# 3 Building climate-smart, resilient and inclusive cities

As engines of growth, cities can play a pivotal role in supporting Egypt's green transition. At the same time, cities are major sources of pollution. They need to contribute more strongly to national climate mitigation efforts and build resilience to multiple climate-related risks, especially heatwaves, flash floods, dust storms and rising sea levels. The role of subnational governments is essential in advancing place-based climate action. This chapter examines opportunities and challenges to make cities more inclusive and a driving force for Egypt's green transition. It includes brief case studies on climate action in the Governorate of Alexandria and the city of Al-Kharga, an oasis in the New Valley Governorate.

## 3.1. Introduction

Cities can play a pivotal role in supporting Egypt's green transition. With about 80% of employment, Egyptian cities are engines of the country's growth and among the largest contributors to its gross domestic product (GDP), estimated at 75% (UN-Habitat, 2024[1]). Cities can support Egypt's green transition through urban economic activity, green innovation, jobs and more inclusive development (UN-Habitat, 2024[1]).

At the same time, cities are major polluters and greenhouse gas (GHG) emitters and thus need to contribute more strongly to national climate mitigation efforts. According to World Bank calculations, Egyptian cities contribute to more than 80% of direct carbon dioxide ($CO_2$) emissions at national level (Goyal and Sharma, 2023[2]). Cities also represent a large share of growing demand for energy and public water supply. They face increasing waste management and pollution challenges, especially air pollution and wastewater discharge. Addressing Egypt's chronic shortage of affordable housing remains a key challenge, along with creating an adequate offer of public transport options for all.

Coherent and targeted policy action is urgently needed from different levels of government to steer urban development towards more sustainable pathways (OECD, 2018[3]). A systemic shift towards more circular cities and regions is therefore vital (OECD, 2020[4]), especially because the design of urban infrastructure will have long-term impacts on the country's low-carbon trajectory, resource use, and exposure and vulnerability to climate risks.

The effects of climate change in urban areas are increasingly visible. Egyptian cities are exposed to multiple climate-related hazards, especially heatwaves, flash floods, dust storms and rising sea levels (Goyal and Sharma, 2023[2]). It is essential to strengthen climate resilience at city level to reduce the economic costs of the impacts of climate change and to protect the most vulnerable populations. Low-income residents are more likely to be exposed to hazards, and typically lack financial safety nets to recover from climate impacts.

The government has set up an ambition to build climate-smart, resilient and inclusive cities in line with Egypt's Vision 2030. These three dimensions are overlapping and mutually reinforcing. For example, green spaces help build climate resilience and reduce emissions, while making cities more liveable for citizens. Meanwhile, better land and infrastructure planning and design can contribute to both climate mitigation and adaptation objectives.

The government is raising its climate commitments, as the National Climate Change Strategy 2050 and the second updated Nationally Determined Contribution (NDC) expanded scope to include policy action for urban areas. In parallel, climate issues need to be further mainstreamed into urban planning and design, embedded in both broader regional development strategies and sectoral policies. Egypt faces an implementation gap between national objectives and local realities. Despite more prominence in national strategies (Chapter 1), the role of subnational governments in advancing low-carbon development strategies and climate resilience remains limited in practice.

### *3.1.1. Population growth, spatial constraints and settlement dynamics*

Egypt's population is projected to reach 160 million people in 2050, doubling its population compared to 2010 levels (UN, 2022[5]). Every year, the population is projected to increase by at least 1.6 million people (CAPMAS, 2020[6]), placing additional strain on already scarce natural resources, housing and public services.

Most of the Egyptian population is concentrated in urban areas on about 12% of the territory, mainly along the Nile Valley and its Delta, and to a lesser degree around the Suez Canal (Figure 3.1). Given the limited availability of habitable land and competition with scarce arable land for agriculture, some agglomerations are among the world's densest with more than 20 000 inhabitants/km². With about 23 million inhabitants, Greater Cairo hosts nearly one-quarter of Egypt's population, making it one of the world's largest

metropolitan areas (OECD/European Commission, 2020[7]). The pace of urban population growth, driven by both population growth within cities and rural-urban migration, varies across the country. The Greater Cairo and Alexandria have been growing quickly, dominating Egypt's urban system.

Egypt has a total surface area of close to 1 million km$^2$, which is mainly desert land and sparsely vegetated areas. About 3% of its total land surface is arable; forest areas represent 0.1% (or about 70 000 ha) and have decreased over the past decade. The government has been reclaiming desert land for agriculture and to support a planned urban development. Since the 1970s, the government has built new urban communities (NUCs) to relieve pressure from saturated urban areas in the Nile Valley and Delta. Within three generations, 23 NUCs have been built; another 23 new cities – known as the "fourth generation" – are under way (Figure 3.4). These NUCs aim to accommodate about 30 million residents by 2030[1] (Government of Egypt, 2021[8]).

However, urban policies have been unable to keep pace with population pressures, which has led to uncontrolled urban expansion, environmental degradation and precarious living conditions. Informal and unplanned expansion absorbed most of the demand for affordable housing close to city centres. Meanwhile, many NUCs, built on desert land adjacent to cities, struggle to attract new residents (Zaazaa, 2022[9]). Given the country's spatial constraints, population size and settlement patterns (i.e. the geographical distribution of people) need to become the starting points for analysis to inform urban planning and design.

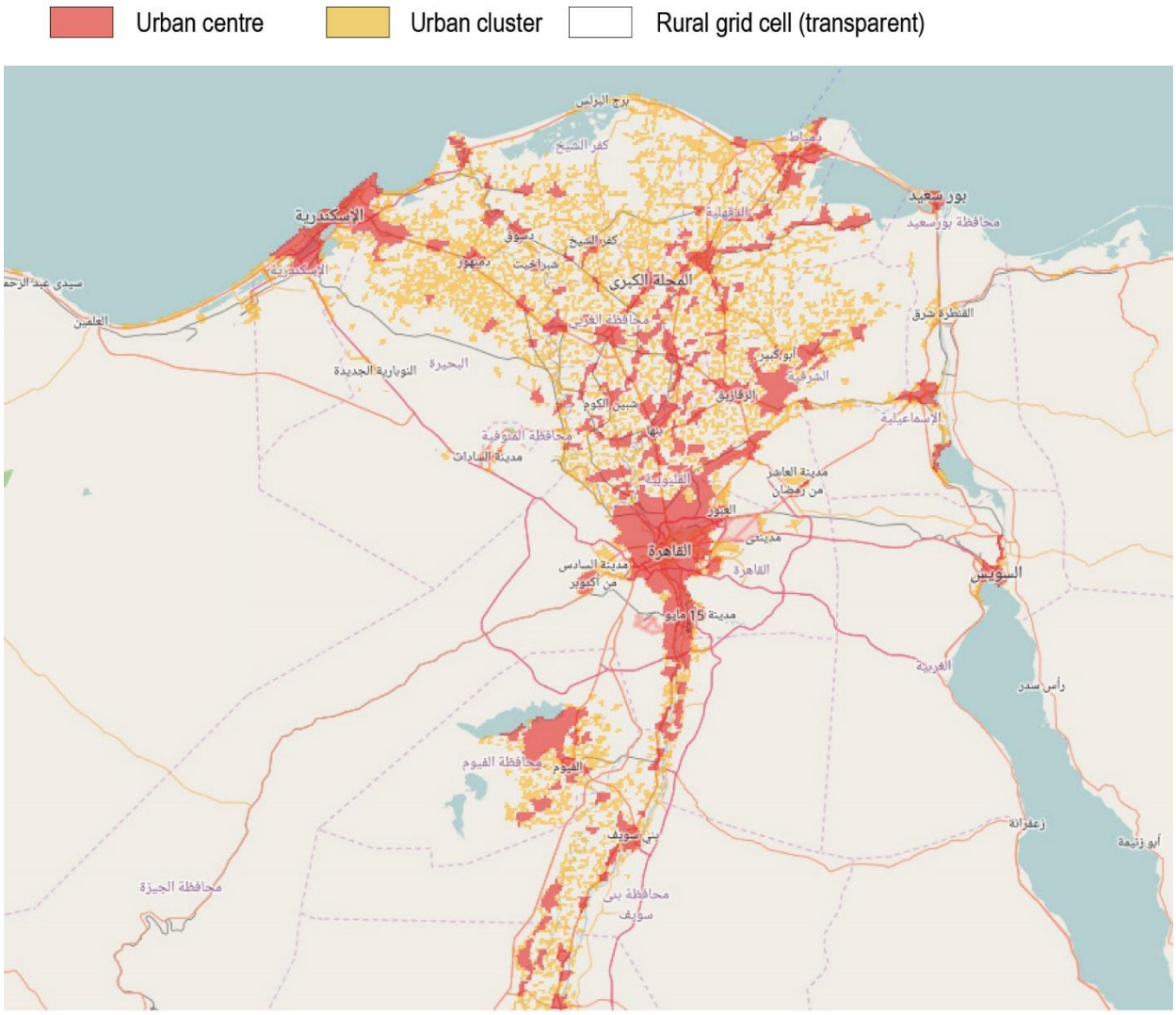
### *3.1.2. Rural-urban continuum*

According to national statistics, 42.8% of Egyptians lived in urban areas in 2020 (CAPMAS, 2020[6]). This has been the same reported share for several decades, although the population has more than doubled since 1990. Egypt uses a purely administrative definition of "urban", which does not relate to the actual size of the agglomeration's population. According to the 2014 Constitution, the State is divided into administrative units, including governorates, cities and villages. Urban areas include: i) the four urban governorates (*muḥāfẓat*), namely Alexandria, Cairo, Port Said and Suez; ii) cities (*madînat*) and sub-divisions (*agsâm*) with *markaz* status (a rural subdivision); and iii) the cities (*madînat*) that are seats of *markaz* administrations (Africapolis, 2023[10]) (Chapter 2). The qualification of urban is thus connected to the function as capital city of governorates and sub-divisions while the rest of the administrative units are considered as rural. In total, the most recent population census of 2016 counted about 250 administrative units as urban (CAPMAS and CEDEJ, 2023[11]) compared to over 1 000 agglomerations.

The binary categories of urban and rural areas no longer reflect Egypt's urban realities with its dense settlement patterns. As a result, highly urbanised areas are categorised as "rural" while facing many challenges related to increased pressure on infrastructure, environmental degradation and social inequalities. The definition of "urban" has a pivotal influence on spatial planning and urban development plans.

## Figure 3.1. The binary categories of urban and rural areas no longer reflect Egypt's urban realities

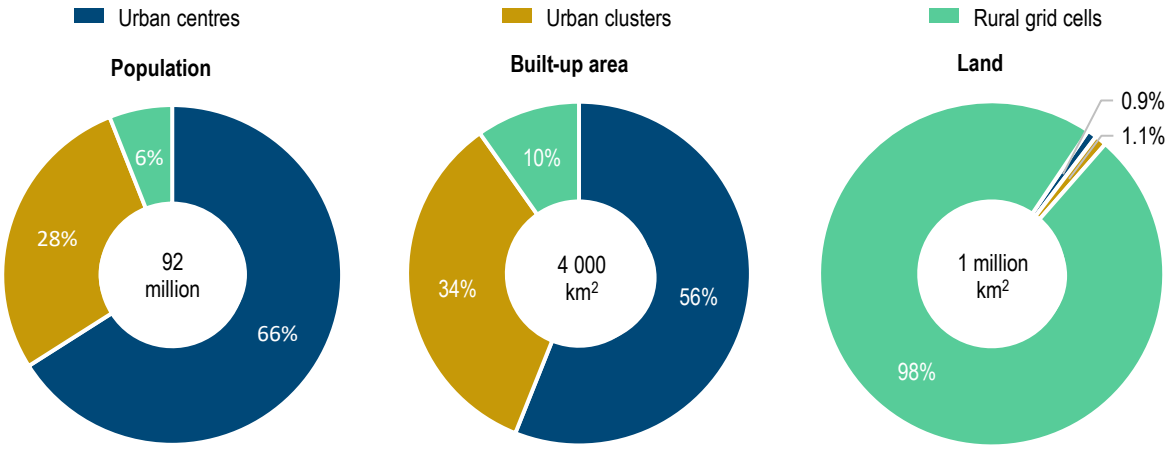
Degree of urbanisation in 2015




Note: This map focuses on densely populated areas and does not reflect Egypt's full territory. The degree of urbanisation classifies municipalities based on their population share in three types of grid cells: "cities" have the majority of their population in an urban centre; "towns and suburbs" have the majority of their population in an urban cluster but are not cities; "rural areas" have the majority of their population in rural grid cells. An urban centre consists of 1 $km^2$ with a density of at least 1 500 inhabitants per $km^2$ and a minimum total population of 50 000. An urban cluster consists of 1 $km^2$ with a density of at least 300 inhabitants per $km^2$ and a minimum total population of 5 000.
Source: European Commission, Copernicus (2024). Testing the degree of urbanisation at the global level, Egypt Country Summary, https://human-settlement.emergency.copernicus.eu/documents/cfs01/V3/CFS_Egypt.pdf.

Data from the internationally harmonised definition of cities show that, in 2015, 66% of Egyptians lived in urban centres and 27% in semi-dense urban areas, also called urban clusters, accounting for 93% of the population (Figure 3.2). The discrepancy with national statistics is substantial and merits consideration towards an approach that more accurately reflects settlement patterns and the resulting implications for effective urban and socio-economic planning (UN-Habitat, 2012[12]).

