



Local Climate Action in the Arab Region:

Lessons Learned and Way Forward



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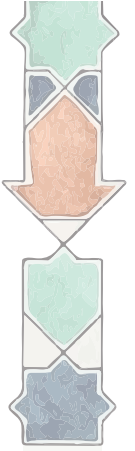
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Acronyms and Abbreviations

AFD	French Development Bank (Agence Française de Développement)
AFOLU	Agriculture, Forestry, and other Land Use
AYCM	Arab Youth Climate Movement
BAU	Business as usual
BEI	Baseline Emission Inventory
BOD	Biological oxygen demand
CAPP	Citizens Awareness Promotion Plan
CDM	Clean Development Mechanism
CEIIA	Center for Excellence and Innovation in the Automobile Industry
CES-MED	Cleaner Energy Saving Mediterranean Cities project
CMCF	Catalyst MENA Clean Energy Fund
CO₂	Carbon dioxide
COP	Conference of Parties
CoR	Committee of the Regions
CSOs	Civil society organizations
DTS	Decentralised wastewater treatment systems
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
GCC	Gulf Cooperation Council
GCF	Green Climate Fund
GCoM	Global Covenant of Mayors for Climate and Energy
GDP	Gross Domestic Product
GEF	Global Environment Fund
GEFTF	Global Environment Facility Trust Fund
GEREEF	Global Energy Efficiency and Renewable Energy Fund
GHG	Greenhouse Gas
HCFC	Hydrochlorofluorocarbon
IRENA	International Renewable Energy Agency
JRC	Joint Research Centre
LED	Light-emitting diode
LEDs	Low Emission Development Strategies
LFG	landfill gas
LULUCF	Land use, Land Use Change, and Forestry
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
MLG	Multi-level governance

NCGs	National Coordination Groups
NGOs	Non-Governmental Organisations
O&M	Operation and maintenance
OECD	Organisation for Economic Cooperation and Development
PPPs	Public Private Partnerships
PRT	Personal Rapid Transport
RES	Renewable Energy Source
RICCAR	Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region
SCCF	Special Climate Change Fund
SDGs	Sustainable Development Goals
SEACAP	Sustainable Energy Access and Climate Action Plans
SEAPs	Sustainable Energy Action Plans
SEMED	Southern and Eastern Mediterranean Sustainable Energy Financing Facility
SPA	Strategic Priority on Adaptation
SPREF	Private Renewable Energy Framework
SPREF	SEMED Private Renewable Energy Framework
SSM	SEACAP Support Mechanism
TOE	Tonne of oil equivalent
UNDRR	United Nations Office for Disaster Risk Reduction (formerly UNISDR)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change



Introduction

Climate change is becoming one of the main threats to humanity, and the Arab region is one of the most vulnerable to its impacts. The 2012 State of Arab Cities report¹ highlighted climate change as a “major emerging challenge” in the region with water security, food security, and urban settlements at particular risk. Global frameworks such as the Sustainable Development Agenda 2030 (Goals 11 and 13) call for climate action at the city level, while the New Urban Agenda has stressed the significance of efficient mitigation and adaptation measures from an urban perspective including a clear commitment to “the generation and use of renewable and affordable energy and sustainable and efficient transport infrastructure and services, where possible, achieving the benefits of connectivity and reducing the financial, environmental and public health costs of inefficient mobility, congestion, air pollution, urban heat island effects and noise.”² Accordingly, UN-Habitat’s strategic plan 2020-2025 identifies climate change as one of its four domains of change, where it works to reduce greenhouse gas (GHG) emissions, improve resource efficiency, and increase the adaptive capacities of communities and infrastructure.

The impacts of climate change are not simply a factor of the intensity of the phenomenon itself, but also of the capacity of local communities to react to it; therefore, developing countries are facing a much more challenging situation. Regionally, the Arab Strategy for Housing and Sustainable Urban Development 2030³ identified climate change as one of six urban priorities that need to be urgently addressed. The strategy’s implementation plan clearly defines the course of action under adaptation and mitigation in order to achieve that goal.

