28]). Abandoned oil and gas wells could be converted into geothermal resources, particularly in the Gulf of Suez area (Moustafa et al., 2022[29]).

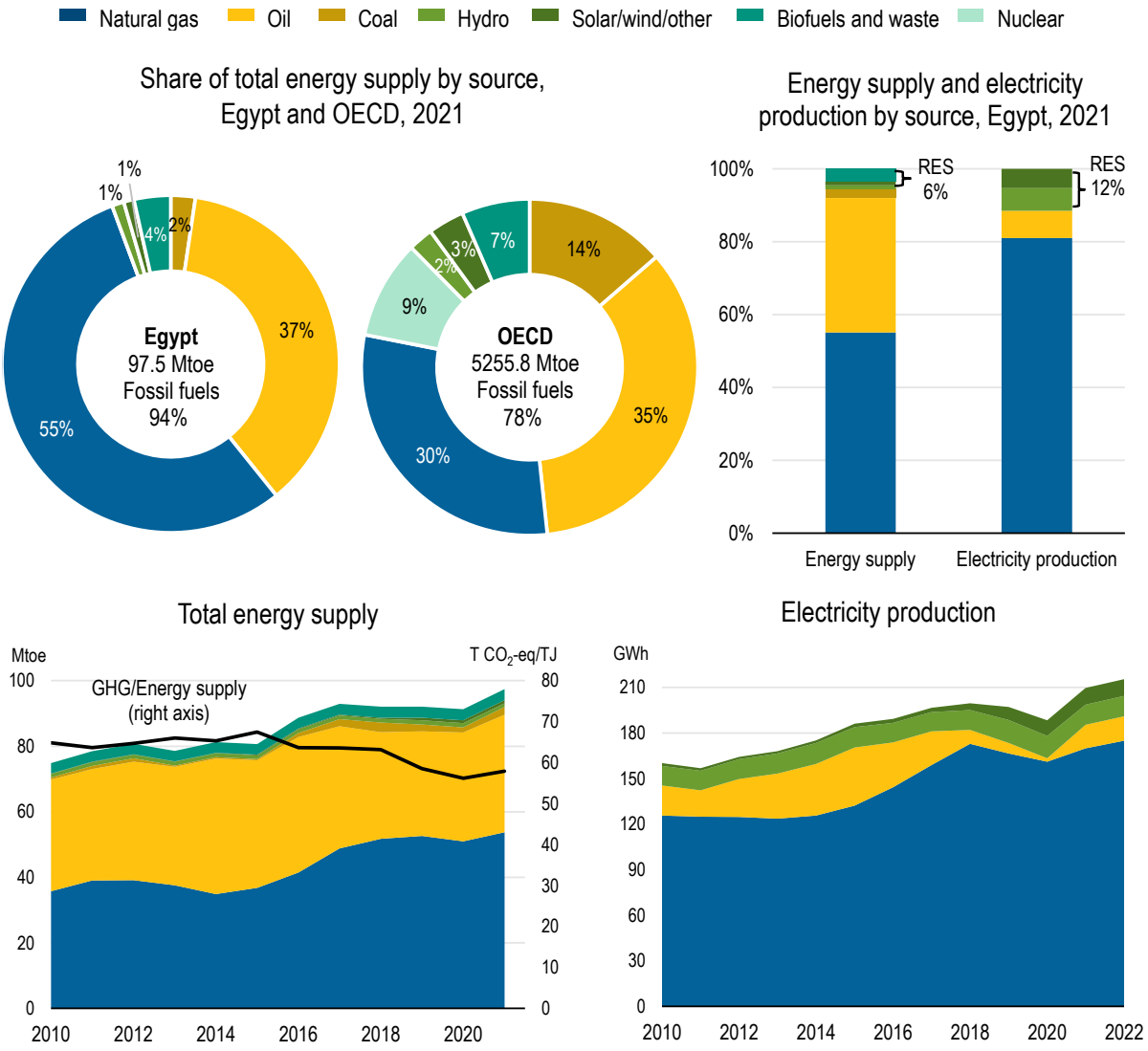
Several initiatives to help the oil and gas sector become cleaner are under way. In 2017, Egypt adhered to the World Bank's Zero Routing Flaring Initiative. In 2022, it also joined the Global Methane Pledge with a view to achieving a 30% reduction in methane by 2030. Within COP27, Egypt's Ministry of Petroleum and Mineral Resources organised the first "Decarbonisation Day". Drawing on six pillars,[9] the Ministry of Petroleum aimed to highlight success stories and progress in the decarbonisation of the oil and gas sector and hard-to-abate industries. In parallel, the first pilot carbon capture and storage project, led by the Italian company Eni, was launched in the Western Desert in 2021. However, the project is still under development.

Energy mix

The energy mix remains heavily dominated by fossil fuels. Oil and gas accounted together for 92% of total primary energy supply, while coal represented less than 2%; renewable energy sources made up about 6% in 2021, mainly driven by increases in wind and solar power (Figure 1.10). The share of renewables in

the national energy mix is below the OECD average. However, Egypt is doing better than many other Middle East countries (Figure 1.11).

Figure 1.10. Egypt's energy mix remains carbon intensive despite some increases in renewables



Note: RES: renewable energy sources. Oil includes oil products, crude, liquefied natural gas and feedstocks. Calculation of total and percentage breakdown exclude heat and electricity trade.
Source: IEA (2023), "World energy balances", IEA World Energy Statistics and Balances (database), https://doi.org/10.1787/data-00512-en.

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Egypt aims to further diversify its energy mix. It plans to complete its first nuclear power plant in 2030 (El Daaba located 250 km west of Alexandria in the Matrouh Governorate), which shall cover about 3% of projected power generation (Figure 1.11). The use of coal is negligible and is excluded as an option for electricity production in the Integrated Sustainable Energy Strategy 2035. This is a welcome development as the country previously intended to increase considerably the use of coal following electricity shortages in 2014.

In line with international trends, Egypt's carbon intensity has decreased significantly since 2015,[10] reflecting technological improvements and the switch from more polluting oil to natural gas. The share of natural gas consumption has grown significantly since 2015; in 2021, natural gas was used for 80% of electricity production (Figure 1.10). The government invests heavily in the expansion of natural gas production and infrastructure across many sectors.

Renewable energy sources

Given its vast areas of desertic land, sunny weather conditions and high wind speeds, particularly in the Gulf of Suez and the Nile Valley, Egypt has enormous potential to develop renewable energy sources. The Wind and Solar Atlases estimate the potential of the East and West Nile areas at around 31.2 gigawatts (GW) of wind power and 52.3 GW of solar (NREA, 2005[30]). According to government estimates, total installed capacity of renewables is estimated at 6.3 GW, including 2.8 GW of hydropower (Aswan High Dam and Reservoir Dams), 1.7 GW of solar power and 1.87 GW of wind power in 2022 Solar PV and wind capacity has grown rapidly, notably thanks to several mega projects (e.g. Benban Solar Park, Zarafana Wind Complex, Gal El-Zeit Wind Farm). However, the capacity of fossil-based plants has increased at a much faster pace.

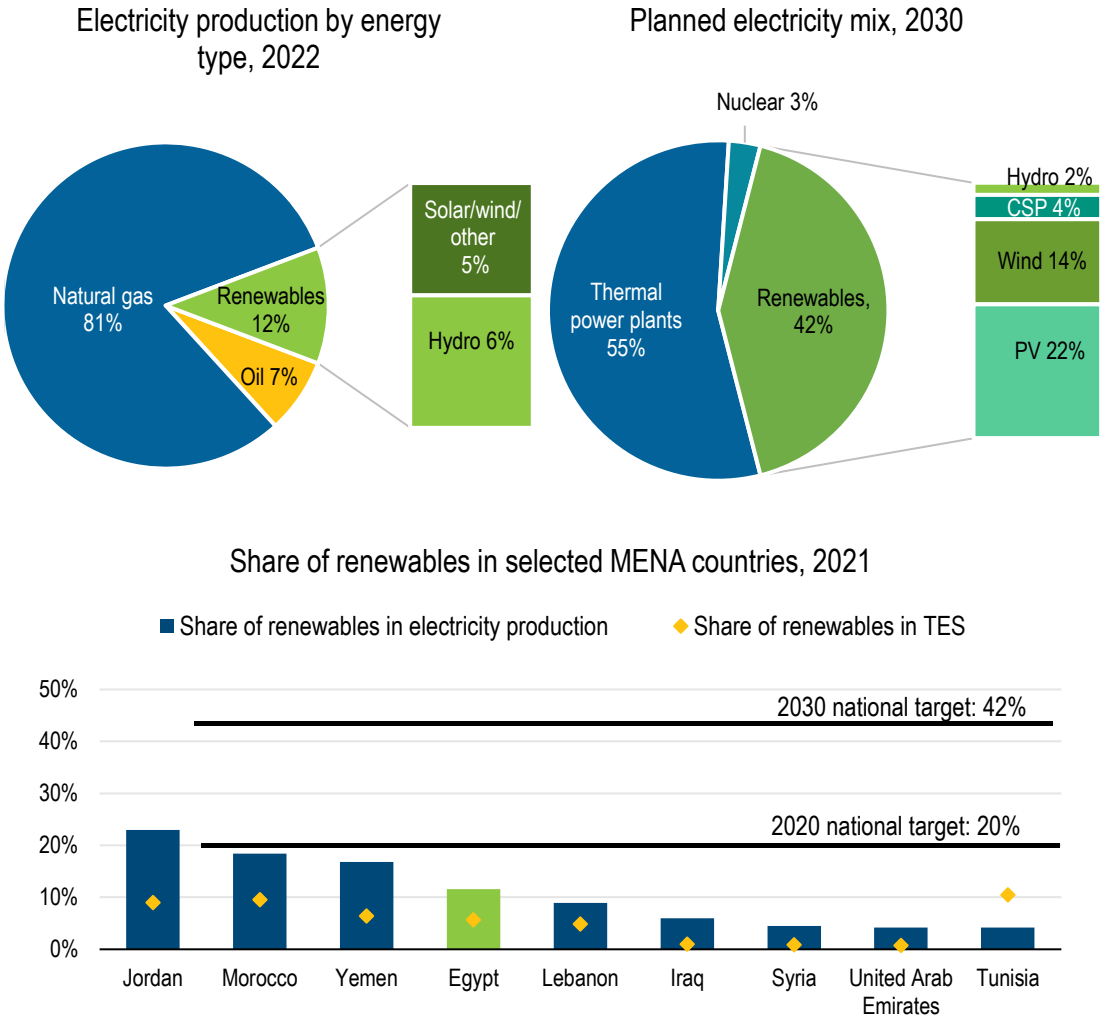
In 2016, the Supreme Energy Council of Egypt approved the Integrated Sustainable Energy Strategy 2035, including a target of generating 20% of its electricity with renewable energy sources by 2022. In 2022, renewables accounted for about 12% in electricity production, which represented 20% of peak load.