## Figure 3.2. About two-thirds of Egyptians lived in urban centres in 2015




Note: The degree of urbanisation classifies municipalities based on their population share in three types of grid cells: "cities" have the majority of their population in an urban centre; "towns and suburbs" have the majority of their population in an urban cluster but are not cities; "rural areas" have the majority of their population in rural grid cells. An urban centre consists of 1 $km^2$ with a density of at least 1 500 inhabitants per $km^2$ and a minimum total population of 50 000. An urban cluster consists of 1 $km^2$ with a density of at least 300 inhabitants per $km^2$ and a minimum total population of 5 000.
Source: European Commission, Copernicus (2024). Testing the degree of urbanisation at the global level, Egypt Country Summary, https://human-settlement.emergency.copernicus.eu/documents/cfs01/V3/CFS_Egypt.pdf.

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Some governorates such as Giza share highly urbanised areas alongside large unpopulated desert areas. Egypt also has many satellite cities near a large city or metropolitan area (Figure 3.1). They are less dense but connected with the economy of the main city; dwellers usually adopt urban lifestyles and commute to their workplace in the main city. This has major impacts on economic activity of previously rural areas. Considering the rural-urban continuum is paramount for regional development planning to ensure policy coherence and integrated action across the territory (e.g. transport, services, administration).

Drawing on OECD methodology, Egypt could consider defining functional urban areas (FUAs) using population density and travel-to-work flows as key information to better understand its urban systems (Box 3.1). FUAs comprise a densely inhabited city and its commuting zone whose labour market is highly integrated into the city. This would help create a harmonised definition of cities and their areas of influence. This, in turn, could better represent the reality of settlement patterns and support policy analysis on topics related to urban development, including climate action, and inform urban development policies and spatial planning. Some efforts to define urban clusters are under way (Box 3.2).

The next national population census, scheduled for 2026, is an opportunity to reconsider administrative divisions and review the definition of urban areas. This could better reflect the actual size of cities and related infrastructure needs. Drawing on harmonised definitions, an analysis of different urban typologies (e.g. formal versus informal; urban, peri-urban, rural) would also be useful. This would capture the diverse characteristics of urban and peri-urban areas and help better understand the trends and challenges of national urban systems, including urban-rural connectivity. This would also contribute to ensuring that policies and funding address the specific needs of its populations, as well as challenges associated with urban sprawl.

### Box 3.1. Functional urban areas

**A common definition of metropolitan areas to inform national policy making and facilitate international comparison**

The OECD, in collaboration with the European Commission, developed a harmonised definition of urban areas as functional economic units. This aims to overcome previous limitations linked to administrative definitions.

Functional urban areas (FUAs) consist of a densely inhabited city and of a surrounding area (commuting zone) whose labour market is highly integrated with the city. This definition chooses as building blocks for FUAs the smallest administrative units for which national commuting data are available (e.g. national commuting data in non-European countries). It captures cities and their respective areas of influence based on people's daily movements.

FUAs are defined by population size in four categories:

- small urban areas, with a population below 200 000
- medium-sized urban areas, with a population between 200 000 and 500 000
- metropolitan areas, with a population between 500 000 and 1.5 million
- large metropolitan areas, with a population of 1.5 million or more.

FUAs can inform national and regional urban planning and policy. A common definition increases international comparability of the economic, social and environmental performances of metropolitan areas. The OECD produces country profiles and maps to localise FUAs for its 38 member countries and some non-members.

Source: (Dijkstra, Poelman and Veneri, 2019[13]; OECD, 2023[14]).

## 3.2. Enhancing urban governance

### *3.2.1. Institutional and policy framework for urban planning*

Egypt's institutional framework for urban planning and development is complex, involving a large number of government bodies and specialised agencies. These entities formulate, implement, finance and regulate urban development policies, and promote sustainable development at different levels and for different types of cities (NUCs vs. existing cities). Most competencies for urban planning and development are centralised at the national level.

The Prime Minister chairs the Supreme Council for Urban Planning and Development (SCUPD), which is the highest authority of urban planning. SCUPD has evolved over time and currently includes nine ministers, two urban agencies and ten experts, enhancing its capacity to address urban planning and development challenges. Among its ministerial members[2] is the Minister of Defence, who also serves as a board member of the National Centre for Planning and Sustainable Land Use. This underscores the interconnectedness of urban development with broader national security and strategic considerations. However, the MoE is not a permanent member of SCUPD. Its regular presence would be important to support the mainstreaming of environmental sustainability into all decisions and better align urban policy with climate and environmental challenges.

The General Organization for Physical Planning (GOPP) under the Ministry of Housing, Utilities and Urban Communities (MoHUUC) is responsible for regional planning and acts as technical secretariat of SCUPD. Concomitantly, the New Urban Communities Authority (NUCA) plans and implements any development of new cities in desert regions. The Urban Development Fund (UDF), an economic agency, is in charge of upgrading existing cities (Box 3.2).

Several sectoral ministries are involved in urban development, which has top-down processes:

- Desert land falls under the responsibility of the Ministry of Defense. It engages the private sector through land allocation and infrastructure development, such as roads, bridges, water systems and power plants.
- The Ministry of Agriculture and Land Reclamation (MoALR) oversees agricultural land in the Nile Valley and Delta, as well as reclaimed desert land for agricultural purposes. Extensive agricultural projects in these areas have led to the emergence of informal housing settlements (Section 3.5.2).
- The Ministry of Housing, Utilities and Urban Communities (MoHUUC) supervises the administrative structure governing urban areas, operating under Law no. 119 of 2008, in conjunction with SCUPD. MoHUUC also holds authority over local infrastructures and utilities, including water and sewage systems for housing under the supervision of institutions affiliated with MoHUUC.
- The Ministry of Planning and Economic Development (MoPED) supervises and plans any economic development.
- At the local level, the Ministry of Local Development (MoLD) is a key player in urban governance and implementation as cities and districts are under its jurisdiction. Infrastructure development, such as supply of regional wastewater or water treatment stations, solid waste management and roads, is usually implemented through a collaboration between several ministries (e.g. MoPED, MoLD, MoALR) in line with their respective mandates.

The institutional framework for urban planning and development faces several challenges. National plans, local infrastructure planning and associated service delivery are not in sync with local development needs. In addition, horizontal co-ordination between different government entities is weak across all levels. There are bureaucratic hurdles, alongside limited local capacity and insufficient financial resources (Alhowaily, 2021[15]).

The government needs to ensure consistency and policy coherence in its approach to sustainable urban development based on common principles of environmental sustainability, climate resilience, social inclusivity and economic viability. Key stakeholders such as GOPP, NUCA and UDF could review legislative and regulatory tools to identify sustainability gaps and propose amendments for legal frameworks. These three bodies are key players but do not have a common space to facilitate dialogue and share experience. Together, they could build a strong foundation for environmentally responsible urban development practices.

In late 2023, the government adopted a National Urban Policy (NUP), which aims to promote positive transformative change in cities. The new policy could play an important role to better manage urban growth and make cities more competitive and liveable (Box 3.3). It is important to rapidly develop actions plans, accompanied with adequate finance and institutional mechanisms, to ensure effective implementation of the new policy.

Increased resources are needed for compliance monitoring and enforcement of laws and regulations. Monitoring and evaluation of urban projects and their respective environmental impacts could be improved by better linking institutions in charge of planning such as GOPP with local authorities in charge of implementation at governorate level. This gap has led to low implementation. There is room to close the loop between urban planning, implementation, monitoring and evaluation to inform future planning.

### Box 3.2. Egypt's key agencies in charge of urban planning and development

**The General Organization for Physical Planning (GOPP)**

GOPP is a governmental body established by Presidential Decree no. 1093 of 1973, mandated to be the sole official authority for planning human settlements in Egypt (Government of Egypt, 2014[16]). It operates under the supervision of the Minister of Housing Utilities and Urban Communities (MoHUUC). Law no. 119 of 2008 empowered GOPP to formulate public policy planning and sustainable urban development; prepare plans and programmes at the national, regional and governorate levels; and review and approve urban plans at the local level. It also monitors and evaluates implementation of these plans through seven regional offices with a view to co-ordinating regional planning and ensure implementation on the ground.

**New Urban Communities Authority (NUCA)**

Operating under MoHUUC, NUCA is a state-owned enterprise established by Law no. 59 of 1979. It has a comprehensive mandate to reshape Egypt's urban landscape by building new urban communities in desert areas, making it Egypt's largest real estate developer and constructor of residential units. The government aims to redistribute Egypt's population away from the saturated Nile Valley to remote regions and mitigate urban sprawl onto agricultural land. NUCA plans new cities, including housing and associated infrastructure. After NUCs are complete, NUCA has remained responsible for service delivery and infrastructure management. More recently, it became engaged in renovating existing areas (e.g. Maspero Triangle, rehabilitation of Downtown Cairo), creating overlap with the Urban Development Fund. NUCA has become Egypt's third largest state-operated enterprise after Egyptian General Petroleum Cooperation and the Suez Canal Authority. Its activities have accelerated in the past five years with a budget of EGP 145.5 billion (USD 4.7 billion) in the fiscal year 2023/24.

**Urban Development Fund (UDF)**

UDF, established in 2021 by prime ministerial decree, is placed under the Prime Minister. It succeeds the Informal Settlements Development Fund, which had upgraded unsafe and unplanned areas and informal markets since 2008. The portfolio of the Fund was enlarged; it can now generate its own resources by managing investments and assets, and establish branches and offices at governorate level. UDF collaborates with GOPP and local authorities across governorates to enhance long-established urban areas, in partnership with private sector organisations and real estate developers. The Fund operates in four main areas: i) urban extensions (pockets of agricultural land within cities, urban extension in the desert periphery within a city's boundaries); ii) brownfields (transformation of land previously used for industrial purposes); iii) areas of valuable or special nature are historical or waterfront land types; and iv) deteriorated areas (e.g. unsafe, planned deteriorated, unplanned and informal activities areas). While NUCA focuses on new cities, UDF's mission is to revitalise and improve quality of life in existing cities.

Source: (UN-Habitat, 2015[17]; UDF, 2023[18]).

The government developed a two-pronged approach to urban development. Urban governance differs depending on whether a city is classified as "new" (since the government started building NUCs in the 1970s). The persistence of this dichotomy is no longer fit for purpose. Once NUCs are well established, they should be integrated under respective governorates as initially planned. This would facilitate coherent regional strategies and enhance the role of local councils. A common governance framework would enable better co-ordination, streamline decision-making processes and provide clear guidance for urban planning

and development projects. This common framework should also include urban clusters to ensure coherent spatial planning beyond the narrow focus of the current administrative definition of “urban areas”.

### Box 3.3. Egypt’s National Urban Policy

In late 2023, drawing on nearly a decade-long elaboration process supported by UN-Habitat, the government approved a new National Urban Policy (NUP), which builds on five pillars:

- managing urban growth
- connectivity within and between cities
- integrated system of cities
- urban governance and land management
- local economic development.

The new policy could play an important role to better manage urban growth and make cities more competitive and liveable. It could help counterbalance the strong attraction of Cairo and Alexandria, thereby enabling development of secondary cities. NUP proposes a new urban system of cities based on six clusters of cities, acknowledging different paces of urbanisation (UN-Habitat, 2024[1]). It will be key to integrate environmental sustainability into all NUP measures and establish sustainability criteria to monitor progress. NUP could provide a common framework for better aligning national with local policies, while supporting local climate initiatives (Matsumoto et al., 2019[19]). Moreover, urban dynamics move quickly; problems change faster than their solutions. Therefore, it will be essential to develop analytical tools that adequately capture rapidly changing urban reality.

Source: Country submission; (Tiemeier, 2019[20]).

### *3.2.2. Mainstreaming of environmental considerations into urban development plans*

Egypt’s policy framework acknowledges the importance of making cities more sustainable but still lacks an integrated vision and action plan on how to achieve this. Egypt’s Vision 2030, the National Climate Change Strategy 2050 and the NDCs provide guidance for developing greener, low-carbon cities. For example, the second updated NDC highlights energy efficiency measures in new and existing buildings, expansion of green spaces and promotion of active mobility (Government of Egypt, 2023[21]). There is a substantial gap between strategic plans and green measures in local development plans. Sectoral policies need to be better integrated into local planning. Information and data on the links between urban development, environmental degradation and climate change impacts remain scattered across various policies and strategies.

In line with Egypt’s Vision 2030, environmental considerations need to be systematically mainstreamed into all urban development plans and related urban and land-use planning tools. Several sectoral strategies are under preparation (Box 3.4). Over the past decade, the MoE and MoPED have undertaken capacity building initiatives. In 2017, the Egyptian Environmental Affairs Agency (EEAA) prepared "Guidance for Building Sustainable Cities". It recommends various aspects of urban planning and development, including land use, infrastructure, energy efficiency, waste management and transportation. However, these guidelines remain optional. Another example is the Environmental Sustainability Standards Guide prepared within the Strategic Framework for Green Recovery in 2021.

Strategic environmental assessment (SEA) would help improve policy coherence by ensuring sectoral policies and major urban development projects adequately consider the environment (e.g. prior to the

creation of new cities). This includes, for example, the mandatory use of localised climate risk assessment in urban planning to prevent construction of new buildings in high-risk flood zones (Section 3.4.1). Stronger co-operation between environmental and urban authorities would help raise environmental awareness and develop expertise in sectoral ministries and at subnational level.