With funding from the Global Covenant of Mayors for Climate and Energy and the Islamic Development Bank; UN-Habitat, CLIMA-MED, CEDARE, and RCREEE all joined forces in 2019 to push for climate action at the local, i.e., municipal, level in the Arab region. Local implementation, one of the 5 pillars of the New Urban Agenda, is crucial to addressing global climate change.

In February 2019, the partners organised a regional capacity building workshop on climate adaptation and mitigation at the local level that was held in Beirut, Lebanon. With more than 40 participants from 10 countries in the region, the workshop discussed climate change impacts on human settlements; global, regional, national, and local frameworks for response; access to climate finance; and the development of Sustainable Energy Access and Climate Action Plans (SEACAPs). Case studies from Saudi Arabia, Lebanon, and Yemen were presented at the workshop as best practices for climate action at the local level.

This report builds on this capacity building workshop and looks to document some of the case studies presented as well as many others. It also aims to provide mayors and city officials with a policy resource that can support their decision-making process while planning climate action at the local level. Chapter 1 of the

1. UN-Habitat (2012) *The State of Arab Cities 2012: Challenges of Urban Transition*, Second Edition, UN-Habitat, Nairobi

2. United Nations (2016) *New Urban Agenda*, United Nations, <http://habitat3.org/the-new-urban-agenda/>, last accessed 25 August 2019

3. LAS (2016) Arab Strategy for Housing and Sustainable Urban Development 2030, <https://unhabitat.org/wp-content/uploads/2017/05/Arab-Strategy-English.pdf>, last accessed 25 August 2019

report sheds light on climate change impacts at the city level and their repercussions. Chapter 2 discusses the GHG profile of the Arab region within a global context, as well as the potential for energy efficiency across the region given Arab country commitments and targets. Chapter 3 discusses improving climate governance and multilevel climate action at the local level, focusing on designing and implementing SEACAPs, as well as the creation of synergies between cities and regional and global action frameworks, as well as awareness-raising. Chapter 4 analyses a number of case studies on adaptation and mitigation from cities across the Arab region, as well as global best practices. This diversity of cities and the different challenges they are facing brings interesting lessons learned to be analysed. Chapter 5 then highlights opportunities to access climate finance at the city level including guidance on writing bankable project proposals and ways to boost public-private partnerships. Finally, Chapter 6 comes up with a set of policy recommendations to city leaders and municipal authorities on enhancing climate action at the local level.



Clima-Med



Chapter 1

Climate Change and the Challenges Facing Arab Cities

Chapter 1: Climate Change and the Challenges Facing Arab Cities

Climate change represents an urgent and potentially irreversible threat to human societies and the planet.⁴ The 2030 Agenda for Sustainable Development,⁵ adopted by the UN Summit on Sustainable Development in September 2015 includes among its 17 goals, Goal 13 to “take urgent action to combat climate change and its impacts.” The Paris agreement adopted by the 21st Conference of Parties (COP 21) of the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015, aims to pursue efforts to hold global temperature rise below 2°C, and limit it to 1.5°C above pre-industrial levels. The Intergovernmental Panel on Climate Change (IPCC) special report on global warming of 1.5°C⁶ indicates that, in 2017, human-induced warming has already reached about 1°C above pre-industrial levels. The United Nations Office for Disaster Risk Reduction (UNDRR, formerly UNISDR) Global Assessment Report⁷ points out that global extreme weather events have doubled in the past 40 years, and the UNDRR report on economic losses, poverty, and disasters demonstrates that 91 per cent of disasters are climate-oriented.⁸ Further climate change, and the limited capacity to adapt to its impacts, amplifies the risks posed by this warming of 1.5 and 2°C.