Egypt affirmed its transition to clean energy by updating its NDC in 2023, which aims to increase the contribution of renewables to 42% of the electricity production by 2030 instead of 2035. This update was based on the energy pillar of the Nexus of Water, Food & Energy Platform, which aims to close 5 GW of existing inefficient oil and gas power generation capacity (about 9% of Egypt's total installed fossil fuel capacity) and facilitate mainly private investments worth more than USD 10 billion to support the installation of the new capacity of 10 GW of new renewable energy (Government of Egypt, 2023[31]). In parallel, it is continuing both to modernise and upgrade transmission and distribution networks to better absorb renewables, and to invest in digital technology and storage infrastructure.

Most mitigation projects focus on the electricity sector; their cost is estimated at over USD 93 billion conditional on international finance until 2030. In 2021, development partners, such as the European Bank for Reconstruction and Development or the International Islamic Trade Finance Corporation, contributed to finance some projects in the renewable energy and petroleum sectors. Still, plans to transition towards a low-carbon energy system continue to face a significant financial gap.

Policy measures put forward in the NDC include reducing use of fossil fuel power plants, replacing inefficient thermal power plants with renewable alternatives and scaling up on-grid renewable energy. The Integrated Sustainable Energy Strategy 2035 will need to be updated to reflect the goals and measures of the NDC. Mitigation measures and projects should systematically indicate their expected effects on emissions reductions.

Figure 1.11. The share of renewables needs to more than triple to reach Egypt's 2030 target



Note: CSP: concentrated solar power. PV: solar photovoltaic. TES: total energy supply. MENA: Middle East and North Africa. MENA countries with less than 1% of renewables are not shown; these countries are Algeria, Bahrain, Kuwait, Libya, Oman, Qatar and Saudi Arabia.
Source: IRENA (2023), Renewable Capacity Statistics 2023; New and Renewable Energy Authority (2023), 2022 Annual report.

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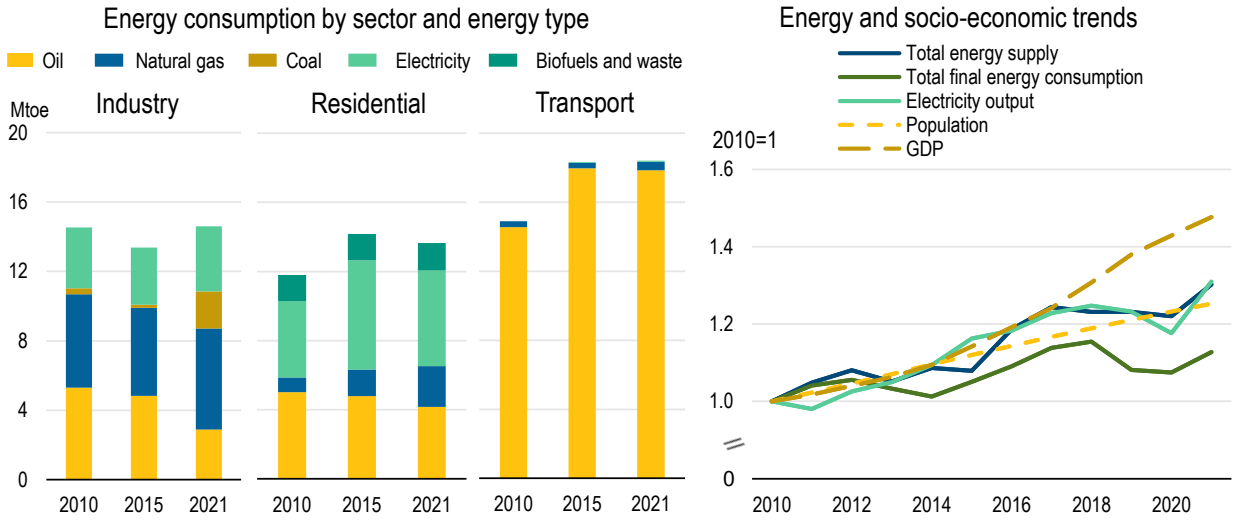
Energy use and intensities

Demand for energy services has increased rapidly in the context of population growth, economic expansion and increased industrial output (Figure 1.12). Primary energy consumption has more than doubled in the past 20 years (Government of Egypt, 2023[32]).

Most energy is consumed by the transport sector (35%), followed by industry (28%) and the residential sector (27%). The remainder is used by services and agriculture. Electricity demand is projected to continue increasing to satisfy the energy needs of a growing population coupled with growing demand for air conditioning due to high temperatures. Energy used in transport has increased rapidly in the past decade (Figure 1.12), reflecting the increasing mobility needs of a growing population and highlighting the need for improving energy efficiency in this sector. Electricity consumption in buildings soared due to the widespread use of air conditioning (Chapter 3).

Figure 1.12. Energy consumption in the transport sector has increased rapidly in the past decade



Note: The left panel shows energy consumption disaggregated by economic sectors and energy source types. The right panel shows the trends of energy and socio-economic indicators relative to 2010. GDP in USD (2017 prices and PPP).
Source: World Bank (2024), World Development Indicators (database), https://databank.worldbank.org/source/world-development-indicators; IEA (2023), "World energy balances", IEA World Energy Statistics and Balances (database), https://doi.org/10.1787/data-00512-en.

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In contrast to many African countries, Egypt achieved nearly universal access to electricity (SDG7). However, despite significant surpluses, electricity supply has been unstable. In 2023, many Egyptians experienced severe power cuts and blackouts during heatwaves, when electricity consumption for cooling soared. These difficulties during electricity peak demand indicate a need to better anticipate user behaviour and communicate load shedding plans in a timely manner.

In response to the global energy crisis, the government announced in 2022 a nationwide energy consumption rationing plan. The plan aimed to rationalise domestic power consumption (15% of natural gas usage) with a view to boosting natural gas exports to Europe. Measures targeted reducing electricity consumption in government buildings, public spaces, malls and sports facilities. This included use of daylight conditions and setting central air conditioners at no cooler than 25 degrees. Street lighting was also reduced, while sports games needed to be completed before sunset. In 2023, the government implemented additional measures. For example, it authorised some groups of employees to telework on Sundays (a regular working day in Egypt) during August. LNG exports were temporarily paused to satisfy the high domestic demand for electricity. In addition, the government increased its diesel fuel imports to balance the power grid (Government of Egypt, 2023[33]).

Considering the much higher export price of natural gas, implementing energy saving measures to reduce domestic demand is a rational choice. It could also offer an opportunity to accelerate the transition to clean energy sources and energy efficiency measures. Enhancing international interconnections could help improve energy supply security and generate higher investment returns. Ensuring a reliable energy supply for all citizens needs to remain a priority.

Energy efficiency

The Integrated Sustainable Energy Strategy 2035 sets a national goal of reducing energy demand by 18% by 2035. To that end, it counts on greater efficiency from both upgraded generation and transmission infrastructure and new technologies. Egypt is developing its third National Energy Efficiency Action Plan.

It notably aims to install 20 million smart meters within ten years (NREA, 2023[34]). The government has started establishing energy efficiency units in ministries and plans to develop a digitalised, sector-wide monitoring system. The strengthening of the institutional framework of energy efficiency is a positive development and needs to be accompanied by adequate resources and staff at all levels. A robust governance framework would help strengthen the enforcement of policies and regulations.

The petroleum sector has developed its first Energy Efficiency Strategy 2022-35 to provide guidance and rationalise the use of petroleum products following a two-stage approach. The first stage lays the groundwork for sound energy management by identifying barriers and energy saving potential of major energy consumers through sector-wide energy audits. It aims to achieve 10% of energy savings by 2027. The second stage aims at upscaling energy efficiency measures in the petroleum sector and harnessing the potential of energy savings in the transport sector. This would help the country achieve its 18% target. A Centre of Excellence of Energy Efficiency and Process Optimisation supports energy efficiency efforts in Egypt (e.g. energy audits, training for engineers), and more broadly on the African continent. In total, the Ministry of Petroleum and Mineral Resources completed 247 projects, which saved about 4 GW per year (Government of Egypt, 2023[32]).

However, energy efficiency measures remain heavily driven by donors, and companies lack economic incentives. Egypt could strengthen energy efficiency in the industrial sector in two ways. First, it could develop a standardised monitoring and reporting system. Second, it could make energy efficiency considerations mandatory in the early design phase for new industrial facilities and major rehabilitation projects. As highlighted in the strategy of the petroleum sector, stronger economic incentives, combined with rewards, could make energy efficiency measures more profitable. Even public companies – which aim to maximise production, not cost effectiveness – would benefit financially. It would also be useful to introduce Minimum Energy Performance Standards for industrial equipment (e.g. motors, pumps, compressors) along with appropriate labelling schemes (Government of Egypt, 2023[32]). The transport sector has untapped potential to improve energy efficiency by setting minimum fuel efficiency standards and energy labelling schemes for vehicles. Tightening energy efficiency standards of housing will help save more energy (Chapter 3).

1.2.5. Sustainable mobility

Mobility patterns

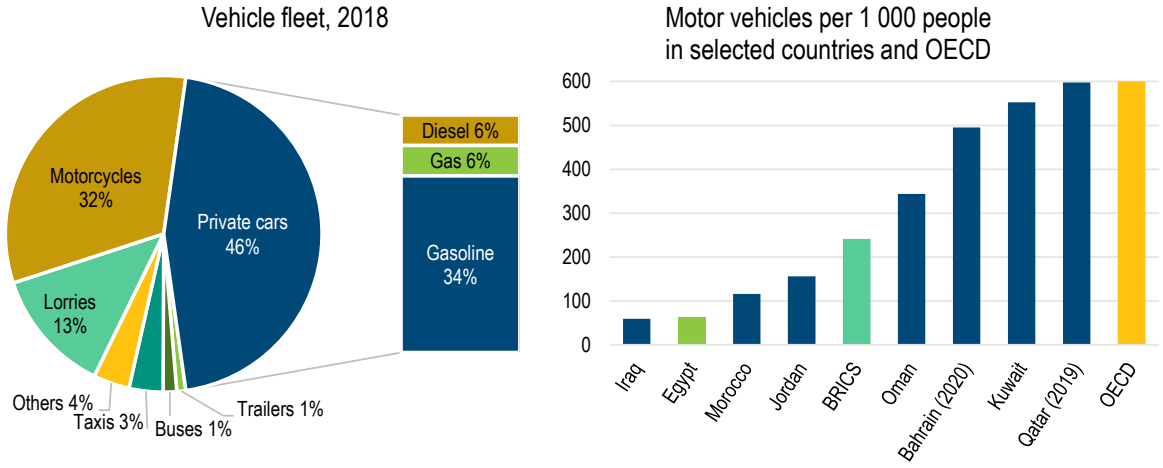
The country has a well-developed road network, one of the oldest railway systems worldwide, and a vibrant passenger and freight transport on the Nile River. Egypt has made major strides in the development of transport infrastructure over the past decade and continues to invest massively in its expansion. The National Roads Project, initiated in 2014, aimed at creating 7 000 km of new roads worth USD 11 billion (Government of Egypt, 2021[8]), while upgrading 10 000 km of existing road infrastructure. Investment in roads and bridges has increased significantly and reached USD 1.8 billion in 2020. Improved connections between cities will contribute to reducing fuel consumption, related GHG emissions and travel time. Freight transport benefits from dedicated road corridors and freight-only rail lines; it is further supported by the modernisation and expansion of maritime port infrastructure. The connection between Cairo and Alexandria has dedicated lanes for heavy-duty vehicles.