### Box 3.4. Green strategies at sectoral level

The government is preparing several sectoral strategies to achieve its sustainability goals:

- **National Strategy for Green Urban Buildings** (green construction materials, increasing the share of green buildings, enhancing quality of life through green areas)
- **National Strategy for Smart Cities and Integrated Land Management in New Cities** (roadmap for the gradual transformation of smart cities through technological applications to solve urban problems)
- **National Strategy for Green Urban Transportation**
- **National Active Transportation Strategy**
- **National Strategy for Active Mobility** (promoting walking and cycling paths).

As elsewhere, strategies are only as good as their implementation. Therefore, national strategies should be systematically shared with key stakeholders, accompanied with an action plan, intermediate targets to monitor progress and associated financial resources. In addition, the government could set up incentive mechanisms for implementation (e.g. results-based financing) and further strengthen decentralisation to overcome working in silos.

Source: Country submission (2024).

### *3.2.3. Tailored place-based policies to support sustainable urban development*

#### *Decentralisation of urban planning*

Heavy reliance on centralised decision making increases the risk of disconnect between policies and responsiveness to local needs (Tobbala, 2019[22]). In a more decentralised system, citizens can more easily hold local government officials accountable for decisions that affect their daily lives. In many OECD countries, citizens participate in finding solutions to local problems and contribute to accelerating the green transition.

While national frameworks can drive local action, subnational governments are well positioned to develop tailored place-based policies to tackle the risks and seize the opportunities presented by the green transition (OECD, 2024[23]). Experience in many OECD countries illustrates the importance of a territorial approach to climate action and resilience (OECD, 2023[24]). As the impacts of climate change vary significantly within countries, local actions can complement national efforts. Moreover, climate risks are highly context-specific, depending on a combination of hazard, exposure and vulnerability. A heatwave, for example, will have a different impact on people living in an oasis like Al-Kharga compared to a densely populated area within Cairo. Moving to more decentralised, participatory approaches would help Egypt better align urban policies with local development needs. This will require strengthening competences, capacities and financial autonomy of subnational governments.

### *Increasing financial autonomy*

In line with provisions of Egypt's Constitution (Articles 176 and 177), each local administration unit should have an independent budget. As such, it should be entitled to collect its own revenue through subnational taxes and fees, which would also strengthen accountability. Nearly all taxes are collected at the national level, leaving local authorities with close to no financial autonomy (Hemaily et al., 2022[25]). Consequently, local authorities depend excessively on cash transfers from the central government, which may undermine local initiatives to advance climate action. Moreover, fragmented investment planning by sectors impedes an integrated development vision at subnational level.[3]

NUP may offer opportunities to develop a more flexible financial system that entitles local councils to increase their own financial revenues, which could be used to finance climate action at the local level. This would be a welcome development and could help reduce fiscal imbalances. A green fiscal strategy and action plan at subnational level can help integrate green priorities into budgeting (OECD, 2019[26]). Furthermore, local administrations have opportunities to raise non-tax revenues. For example, they could raise user fees or charges for publicly provided services or facilities, such as parking. However, increasing the financial burden for citizens may be difficult in the current economic context. Higher fees could be more socially acceptable if citizens notice better services (e.g. waste collection) and if climate action benefits their quality of life (e.g. green spaces).

Meanwhile, it is essential to develop ways to better channel funding from development partners and national governments to support subnational governments, including cities, in addressing climate priorities (Matsumoto et al., 2019[19]). The development of subnational climate action strategies, including local targets, may help local authorities tap into international climate and development finance. Development partners can be more easily convinced to support climate action at subnational level if action contributes to achieving official climate targets in line with the principles of the Paris Declaration on Aid Effectiveness. Local authorities should also aim to leverage additional external funding, particularly from the private sector, as a complement to public resources directed at climate change (OECD, 2019[26]).

### *Local engagement in national decision making and citizen participation*

Actively engaging local authorities in urban development planning processes is essential. For instance, long-term strategic planning at the local level can better consider policy complementarities in different sectors (Matsumoto et al., 2019[19]). More participatory approaches can ensure that plans reflect the specific needs and challenges of each locality by leveraging local knowledge. However, this requires continued capacity building at local level. Many local authorities do not have the required technical expertise to develop such plans, resulting in heavy reliance on development partners. Egypt could strengthen the role of subnational governments by formally acknowledging their contribution to climate mitigation and adaptation efforts in the next update of its NDC.

The MoLD could play a more significant role once empowered local councils participate actively in decision-making processes. It could monitor progress across different governorates and municipalities and thereby make sure subnational plans apply the objectives of national strategies and disseminate funding accordingly. The forthcoming Local Administration Law could further strengthen the role of local councils.

Stronger city-to-city co-operation could further alleviate the overreliance on central government support in all matters. This could be encouraged through the building of city networks and international initiatives such as the OECD Champion Mayors for Inclusive Growth Initiative (OECD, 2024[27]).

While many citizens already play an active role in the implementation of local climate initiatives, public participation and active community engagement in environmental decision making need to be enhanced (Chapter 2). This would help create a sense of ownership, enhance social acceptability of policy measures and facilitate effective implementation. Raising environmental awareness, especially among young people, is critical. Egyptian citizens can become a driving force of the transition to sustainability. As in other

countries, the central government and local authorities both need to pursue efforts to create the conditions for empowering citizens and building effective forms of public participation.

### *3.2.4. Land-use planning and management*

In the context of rapid population growth, urbanisation and agriculture are the main drivers of land-use change. Given the scarcity of agricultural land, agricultural-to-residential land conversion is illegal. Any conversion is subject to approval by the General Authority for Reconstruction Projects and Agricultural Reclamation under the MoALR. Nevertheless, Egypt lost since 2011 an estimated 90 000 feddan (about 37 800 ha) of fertile agricultural land to unplanned settlement growth (Egypt Daily News, 2020[28]).

Urban planning tools have been unable to keep pace with the demand for affordable housing, which is mainly satisfied by the informal sector. This situation has led to continued encroachments on agricultural land and unplanned urban expansion beyond city boundaries. According to government estimates, more than 2 million informal buildings were constructed between 2011 and 2020 (Samir, 2020[29]), driven by a lack of affordable housing, high land prices and weak institutional capacity to enforce land regulations. Several presidential decrees and the 2019 Reconciliation Law for Informal Buildings retroactively legalised previous encroachments on agricultural land. However, urban encroachment on agricultural land may continue if the root causes of uncontrolled expansion are not addressed (Abdelkader et al., 2022[30]).

In 2020, the government launched the National Centre for Spatial Data Infrastructure, which aims to establish an integrated national planning system to prevent future land encroachments. This provides an important opportunity to integrate climate considerations systematically into land-use planning. In this way, Egypt could strengthen climate-smart spatial development (e.g. green zoning, land-use change for climate risk mitigation).

Egypt's land management is complex, involving multiple government entities in land allocation. It distinguishes mainly between two categories of lands: i) urban lands within city or village cordons, including agricultural lands; and ii) desert lands. The latter generates significant economic gains and is increasingly used as a capital investment in urban development companies. NUCA plays a pivotal role in land allocation inside the administrative borders of NUCs.

Outdated land surveys, bureaucratic registration methods, the large number of different permits needed and limited accountability of key stakeholders contributed to the expansion of unplanned informal settlements. Egypt needs to simplify land planning and registration and make it more transparent and faster, as well as enforce existing laws. Plans to streamline land allocation, notably through a "one-stop-shop" go in the right direction and would help improve transparency in the land allocation process and the overall investment climate for private sector actors (IMF, 2023[31]).

## 3.3. Promoting climate-smart cities

Most of Egypt's economic activity is connected to urban areas. However, there are no official data on the share of cities in national GDP. It would be helpful to collect relevant data to calculate the precise contribution of cities.

As in other countries, the digital economy offers significant opportunities for economic growth, job creation and efficiency gains thanks to smart technology. By 2050, the government plans to have transformed or built 38 smart cities, mainly fourth generation cities. In 2022, the National Initiative for Smart Green Projects was launched to encourage the mapping of smart green projects at governorate level with a view to connecting these projects to financing agencies, as well as attracting additional investment from both domestic and international sources. A Code for Smart Cities is pending approval.

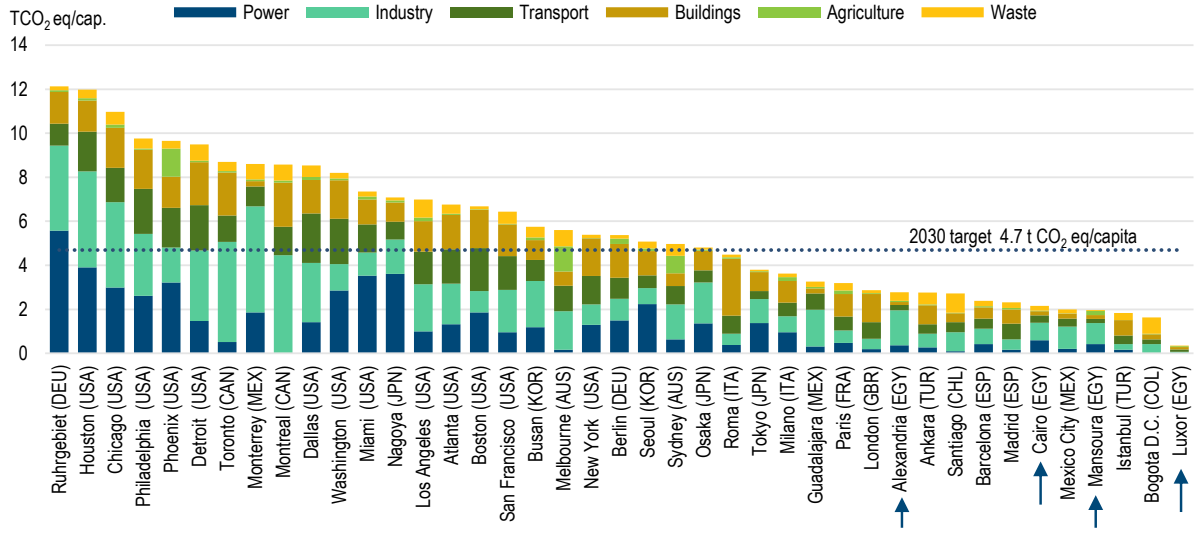
Smart cities must be sustainable. New digital models can help optimise urban design to minimise energy consumption and carbon emissions (Matsumoto et al., 2019[19]). Therefore, Egypt needs to incorporate climate goals and environmental standards explicitly into the definition of smart cities and reflect environmental considerations in land-use planning and building codes. The labelling of smart cities should include mandatory sustainability requirements and promote social inclusiveness (Waisová, 2022[32]). Smart cities offer new opportunities to establish city-level climate mitigation and adaptation plans and measure progress towards these targets.

### *3.3.1. Measuring subnational GHG emissions*

While cities are major sources of pollution, including GHG emissions, they also have significant potential to contribute to emissions reductions efforts. Since the early 1990s, cities across the world have started raising their climate actions. These range from installing solar panels, renovating buildings and implementing congestion charges to maintaining and expanding green spaces, constructing porous infrastructure and reclaiming wastewater (Matsumoto et al., 2019[19]). Some cities and regions have set even more ambitious GHG emissions reduction targets than their respective central governments at the national level (Figure 3.3).

## Figure 3.3. There are significant disparities in progress towards net zero across cities and regions

Emissions per capita by sector in OECD metropolitan areas and four Egyptian cities, 2018




Note: The 2030 emissions per capita target (4.7 $tCO_2$-eq.) is defined based on computations derived from the IEA Net Zero Emissions Scenario for advanced economies.
Source: OECD calculations based on the Emissions Database for Global Atmospheric Research (EDGAR) v8.0, https://edgar.jrc.ec.europa.eu/dataset_ghg80.

StatLink https://stat.link/kog7dy

In Egypt, GHG emissions at subnational level are not yet monitored and the GHG footprint of Egyptian cities remains unknown (Government of Egypt, 2022[33]). Therefore, Egyptian governorates and cities will face challenges in defining their own climate mitigation objectives. As MoE and the EEAA gear up national monitoring capacity to conduct more regular GHG inventories, it will be essential to also develop municipal-level measuring, reporting and verification systems. This would help guide emission reduction efforts, resource allocations and development of comprehensive climate action plans at subnational level (Wu, Raich and Xiao, 18 January 2023[34]). Like other emerging economies, most Egyptian cities lack staff with

appropriate technical skills. However, standardised methods have made it easier to account for GHG emissions by sector and scope (OECD, 2023[24]). These include such methods as the internationally comparable GHG reporting methodologies for companies, organisations and local governments. An increasing number of cities are publicly reporting emissions data by sector and type of emissions.

According to World Bank calculations, per capita emission intensities in Egyptian cities have increased rapidly over the past decades and reached about 2.4 tonnes annually in 2015 (Goyal and Sharma, 2023[2]). These increases were driven by economic activities, rising incomes and changing consumption patterns. Buildings, urban mobility, solid waste and wastewater management, and urban land use are key drivers of GHG emissions in urban areas. The spatial concentration of industrial and residential activities largely defines $CO_2$ concentrations in cities, also depending on income levels (e.g. Shubra al Khaymah) and population densities (e.g. Alexandria and Port Said) (Goyal and Sharma, 2023[2]). It is therefore necessary to promote policies that encourage low-carbon development to counterbalance the impacts of changing consumption patterns and urban population growth.