The Arab region faces several challenges that constitute obstacles to achieving sustainable development and combating climate change, most importantly that the Arab region lagging did not achieve some of the most important Millennium Development Goals (MDGs), particularly those related to hunger, food insecurity, access to water, improved sanitation in rural areas, and child and maternal mortality.⁹ At the same time, most countries of the region are witnessing, or have recently witnessed, to varying degrees, more than ever before and in an unprecedented manner in modern times, the absence of peace and security; and the spread of terrorism, conflict, armed conflict, and security threats. In fact, Arab migrants constitute 50 per cent of all world migrants, while the Arab region hosts 14 per cent of international migrants.¹⁰

It has become clear that sustainable development cannot be achieved without managing the risks of climate change, and that the relevant policies and procedures should go beyond reducing current risks, to preventing new risks.

A large number of heads of Arab states and governments participated in the United Nations Summit on Sustainable Development in New York in 2015 and the Climate Summit in Paris, signalling a deep political commitment to the 2030 Agenda for Sustainable Development and the Paris Climate Change Agreement, respectively. This is an important starting point to build upon. Already, the process is in motion by the adoption, at the Arab summit level, of Arab strategies, plans, and programmes for sustainable consumption and production (in 2009), food security (in 2010 and 2017), water security (in

4. IPCC, 2014

5. United Nations, 2015, p. 14

6. IPCC, 2018

7. UNDRR, 2015

8. Wallemacq and House, 2018

9. ESCWA, 2015; UNDP and LAS, 2013

10. ESCWA, 2018



2012), climate change (in 2012), disaster risk reduction (in 2012 and 2018), health and environment (in 2012), renewable energy (in 2013), housing and sustainable urban development (in 2016 and 2019), and the environmental dimensions of the Sustainable Development Goals (SDGs) (in 2017). However, political will must follow political commitment, and heads of states and governments should lead a viable and effective process so that sustainable development and the fight against climate change become not only a national and regional priority, but a way of life.

a. Climate change impacts on the Arab region

Climate change serves as a multiplier of threats that exacerbates existing vulnerability with severe environmental, economic, social, and political repercussions affecting not only national and regional security, but also human security. Just as the impacts of climate change vary among the regions of the world, they also vary within the Arab region, depending on climatic zones and economic sectors. Understandably, the sectors most affected are those that particularly depend on the climate, such as agriculture.

The Arab region is one of the most vulnerable regions of the world to the negative impacts of climate change and their various interactions: high temperatures, threats to coastal areas, increased drought and desertification, scarcity of water resources, increased salinity of groundwater, and the spread of epidemics, pests and diseases.¹¹ Most of the Arab region is located in the over-arid, arid and semi-arid regions. Ninety per cent of the region's population live on 4 per cent of the total area of 1.4 billion hectares, and more than 63 per cent of the population lives in large cities and small towns.¹² In many Arab countries, the bulk of the population, physical assets, and government and administrative centres are located close to, or along, the region's 37,000 km of coastline.¹³ The significant growth in the size

11. IPCC, 2014

12. AMF, 2018

13. Verner, 2012

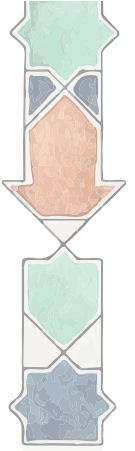
and intensity of economic and development activities within coastal cities, and in coastal and marine areas in general, in addition to the importance of international waterways to the Arab region, increases vulnerability to climate change.

Rising sea level can damage marine and coastal ecosystems, and lead to the retreat of shorelines due to erosion and corrosion. It also leads to the flooding of low lying populated areas, wetlands, and low islands, and inevitably causes displacement. The limited availability of fertile agricultural land makes the degradation of low coastal areas more alarming, as it will surely affect both agricultural activity and productivity not only along the coastline, but as far as sea water intrusion affects the soils and groundwater. It poses, as well, threats to industrial facilities, tourist resorts, infrastructure, and natural and cultural heritage. The overlapping of sea water and groundwater increases pressure and degrades already limited freshwater resources and supplies. Infrastructure of offshore desalination plants, power plants, fish processing facilities, and oil extraction platforms can be affected. Port facilities can be subject to submergence impeding the import and export of goods and products, as well as their production inputs. Increased economic impacts are also expected for the construction sector due to losses to property, facilities, utilities, and infrastructure; and also because of the suspension of construction projects in affected areas which can also mean loss of employment opportunities. The construction sector could also suffer from the social repercussions of sea level rise and migration, whether internal or external. This will result in increasing pressures on the environment and resources, as well as on the construction sector itself to provide adequate housing with essential services to vulnerable groups.