With 70 road vehicles per 1 000 inhabitants, Egypt has one of the lowest ratios of motorisation rate in the MENA region (Figure 1.13). It has a relatively large share of motorcycles given the more affordable price. Ownership of private passenger cars is projected to increase rapidly. On average, Egypt recorded 205 000 motor vehicles sales between 2018 and 2022 (CEIC, 2023[35]). These road-dominated mobility trends are a source of rising environmental pressures.

Cairo and Giza recorded together over 5.2 million cars in 2022, representing nearly half all licensed vehicles. This situation leads to traffic congestion with major adverse effects on air quality, public health,

climate and economic activity. Stronger incentives and increased road pricing are needed to better manage and rationalise travel demand (e.g. congestion charges, road tolls, street parking fees) (Chapters 2 and 3). The dense traffic situation in Cairo makes it difficult to promote active transport modes due to road safety concerns; the country has one of Africa's highest caseloads of road accidents.

Figure 1.13. Egypt has a comparatively small vehicle fleet



Note: The left panel shows composition of vehicle fleet in Egypt in 2018. The right panel shows motor vehicle per population for selected countries and OECD average. BRICS covers the non-weighted average of Brazil, Russia, India, People's Republic of China and South Africa.
Source: CAPMAS (2018), Bulletin of licensed vehicles statistics; IRF (2024), World Road Statistics 2024, https://datawarehouse.worldroadstatistics.org.

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Egypt has an immense opportunity to leapfrog towards a low-carbon transport system. All new urban settlements could be developed in a more compact, transport-oriented way that guarantees easy access to transport links. This could include a network of safe walking and cycling routes to prevent car dependency (Chapter 3). However, multiple government bodies plan infrastructure, which are resulting in complex governance. It would be useful to streamline the institutional arrangement and promote collaboration among agencies and authorities. Rather than focusing on individual outcomes, government entities should work together to develop an integrated nationwide sustainable mobility strategy to advance a low-carbon transition in the transport sector. Key elements of such a strategy include tackling accessibility, using transport planning to better control modal share and smart travel demand management. Geolocalised data on modal share (across space and time) are not yet collected regularly. This would provide a starting point to better understand mobility patterns and related transportation needs.

Decarbonising transport

The transport sector is the largest energy consumer and main consumer of petroleum products. It is also a large contributor to national GHG emissions. According to government projections, the sector's CO_2-eq. emissions will more than double between 2015 and 2030 – from 48 million tonnes to 115-124 million tonnes – depending on international financial support (Government of Egypt, 2023[16]). This would be similar to the level of transport-related GHG emissions produced in Germany, a country with a vehicle stock six times larger than that of Egypt. While Egypt's vehicle fleet will continue to increase, the government's GHG projections for the transport sector may be overestimated.[11]

The projected increase of transport-related emissions calls for urgent action to move away from reproducing car-dominated, high-carbon transport models. This would also bring significant economic and public health benefits. The government should therefore consider tightening its target for reducing emissions in the transport sector, while pursuing efforts to scale up affordable, inclusive and secure public transport options (Chapter 2).

Efforts to make the road vehicle fleet cleaner need to be expanded. In the absence of vehicle deregistration, about one-quarter of all circulating vehicles are likely over 30 years old (Harun et al., 2023[36]). Egypt has banned the import of second-hand passenger vehicles older than one year, which greatly limits the influx of additional polluting vehicles. It also implemented several nationwide vehicle scrapping programmes to remove old taxis (50 000 taxis between 2010-21), which were among the most fuel-inefficient and polluting vehicles (World Bank, 2022[37]; Harun et al., 2023[36]). However, Egypt still needs to improve the appropriate infrastructure for recycling end-of-life vehicles in a safe and environmentally sound manner. Many scrapped vehicles were only set aside for storage.

Egypt should consider upgrading its vehicle registration system through three key measures. It could collect climate-relevant information (e.g. fuel efficiency, CO_2/km, air quality certificates) more systematically. It could introduce a climate component in vehicle taxation to promote more efficient and environmentally friendly vehicles (Chapter 2). Finally, it could make deregistration of scrapped or unused vehicles mandatory. Data on the composition and evolution of the vehicle fleet need to be more detailed and accessible.

The government supported fuel switching to cleaner and more efficient fuels such as compressed natural gas (CNG). By end 2023, Egypt recorded 540 000 CNG vehicles and 1 000 CNG fuelling stations (Government of Egypt, 2023[32]). Egypt needs to pursue efforts to develop minimum fuel efficiency standards or energy labelling scheme for vehicles (Government of Egypt, 2023[32]). More particularly, the sulphur content of diesel has been reduced thanks to the upgrade of local refineries and their production capacity of low-sulphur diesel. Due to the age of the car fleet, average fuel consumption remains high, about 8 litres per 100 km (IEA, 2019[38]). The introduction of low-emission zones and diesel bans in densely populated urban areas would reduce air pollution with major health benefits for citizens. However, this would also require an efficient emission control system to enforce regulations. Therefore, it may be more efficient to pursue efforts to upgrade domestic refineries' capacity to produce cleaner diesel that complies with minimum standards. This is particularly relevant for urban areas. In line with the cities-first approach, the government should consider measures to tighten and enforce diesel fuel standards in Greater Cairo and other densely populated cities.

Electric mobility

The deployment of electric vehicles (EV) is in its infancy. Affordability and the absence of adequate charging infrastructure represent major barriers for promoting electric mobility. The EV industry also faces challenges related to the country's foreign currency crunch, as new EVs are offered only in US dollars. Providing EVs at affordable prices and developing the necessary charging infrastructure are preconditions for scaling up electric mobility. As in other emerging economies, promoting the use of electric two-three wheelers and a coherent network of urban buses would be more cost effective (OECD, 2023[39]). Advancing the electrification of road transport would have major benefits for improving air quality, especially in densely populated urban areas.

The government has strong ambitions to push uptake of EVs in the next decade. Its 2019 e-mobility strategy aims to increase the market share of private EVs to 50% by 2040 (World Bank, 2022[20]). The government has also announced plans to ban new sales of internal combustion engine vehicles beginning by 2040. A World Bank-led pilot project supports deployment of 100 electric buses across the Greater Cairo area. The government also introduced electric bus trials in Alexandria.

Economic incentives such as tax breaks, rebates and subsidies could further encourage uptake of EVs. Since 2018, Egypt has authorised the import of used EVs less than three years of age and provides customs exemptions for EVs imported from EU countries and Türkiye. In parallel, the government aims to develop local manufacturing of EVs made in Egypt, including co-operation with the People's Republic of China and India. Government subsidies could support up to one-third of local production costs of EVs. The Supreme Council for Vehicle Manufacturing and a new regulatory authority were created in 2023 to support development of the domestic automotive industry.

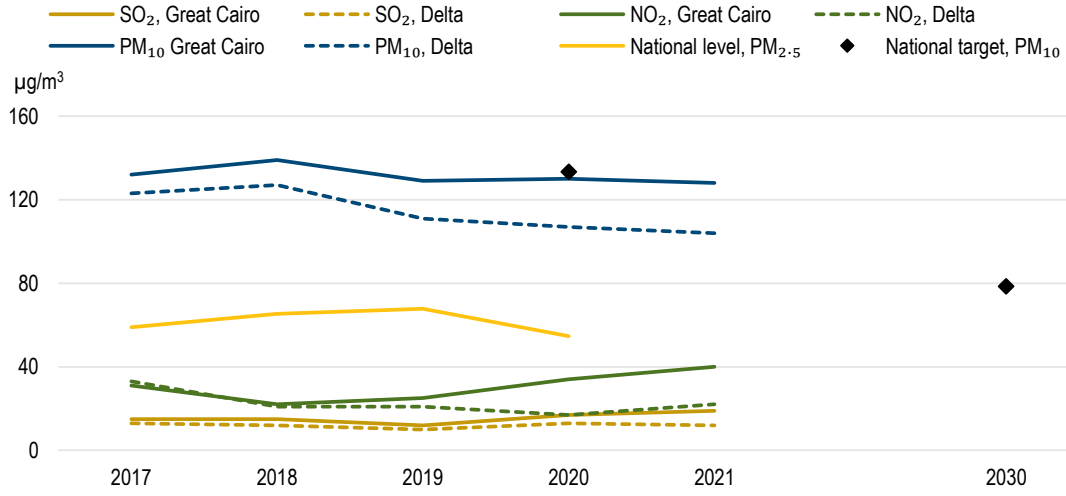
1.2.6. Atmospheric emissions and air quality

Air pollution is a major environmental challenge and health concern. Fine particulate matters ($PM_{2.5}$ and PM_{10}) are among the main sources of outdoor air pollution. Other sources are the open burning of municipal and agricultural waste, notably rice straw. Air pollution is also driven by fossil fuel combustion for energy generation. Traffic and related congestion remain one of the main sources of air pollution in urban areas, with major health impacts for citizens.

In addition to human-made pollution, Egypt is exposed to severe atmospheric air pollution from natural sources given its specific geographic characteristics. The country is almost completely located within the Sahara Desert with an average elevation of 320 metres above sea level. Like other Middle East countries, Egypt is exposed to frequent sand and dust storms, thermal inversion and high temperature exacerbating its ambulant air quality. These conditions are expected to worsen with the impacts of climate change, notably temperature increases. Due to its semi-arid climate with low rainfall, Egypt does not benefit from the effects of rain (and related wind) washing down the pollution, which may have had a small impact on reducing particulate air pollution. Policies to reduce the effects of sand and dust storms, such as monitoring and early warning systems, soil conservation, windbreaks and surface stabilisation, can improve the intensity and effect of both natural and human-made air pollution (UNCCD, 2022[40]).

Figure 1.14. Egypt met its 2020 target of reducing PM_{10} emissions

Concentration of air pollutants, 2017-21, and 2030 target for PM_{10}



Note: NO_x: nitrogen oxides; $PM_{2.5}$ and PM_{10}: particulate matters with a diameter of 2.5 and 10 micrometres or less, respectively; SO_2: sulphur dioxide.
Source: CAPMAS Annual Bulletin of Environment Statistics, Part 2: Environmental Quality and Energy 2021; Government of Egypt (2016), Sustainable Development Strategy: Egypt's Vision 2030.