At the global level, it is estimated that local governments have direct power over less than a third of GHG emissions reductions; the remainder depend on national or state governments or co-ordination across levels of government (CUT, 2019[35]). As most policies are designed at national level, Egyptian cities have far less power to influence policy design in key domains such as energy supply or transport infrastructure. As elsewhere, lack of power impedes local efforts to advance climate mitigation measures. Limited financial autonomy represents a key barrier (Section 3.2.3).

### *3.3.2. New urban communities*

The creation of NUCs offers many opportunities to design environmentally sustainable, climate-resilient and inclusive cities. The design of cities greatly affects their environmental footprints. Reducing GHG emissions in cities therefore starts with improving urban planning to build more compact, transit-oriented cities that better connect residential areas to economic and social activities.

NUCs have become greener over time. The Central Unit for Sustainable Cities and Renewable Energy was established in 2014 within NUCA. It helps design urban communities to improve energy efficiency, water management and recycling, waste management and sustainable transportation. More recently, it expanded its scope to facilitate co-ordination and support green architecture, including solar panels on rooftops of administrative buildings. Some 21 solar power plants were established that contributed to reducing 1 500 tonnes of $CO_2$-eq. Furthermore, it facilitated the construction of 25 sewage treatment plants to irrigate green spaces and create new forest areas while supporting integrated waste management and the creation of walking and cycling paths.

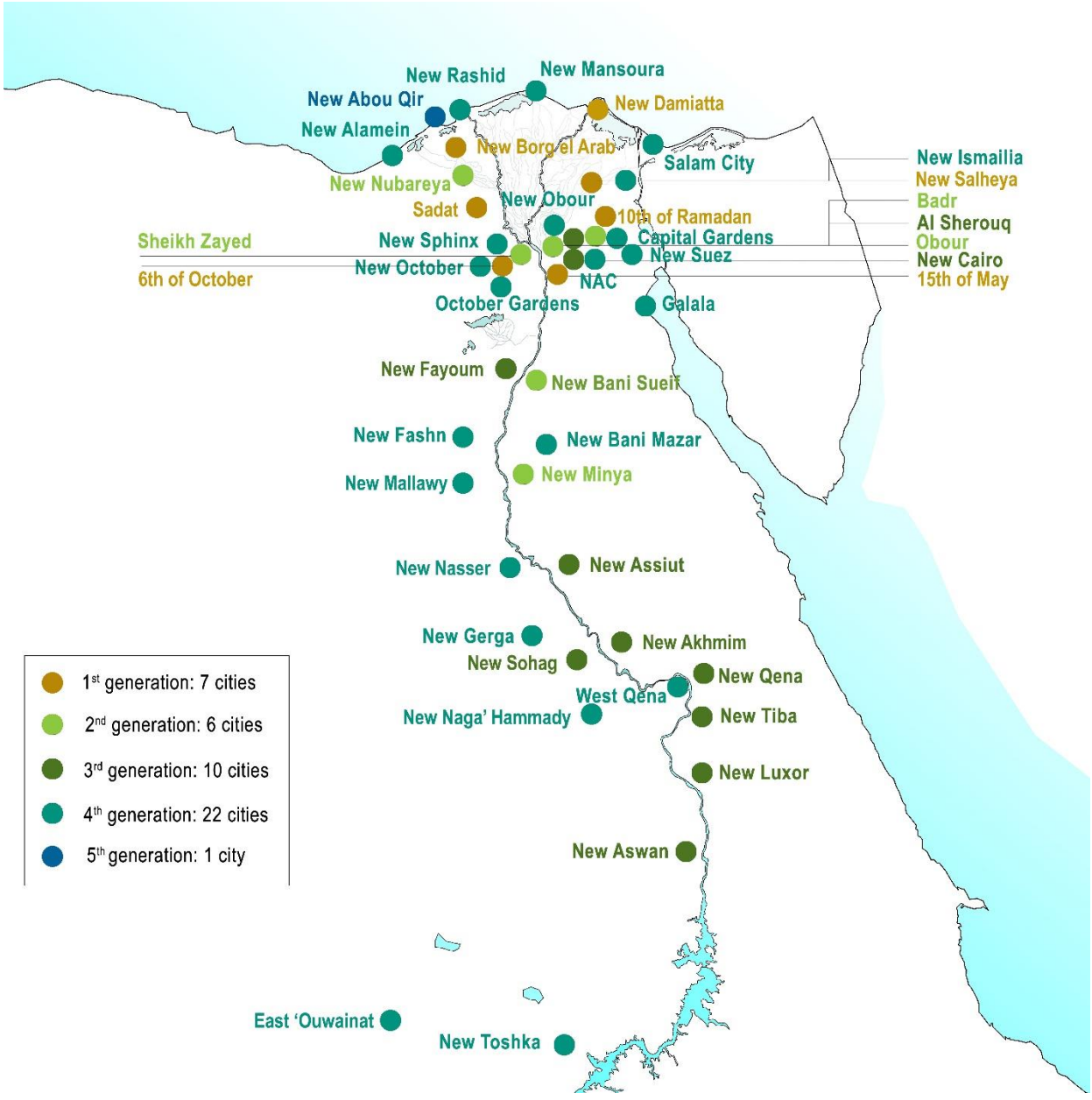
The fourth generation of NUCs (Figure 3.4) strives to incorporate green and inclusive principles in urban planning, but implementation varies. Egypt has no official definition of fourth generation cities or smart cities (Waisová, 2022[32]). Nonetheless, fourth generation cities are generally branded as sustainable, environmentally friendly, “eco cities”. For instance, NUCs dedicate larger areas to green spaces and gardens. New Alamein City will be mainly operated with renewable energy sources. These cities are among Egypt’s flagship projects to promote sustainable urban planning. Several pilot projects have been implemented to help cities promote sustainable tourism (e.g. Green Sharm el Sheikh, Green Hurghada).

At the same time, new cities struggle to attract dwellers and remain largely below target population, partly due to commuting distance and a lack of affordable housing options. In 2017, less than 2 million people lived in new cities, far below the targeted 3.6 million inhabitants for 2006 (Shawkat, 2013[36]).

The high vacancy rate is a concern and should lead the government to draw lessons from the first three generations of NUCs. They may not match demand for affordable housing and may unnecessarily increase environmental costs related to the construction of unoccupied buildings. An assessment of the viability of NUCs, their attractiveness and respective environmental footprint is overdue to guide future policy making

(UN-Habitat, 2012[12]). SEA can help assess environmental impacts related to the choice of location and NUC's broader economic integration (e.g. distance to job opportunities). Moreover, it would be useful to introduce a minimum share of social housing to address affordability issues and improve the social mix of different income groups within NUCs.

### Figure 3.4. Egypt counts 23 New Urban Communities and plans to build another 23 by 2030




Note: This map focuses on New Urban Communities and does not reflect Egypt's full territory.
Source: Country submission (2024).

### *3.3.3. Greening the building sector*

The building sector is a major GHG emitter given the high carbon footprint of construction material and energy consumption of buildings. Egypt's building code provides detailed provisions for many sectors. However, the code is not enforced in many cases, even in the formal building sector. Moreover, the existing building stock has limited focus on green building (Goyal and Sharma, 2023[2]). A revision of the building code is urgently needed to reflect up to date standards that support climate and environmental goals.

The government has many opportunities to integrate tighter building standards and green building practices into its building code and thereby mitigate GHG emissions while improving climate resilience. This could include the definition of national standards for low-carbon construction material, minimum energy efficiency standards for all new buildings, provisions for use of renewable energy sources and minimum requirements for green public spaces in residential areas. The expansion of on-site renewables has great potential in Egyptian cities. Some OECD countries with far less optimal sun conditions have made use of solar panels on roofs mandatory for all new commercial buildings (OECD, 2023[37]); many others provide generous incentives for residential buildings.

The Housing and Building National Research Center, established under MoHUCC, develops and issues technical codes. Among other priorities, it disseminates knowledge and training of engineers and technicians in the fields of housing and building (HBRC, 2024[38]). Increased co-operation with universities and relevant professional staff (e.g. engineers, architects) could help raise awareness and facilitate development of a new curriculum on sustainable building. More research into green construction materials could help reduce the material costs of green buildings.

Many codes and guidelines have been issued such as the smart city code and energy codes (commercial and residential buildings). In addition, guidelines for bicycle infrastructure and green building are under development. An update of the energy code is also under way to make it more applicable to the real estate market. HBRC participated in the development of one of the first energy performance certificate for buildings in the MENA region aimed at reducing GHG emissions in the built environment (Build_me, 2024[39]). However, implementation of guidelines generates high up-front costs. This represents a burden for investors and buyers, while efficiency gains to be harnessed over time are less visible. Economic incentives to encourage the application of green building design are therefore essential.

#### *Building materials and construction methods*

Greening the building sector requires a stronger focus on mitigating environmental hazards resulting from the construction materials industry. Cement, one of the most important industrial sectors in Egypt, has a production capacity of about 92 million tonnes annually. This makes Egypt the largest cement producer in Africa and places it among the top ten worldwide (Government of Egypt, 2024[40]). The country is also the largest steel producer on the African continent. The manufacturing of these materials is highly energy intensive and has a large carbon footprint. At the global level, transition to green construction could help reduce global carbon emissions in construction value chains by about 23% by 2035 (IFC, 2023[41]). Several emissions reduction strategies for construction can be followed, ranging from alternative additives in materials and design optimisation to waste recycling, alternative water sourcing, and enhanced water and building system efficiencies.

It would be important to develop and implement robust standards for environmentally friendly construction materials. Measures could prioritise the use of renewable energy sources in the extraction processes in mines and quarries. They could also offer access to dedicated funding mechanisms and subsidies for sustainable construction projects. Targeted efforts could further promote circularity of building materials by designing recyclable materials and closing the material loops for construction and demolition.

Nearly all buildings in NUCs are villas or low-rise buildings that rarely exceed five stories. Skeleton structure is the dominating construction system, which heavily relies on concrete or steel. Historically,

Egypt used natural stones and bearing walls systems. These would offer a more suitable construction system for buildings up to five stories.[4] Stone is a natural and readily available resource in most NUC locations, which would also minimise transportation costs and related $CO_2$ emissions. Stone buildings have excellent thermal mass, meaning they absorb heat during the day and release it slowly at night. This process naturally regulates indoor temperatures in the hot desert climate. Egypt can also build on existing know-how as stones are still used to construct buildings in numerous villages.

### *Green building certification*

Green building certificates and energy efficiency labels could further incentivise green practices in the building sector. Several green building certificates exist but have struggled to lead successful change at scale (Box 3.5). National certifications still lack international recognition to encourage international or multinational companies to apply for them. The national certification system needs to better consider the specific requirements and nature of the construction ecosystem to upscale green building components in the construction and real estate sectors. Economic incentives could encourage the real estate sector to apply for green certification more systematically. The large-scale rollout of green building certificates would also require lowering certification costs, strengthening enforceability, and raising awareness among architects, engineers and investors. More cost-reflective electricity pricing (Chapter 2) would provide more incentives for developers and house owners to invest in energy-efficient buildings.

The government also has much scope to green its own public buildings and social housing programmes through mandatory application of building certificates and energy efficiency standards and enhanced green public procurement. In 2022, Egypt's National Social Housing Programme adopted green building practices in social housing units for the first time (World Bank, 2022[42]). Some 7 000 units using the Green Pyramid Rating System (GPRS) were completed during the pilot phase; another 25 000 units are forthcoming. It would be important to pursue efforts and apply national GPRS certification scheme on all public housing projects while scaling up training for architects and engineers.

By 2030, Egyptian cities will require an estimated 4.5 million residential units and at least 23 million $m^2$ of commercial buildings (Goyal and Sharma, 2023[2]). Basic environmental standards must be applied to all housing types, including those designed for low-income populations. Guidelines for retrofitting building stock could be tailored to different urban typologies (formal vs. informal). For instance, buildings in the informal sector that apply these guidelines could benefit from a reduced reconciliation fee. This would make it attractive for the informal housing sector to invest in green measures and promote formalising their property in the land system.

### Box 3.5. Green building certification

**Green Pyramid Rating System (GPRS)**

The GPRS is a national certification scheme developed by the MoHUUC in 2011 to promote green building practices in Egypt. GPRS scoring is based on a point-weighting system that assesses various aspects of building practices. The GPRS v2.0 of 2017, assesses seven categories: sustainable sites, energy efficiency, water efficiency, materials and resources, indoor environmental quality, management protocols and innovation (counted as a bonus). Buildings are rated on a scale of one to five pyramids, with the top score indicating a highly sustainable building. In 2022, the government launched a testing phase of applying GPRS certification on social housing projects.

**TARSHEED**

TARSHEED, meaning "rationalisation" in English, is affiliated with Egypt's Green Building Council. To obtain TARSHEED certification, a project must save at least 20% of energy, water and material resources. The evaluation involves two stages: i) a preliminary assessment during the design phase; and ii) a final assessment during construction and handover.

**Leadership in Energy and Environmental Design (LEED)**

LEED is an internationally recognised green building certification system, developed by the United States Green Building Council. LEED evaluates buildings across numerous criteria, including energy efficiency, water conservation, materials selection, indoor environmental quality and innovation. LEED has mainly been used by buildings occupied by international companies or organisations, which have strong mandates for green workspaces. Over 20 buildings have received LEED certification. However, high fees and complex technical requirements pose barriers to wider adoption on the Egyptian market.