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Pastoralist communities in Djibouti and other countries in the horn of Africa are extremely vulnerable to drought



Temperatures in the region are rising faster than the global average.¹⁴ Summer has become hotter and drier, while rainfall has decreased over most of the region, leading to more intense and longer droughts, while at the same time, the intensity and risks of flash floods have increased. In 2017, extreme heat waves were recorded across the Arab region, with the hottest temperature in the World recorded in Kuwait.¹⁵ The frequency of dust and sand storms has also increased throughout the Arab region all the year round and not just in its usual months. Tropical cyclones have also become a common threat to many countries in the region.¹⁶

The Arab Climate Change Assessment Report¹⁷ developed by the Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) indicates that, generally, the vulnerability of the Arab region to climate change is increasing over time. According to the different emissions scenarios developed, the average mean change in temperature is expected to increase by 1.9°C to 2.6°C by mid-century, and 2.3°C to 4.8°C by end of the century.¹⁸ Annual precipitation rates across the Arab region will largely decrease until the end of the century, by 90-120 mm in coastal areas, mainly around the Atlas Mountains and in the upper Euphrates and Tigris basin.¹⁹ However, some limited areas are expected to show an increase in the intensity and volume of precipitation, mostly in the south-eastern Arabian Peninsula and some parts of the Sahel. The projections show that the number of very hot days, i.e., when temperatures reach over 40°C, will increase significantly across the Arab region until the end of the century.²⁰ Along the Mediterranean coast, the number of summer days over 35°C are also expected to increase substantially. Sensitivity also varies, but is often high near the coastline, where population density is highest.²¹

The Arab region is already one of the most water-scarce regions in the world, with the current utilization rate of water resources estimated at 76.6 per cent compared to about 7.5 per cent worldwide.²² Average water per capita in the Arab region is 800 cubic metres. Water scarcity is a major issue in 19 of the 22 Arab countries, while desertification and land degradation affect 17 countries.²³

The Arab region has the highest food-deficit and is the highest food-importing region in the world.²⁴ Currently, the region imports 70 per cent of its food requirements at an increasing cost.²⁵ More alarmingly, whenever the world's major food exporters suffer from drought, any policies they may follow will affect countries of the Arab region.

14. Verner, 2012

15. UNDP, 2018

16. Verner, 2012

17. ESCWA and others, 2017

18. ESCWA and others, 2017

19. ESCWA and others, 2017

20. ESCWA and others, 2017

21. ESCWA and others, 2017

22. AOAD, 2017

23. AOAD, 2017

24. UNDP, 2018

25. AOAD, 2017

In terms of agricultural trends, there is evidence that productivity gains are slowing. Indeed, agricultural yields are currently far below potential, especially in rain-fed areas which account for 70 per cent of cultivated land in the region,²⁶ are expected to decline over time and lead to long-term decline in averages. Crop yields²⁷ are expected to drop by 30 per cent with a 1.5 to 2.5°C increase in temperatures and by 60 per cent with a 3 to 4°C increase. Some estimates indicate that agricultural output in the Arab region as a whole may decline by 21 per cent by 2080, with a decline of up to 40 per cent in parts of North Africa.²⁸ The recent drought in Somalia reduced average harvests by 70 per cent. Not only will food production be affected, but all four dimensions of food security: food availability, accessibility, stability, and use.²⁹



Richard Alloway / CC BY 2.0

Droughts are increasing in frequency, intensity, and duration.³⁰ Rising temperature increase drought severity due to increased evaporation. Droughts exacerbate desertification, land degradation, and poverty, and increase the frequency of sand and dust storms. Droughts cannot be prevented, but 'adapting to drought' can be learned. This is the real challenge for the Arab region, neutralizing drought and solving the equation of how, with less water and land and more fragile ecosystems, water security and food security can be improved to provide a decent and healthy life for the people of the region.