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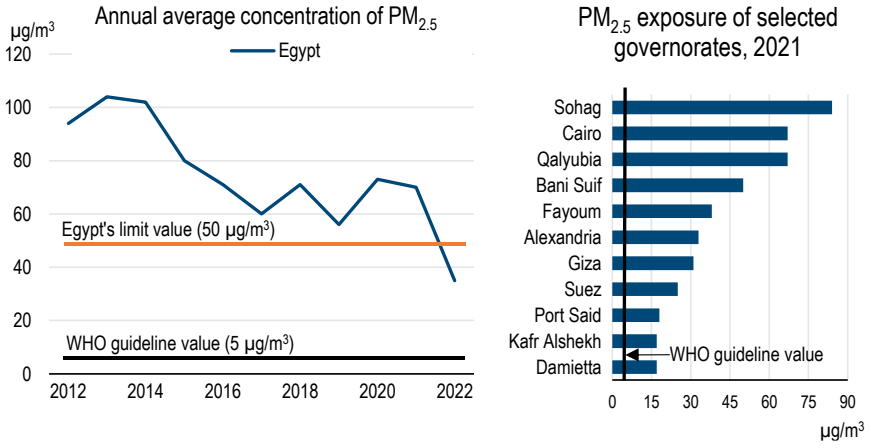
Egypt met its 2020 target of reducing PM_{10} emissions by 15% compared to 2015 levels in the Greater Cairo area and largely exceeded the target in the Delta region (Figure 1.14). However, the country still has a way to go towards achieving its goal of halving PM_{10} emissions by 2030 (CAPMAS, 2023[41]). Annual average concentration of $PM_{2.5}$ has decreased over the past decade and dropped for the first time below Egypt's national limit value of 50 µg/m³ in 2022 (Figure 1.15).

As in many other countries, strong regional disparities persist (Figure 1.15). Air quality is also subject to seasonal variations with the lowest concentrations of $PM_{2.5}$ and PM_{10} occurring in July and August, and the highest in autumn.

Figure 1.15. Air quality is moderate overall, but Egyptians are unevenly exposed to air pollution



Source: Left panel: data provided by the Government of Egypt (2024); right panel: CAPMAS (2023), Annual Bulletin of Environmental Statistics, Part 2: Environmental Quality & Energy 2021.

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Over the past decades, the government has taken several measures to improve air quality. It has focused on regulating industrial emissions, improving solid waste management, reducing road transport-related emissions and scaling up public transport options, and more recently, promoting electric buses. The government also encouraged establishment of a collection system for rice straws. This prevented the burning of agricultural waste leading to toxic emissions (black cloud phenomenon), while creating new economic opportunities for farmers.[12] Egypt has also made major strides in the area of household air pollution by promoting cleaner heating and cooking fuels and through targeted measures to keep out desert dust (Woolley et al., 2021[42]).

The Greater Cairo area remains Egypt's air pollution hotspot. In 2021, with the support of the World Bank, the government launched the Greater Cairo Air Pollution Management and Climate Change Project. The six-year project worth USD 200 million aims to reduce air and climate emissions from critical sectors and increase resilience to air pollution (World Bank, 2022[37]). Key objectives include the modernisation of Egypt's air quality management system, the construction of integrated waste management facilities and the rollout of electric buses, as well as behavioural change and awareness-raising activities to promote citizen engagement (World Bank, 2022[37]).

Air quality monitoring capacity has improved overall. Some stations have real-time monitoring capacity. The government started expanding its network of air quality monitoring stations (Government of Egypt, 2023[43]). Most stations are located in and around Cairo and other major cities; some require technical upgrades to monitor all types of pollutants. Further increasing coverage and capacity of monitoring stations is key to combat air pollution effectively.

As a next step, it would be useful to develop an integrated air pollution reduction strategy. Such a strategy could include timebound targets for all major air pollutants and an integrated vision to reconcile environmental and social dimensions with economic priorities. This would help improve policy integration, moving it beyond a series of individual projects. Moreover, it would ensure alignment between local clean air initiatives and broader national development objectives, particularly industrial development. The maximum limits of outdoor air pollutants, defined in Egypt's Environmental Law no. 4 of 1994, would need to become more stringent to approach international standards (Government of Egypt, 1994[44]). MoE has started publishing air pollution updates through various communications channels. These efforts need to be pursued at local level. This would help vulnerable people cope with high pollution days and to protect themselves by wearing masks and staying inside.

1.3. Transition to a resource-efficient economy

1.3.1. Waste management

Like many emerging economies, Egypt faces major challenges in making waste management more sustainable. Significant portions of waste are not yet properly managed. Most waste goes to landfills and illegal dumping sites or is openly burned despite long-standing laws against the practice (Government of Egypt, 1994[44]). Landfilling remains the primary form of waste treatment in Egypt. The country has a way to go to achieve its 2030 target to reduce the share of landfilled waste to 20%. Moreover, some landfills lack basic sanitary standards. The MoE has developed extensive rehabilitation requirements (e.g. location properties, operation requirements, safety measures, data records and payment system); implementation should be accelerated. Egypt also needs to pursue efforts to deal with historic waste accumulation in open dumps to prevent grave health and environmental deterioration in some governorates.

High landfilling rates, the lack of separation of bio-waste and open waste burning, notably agricultural waste, contribute to making the waste sector a significant emitter of GHG emissions. Waste contributed to about 8% of total GHG emissions in 2015, above the OECD average of 3% (Government of Egypt, 2018[13]). High population growth, industrial activity, urbanisation, changing consumption patterns and limited awareness of citizens are among the multiple factors that amplify Egypt's unsolved waste problems.

According to government estimates, Egypt generated 95 million tonnes of solid waste in 2018. Key waste streams include agricultural waste (34%), waste from cleansing of canals and irrigation networks (28%), municipal solid waste (23%), construction waste (6%), industrial waste (5%) and sludge (2%) (Government of Egypt, 2018[45]) (Figure 1.16). Organic waste represents between 55-60% of waste, followed by plastics (13%). Hazardous waste accounted for less than 1% but is set to grow more rapidly.

Estimates of waste data are inconsistent and it remains unclear how much waste is produced, collected and disposed of per year. Precise data of different types and quantities of waste per sector and per governorate, as well as different waste treatment modes, are only partially available. This gap is also due to unknown amounts of non-collected waste and the informal waste sector. The situation highlights the need for harmonised definitions, calculation techniques and weighting facilities at disposal sites to develop accurate statistics on different waste streams and waste treatment modes (Nassar, Biltagy and Safwat, 2023[46]). It would be useful to produce standardised waste profiles at governorate level. In addition, Egypt could work towards an integrated waste information system that records harmonised data on waste generation and waste treatment across the country. Meanwhile, a digital platform could provide access to key information and promote mutual learning among municipalities.

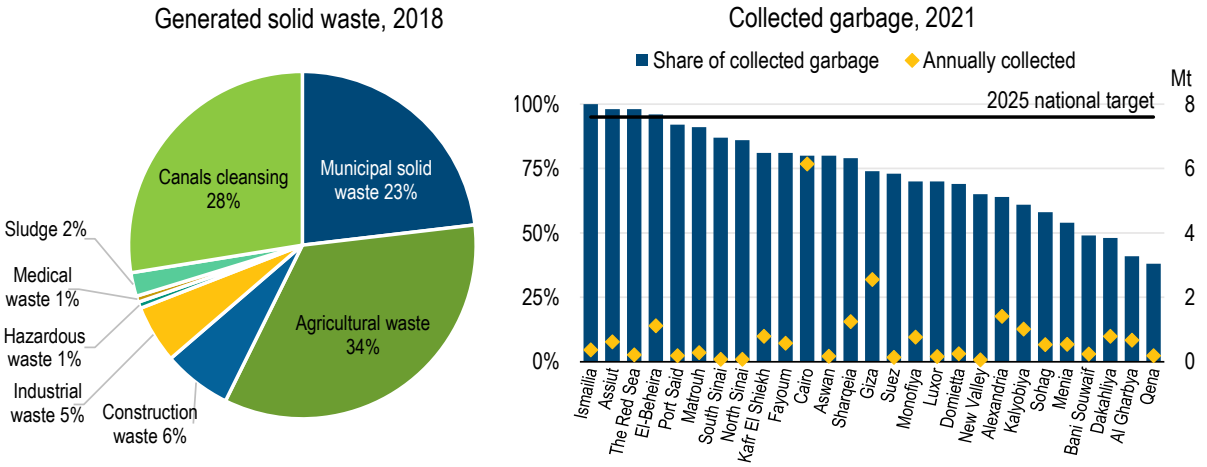
Municipal solid waste

In 2021, Egypt generated an estimated 21.2 million tonnes of municipal waste. Municipal solid waste levels have increased and will continue to grow in the context of rapid population growth, urbanisation and changing consumption patterns. For example, the city of Cairo produced on average 17 850 tonnes of waste per day in 2021. This represented a 2.7% increase from 2020 levels and about one-quarter of total municipal waste (CAPMAS, 2023[47]). According to national estimates, Egypt produced on average about 251 kg of municipal waste per capita in 2021 (Government of Egypt, 2023[48]), which is less than half of the OECD average of 534 kg (OECD, 2023[49]). While richer economies typically produce more municipal waste per capita, some of Egypt's municipal solid waste remains unregistered as collection capacity remains insufficient; therefore, any comparisons should be made with caution.

Moreover, regional disparities are strong. In 2021, four governorates (Cairo, Kalyoubia, Giza and Alexandria) collected nearly half of total waste. Collection rates vary widely from less than 40% to nearly 100% (Figure 1.16). Efforts to increase capacity and establish a nationwide waste collection system are under way.

Recycling capacity remains weak overall. The CAPMAS report estimates the recycling rate of solid municipal waste at 15.9% in 2021 (or 12 140 tonnes per day), while Egypt's 2021 Voluntary National Review of SDGs acknowledges "significant potential for improvement" with an estimated recycling rate of solid waste of 2.5% in 2017 (Government of Egypt, 2021[8]). Increasing waste separation at the source would greatly help reduce the volume of landfilled waste and enable easier recycling and disposal.

Figure 1.16. Collection capacity of municipal waste varies across governorates



Note: Garbage is defined as solid or semi-solid materials left behind from normal daily human activities.
Source: CAPMAS (2021), Annual Bulletin of public utilities services at the level of cities and districts councils; Ministry of Environment (2018), Business opportunities: Economic business models in Egypt's recycling sector for startups and SMEs.

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Waste management policies and measures

Egypt's updated Vision 2030 aims to raise the efficiency of the waste management system and promote an economy-wide shift to circularity. Sustainable waste management is one of four strategic objectives within the sustainability pillar (CAPMAS, 2023[41]). The second updated NDC sets specific targets for improving waste management. The government aims to reduce waste directed to landfills by upgrading its

solid waste management infrastructure, increase the amount of collected waste from 55% to 95% between 2022 and 2025, and expand recycling and energy recovery rates (Government of Egypt, 2023[16]). It notably intends to create new fixed and mobile transfer stations; gear up mechanical and biological treatment plants to use at least 60% of collected waste; and pursue the closure of uncontrolled dumpsites. In addition, the government aims to increase the waste-to-energy contribution of solid waste management up to 20% of collected waste by 2026. To achieve these ambitious targets, the government will need to increase considerably public financial resources and incentivise private investment. These could be more easily mobilised when waste is seen as a marketable resource (Nassar, Biltagy and Safwat, 2023[46]). Egypt also benefits from the support of several development partners.