**Excellence in Design for Greater Efficiencies (EDGE)**

Developed by the International Finance Corporation of the World Bank Group, EDGE stands out for its user-friendly approach. While not as comprehensive as LEED, EDGE's streamlined approach makes it easier to encourage widespread adoption of green building practices. It has been applied in over 100 countries. EDGE is supported by free software that encourages solutions to reduce energy, water and the energy used to make building materials by at least 20%, which is the standard for EDGE certification. Combining successful elements of GPRS and EDGE may open new avenues for a locally adjusted, internationally recognised green building certification system.

Source: (Arafat et al., 2023[43]; Egypt GBC, 2024[44]; EDGE Buildings, 2024[45]).

*Sustainable cooling*

As in other countries, Egypt's demand for space cooling will continue to grow in the coming years. It will generate peak electricity demand during summer, putting enormous strain on electricity systems, particularly in densely populated cities (IEA, 2023[46]). Cairo already consumes about half of its electricity demand for air conditioning compared to 20% at the global level (UNEP, 2022[47]). In many areas, diesel-powered generators fill energy supply gaps with detrimental effects on human health and the environment.

Therefore, in the short term, implementing policies to improve equipment efficiency is paramount to curb the ever-growing energy demand for cooling. This requires little new technology as existing and new installations have lower efficiency than the best available technology in the market, leaving Egypt with

significant untapped potential for energy savings (Hassan, Dallal and Grözinger, 2022[48]). Labelling of products should be expanded to inform consumers, along with financial incentives to encourage demand for higher efficiency products (UNEP, 2023[49]). Tighter energy efficiency standards in Egypt's building codes are urgently needed to make improvements in the energy performance of buildings mandatory.

These policies are especially important for new buildings given the large amount of housing that will be constructed in the next decade. Egypt has a unique opportunity to develop a holistic approach to cooling policy for NUCs through a combination of regulations, information and incentives. Passive design strategies, including proper insulation and nature-based solutions (e.g. green roofs and façades), could provide climate-friendly alternatives to air conditioning (e.g. district cooling systems). At the same time, they could reduce energy consumption and GHG emissions, and strengthen climate resilience. For example, a feasibility study for a seawater air-conditioning system has been developed for New Alamein City (UNEP, 2022[47]). Such alternatives need to be more systematically considered for widespread use.

Improving energy efficiency in existing buildings will require considerable support for retrofitting. Low-income households cannot afford major investments and are thus more vulnerable to heatwaves. About three-quarters of existing households are not equipped with air conditioning (Hassan, Dallal and Grözinger, 2022[48]). Cheap but inefficient equipment results in high electricity bills for end users, additional strain on electricity distribution infrastructure and higher GHG emissions (UNEP, 2023[49]). Egypt would benefit from developing National Cooling Action Plans at subnational levels, including support to help vulnerable groups (e.g. young children and the elderly) cope with extreme weather conditions and to attenuate health impacts.

### *3.3.4. Shift towards low-carbon transport systems*

The transport sector accounted for 15% of national GHG emissions in 2015, which are set to double by 2030 (Chapter 1). Emissions from urban mobility systems represent a primary driver of this projected increase in the sector's GHG footprint. The expansion of public transport can significantly reduce transport-related emissions. For instance, the Cairo Metro expansion of lines 2 and 3 will save about 1 million tonnes of carbon dioxide equivalent (Mt $CO_2$-eq.) emissions per year (Attari et al., 2023[50]). Despite investment in public transport (Chapter 2), Egypt's mass transit system remains insufficient as demand for urban mobility is growing rapidly and has outpaced the capacity of public transport.

Strategic plans covering urban transport include the National Urban Development Framework 2052, launched in 2014 and Cairo 2052 (Government of Egypt, 2014[16]). For instance, the strategic plan for Greater Cairo identified environmental degradation as a key challenge and included better environmental sustainability in its eight strategic pillars for the development of Cairo (Government of Egypt, 2014[16]). Specifically, it aimed to develop a highly efficient public transportation network and strengthen interlinkages with NUCs. Safety concerns hamper public transport use and active mobility.

#### *Advancing integrated planning of public transport*

Urban transport planning is conceived and managed by various government entities depending on different transport modes. Informal operators, managing 7- or 14-seater microbuses, dominate public transport services in cities and are lightly regulated. Tighter regulations, combined with economic incentives, to help these operations shift towards more fuel-efficient and cleaner vehicles would provide major GHG emissions savings and reduce air pollution in cities. A project to deploy 100 electric buses is under way within the Greater Cairo Air Pollution Management and Climate Change Project (World Bank, 2022[51]). In parallel, dedicated bus rapid transit lanes need to be expanded in major corridors. In the context of COP27, government entities worked together to set up a fully electrified bus transit network composed of 140 electric buses in Sharm El Sheikh within half a year (Hegazy, 12 March 2023[52]). This example

illustrates that speedy implementation is possible, underlining the importance of strong political commitment, co-ordination and early stakeholder participation.

The Greater Cairo region and Alexandria are the only cities with public transport operators. Cairo Transport Authority oversees concession-based agreements with over 20 private operators and runs historic tramlines and two Nile ferry lines. The Ministry of Transport is responsible for the metro operation through the Egyptian Company for Metro Management and Operation and construction through the National Authority for Tunnels; suburban rail lines are operated and maintained by Egypt National Railways. The Greater Cairo Transport Regulatory Authority (GCTRA) was established in 2012 as lead institution for transport planning and regulation in the Greater Cairo region. However, it struggled to fulfil its mission and was replaced by Law no. 93 of 2019 with the Land Transport Regulatory Authority (Attari et al., 2023[50]). The Transport Regulation Unit was created to fill the gap of public transport service provisions within NUCs, creating yet another system.

The multitude of public authorities involved in transportation planning highlights the need to streamline the institutional framework. An integrated, multi-modal strategy is needed at cluster level (including NUCs) that expands and improves the quality of public services while reducing traffic congestion. Geolocalised data on modal share (across space and time) need to be collected regularly. This would provide a starting point to better understand mobility patterns and related transportation needs to inform urban transport planning. Key elements of such a strategy include tackling accessibility, using transport planning to better control modal share and introducing smart travel demand management.

### *Improving accessibility*

The Greater Cairo region faces a growing spatial mismatch between people's living places and employment. Most people live in the inner and central zones of the city. Central Giza and Cairo have the highest job density, while only an estimated 10% of jobs exist in the NUCs (Attari et al., 2023[50]). This situation will greatly change with the ongoing move of government bodies to the New Administrative Capital; the move will heavily affect commuting patterns, and the monorail will play a key role in connecting people with their workplace (Chapter 2). However, more needs to be done to solve the first and last-mile problem to help passengers get from a transit stop to their destination and bridge the lack of transportation between transit connections.

NUCs are characterised by wide lanes and expressways. Building more compact, transit-oriented cities is essential to reduce distance between residential areas and workplaces. Access to public transport system is highly unequal, especially in NUCs. This underscores that the early stage of urban planning and design of NUCs does not sufficiently consider sustainable transport. The fourth generation of NUCs provides an opportunity to make necessary adjustments to reduce growing car dependency and create more equitable and smart transportation services.

### *Tackling congestion*

The Greater Cairo region is one of most congested urban agglomerations in the world. Despite numerous initiatives, the situation has not improved over the past decades. Congestion has major economic, environmental and social costs. Without congestion, people living within Central Cairo can reach over 80% of jobs within 30 minutes of travel. Accessibility for most of these zones drops below the 60% threshold with congestion. Most people living within the Greater Cairo region can reach over 80% of jobs within 60 minutes (Transport for Cairo, 2022[53]).

Widening roads has proven to be inefficient as the newly created space has been quickly filled with an ever-growing number of vehicles. Experience in other mega cities such as Seoul has shown that congestion intensified over time despite larger roads (Korea Green Growth Partnership, World Bank, 2015[54]). Therefore, promoting modal shift from private cars to sustainable integrated public transport

needs to become a priority (Chapter 2). Stronger incentives and increased road pricing are needed to better manage and rationalise travel demand (e.g. congestion charges, road tolls, street parking fees). Charges related to road traffic have proven to be effective in many OECD countries and contributed to reducing congestion and related economic and environmental costs (Box 3.6).

### Box 3.6. Policies in practice: London's congestion charges and low emission zones

London's congestion charge zone is one of the largest in the world. It was set up nearly two decades ago to discourage road traffic in central London, improve air quality and raise additional resources for public transport. A low emission zone for heavy goods vehicles was created in 2008. In addition, the city of London introduced the world's first 24-hour ultra-low emission zone (ULEZ) in 2019, covering 4 million people or about a third of the city's population. While traffic congestion in central London remains a challenge, carbon emissions and other air pollutants from transport have been reduced. According to the 2022 six-month assessment report of the expanded ULEZ, a larger share of vehicles in London is cleaner, contributing to London's commitment to becoming a zero-carbon city by 2030. Nearly 94% of vehicles driving in the ULEZ meet the emission standards on an average day. London also recorded a sharp decline in the use of diesel cars driving in the ULEZ, resulting in cleaner air and important health benefits. On average, there were 44 000 fewer diesel cars each day, representing a 20% reduction.

Source: (OECD, 2022[55]), IPAC Policies in Practice: London's Congestion Charge and its Low Emission Zones.

## 3.4. Strengthening climate resilience

Egyptian cities are at high risk from climate-related natural hazards, including heatwaves, flash floods, dust storms and rising sea levels for coastal cities, as well as growing water scarcity. According to the World Bank's climate risk vulnerability assessment of 14 cities, more than 80% of the population is exposed to at least one major climate risk (Goyal and Sharma, 2023[2]). Climate-hazards have cascading and compounding consequences across sectors, which are felt differently across people and places (OECD, 2023[24]). Informal settlements are usually more vulnerable due to their physical conditions and residents' limited capacity to cope with climate impacts. As elsewhere, young children, the elderly and those working outside are among the more vulnerable groups. Adopting a place-based response is essential to better consider local interactions between different domains and deliver solutions that generate synergies and co-benefits (Section 3.2.3). In the context of uncertainty, it is vital for Egyptian cities to develop resilience to enhance their ability to anticipate, absorb, recover from and adapt to climate shocks.

### *3.4.1. Understanding localised climate risks and measuring progress on adaptation*

Many governorates and cities do not have a solid understanding of the adverse impacts of climate change in their respective areas. They are thus unable to protect their citizens from climate-related hazards. In line with recommendations in the National Climate Change Strategy 2050, governorates should develop their own subnational climate change strategies to identify localised climate risks and adequately address them in local and regional planning processes (Government of Egypt, 2022[33]). Giza, with the support of MoE and development partners, has been the first governorate to formulate a framework for such a strategy in 2018; however, implementation has been lagging. The National Adaptation Plan, under development,

should explicitly include the role of subnational governments in building climate resilience and develop adaptation solutions to address vulnerabilities of urban communities.

The MoE is finalising an interactive map of climate change risks by 2100. This represents an immense opportunity to develop strategic foresight in support of future policy making. It would be helpful to share findings and make these mapping tools available at governorate and city level to inform climate-sensitive local planning and implementation.

The central government will need to pursue efforts to downscale climate risk assessments at subnational level and develop appropriate city-level early warning systems (e.g. floods, heatwaves). This requires substantial support for capacity building. For instance, GOPP, supported by the German Development Agency (GIZ), has started working on a methodology to produce standardised profiles of climate risks and vulnerabilities at governorate level. Once approved by SCUPD, this would become part of standard procedures of GOPP's urban planning process and would thus greatly contribute to mainstreaming climate risk considerations within strategic planning at governorate level. These efforts need to be pursued and implemented across all governorates.

Localised risk assessments would also allow local communities to gain a better understanding of localised climate risks, exposure and vulnerability, and take appropriate self-protective measures. Moreover, the World Bank, in collaboration with the MoLD, GOPP and other government bodies, elaborated a City Atlas of Egypt (World Bank, forthcoming[56]). This includes updated information on environmental challenges and climate change risks and natural hazards. As such, it will provide another excellent information source for both local and national stakeholders.

Egypt needs to consider climate risk assessments systematically when developing new cities to ensure integrated and risk-informed planning. For instance, New Alamein City and New Mansoura City are both built directly on the shores of the Mediterranean Sea. According to different scenarios for rising sea levels, New Mansoura is built in a high-risk area. Similarly, the Al-Alamein Towers, a series of 170-m skyscrapers, will be constructed just 300 m from the shoreline. GOPP co-operation with the United Nations Development Programme (UNDP) on developing sustainable spatial planning, resulting in guidelines for SEAs in urban plans, is a step in the right direction.

Meanwhile, NUCs have started gearing up to address environmental problems and become more climate resilient. For instance, 6th October City has become Egypt's first city to complete its Green City Action Plan under the Green Cities programme of the European Bank for Reconstruction and Development (EBRD, 2024[57]).[5] In response to growing pressure on drainage infrastructure and recurrent flash flooding, New Cairo implemented a green infrastructure pilot project to improve stormwater management in a sustainable, cost-effective manner (Azouz and Salem, 2023[58]). UDF conducts pilot initiatives to develop local urban resilience plans in some neighbourhoods of existing cities.