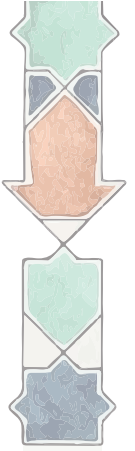
26. AOAD, 2017

27. UNDP, 2018

28. Cline, 2007

29. AOAD, 2017

30. Erian, 2010



Though industry affects the environment in terms of its contribution to energy consumption and the release of GHG, it will also be hampered by the negative impacts of climate change. The decline in agricultural production reduces inputs and thus the production and availability of processed food commodities. The competitiveness and sustainability of manufacturing industries may be affected by changes in the availability and cost of food, raw materials, water, and energy; which may force local industries to operate at a fraction of their capacity and/ or dispense with some of their workforce. Drought contributes to reducing the amount of dam water and reservoirs, and leads to a shortage of hydropower generation, which is used in various fields, including industry.

Rising sea levels, rising temperatures, and increased exposure to floods and storms all affect the viability of investments in vulnerable areas. Rising insurance prices or reluctance of insurance companies to cover industrial projects in flood-prone or hurricane-prone areas can be expected to hinder development projects. Financial institutions will also be reluctant to grant loans and credit guarantees to these projects, thus distorting the distribution of development projects across the region.

Shortage of electricity produced from hydroelectric plants due to droughts is expected. At the same time, demand for energy will increase for desalination units due to water scarcity, as well as, for cooling and air conditioning systems due to the higher temperatures. Electricity grids, oil, and natural gas pipelines in vulnerable areas can likewise be damaged by extreme weather events.

Though the transportation sector in the Arab world has witnessed great developments in the past two decades, is generally characterised by a limited penetration of public transport systems, and the inadequate application of environmental specifications and standards, with vehicles tending not to be subject to periodic maintenance.³¹ As such, with the rising temperatures, poor transport choices will limit opportunities and quality of life, and prolonged waiting in extreme weather conditions will increase exposure to the associated health risks. Moreover, vehicles used in road transport will continue to be the largest fuel consumer in the Arab transportation sector, as well as, the largest GHG emitter and urban air polluter, and where mitigation actions should focus (See Chapter 2 for further discussion of these issues).³² In addition, more frequent and intense extreme weather events are likely to adversely affect transportation services and road safety, with high winds, intense rainfall, as well as flooding by higher tides, rivers, and urban drains³³.

Tourism is very sensitive to climate change, as climate has an impact on many of its resources; such as biodiversity, landscapes, and water quantity and quality. The tourism sector is one of the most water-consuming sectors for drinking, sanitation, and other services related to swimming pools, green areas, and golf courses. The sector will inevitably be affected by the scarcity of water resources, and it is expected that there will be tension, especially with local communities and agriculture over the use of water. Moreover, the increase in average and maximum temperatures, sea level rise, coastal erosion, flooding of coastal areas, and deteriorating ecological ecosystems such as coral reefs, will have serious

31. ESCWA, 2009

32. ESCWA, 2009

33. ESCWA, 2009

negative impacts on the tourism sector in terms of curtailing or changing the tourism season, tourist numbers, and tourism revenues.³⁴ What is more, the tourism comfort index³⁵ in the Arab region, which is currently ranked between good to excellent, is expected to decline in the coming decades to marginal or negative.