Egypt has achieved an important milestone with its adoption of the new Waste Management Law no. 202 of 2020. The law clearly attributes roles and responsibilities of different institutions involved in waste management, while opening up opportunities for private sector investment. As the country's first solid waste management legislation, the new law mainstreams previously scattered regulations. One of its goals is to develop integrated management of municipal, industrial, agricultural, demolition and construction waste to ensure their safe disposal. The 2020 law expressly prohibits open burning of waste; the throwing, sorting or treating of municipal waste except in designated places; and the dumping of agricultural waste into waterways and other unauthorised places. It also introduces measures to reduce single-use plastic bags; a dedicated fund for municipal waste collection in each governorate; a "Green Label" certification to reduce industrial waste; and extended responsibility for producers. The law sets requirements on how to handle hazardous waste. In addition, the MoE launched a "No-to-plastic" awareness campaign.

The new Waste Management Regulatory Authority (WMRA), under the auspices of the MoE, covers a wide range of responsibilities. It notably designs and implements a national strategy for integrated waste management, overseeing regulation of the sector and attracting new investors. Master plans at governorate level will complement a national master plan for municipal waste management. Moreover, several efforts to formalise the sector are underway (Chapter 3).

Despite progress, Egypt is far from leveraging the full potential of waste management tools. Such tools, for example, could separate waste at source, provide economic incentives to make recycling more attractive, and manage pollution taxes, pay-as-you throw mechanisms and extended producer responsibility schemes. Like other countries, Egypt has huge potential to better apply the waste hierarchy and move towards circularity.

1.3.2. Sustainable agriculture

Agriculture is one of the sectors most vulnerable to the impacts of climate change, while remaining a GHG emitter, a major source of pollution and a large user of land, water and energy. It also plays a key role for rural employment, contributing to 11.5% of national GDP boosted by agricultural exports (e.g. citrus, potatoes, olives, onions, garlic). Over 80% of Egyptian farmers are smallholders cultivating less than 3 feddan (1.3 ha) of arable land using conventional irrigation. Achieving food security and improving the livelihoods of rural people are core challenges of the agricultural sector. The government has set ambitious goals for the agricultural sector to lift 2.6 million people out of poverty and to create another 2 million new jobs by 2030 (Government of Egypt, 2020[50]). It also aims to increase the sector's contribution to national GDP to 15% by 2030.

Agricultural productivity has increased significantly over the past decade. However, the sector faces increasing pressure to improve agricultural performance to feed a larger number of people in the context of limited areas of arable land. Fertile agricultural land is confined to the Nile Valley and its Delta ("old land"), as well as a few oases and some arable land in Sinai. Nearly all cultivated areas are under irrigation. Crop intensity is high, reaching about 180%, with up to three harvests per year. However, Egypt also records high food losses along the value chain, estimated at 20% on average and up to 30% for more perishable foodstuffs such as fruit and vegetables (Government of Egypt, 2020[50]).[13]

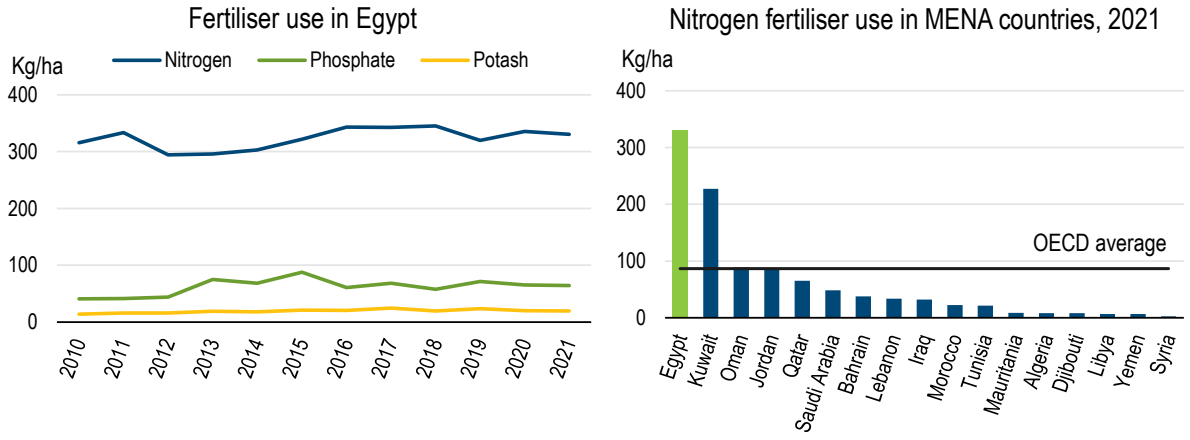
In response to these growing pressures, Egypt increased the surface of cultivated areas from 8.7 million feddan to 9.4 million feddan between 2010 and 2020. This includes 3.3 million feddan of new lands, converting desertic areas to agricultural land. The government aims to gain an additional 1.5 million feddan of new land for agricultural purposes and another 0.5 million feddan in North and Centre Sinai by 2030. These gains would take the share of new lands from about 33% to nearly 50%. Egypt gives high priority to land reclamation and horizontal agricultural expansion. However, it needs to continue improving resource efficiency and total factor productivity to create higher value with less land and water per unit. It also needs to strike a balance between ambitious agricultural export objectives and the need to satisfy increasing demand on the domestic food market, while ensuring sustainability of the natural resource base.

The government has a series of mega projects to increase local production of strategic food commodities (e.g. wheat, vegetables, livestock, fisheries). It aims to increase annual wheat production by 33% from 9.2 million tonnes in 2020 to 12.2 million tonnes in 2030 to reach a self-sufficiency ratio of 67% (Government of Egypt, 2020[50]). Agricultural expansion and crop maximisation have received far more policy attention than improving environmental sustainability. This creates a vicious circle as unsustainable farming practices and the impacts of climate change contribute to deteriorating agricultural land, threatening the long-term sustainability of production.

The level of agricultural pollution remains unknown. Many governorates do not yet monitor key indicators from diffuse pollution from agriculture (e.g. nitrogen and phosphorus concentration) (CAPMAS, 2023[41]). The national project for updating agricultural land maps includes many important measures. These range from geographic information system training for civil servants to awareness-raising campaigns on the importance of conserving agricultural land. Increased use of remote sensing systems will allow monitoring the degradation of soils due to salinisation, sand drift or encroachment of urban areas on agricultural land. The updating of agricultural maps could also provide an opportunity to improve understanding of pollution levels from agricultural activities across the territory. Co-operation between the Ministry of Agriculture and Land Reclamation and the MoE and EEAA needs to be strengthened.

Egypt has one of the world's highest rates of nitrogen fertiliser use per hectare of crop. It used on average 330 kg/ha, far above the MENA average (Figure 1.17). This has major negative impacts on soil and water quality. Better knowledge and an improved agricultural policy mix could help farmers optimise use of fertilisers. This could be achieved through a comprehensive offer of training for farmers, while phasing out fertiliser subsidies.

Figure 1.17. Egypt's nitrogen fertiliser use is among the highest worldwide



Note: Fertiliser use per cropland area. MENA: Middle East and North Africa. The OECD average is the non-weighted average.
Source: FAO (2024), FAOSTAT (database), www.fao.org/faostat/en/#data.

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The government has raised prices of fertilisers significantly over the past decade, mainly due to increased production costs, which contributed to reducing wasteful consumption. Within its efforts to promote sustainable agriculture, the government foresees rationalising use of mineral/chemical fertilisers and expanding use of organic and biological fertilisation. It also plans to create guidelines for most agricultural lands. However, it has not yet set specific targets or measures to incentivise farmers to apply fertilisers more sensitively. Moreover, Egypt has an overproduction of fertilisers, and the government plans to further scale up national fertiliser production for export.The promotion of organic farming has been struggling with low productivity, and lack of appropriate marketing structures and certification schemes. A law on organic farming, adopted in 2020, aims to limit the negative impacts of traditional farming methods dependent on chemicals in planting and animal feeding. However, implementation is falling behind. Organic certified agriculture land accounted for an estimated 160 000 ha in 2018 (GIZ, 2018[51]). While the share of organic farming remains modest, Egypt has one of the largest surfaces dedicated to the practice in Africa. The government set a target of converting 20% of land to sustainable agriculture by 2030, including 350 000 ha dedicated to organic agriculture, which would more than double the current surface. Together with Tunisia and Morocco, Egypt is one of the first African countries to regulate the sector and establish a certification system to guarantee credible quality of organic products for consumers.

Policy measures to develop climate resilience

Egypt's 2030 Updated Sustainable Agriculture Development Strategy, published in 2020, places a stronger emphasis on the environmental dimension and climate adaptation measures to make the agricultural sector more resilient (Government of Egypt, 2020[50]). Sustainable management of natural resources and adapting the agricultural sector to climate change and mitigating its impacts are among the six strategic objectives. The strategy includes an action plan for 2020-25 and 2025-30 with detailed objectives, key performance indicators and a monitoring system. It also provides a strategic framework for climate risks and adaptation to climate change in the agriculture sector. However, national projects mainly focus on agricultural expansion and less on climate-relevant aspects.

The second updated NDC does not include any climate mitigation measures for the agricultural sector (Government of Egypt, 2023[16]). In contrast, nearly all adaptation measures focus on improving water management; costs of adaptation in the agricultural sector until 2030 are estimated at USD 14.5 billion. Key projects within the NDC include enhancing agricultural production in the Valley and Nile Delta regions, rehabilitating agricultural areas in the northern Delta affected by sea level rise, combating desertification, improving water harvesting and developing on-farm irrigation. Early warning systems, improved weather forecasting services and agricultural insurance systems against climate risks are still in their infancy. These are important measures to make the sector more climate resilient. The government could provide further incentives for farmers to adjust their cropping system and on-farm water management practices.

Egypt has scope to further rationalise water use in the agricultural sector. Old lands continue to apply traditional irrigation methods. Current efforts to upgrade and rehabilitate canals in the Delta regions are necessary. In line with the Sustainable Agriculture Development Strategy's absolute priority given to the management of scarce water resources, Egypt is exerting efforts to upscale the use of modern irrigation technologies. This should be combined with price signals to rationalise water usage (OECD, 2015[52]). Egyptian farmers only bear the on-farm irrigation costs and do not pay for water used in their farms (Moh and Saleh, 2018[53]). Agricultural water allocation reform could help incentivise adoption of climate-smart technologies (World Bank, 2022[20]). The action plan sets out a target of establishing modern irrigation schemes for sugarcane and orchard trees for a total surface of 1.1 million feddan by 2030 (Government of Egypt, 2020[50]). In parallel, the government plans to set up improved surface irrigation for 4.3 million feddan to improve on-farm agricultural practices. Within Egypt's Future Project for Agricultural Production, some 2.2 million feddan in Al Dabaa will be designed to maximise irrigation efficiency by up to 90% by 2030. Smart irrigation systems consider the degree of soil moisture, the level of salinity and temperature when calculating water requirements.

While domestic seed production has increased and is regulated, information remains scattered. Egypt should update seed policy periodically and ensure that its seed sector remains fit for purpose and adapts to changing environmental and climate conditions (Thijssen et al., 2023[54]). Awareness of quality seed and new varieties, as well as access to climate-resilient varieties, needs to be further improved and promoted, for instance, through mobile applications.