Assessing progress on adaptation is a common challenge faced by many countries that attempt to monitor actions and document their contribution to resilience building. Local authorities are well positioned to participate in assessment of adaptation progress given their connection with local dynamics. They can play a role in implementing adaption measures and collecting data and information for national assessment reports (OECD, 2023[59]). Measuring the impact of adaptation measures can help justify the investment cost in sustainable infrastructure and thus attract more financing. While Egyptian cities scale up adaptation, they should consider developing indicators that allow them to measure progress towards building climate resilience.

### *3.4.2. Coastal protection*

Many efforts to protect coastal cities against flooding focus on building grey coastal defence infrastructure to halt coastline erosion and protect coastal cities from storms. For instance, about 2.5 km of Alexandria's shoreline has been transformed into a concrete landscape (Bonnefoi, 2022[60]). Submerged breakwaters

were installed offshore in the east of Alexandria to limit the height of waves before they reach the shore. These measures have so far been relatively effective in protecting the densely populated coastal areas from marine submersion, while raising awareness about the impacts of climate change. In the long term, however, hard infrastructure may not be enough to protect built-up areas against the consequences of rising sea levels. The ongoing construction boom in coastal areas further increases built-up area and the value of assets exposed to climate risks, while reducing natural protection offered by vegetation.

Green buffers such as dunes could provide natural barriers against erosion and rising sea levels (Bonnefoi, 2022[60]). Within a multi-year project funded by the Green Climate Fund, Egypt upscaled nature-based coastal protection solutions in the Nile Delta using a dyke system in the five most vulnerable hotspots (GCF, 2022[61]). These efforts need to be sustained. In addition, the project supports development of an Integrated Coastal Zone Management plan for the whole North Coast. A stronger use of nature-based solutions can enhance Egypt's systemic resilience to extreme weather events and address water scarcity, while yielding well-being and environmental co-benefits (OECD, 2020[62]).

### *3.4.3. Green spaces*

Green spaces in cities play a vital role by providing shade, absorbing water and cooling the local environment, thereby reducing the urban heat island effect. They also contribute to improving air quality and urban biodiversity, making cities more liveable. Little green space is available in Egypt. Greater Cairo lost 900 000 $m^2$ of greenery between 2017 and 2020 (UDF, 2023[18]). This is in line with Africa-wide trends, where green spaces tend to disappear when urban agglomerations become larger and more compact; they are often the easiest to be sacrificed to build larger roads (Dimitrijevic, 2022[63]). While the World Health Organization (WHO) recommends that all people reside within 300 m of green space, this is the case for only 8% of citizens in Alexandria (Anderson et al., 2022[64]). Restoration of green space should be prioritised and would also help better protect citizens from extreme heat.

Egypt's Vision 2030 sets a target of creating 3 $m^2$ of greenery per person compared to 0.74 $m^2$ per person in Cairo in 2020 (Dimitrijevic, 2022[63]). This would be a significant improvement but still three times less than recommended by WHO. Egypt's second updated NDC foresees to "increase green spaces and sustainable parks in new cities that are irrigated with treated wastewater to act as carbon sinks to improve quality of life for citizens and reduce negative health impacts" (Government of Egypt, 2023[21]). It intends to increase the per capita share of public green areas in existing cities. All Egyptian cities would benefit from setting their own green cover targets and measuring progress, while preserving existing green spaces in city centres. Drought-tolerant landscaping, combined with modern irrigation practices, would help rationalise the use of scarce water resources.

As in other countries, green space is less available in lower-income neighbourhoods. Moreover, some newly created parks and walkways have entry fees, limiting access to citizens who can afford to pay. Providing more equitable access, including minimum proximity standards for accessibility to social housing, would be important for inclusion. Developing comprehensive data on green spaces could be a starting point towards more integrated planning and management of green spaces (Dimitrijevic, 2022[63]).

### *3.4.4. Desalination and water efficiency*

The government plans to quadruple its desalination capacity within the next four years to reduce water dependency on the Nile River and ensure water security for its coastal areas. The government developed a dedicated water desalination strategy. It aims to create a desalination capacity of 8.8 million $m^3$/day (3.2 billion $m^3$) by 2050 at a cost of USD 8 billion. All new cities and communities along the coast shall depend on sea water desalination to meet municipal requirements. Over 80 desalination plants are already in operation. The Sovereign Fund of Egypt has designated 14 consortia and three companies to bid for the

construction of new seawater desalination plants. According to government plans, all new desalination plants shall be powered by renewable energy, thereby reducing their carbon footprint.

While an expansion and diversification of water sources is urgently needed, most forms of desalination are energy-intensive and costly. They may also have major negative environmental impacts (e.g. brine waste), which requires close monitoring and the use of best available technologies to minimise negative impacts on marine life and ecosystems. Cost-effectiveness analysis should systematically explore viable alternatives that may achieve the desired results with fewer environmental impacts (e.g. rehabilitation of water distribution networks to reduce water leakage). Beyond investments in water supply projects, a stronger focus on demand-management policies would be useful to further rationalise water consumption (Chapter 1). New water monitoring technologies can help develop climate-resilient and more efficient water distribution networks. Raising citizens' awareness of the value of water needs to remain a priority.

## 3.5. Prioritising policies for inclusive cities

### *3.5.1. Making existing cities more liveable and sustainable*

More attention is clearly needed to help housing in existing cities become more climate resilient and energy efficient. Despite the size of the informal building stock and significant surface area, few efforts have been directed towards establishing mitigation and adaptation plans for existing neighbourhoods. The National Climate Change Strategy 2050 foresees a budget of only USD 31 million for housing and utilities, compared to USD 57.5 billion for transport and USD 7.6 billion for waste management (Government of Egypt, 2022[33]). The budget required for retrofitting buildings is largely underestimated.

Development partners implemented some adaptation projects but rarely moved beyond the pilot phase. For instance, GIZ conducted a participatory climate change adaptation project in informal settlements of the Greater Cairo region (Schuck, 2015[65]). The initiative focused on introducing green roofs, painting façades in bright colours and installing shading devices in the streets. On a larger scale, one of the requirements to apply for legalisation under the reconciliation law was painting the façades of the building in white. This requirement aimed to improve the visual identity of the informal settlements but also had environmental co-benefits: white façades can help mitigate the heat resulting from the sunlight on the buildings.

While UDF has successfully upgraded many buildings, its finances are limited. The fund has a budget of USD 10.3 billion to upgrade unsafe and unplanned areas between 2021-30 (Watan News, 2020[66]). In comparison, public and private investment in NUCs accounted for USD 22.8 billion in the fiscal year 2023/24 alone. NUCA more than doubled its annual budget from USD 2 billion in 2021/22 to USD 4.7 billion in 2023/24, mainly directing it towards high-income housing. However, most Egyptians live in existing areas, which benefit from less generous public support. Achieving spatial justice will require a more equitable distribution of public resources between different income groups. Some precarious areas still lack basic services and require urgent infrastructure upgrades. UDF could start building a pipeline of feasible urban upgrading projects, including adaptation measures, with a view to attracting climate and development finance.

### *3.5.2. Tackling informality*

The past decades have witnessed a significant transformation in the shape and character of Egyptian cities, driven primarily by the growth of informal settlements. According to different estimates, between 40-60% of Egypt's housing stock is informal. This means that more than 3 million housing units were constructed without permits (UN-Habitat, 2016[67]). The government aims to eliminate informal housing areas by 2030 (Government of Egypt, 2021[8]). While government initiatives historically focused on direct

supply of subsidised housing for lower-income groups, they were insufficient to accommodate the expanding urban population. Long-term efforts to improve housing and access to basic services are needed (Box 3.7).

### Box 3.7. Improving housing and access to basic services in Indonesia

The challenge of affordable housing has been especially acute in Indonesia where the population is rapidly urbanising, putting pressure on land and housing markets. In addition to a housing shortage, close to one-third of the population live in housing with at least one substandard feature (e.g. poor quality materials, a lack of access to basic services).

The government has prioritised housing through numerous laws and programmes over many years with mixed results. Some programmes have been successful with positive impacts on living conditions. However, others have failed to achieve expected results due to land availability; complicated processes for land acquisition and permitting; constraints on developer finance; and housing built in areas far from urban centres.

The National Slum Upgrading Program (NSUP) stands out for its positive impact in low-income communities. As one of the few countries that has gone to scale with upgrading at the national level, Indonesia presents many lessons for other countries. The NSUP, which invests in basic infrastructure and services in low-income communities, operates with communities and local governments at the centre. Through participatory approaches, communities identify and plan for priority needs, while local governments integrate community investments with city-wide planning. Investments include a focus on improving urban resilience and disaster/climate risks (with specific investments in housing resilience), and on encouraging a more energy-efficient, compact urban environment.

Through the programme, the country has achieved significant progress in improved access to clean water and sanitation, local roads and drainage, solid waste management, more secure housing, and health and education services for residents. Investments in major capacity building efforts at the local level have reached a cadre of planners, engineers and community facilitators, an important factor contributing to success.

A key challenge for programme implementation has been in fostering co-ordination across levels of government. This has been addressed through developing a collaborative institutional arrangement that created task forces at the central, provincial, local and municipal ward levels. Local Slum Improvement Action Plans served as the basis for co-ordinating any intervention in the slum area.

Key lessons from Indonesia point to the importance of investments in strengthening local governments and the central role of community participation, preserving in-situ upgrading when possible, and strong efforts to align planning with investments both at the community and city-wide level through collaboration.

Sources: (World Bank, 2021[68]; NAHP, World Bank, PUPR, 2023[69]).

In the informal sector, the government distinguishes between unplanned settlements and unsafe areas. Over the past decade, Egypt has made major strides in addressing unsafe areas. According to government estimates, the share of people living in unsafe areas was halved from 10.6% in 2015 to 5.2% in 2019 (Government of Egypt, 2021[8]). The government declared the country to be free of “unsafe areas” in 2022. By the end of 2023, it completed nearly 1 million social housing units within its large-scale programme to provide “Housing Units for all Egyptians” (Government of Egypt, 2023[70]).

However, actions to address unsafe areas were accompanied by colossal demolitions of urban housing and displacement of residents for investment or infrastructure projects. Where possible, upgrading slums would reduce significant environmental impacts related to construction and demolition waste. At the same time, it would prevent isolation of displaced populations in informal areas (Alternative Policy Solutions, 2023[71]). Given the long commutes, many households chose cash compensation and settled in other informal areas rather than accept a unit in public housing projects.

Efforts have also been made to prevent new unplanned settlements and encroachment on agricultural land, including a six-month suspension of construction for companies violating regulations within the governorates of Cairo, Giza and Alexandria. The Reconciliation Law for Construction Violations of 2019 was an important step to legalise the informal housing stock under certain conditions. Given the magnitude of informal housing, such a law is a pragmatic step to acknowledge Egypt's urban realities. However, high reconciliation fees and technical requirements undermined implementation. In late 2023, the government adopted a new law to make it easier for citizens to settle construction violations with state authorities. For instance, a 25% discount is granted to those who pay complete reconciliation fees or pay in instalments within the next five years (El-Din, 2023[72]). Despite progress, Egypt has a way to go to increase access to adequate housing at affordable prices.

### *3.5.3. More gender-equitable and inclusive transport*

The use of public transport is undermined by a lack of security, particularly for women. Surveys have reported that some Egyptian women feel unsafe on public transportation (UN Habitat, 2021[73]; World Bank, 2021[74]). Other cities, such as Quito in Ecuador, face the same challenge (Box 3.8). The government started implementing specific measures to promote gender-equitable transport. For instance, the National Council of Women, with the support of the French Development Agency (AFD), supported development of gender-focused action plans in major urban transport projects, such as the renovation of the Alexandria Tram and Cairo Metro Line 1. Every new transportation project, plan or policy should be screened to check if it incorporates a gender-inclusive perspective. Systematic collection of relevant gender-disaggregated or gender-sensitive data could help analyse the impact of measures. Similarly, geolocalised data on modal share (across space and time) would be a starting point to better understand mobility patterns and related transportation needs.

Beyond gender issues, promoting inclusiveness also requires efforts to make transport fees accessible to all income groups. Operators such as Muasalat Misr offers smart, sustainable mobility solutions with barrier-free access (e.g. wheelchair ramps) and the first cashless transit smart card for Cairo with flexible fares. However, travel fares are not affordable for certain socio-economic levels. This may lead to the exclusion of lower-income groups.

### Box 3.8. Addressing gender safety in public transport in Quito, Ecuador

At the core of a well-functioning, equitable city is safe and secure access to public transport, which is essential for reaching jobs, markets, health care and education. Yet in many cities, women face verbal and physical harassment with little opportunity for recourse. The city of Quito has faced this same challenge. In 2012, an estimated 91% of women reported harassment in public spaces. To address this challenge, the city embarked on a long-term effort with multiple initiatives.

Among key reforms over the past two decades are policies and programmes to eliminate gender-based violence through training of public servants, bus drivers and police, targeted public awareness campaigns and allocation of municipal resources to upgrade bus stops to make them safer for women. In 2017, a campaign focused on using SMS to provide information in real time. This alerted the bus driver of the harassment incident and sounded an alarm inside the bus to alert passengers. Security personnel of the Transport Authority are alerted to intercept the victim and/or aggressor at the next bus station. The Transport Authority also promoted female employment to address the gender gap.