Despite reforms, the state remains heavily involved in influencing market prices for key crops through price and procurement policies, as well as consumer subsidies (OECD, forthcoming[55]). For instance, agricultural co-ops distribute farm inputs such as seeds, fertilisers and pesticides at village level based on fertiliser maps for each crop. Membership is mandatory for farmers. In 2020, the government introduced an electronic smart card for farmers, which allows them to buy subsidised fertilisers. In turn, Egypt does not have any legal entity to represent the interests of farmers. Like newly created associations that benefit water users, independent associations for small-scale farmers could provide advice, mutualise investment costs and create new economic opportunities along supply chains. Smallholders usually struggle to access financing for investments in climate resilience. Much agricultural support targets large-scale projects; better targeting support to improve the productivity and sustainability of existing farms can accelerate the transition to sustainable agriculture.

1.4. Managing natural capital

1.4.1. Sustainable water management

Water supply and consumption

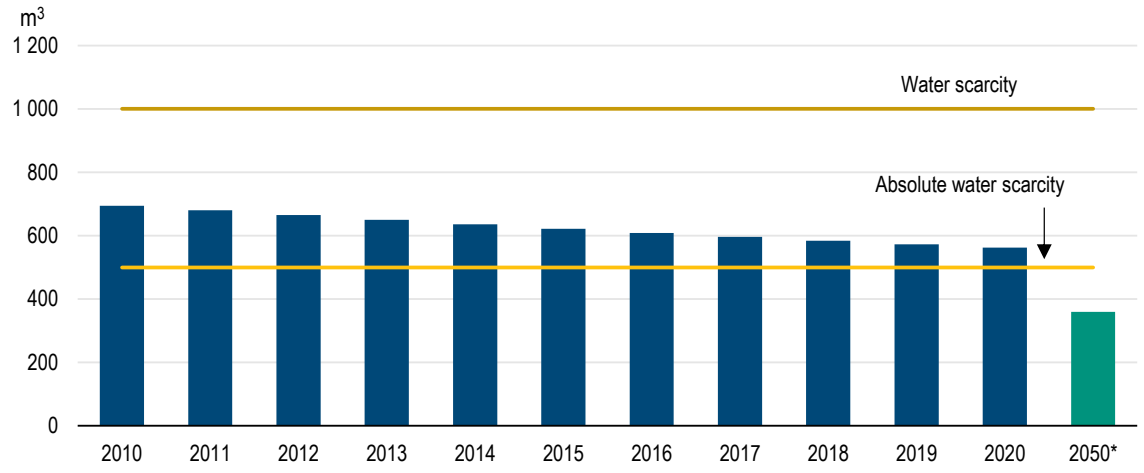
Egypt is among the world's most water-scarce countries. It depends heavily on a single water source, the Nile River, making it vulnerable to upstream developments as witnessed in the controversy over the Grand Ethiopian Renaissance Dam. At 97%, Egypt has one of the highest water-dependency ratios in the Arab region (UNDP, 2013[56]). Consequently, transboundary water considerations are of paramount importance.

Unlike many African countries, Egypt is faced with physical scarcity of water. In the context of rapid population growth and limited availability of freshwater resources, the per capita share of available water has been declining. The country is moving towards absolute water scarcity (less than 500 m^3 per capita of annual water supply) (Figure 1.18). The government estimates that annually available freshwater resources will shrink to only 360 m^3 per capita by 2050, with an estimated population of 170 million people.

Water scarcity is mainly triggered by the country's arid climate conditions posing a major threat to rural livelihoods, which remain heavily dependent on agriculture. The impacts of climate change (e.g. higher evaporation rates, changes in seasonal precipitation) exacerbate this difficult situation, as outlined in the National Climate Change Strategy 2050 (Government of Egypt, 2022[24]).

Figure 1.18. Egypt faces absolute water scarcity with a decreasing per capita share of water

Renewable water resources per capita



Note: *2050: government estimate.
Source: World Bank (2024), World Development Indicators (database), https://databank.worldbank.org/source/world-development-indicators.

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Water demand largely exceeds renewable freshwater supply in Egypt. In 2022, the total annual water supply from conventional water sources was estimated at 59.7 billion cubic metres (BCM), with the bulk of freshwater coming from the Nile River (55.5 BCM or 68%) (CAPMAS, 2023[41]). Demand for water is estimated to reach 90-100 BCM by 2050 (Government of Egypt, 2021[57]). While agriculture accounts for about three-quarters of total water use, the share of households is increasing rapidly (CAPMAS, 2023[41]).

The significant gap between freshwater supply and demand highlights the importance of developing non-conventional water resources. Reuse of agricultural drainage water and treated wastewater can help satisfy an ever-growing demand for water. While the share of water produced from desalination efforts (0.35 BCM) remains negligible, it has been growing rapidly. Beyond the expansion of water supply, the country will also need to improve demand management (e.g. more efficient water distribution networks, water-saving irrigation technologies, water metering). Rapid urbanisation increases pressure on local authorities to develop efficient local water management systems.

Policy framework and measures for sustainable water management

Since the early 1980s, Egypt has developed a comprehensive legal framework to manage its scarce water resources. The Resources and Irrigation Law, ratified in 2021, is a major step forward to unify attempts to improve water use and protect the quality of water bodies. It includes provisions for water user associations and climate change adaptation (e.g. management and protection of coasts; protection from risks of heavy rainfall and flash floods).

The 2050 Water Strategy, supported by the National Water Resources Plan 2017-37, sets out the main strategic goals and framework for water management. It aims to achieve water security for all Egyptians by promoting sustainable management of water resources. To that end, it brings together key stakeholders concerned with water management under a single umbrella. The strategy builds on four pillars: i) developing water resources; ii) enhancing water quality; iii) rationalising water uses; and iv) creating an enabling environment. It includes a series of measurable targets and a monitoring and evaluation system.

As in many other countries, various government entities address water issues. Chiefly, the Ministry of Water Resources and Irrigation manages water. However, three other ministries play key roles: MoE, the Ministry of Health and Population and the Ministry of Housing, Utilities & Urban Communities. In addition, specialised technical agencies have responsibilities, including the EEAA, WMRA, the Egyptian Water Regulatory Agency, the Holding Company for Water and Wastewater (HCWW) and the National Water Research Center. Water-related data and information remain scattered across government bodies, making them difficult for the public to access.

Overall, the government intends to invest USD 50 billion in the water sector, supported by many development partners (CAPMAS, 2023[41]). Implementation involves participation of nine different ministries, including housing, agriculture, health, environment and planning. Effectively managing competition for scarce water resources across uses (agriculture, industry, domestic supply and ecosystem services) and addressing potential trade-offs would be an important step towards integrated water resource management. Water and climate change are inextricably linked. Consequently, nearly all adaptation activities proposed within Egypt's updated NDCs have a water dimension (Government of Egypt, 2023[16]).

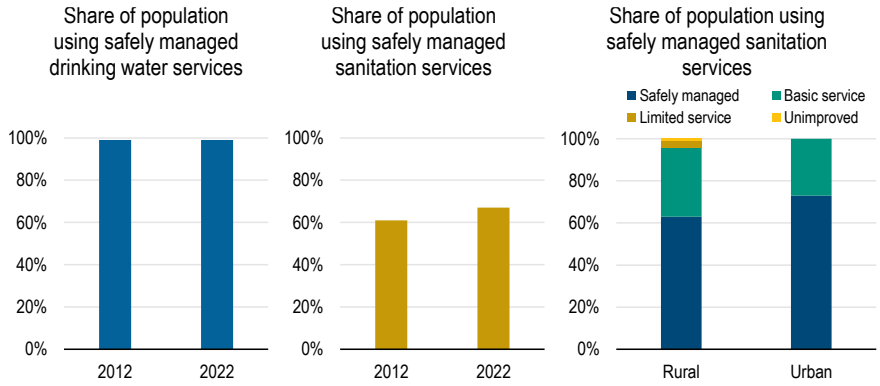
Egypt has developed many ambitious water projects over the past decade. The National Canal Lining Project, launched in 2020, has a budget of EGP 80 billion (USD 2.6 billion). As one of Egypt's biggest water projects, it aims to rehabilitate 20 000 km of irrigation canals by 2024. About a quarter of this total had been completed at the end of 2022. The project will raise water use efficiency and improve water distribution equity, especially for farmers at the end of canals. It will also increase land productivity, restore the shape of canals and reduce water pollution (Government of Egypt, 2021[8]). However, the impacts of modern irrigation systems are complex, and sometimes alter cropping and water application decisions by farmers, inadvertently increasing water scarcity. Moreover, increased irrigation efficiency reduces return flows, which must be carefully considered in allocation arrangements.

In parallel, the government also plans to quadruple its desalination capacity within the next four years to promote water security for its coastal cities (Chapter 3). Given the significant investment in large water infrastructures, the costs and benefits of such projects need careful evaluation and integration into a long-term investment strategy. Beyond investments in water supply projects, a stronger focus on water allocation planning and demand-management policies is needed (OECD, 2015[52]). Egypt could conduct a regular "health check" for water resources allocation in line with OECD best practices (OECD, 2015[52]). Raising citizens' awareness of the value of water and water-wise practices should remain a priority.

Water and sanitation services

Egypt achieved nearly universal access to safe drinking water over a decade ago and is working to ensure the sustainability of drinking water in accordance with national laws and regulations. It is also one of the rare African countries on track to achieve universal basic sanitation by 2030 (UN, 2023[58]). To date, about two-thirds of the population use a safely managed sanitation service (Figure 1.19). About 90% of the population has a handwash facility with soap and water available at home (UN Water, 2023[59]). Disparities between urban and rural areas have been reduced. Much of these achievements are related to the Haya Karima Initiative (Box 1.1).

Figure 1.19. Egypt is on track to achieve SDG 6 on clean water and sanitation



Source: UN (2024), UN Water SDG 6 Data Portal, https://sdg6data.org.

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Egypt needs to improve the efficiency of public water supply and move towards a more sustainable financial management of water and sanitation services (WSS). The state-owned HCWW introduced several reforms to raise water tariffs for WSS and make the sector more financially viable. Most urban households have metered, private connections to a piped water network and are connected to the sewage system. Egypt has developed a progressive water tariff system that guarantees a low tariff rate to cover essential household water needs. High-use consumers pay nearly five times more on their water bills, cross-subsidising the reduced-rate bracket. Water tariffs are also adjusted to different sectors (Table 1.3).

Despite price increases, WSS tariffs do not reflect the full financial cost of services and continue to be subsidised by the government.[14] Experience in OECD countries shows that tariffs are best designed if they manage to secure sustainable financing for service provision; while complementary social measures can target vulnerable groups to address affordability issues (Leflaive and Hjort, 2020[60]). Greater predictability and transparency of tariff increases, along with ensuring reliable, quality of service, could make such increases more socially acceptable (Alternative Policy Solutions, 2019[61]). Government efforts to increase cost recovery should also be informed by long-term strategic financial planning for water infrastructure investment, including climate adaptation.