Through these initiatives, Quito has seen an improvement in safety for women in public spaces and on public transport. An evaluation (2012-17) on sexual harassment and violence found a 6% decrease in in public spaces and an 8.4% decrease in public transport. Overall perceptions of the initiatives have been reported as positive for safety improvements by those women interviewed.

More recently, efforts to employ women in the sector have also paid off. The share of women employed by the Quito Metro has increased, with approximately 40% in positions as employees and 50% in managerial positions. Having women in both technical and managerial roles can help design transportation services that promote safety for women.

Key lessons for other cities on how to best achieve results include the importance of engaging with citizens and operators to diagnose the problems and develop solutions from the outset; designing incremental reforms to enable changes as needed; identifying specific groups for tailored information campaigns (e.g. men). Using technology for addressing real-time offences and creating social awareness/peer pressure can also be effective.

Sources: (Allen, 2018[75]; IDTP, 22 May 2023[76]; Gonzalez, 2024[77]).

### *3.5.4. Formalising the waste sector*

Waste management continues to rely heavily on the informal sector, depending on more than 100 000 poor, mostly young workers, as the backbone of the industry (UNDP, 2021[78]). New efforts to formalise the sector are under way. Through training, for example, rubbish collectors and recycling workers are able to integrate into formal waste management companies (Box 3.9). This move recognises their profession on Egyptian identity cards, providing them with social protection coverage. The government also plans to connect household waste collection fees to the well-established electricity billing system. These efforts to integrate informal workers and enhance public waste management services have much potential for improving waste management services overall and reducing GHG emissions, which represented 8% of national emissions in 2015 (Chapter 1).

### Box 3.9. Formalising waste pickers in Pune, India

Waste pickers in cities typically belong to vulnerable groups such as recent migrants, women, children, the elderly and disabled, who have few other employment options. Conditions are risky with exposure to hazardous and environmental risks. Yet waste pickers provide critical services at a low cost in cities and are an integral part of the waste management ecosystem.

The municipality of Pune provides a good example of how informal waste pickers worked together with waste buyers and the municipality. Together, they created an efficient approach for waste collection, sorting and recycling in the city. At the same time, they formalised jobs and access to social protection for vulnerable workers.

The initiative started 30 years ago with the formation of a membership-based trade union, Kagad Kach Patra Kashtakari Panchayat (KKPKP). The union worked to improve conditions for members through advocacy, and convinced the municipality to provide identity cards. The KKPKP commissioned several studies to quantify the economic savings that informal workers provided to the city through their service. This information proved to be powerful in convincing Pune to pilot a new approach. The municipality created Solid Waste Collection and Handling (SWaCH), a worker's co-operative that worked with the city government to provide formalised waste and recycling services to residents.

Through the cooperative, an estimated 3 700 members collect waste door-to-door. The service covers some 4 million citizens or about 80% of the city. As SWaCH has grown, it has continued to diversify its collection services. It now includes sanitary waste, electrical and electronic equipment, clothing and compost.

Household fees for services generate most of the revenue. Workers have seen a substantial rise in income and resulting improvements in living conditions. The city-wide impacts have also been impressive, with substantial savings in labour, processing and transport costs in their solid waste management. Some 78 T of waste is recycled annually. This resulted in annual GHG emissions savings of approximately 50 000 tonnes of $CO_2$ in 2021.

SWaCH illustrates an effective model for bridging the gap between the informal sector and municipal waste management service needs. The organisation has had considerable success in helping waste pickers in the city transition from scavenging to service provision, improving their working conditions, income generation and legitimising their work. Given the success of the programme, the national government passed legislation in 2016 requiring all cities to register waste pickers, provide them with identification cards and integrate them into formal waste management.

Sources: (Center for Public Impact, 2021[79]; World Bank, 2021[80]; Swach Coop, 2023[81]).

## 3.6. Climate action in the Governorate of Alexandria

### *3.6.1. People, places and economy*

Alexandria is Egypt's second largest urban agglomeration after the Greater Cairo region. Located on the Mediterranean Sea, about 220 km north of Cairo, Alexandria is one of four urban governorates with an estimated population of 5.5 million people in 2017 (CAPMAS and CEDEJ, 2023[11]). However, during the summer period, its population reaches up to 9 million people due to seasonal tourism, including from Cairo based Egyptians. This massive influx of tourists has significant consequences on the city's infrastructure and service delivery, notably for waste and wastewater management. The governorate has introduced

emergency plans to address problems related to stormwater and rain flooding. It also expanded capacity and raised the efficiency of its wastewater treatment plants. Growing electricity demand puts the city's electricity grid under strain. Congestion in the city of Alexandria is endemic. According to government projections, Alexandria's population is expected to reach 6.8 million by 2030, putting additional pressure on already saturated places (AFD, 2018[82]).

The governorate has a coastline of 44.5 km spanning from Al-Ajami in the west to Abu Qari in the east. Its landscape is diverse and counts 65 sandy beaches. The heart of Alexandria city is built on a T-shaped peninsula caught between the sea, lagoons and former lakes. The Corniche, a large waterfront, runs along the Eastern Harbour, one of the world's oldest ports, with a major traffic corridor. As large parts of the city are below sea level, it is vital to further improve flood protection and the city's drainage system. About 2.5 km of the shore has been transformed into concrete landscape to protect the city against stormwater and coastal erosion (Bonnefoi, 2022[60]). Moreover, the city, has a rich cultural heritage with numerous monuments from Greek-Roman times, which require adequate protection.

Most people live in the city of Alexandria and its surroundings. New Borg El Arab City, located about 55 km southwest of Alexandria, was established in 1979 as part of the first generation of NUCs. It aimed to reduce commuting between Alexandria's core city and industrial areas, and relocate people away from the already saturated city. These efforts also aimed at preventing urban sprawl on agricultural land and absorbing population increases. However, like other NUCs, New Borg El Arab struggled to attract the targeted population, mainly because of a lack of urban infrastructure and public services. The distance from the sea also made it less appealing, considering the many (informal) job opportunities in the ocean economy. The city is under NUCA administration, giving it different governance. Containing urban sprawl and tackling informal and unsafe areas continue to be among the key challenges of the Alexandria governorate.

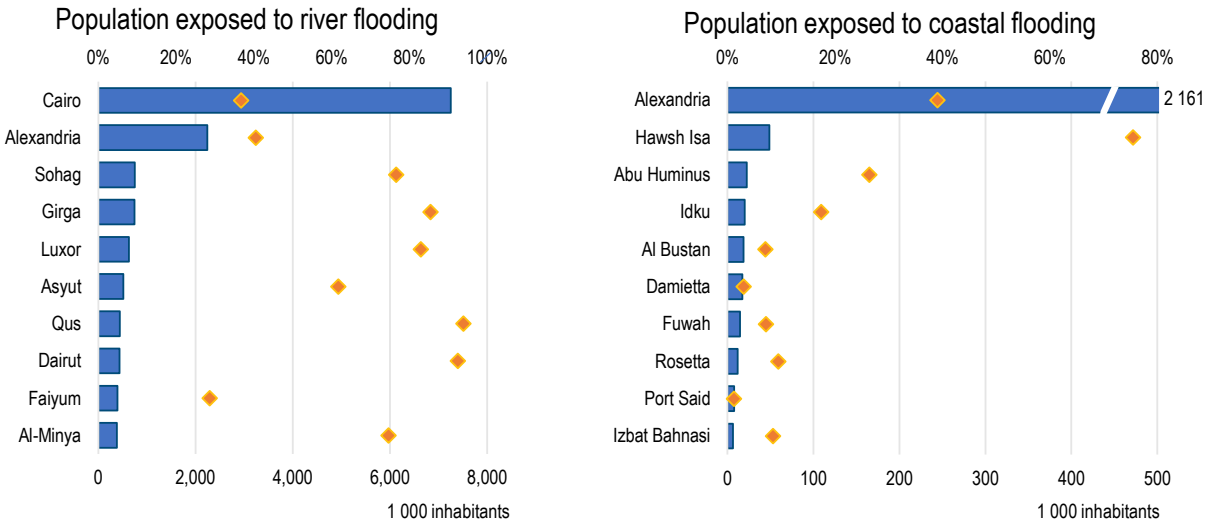
Alexandria is an important economic centre. Its significant industrial base represents nearly 40% of national industries because of its natural gas and oil pipelines from Suez and the presence of refineries, mainly managed by state-owned companies. The governorate attracts significant investment in other major industries (e.g. chemicals, metallurgy, leather, electricals, engineering, textiles, cement). Its well-established and diverse manufacturing sector is growing quickly. Alexandria's shoreline sources around 13% of Egypt's fish production (Iskander, 2021[83]). As Egypt's largest seaport on the Mediterranean, Alexandria is also a major trading hub. The Alexandria Public Free Zone, located near the city, provides a wide range of services, including shipping, unloading, navigation and transport. Moreover, the Cairo-Alexandria Logistical Corridor operation, which will link Alexandria's seaport to Cairo's dry port and Upper Egypt, is expected to provide further efficiency in the transport and logistics chains (IFC, 2023[84]). This will help better connect the two metropolitan areas.

### *3.6.2. Climate-related risks*

As a coastal city, Alexandria is exposed to several climate-related and natural hazards, mainly rising sea levels, storms, flooding, saltwater intrusion, earthquakes, rising temperatures and related heat stress. High population density further exacerbates environmental pressures, notably water scarcity.

Four of ten people in the Alexandria area are exposed to coastal flooding risks (Figure 3.5). This is among the largest shares in Egypt. Furthermore, 42% of the population is also exposed to river flooding. About 45% of the population live in areas below mean sea levels (Goyal and Sharma, 2023[2]) and land is sinking by 1.6 mm annually (Al-Mailam, Arkeh and Hamzawy, 2023[85]). Depending on different projections, rising sea levels may flood a significant part of Alexandria. If climate change is not mitigated, this situation may require a massive relocation of people and assets. Considering the environmental risks, any future urban development in low-lying areas must be avoided.

## Figure 3.5. Alexandria's population faces significant coastal and river flooding risks




Note: Data features urban centres, which are defined by specific cut-off values on resident population and built-up surface share in a 1x1 km uniform global grid (European Commission, Copernicus, 2024[86]).
Source: OECD calculations based on Muis et al. (2016), A global reanalysis of storm surge and extreme sea levels (coastal flooding) and Baug. et al. (2024), Global river flood hazard maps (river flooding).

StatLink https://stat.link/u01gyb

Alexandria's built-up area exposed to pluvial flood hazard increased from 9 km$^2$ to 24 km$^2$ between 1985 and 2015 (Goyal and Sharma, 2023[2]). This is less than in the Greater Cairo region but still represents a significant increase (Figure 3.5). The 2015 floods inundated at least one-third of the city, killing seven people and causing a direct damage of nearly USD 40 million. A storm in 2016 caused more moderate damage to beaches and tourist facilities of Corniche. The catastrophic 2023 flooding in neighbouring Libya, which killed over 4 000 people and destroyed a quarter of the port city of Derna, was a wakeup call for all coastal cities in the Mediterranean to gear up their respective natural disaster risk strategies.

Given that Alexandria is close to the sea, people cope more easily with heatwaves than Cairo-based citizens. Nevertheless, prolonged days with extreme temperatures slow down economic activity and bear major health risks for vulnerable populations. As in other cities, more use of air conditioning leads to unsustainable energy consumption during summer periods (Section 3.3.3).

Local institutional capacity to manage these risks and build resilience of communities to cope with climate change impact and prepare for potential future disasters is limited (AFD, 2018[82]). The emergency response system remains highly centralised with limited horizontal and vertical co-ordination between agencies down to the level of local communities.

### *3.6.3. Policies and climate measures*

The Alexandria Strategic Urban Plan 2032 (UNDP, 2020[87]), managed by GOPP under MoHCC, outlines the city's development vision. The diagnosis phase from 2011-14 was supported by a Germany-based consulting firm. Consultations with local stakeholders led to the development of a new geographic information system for the Alexandria governorate. Building on a decade-long partnership between GOPP and UNDP (2009-19), the government approved Vision for Alexandria 2032 and the Strategic Urban Plan for Alexandria City till 2032. Implementation has advanced slowly, undermined by lack of financing and technical expertise. Local ownership has been limited due to frequent changes in governors and their

executive councils, as well as staff turnover (Government of Egypt; UNDP, 2019[88]).[6] Ten years on, a mid-term assessment would be timely to take stock of achievements and remaining challenges, while updating local development plans to make them more climate sensitive. This involves analysing the specific climate risks and vulnerabilities of Alexandria, assessing local capacity and resources, and aligning city-level priorities with national adaptation goals.

Meanwhile, MoPED, together with the United Nations Population Fund, elaborated subnational indicators to localise the Sustainable Development Goals (SDGs). In this way, it would facilitate implementation of Agenda 2030 for Sustainable Development at governorate level. However, the SDG localisation report of Alexandria does not cover SDG 13 on climate action (Government of Egypt, 2021[89]). It indicates that the governorate is ahead of the national average in many areas (e.g. eliminating unsafe areas, clean water and sanitation services) and ranked position 6 of 22 governorates for SDG 11 on sustainable cities and communities (Government of Egypt, 2021[89]). The experience of localising SDGs could be useful for developing subnational indicators for climate action at governorate level to contribute to translating Egypt's national climate commitments into practice. Downscaling national adaptation priorities outlined in the second updated NDC to the city level would require development of a localised adaptation plan for Alexandria.