Table 1.3. Water tariffs are adjusted to consumption levels and reflect different types of usage

Trends in household water tariffs		
Consumption (m^3/month)	Before 2018(EGP)	Since 2018 (EGP)
0-10	0.45	0.65
>10 – 20	1.20	1.60
>20 – 30	1.65	2.25
30-40	2.00	2.75
>40	2.15	3.15
Sewage fee	63%	75%
Sector-specific water tariff trends		
Sector	Before 2018 (EGP)	Since 2018 (EGP)
Service	0.45	3.30
Government	1.20	3.40
Commercial	1.65	3.40
Industrial	2.00	4.55
Tourism	2.15	4.60
Sporting and social clubs	-	10.00
Sewage fee	92%	98%

Source: (Mada Masr, 2018[62]); government submission (2024).

Water quality and wastewater treatment

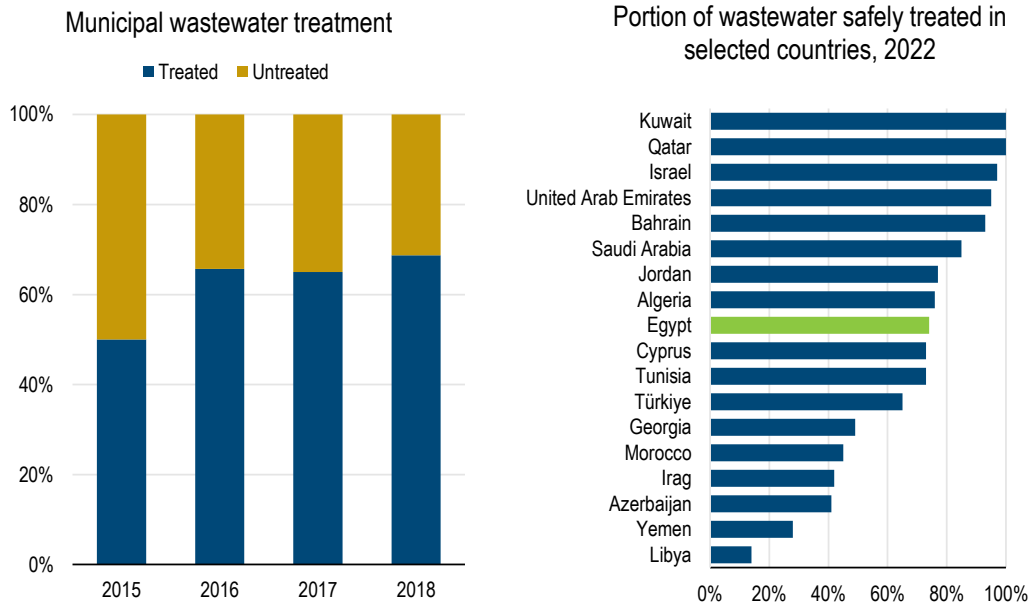
Water quality indicators for the Nile River met most of the national limits in 2021 (CAPMAS, 2023[41]). Water quality standards are defined from executive regulations for different types of water bodies. Over the past decade, Egypt has improved considerably its monitoring capacity, providing an increasingly robust understanding of the state and evolution of water quality. However, many governorates still lack values for nitrogen and phosphorus balances (CAPMAS, 2023[41]). Groundwater and soil quality in the Delta region are also increasingly affected by sea water intrusion, leading to high salinity levels.

Pollution in the Nile River has decreased, thanks notably to increased control of industrial wastewater and growing wastewater management capacity. The new irrigation law also focuses on water quality conservation and pollution control. However, some companies still discharge industrial wastewater with partial treatment. They work towards implementing action plans to achieve full compliance. The government provides technical and financial support to factories to develop industrial wastewater treatment processes and zero liquid discharge systems. There are also dedicated efforts to address pollution in specific drains that need immediate intervention due to critical water quality. The government is reinforcing the polluter pays principle by tightening the penalty for factories whose waste discharge, whether liquid or solid, leads to pollution of waterways (Government of Egypt, 2016[63]; AfDB, 2022[5]). Volunteer initiatives such as “Very Nile” contribute to cleaning the Nile River from solid waste (Government of Egypt, 2021[8]). Since its creation in 2018, local fishers collected over 100 tonnes of plastics to clean the Nile. Another recent initiative aims to ban single-use plastic bags from the Zamalek Island in the heart of Cairo.

The share of treated wastewater grew constantly from 50% in 2015 to 74% in 2022 (Figure 1.20). This is below the OECD average but better than many other countries in the Arab region (UN Water, 2023[59]). Egypt invested in a series of mega projects to enhance its water treatment and reuse capacity across its territory (e.g. Bahr El-Baqar treatment plant, West Delta El Dabaa plant, Elmahsama plant). Several projects target rural areas (e.g. Sustainable Rural Sanitation Services Project, depollution of the Kitchener Drain in the Delta region, wastewater development in Upper Egypt). By 2030, Egypt aims to maintain or enhance the water quality in all surface water sub-systems. It seeks compliance with the Law of

Environment for 85% of surface water sub-systems by 2037 (Government of Egypt, 2021[57]). Despite progress, the country still has a way to go to further improve its water quality.

Figure 1.20. The share of treated wastewater has been growing but requires further improvement



Source: UN Water (2023), SDG 6 Snapshot in Egypt, www.sdg6data.org/en/country-or-area/Egypt.

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1.4.2. Biodiversity

Despite being an arid or semi-arid country, Egypt is biodiverse with around 140 types of globally important species. With a coastline of over 3 000 km, Egypt has a rich diversity of marine life, with over 5 000 species in Egyptian waters. According to government estimates, this includes more than 1 700 different species of fish, about 1 400 species of seaweeds and seagrasses, 220 hard species of coral, 800 species of soft coral and many other marine invertebrate fauna creatures. The Red Sea is one of the world's most important repositories of marine biodiversity. The coastline also offers a variety of habitats, including coastal lakes, mangrove, seagrasses, salt marshes, mudflats, sand dunes and beaches.

Egypt counts five major habitat systems. The desert is the dominant habitat system, covering about 87% of the total area. It is followed by the marine habitat system and wetlands. The fourth and fifth systems – artificial habitat and freshwater habitat – are among the smallest habitat systems in Egypt. Egypt's rich marine ecosystem plays a pivotal role in attracting tourism. At the same time, unregulated tourism can be a major driver of biodiversity loss and degradation (both species and ecosystems). Since tourism-related businesses depend on biodiversity, nature conservation should become a key priority of the industry. Over the past decade, the MoE and Ministry of Tourism have increased co-operation to help the sector become more sustainable.

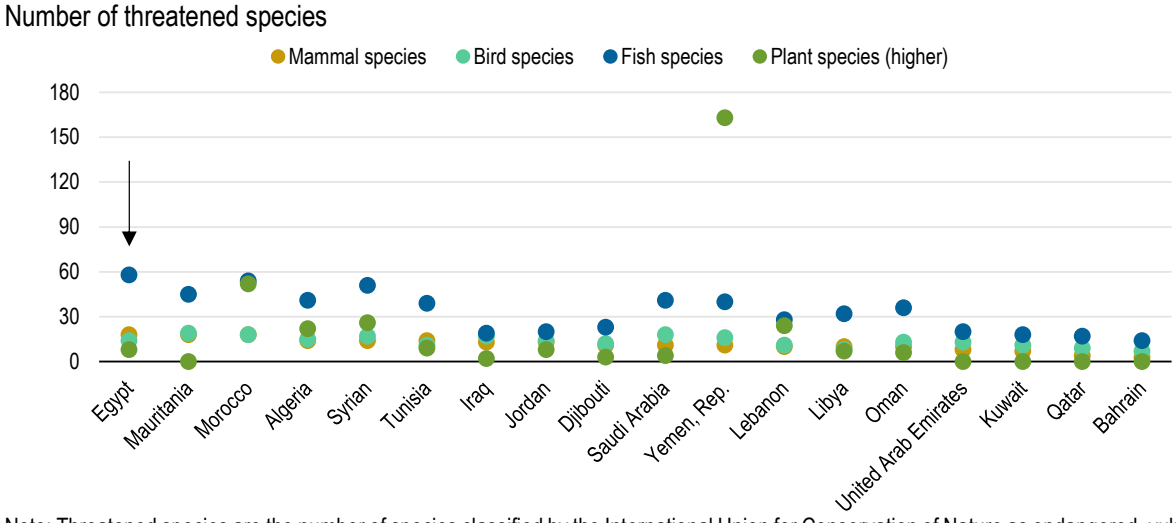
The main direct causes of biodiversity loss are connected to human activities. Land-use change related to urban and agricultural expansion, as well as associated use of pesticides and fertilisers, causes alternations and reduction of ecosystem services of natural habitats. All types of pollution (air, water, soil) negatively affect plant and animal species. In addition, ongoing desertification and climate change exacerbate biodiversity loss. The conversion of natural land area along coastal areas has had a large

impact on coastal and marine species and habitats in some areas. While none of the largest oil spills recorded globally has occurred in Egyptian waters, about a dozen smaller oil spills were recorded in Egyptian Red Sea waters between 2013 and 2017. Houthi attacks on cargo ships represent a new risk for oil spills and other leaks in the southern Red Sea as witnessed in early 2024 (Goodman, 2024[64]).

Threatened species

According to national estimates, over 40 species are under pressure in Egyptian coastal and marine environment, including marine mammals (17 species), marine turtles (4 species), sharks (more than 50 species), sea cucumber, special bivalves, coral reefs, mangrove trees and many birds (Government of Egypt, 2016[63]). Many fish species are in decline (Figure 1.21). This is mainly due to the unsustainable use of water resources (e.g. overfishing, fishing in illegal areas) and coastal pollution. Specific protection, management and restoration efforts will be required to recover certain economically important fish species (Government of Egypt, 2016[63]). Moreover, about one-quarter of sharks are endangered. Shark attacks have recently been on the rise on the Egyptian coasts of the Red Sea. In response to this threat, the government has funded research to better understand the behavioural changes of sharks (Government of Egypt, 2023[65]). Enforcement of regulations for wildlife protection and prevention of overfishing also needs to be stepped up.

Figure 1.21. Many Egyptian fish species are threatened



Note: Threatened species are the number of species classified by the International Union for Conservation of Nature as endangered, vulnerable, rare, indeterminate, out of danger or insufficiently known.
Source: World Bank (2024), World Development Indicators (database), https://databank.worldbank.org/source/world-development-indicators.

StatLink https://stat.link/eyo051

While several national lists on different species exist, Egyptian scientific institutions and the International Union for Conservation of Nature have not jointly adopted an official national Red List of species. However, over the past decade, knowledge about the health of species and ecosystems has improved overall. Several research programmes aim to assess the status of species in terms of density and prevalence rate across Egypt's natural habitats. Among other areas, monitoring focuses on Egyptian gazelles, crocodiles, waterfowls, coral reefs, sharks and desert plants. A solid evidence-based analysis is needed to help set priorities for conservation action plans for protection of species and ecosystems, as well as ecosystem restoration. A monitoring system to regularly update assessment criteria can support the decision-making process.