Given its high-risk exposure, adaptation is a key priority for the city of Alexandria. Under the leadership of Governor El Sherif, a Committee on Climate Change was established in 2023 to bring together researchers, private sector representatives and local stakeholders to analyse the impacts of climate change on the city. Work will include localised risk assessments and the development of early warning systems. Several initiatives to promote green growth and climate action in Alexandria are under way (Box 3.10).

Enhancing capacity to leverage green finance, including private financing for green investment, needs to remain a key priority to overcome financial gaps. Access to international development and climate financing could be further facilitated through a governorate-level Climate Action Strategy for Alexandria, including measurable, timebound targets. This would not only allow monitoring and assessing Alexandria's progress towards low-carbon development and climate resilience, but also increase accountability of public action.

Many development partners intervene to support climate action in Alexandria. For instance, the World Bank and the International Finance Corporation prepared a comprehensive Climate Action Plan for Alexandria. It included risk assessments and projections, accompanied with recommendations for investment and reform priorities to enhance the city's climate resilience and pivot towards green and low-carbon solutions (Goyal and Sharma, 2023[2]). The EBRD is developing a Green City Action Plan focusing on key environmental challenges such as water, air quality and waste (EBRD, 2023[90]). GIZ supports the governorate in developing climate risk assessment tools to build the foundations for effective climate risk management through participative approaches (GIZ, 2023[91]). AFD contributes to development of sustainable urban transport and mobility (AFD, 2023[92]). Given the multitude of development partners, it is key to avoid duplication and strengthen local ownership to facilitate implementation and sustain results. Despite many capacity building efforts, local authorities still need to enhance technical and financial capacity to conceive and implement climate action in a coherent and efficient manner.

### Box 3.10. Examples of green measures taken by the Governorate of Alexandria

The Governorate of Alexandria with the support of the central government, is gearing up to advance low-carbon development and build climate resilience, through the following:

**Climate mitigation projects:**

- Transformation of Alexandria's port into a smart green port.
- Development of an integrated cleaning and garbage collection system through a contract with the Egyptian company Nahdet Misr Environmental Services.
- Development of public squares around Misr station, contributing to GHG emissions reduction efforts and improving the quality of life for citizens.
- Implementation of a plasticiser programme in co-operation with EBRD.
- Upgrading of unsafe areas to improve living conditions and air quality.
- Expansion of the use of solar energy in many projects, including:
    - a first solar-powered market in the Amriya area
    - use of solar-powered lighting poles in the city's main corridors.

**Adaptation measures:**

- Nine coastal protection projects using submersible barriers and beach restoration (e.g. placement of sand to restore the beachline); three forthcoming projects, including one on enhancing protection of the Castle of Qaitbay; projects are implemented by the Coastal Protection Authority with funding from the Ministry of Water Resources and Irrigation.
- Several rainwater management projects are under way focusing on the separation of rainwater from sewage; projects were designed by the Faculty of Engineering of the University of Alexandria and implemented by the Armed Forces Engineering Authority under the supervision of the Council of Ministers.

Source: Country submission, Governorate of Alexandria (2024).

### *3.6.4. Examples of policy action in specific sectors*

*Improving wastewater management*

Alexandria's rapidly growing population and influx of seasonal visitors increase demand for water, generating an ever-growing amount of wastewater. Several lakes in the Delta region suffer from increased concentrations of nitrogen, phosphorus and organic matter. This is mainly due to large amounts of agricultural drainage, as well as domestic and industrial wastewater discharged directly into the lakes over the past decades. In 2021, Lake Mariout close to Alexandria deteriorated to bad water quality status according to the World Quality Index (CAPMAS, 2022[93]). The situation is set to improve thanks to a rehabilitation programme and expansion of the city's wastewater management capacity. For example, upgrading of the East Alexandria Wastewater Treatment increased capacity to 800 000 $m^3$/day, making it one of the largest sewage treatment plants in Alexandria. It includes a sludge treatment facility using energy recovery, which contributes to reducing about 1 000 tonnes of $CO_2$-eq. per month (Arab Contractors, 2023[94]). This is one of the city's flagship projects, contributing to environmentally friendly practices and reduction of GHG emissions. In some areas, the governorate has introduced treated wastewater in agriculture and landscape management.

*Addressing sustainable mobility*

Congestion and related air pollution is a major challenge for the city of Alexandria. Considering geographic space constraints, the city's road network is linear with a few east-west streets; they are mainly parallel to the sea, while others are perpendicular to them. The public transport system is insufficient and has degraded over the past decades (Mohamed, 2023[95]).

The governorate has been promoting use of low-carbon transportation through introduction of 55 electric buses. In addition, the Transport and Passenger Authority replaces about 50 buses powered by fossil fuel each year with those run by compressed natural gas. Alexandria is also gearing up its public transport offer through rehabilitation of a 13.8-km long Raml tramline and construction of its first metro line spanning 21.7 km with 20 stations from Abu Qir Railway Station to Misr Station (EIB, 2023[96]). Construction, which started in early 2024, is scheduled for completion in 2026. It will have a capacity of 60 000 passengers per hour and will halve travel time to 25 minutes. These mega projects are funded with the support of international partners and will help Alexandria make a leap in its transition towards more sustainable mobility. In addition, a green belt could help address traffic and pollution issues on Alexandria's internal roads and encourage broader use of active transport modes, especially on El-Gaish Road, the main transport corridor of the Corniche (Mohamed, 2023[95]).

*Increasing green spaces*

The city of Alexandria has much scope to increase green spaces. In comparison with other African cities, Alexandrian citizens live further away from green spaces (Anderson et al., 2022[64]). The governorate contributes to implementing national strategies in this area, notably to the Presidential Initiative aimed at planting 100 million trees. Some 280 000 trees have been planted in Alexandria with the support of MoE and citizen volunteers. Increasing green spaces in and around the city will not only improve citizens' well-being but can also make Alexandria more attractive to new businesses and generate investment opportunities.

## 3.7. Al-Kharga, Egypt's first environmentally friendly city

### *3.7.1. People, places and economy*

An oasis in the Western Desert about 340 km west from Luxor and 600 km from Cairo, Al-Kharga is the capital of the New Valley governorate, and as such has the administrative status of "urban".[7] It is an archipelago of irrigated spots within a vast depression stretching over 200 km (Garcier, 2023[97]). In total, Egypt counts six inhabited oases west of the Nile. Despite its remote location, Al-Kharga's population has been growing over the past two decades by over 30% and reached about 90 000 people in 2017 (Garcier, 2023[97]). According to government estimates for 2024, its population currently counts about 108 000 people. This makes it Egypt's largest oasis closely followed by Dakhla (Garcier, 2023[97]). Its name in English means "the outer" (outsider or outside city). It was known in the past as the "Great Oasis" and is considered one of the ecotourism destinations thanks to several important archaeological sites (e.g. Temple of Hibis; Temple of Nadura, Ghweita Temple, Qasr al-Zayan Temple, Dosh Temple, Bagawat cemetery) (Government of Egypt, 2023[98]). Some of these monuments date back to the Persian period (660-330 BC).

Urban infrastructure is relatively well developed. All households have access to electricity; water and sanitation services are connected to the sewage network by 90% coverage (World Bank, forthcoming[56]). The oasis depends entirely on groundwater, which is extracted from the Nubian Sandstone Aquifer System. Water is mainly used for domestic and agricultural purposes.

The average rate of annual municipal solid waste in the city is estimated at 182 kg per capita, below the national average of 251 kg per capita (Chapter 1). About half of total waste is sorted and recycled; the remainder of collected municipal solid waste is disposed on open dumps outside the city (World Bank, forthcoming[56]).

Al-Kharga counts 39 solar energy stations to extract water from wells, 19 of them in the local governorate buildings, 6 in schools and 14 in mosques, with a total generating capacity of 600 kW. Thermal springs in villages at Bulaq and Nasser Elthawra to the south of the city of Kharga are famous for water temperature of up to 50°C. The springs have attracted some tourists, but tourism activity has been generally limited because of their remote location. At the same time, increased tourism would put more pressure on municipal waste management and scarce water resources.

Al-Kharga needs a marketing action plan to identify niche opportunities and further structure the emerging tourism sector, while enforcing strict environmental regulations to balance recreation and nature conservation. Improving access would be key to developing tourist activities. Egypt may wish to co-operate with other countries and regions to share experiences and lessons learnt. For instance, the Amazonas and Pantanal regions of Brazil face similar challenges related to access and sustainable tourism practices. It will also be important to develop activities in an inclusive manner so that benefits and economic opportunities are shared broadly.

A bus service connects the oasis to the other oases in the Western Desert (e.g. Dakhla, Farafra, Bahariya) and to the rest of Egypt. A road trip to Luxor in the Nile Delta takes between 4-5 hours. A commercial flight from Cairo is planned to operate once per week. The oasis remains isolated. Within the revival of the New Valley project, also known as Toshka project,[8] Al-Kharga may have opportunities to better connect with other desert areas by improving the transportation network and deepening economic linkages. It could further develop economic co-operation with cities in the Nile Valley.

### *3.7.2. Climate-related risks*

Located in the middle of the desert approximately 600 m above sea level, Al-Kharga has a subtropical desert climate with temperatures about 1.9% higher than the Egyptian average. The average surface temperature during summer (2017-21) reached 51.1°C (World Bank, forthcoming[56]). Heat stress is a major challenge. Citizens need to protect themselves and limit their daily exposure to sun during the hottest moments of the day. Al-Kharga has one of the world's lowest precipitation rates with less than one rainy day per year (0.08 mm annually). Sandstorms represent a major threat to monuments. Sands from the nearby dune belt have already started to accumulate around the Temple of Hibis.

### *3.7.3. Policies and green measures*

Al-Kharga's development vision is outlined in its strategic urban plan, approved in 2015. Drawing on a six-month assessment in 2022, the government designated Al-Kharga as Egypt's first environmentally friendly city. The assessment analysed air, water and light quality, and helped promote responsible use of natural resources and sustainable agricultural practices. The city has increased use of renewable energy sources in co-operation with private sector companies. It does not have any major polluting industry and is committed to becoming plastic free. Al-Kharga has one of the highest shares of green areas in the country (500 $m^2$ per capita) (Egypt Today, 2022[99]). Some 7 000 trees have been planted along the Al-Kharga airport road, covering 11 km. By designating Al-Kharga as an eco-city, the government aims to provide a sustainable model for the development of desert lowlands that is compatible with urban heritage and the local environment. It aspires to balance economic growth, environmental protection and social well-being, ensuring a sustainable future for the oasis and its communities (Box 3.11).

### Box 3.11. Green growth opportunities in Al-Kharga

Al-Kharga has several opportunities to promote sustainable development and incentivise green investment.

**Ecotourism**: sustainable tourism initiatives that showcase the natural and cultural heritage of the oasis while minimising environmental impacts through the following actions:

- Raise the efficiency of sulphur wells in the province.
- Promote craft and environmental industries.
- Participate in international exhibitions.

**Agriculture**: supporting local agricultural practices that promote sustainable farming techniques, water conservation and preservation of traditional knowledge through the following actions:

- Promote water conservation, preservation of traditional knowledge, planting low water consumption trees, using modern irrigation methods and operating wells with solar energy.
- Improve different crop breeds.
- Protect date crops from the palm weevil.
- Use scientific research to improve the quality of new varieties with an economic return.
- Carry out various agricultural initiatives that preserve the environment, such as (palm initiative - mulberry tree planting initiative).

**Small-scale agro-industry**: encouraging development of value-added activities such as food processing, handicrafts and local products that can generate income and employment opportunities.

**Renewable energy:** developing solar parks, to provide clean energy to the oasis and surrounding areas:

- Promote solar-powered government buildings (e.g. Governorate general office, local units), schools and mosques.
- Pursue efforts to operate public wells with solar energy (e.g. 145 solar-powered wells are already operational).

Source: Country submission (2023).

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## Notes

[1] The inhabited area represented about 12% of total land area in 2023 (Chapter 1, Figure 1.1).

[2] Other members include the Minister of Culture; the Minister of Investment; the Minister of Housing, Utilities and Urban Development; the Minister of State for Economic Development; the Minister of State for Local Development; the Chairman of the General Authority for Urban Planning; and the Director of the National Centre for the use and planning of State-owned land, in addition to a group of specialists in urban development matters.

[3] Governorates submit sectoral investment plans to relevant sectoral ministries, impeding development of synergies across sectors.

[4] While this construction method may have some limitations in openings, the environmental benefits outweigh constraints, which could be solved through modern techniques.

[5] Two more action plans are under development for Alexandria and Cairo.

[6] Despite major outputs (e.g. capital investment plan for the city; urban management strategy and guidelines), project results were not largely communicated to the public and to date, key documents are not accessible on line (Government of Egypt; UNDP, 2019[88]).

[7] Al-Kharga became a madina in 1993 in application of the decrees of the Administration of Land Taxes no. 4 of 1993 and Egyptian Surveying Office (ESA) no. 7 of 1993.

[8] The Toshka project was initiated in 1997, aimed at reclaiming desert land for agricultural and industrial development and creating new settlements by connecting these areas through a system of canals to pumped water from Lake Nasser. The initiative faced several technical and organisational challenges: in 2017, about 12 000 hectares of new agricultural land were in the process of being reclaimed (Garcier, 2023[97]).