Measures and policies

Egypt has been committed to protecting biodiversity and implemented many biodiversity conservation measures. It launched its first National Biodiversity Strategy and Action Plan in 1998 (Government of Egypt, 1997[66]), developing an updated strategy and action plan in 2016 covering 2015-30. The government has started another update to reflect the new commitments of the Kunming-Montreal Global Biodiversity Framework. Moreover, the updated Vision 2030 indicates a new target for protected marine areas aimed at increasing the share to 40% by 2030, which would be well above the collective global goal of 30%. Egypt is a party to the Convention on Biological Diversity and signed many international conventions (e.g. Ramsar Convention on Wetlands, Convention on the Conservation of Migratory Species of Wild Animals and the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), African-Eurasian Migratory Waterbird Agreement and the Gulf of Aden Environment "Jeddah Convention").

Box 1.3. ECO EGYPT, an ecotourism experience

Within the Mainstreaming Biodiversity in Egypt's Tourism Project, ECO EGYPT was implemented by Egyptian Environmental Affairs Agency and the United Nations Development Programme with funding from the Global Environment Facility. It involved co-operation between the Ministry of Environment, the Ministry of Tourism and Antiquities, and the State Ministry of Information.

The campaign was based on four pillars:

- See: explore 13 protected areas across Egypt.
- Do: participate in a variety of eco-activities in different sites.
- Meet: discover the lifestyle of local communities, learn about their culture and tradition.
- Stay: at authentic camps or ecolodges.

ECO EGYPT helped attract tourists to ecological sites and protected areas while strengthening economic development of local communities within an integrated approach. It included the Tribal Talks campaign, offering a series of short videos to shed light on Egypt's diverse local communities.

Among other outcomes, the campaign led to adoption of several decrees, including banning of single-use plastics in South Sinai. Moreover, the first Red Sea Marine Conservation campaign in MENA was launched in 2021 to help protect the Red Sea's marine and coastal environment. As a next step, it would be useful to take stock of the outcomes of the campaign and sustain results. The government intends to pursue the campaign beyond the initial three-year implementation period.

Source: (UNDP, 2020[67]).

Egypt participates in the Ramsar and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. It is also a member of PERSGA, a regional organisation for conservation of the environment in the Red Sea and Gulf of Aden. However, implementation of commitments has been lagging in many areas, notably due to limited financial and human resources. Local expertise needs to be further strengthened to ensure sustainability of actions and better consider local contexts. Moreover, the government should consider updating the legal and institutional frameworks to create an enabling environment for the implementation of the national strategy and related biodiversity conservation and restoration activities. In addition, economic incentives for biodiversity conservation and its sustainable use could better target threatened species, as well as the ecosystems on which they depend.

There is an urgent need to mainstream biodiversity into all sectors. This would help mobilise additional investment in biodiversity conservation and sustainable use measures. EIA of renewable energy projects considers bird migration routes. The government implemented several projects to promote radar-assisted shutdown on demand of wind farms and developed new green job opportunities for female bird watchers. However, other sectors have struggled to integrate biodiversity concerns. For example, the agricultural sector has so far paid little attention to agrobiodiversity. Therefore, Egypt should continue to raise awareness and strengthen capacity of relevant governmental agencies. It should also provide economic incentives for key stakeholders to adopt ecologically sustainable management practices.

Egypt aspires to become a global ecotourism destination. The government nationwide campaign, ECO EGYPT, was launched in 2020 by the MoE within the broader Live Green presidential initiative (Box 1.3.). In addition, it prepared guidance for ecolodges, environmental practices in tourist restaurants and training for hotel workers, as well as media campaigns. However, ecotourism legislation has room for improvement and suffers from weak enforcement. The impact of recreational activities on fragile coastal areas needs to be better assessed and calls for a better implementation of the polluter pays principle. More sustainable tourism practices would help reduce pressures on biodiversity, particularly by reducing waste generation and rationalising water use.

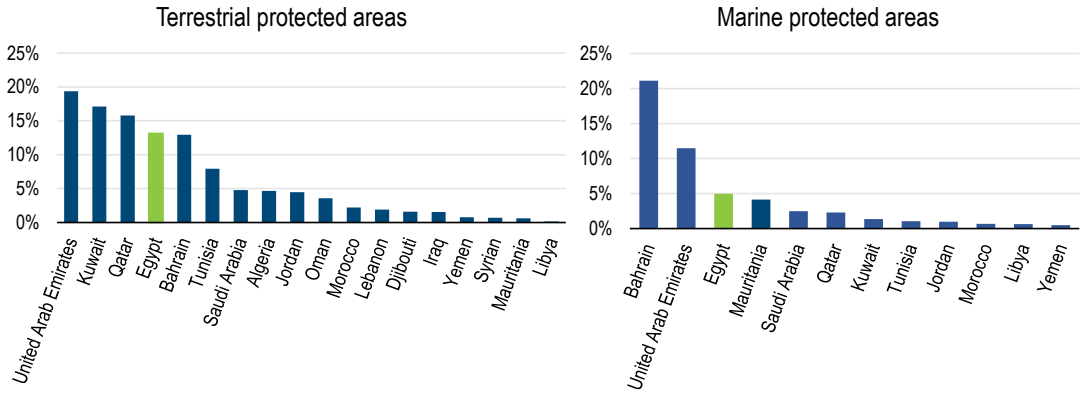
Protected areas

The country counts 30 protected areas, covering about 14% of its total land area. The share of terrestrial protected areas is much higher than in many other MENA countries (Figure 1.22). However, under the Kunming-Montreal Global Biodiversity Framework, Egypt will need to further expand protection to contribute to the new collective global target of 30%. An assessment under way could provide the basis for reform.

For a long time, the performance of protected areas has been hampered by weak operational, administrative and management capacity, as well as by lack of both trained staff and financial resources. In 2015, less than half of protected areas had proper management plans, and many were outdated (Government of Egypt, 2016[63]). However, the government revised the fee system for protected areas, especially in the Red Sea, which attracts up to 10 million tourists per year. This contributed to increasing considerably the income collected from entry fees of protected areas, reaching about EGP 500 million in 2023; income is projected to increase to EGP 1 billion in the coming years. About 25% of collected entry fees is dedicated to the management of protected areas; the remainder is used for other environmental protection programmes. These additional resources allowed increasing the number of scientific staff and experts who support the management of protected areas.

Figure 1.22. Egypt has one of the highest shares of protected areas in MENA countries

Protected areas in MENA countries, 2022



Note: Left panel shows terrestrial protected areas as percentage of total land area and right panel shows marine protected areas as percentage of territorial waters in MENA countries in 2022. MENA countries that have marine protected areas less than 0.5% are not shown; these countries are Oman, Syria, Lebanon, Djibouti, Algeria and Iraq.
Source: World Bank (2024), World Development Indicators (database), https://databank.worldbank.org/source/world-development-indicators.

StatLink https://stat.link/dhqip0

The government intends to declare the entire coral reef habitat of the Red Sea stretching over 1 800 km as protected areas (also called The Great Fringing Reef) through a prime ministerial degree in 2024. This will be a milestone given the global importance of coral reefs in the Red Sea area. It will also help significantly increase the share of protected marine areas. In addition, the USAID-backed Red Sea Initiative provided an initial contribution of USD 15 million. This will help protect the Red Sea's coral reefs and surrounding coastal ecosystem against the impacts of climate change and human activity (USAID, 2022[68]). It also aims to leverage private sector funding and develop blended finance mechanisms to support businesses in building climate resilience.

Egypt took another important step at COP28 in 2023, announcing its intention to join the Blue Partnership Agreement. This partnership supports multilateral co-operation to develop a sustainable blue economy in the Mediterranean region. More specifically, it seeks to support sustainable investment in the blue economy. It will also share good practices to improve project design and implementation. Finally, it will develop an enabling environment, alongside participating countries such as Jordan, Morocco and Spain. Mutual learning will help Egypt make progress in different areas of co-operation, including marine tourism, sustainable maritime transport, renewable marine energy and plastic waste.

Egypt will have additional opportunities to strengthen its national commitments as host of the COP24 for the Protection of the Marine Environment in 2025. The government has developed a marine litter management plan and aims to prevent and reduce marine litter pollution in the Mediterranean. Several voluntary initiatives are under way; local stakeholders generally drive action.

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Notes

[1] Revenue from tourism is among the top sources of foreign currency, representing about 12% of GDP. Egypt aims at attracting some 30 million tourists by 2028. It launched its 2030 National Strategy for Sustainable Development in November 2015 (Government of Egypt, 2023[71]).

[2] Traditionally, policy measures focused on strengthening family planning and birth control. For example, in 2019, the government launched a family planning initiative called "Two Is Enough", which encouraged poor rural people to have fewer children. In 2023, the government introduced a financial incentive of EGP 1 000 per year for married women aged over 45 with no more than two children.

[3] It targets 6 million women of childbearing age and 2 million young couples who are about to get married. Beyond educational interventions and the expansion of health services, the nationwide programme focuses on the economic empowerment of women and legislative action, including revising the child marriage law and the child labour law.

[4] According to CAPMAS, the informal private sector is defined as production units that carry out an economic activity without administrative registration or practicing activities without holding permission/license from competent authorities. These economic actors don’t have any legal entity in accordance with the necessary procedures to practice such activities.

[5] As a member of the former non-Annex I group of developing countries, Egypt had less strict requirements under the Kyoto Protocol and benefits from global climate finance from developed countries.

[6] Instead of flaring, the petroleum gases will be directed to gas processing facilities to produce LPG, natural gas and condensates (Government of Egypt, 2023[16]).

[7] Northern coastal areas receive between 80 and 220 millimetres of precipitation annually. In turn, there is virtually no rainfall in the desertic areas of the New Valley governorate. The total amount of rainwater is estimated at 1.3 billion cubic meters (CAPMAS, 2023[41])

[8] With the discovery of Zohr, the Mediterranean’s largest natural gas field and other new offshore gas fields (e.g. Nargis-1), Egypt boosted its role as an important gas hub in the Mediterranean region.

[9] Activities include the expansion of natural gas connections to households, promotion of the switch to compressed natural gas in the transport sector, energy efficiency measures, reduction of carbon intensity of oil and gas resources and promotion of renewables, bio-based products and low-carbon hydrogen.

[10] It was estimated at 51.3 tCO_2/TJ in 2020, below the G20 average (~59 tCO_2/TJ) but remains above EU standards (46.3 tCO_2/TJ).

[11] The transport sector is projected to emit 88 million tonnes of CO_2-eq. in 2030 and 136 million tonnes in 2050 if measures under the policy and regulatory framework are fully implemented (World Bank, 2022[20]).

[12] Some 1.4 million tonnes of rice straw have been collected at 621 locations and transformed into useful products. This government initiative also contributed to creating new employment opportunities for young people in six regions (Reuter and Chang, 2023[72]).

[13] The government's action plan intends to halve food losses by 2030. This will require major improvements in the logistical infrastructure and marketing system. Smallholders would also need easier access to markets.

[14] In 2018, operational costs of the Holding Company for Potable Water and Wastewater accounted for EGP 17 billion and revenues were at EGP 15 billion, resulting in a deficit of EGP 2 billion, which was covered by the government (Amer, 2017[73]).