Climate change is a major threat to public health and extreme weather events associated with climate change, such as heat waves, floods, and drought, can result in casualties and the spread of disease. Many common diseases show high sensitivity to temperature changes and precipitation, such as summer heat waves, resulting in increased severity and potential mortality, the spread of diseases associated with water and food shortages, and the spread of epidemic diseases to areas beyond their known range. Climate change-related diseases³⁶ are already becoming more likely in the region. Heat waves cause death directly through heat-related illnesses or indirectly by aggravating pre-existing heat-sensitive medical conditions. Extreme weather events can have psychological impacts due to loss, social disruption, displacement, and repeated exposure to natural disasters. Vector-borne diseases³⁷ closely related to temperature and humidity conditions, such as malaria, dengue fever, rift valley fever, and west Nile virus, are expected to spread, re-emerge in previously endemic areas, or emerge in previously unaffected areas and countries. Finally, inadequate water supplies, in quantity or quality, increase the risk of waterborne diseases³⁸ such as diarrhoea, typhoid, hepatitis, dysentery, giardiasis, bilharziasis, leishmaniosis, schistosomiasis, and cholera. What's more, the use of wastewater for irrigation, because of water shortages, if improperly treated, poses health risks to farmers, their families, and consumers.

The most vulnerable to climate-related diseases are the internally displaced, migrants, those with low socio-economic status, dwellers in low-lying lands and informal settlements, and members of specific occupations, such as construction workers operating in the open air under extreme weather conditions.

The impacts of climate change vary also according to gender. The negative impacts of climate change are not gender neutral.³⁹ The inequalities that continue to exist in different areas of life in Arab countries, albeit varying, increase the vulnerability of women to climate change risks and limit their adaptive capacity, which in turn leads to greater inequalities between women and men. The increased vulnerability of women to climate change risks is due to three factors: inequality in terms of access to resources, scarcity of opportunities for improving current livelihoods or developing alternatives, and lack of participation in decision-making. The poorest socio-economic groups are usually the most affected and least able to adapt, and since women are more vulnerable to poverty than men, they constitute the largest proportion of these groups.⁴⁰

34. Göll, 2017

35. AFED, 2016

36. Verner, 2012

37. Verner, 2012

38. Verner, 2012; ESCWA and others, 2017

39. IUCN, 2011; Ministry of Environment in the Hashemite Kingdom of Jordan, IUCN, and Global Alliance for Gender and Climate, 2010

40. IUCN, 2011; Ministry of Environment in the Hashemite Kingdom of Jordan, IUCN, and Global Alliance for Gender and Climate, 2010



Woman fetching water in Kairouan, Tunisia. Water scarcity exacerbated by climate change can make life harder for women, on whom this responsibility has traditionally fallen

b. Climate change impacts exacerbating challenges to Arab cities

The ability of communities to deal with the impacts of climate change is shaped both by their natural and socio-economic realities, as well as by the challenges imposed by these realities. Economic and social conditions vary among countries of the Arab region (per capita Gross Domestic Product (GDP), population, literacy rate, standards of living, services, etc.). Across the region, approximately 25 per cent of the population⁴¹ is considered to be living below the poverty line. The Arab region is, unfortunately, the only region in the world where poverty increased between 2011 and 2016, and poverty is projected to increase even further by 2030.⁴²

The negative impacts of climate change on Arab cities are exacerbated by these existing challenges, as well as the concentration of assets and populations in cities. Cities located in coastal areas are more exposed to sea-level rise and storm surges which can be disastrous for many of the region's densely populated coastal cities, with their economic, industrial, and business activities, including oil production facilities. In addition to projected temperature increases, night-time temperatures in cities are expected to rise an additional 3°C because of the urban heat island effect.⁴³ The Arab region is already more affected by increasing temperatures than the rest of the world due to the high solar radiation and soils that tend to absorb and store heat. This, combined with the heat island effect and poor air quality of cities, will lead to more extreme temperatures.

41. UNDP, 2018

42. UNDP, 2018

43. Verner, 2012



Urbanization has been driven by the region's economic development, migration to Arab oil-rich countries, drought and conflict-driven displacement, as well as population growth. In 2017,⁴⁴ the population of Arab countries amounted to 413.5 million, 63 per cent of whom were living in cities, with the population expected to reach approximately 635 million by 2050.⁴⁵ The urban population in Arab countries grew by more than four times from 1970 to 2010 and will more than double by 2050.⁴⁶ Most of this growth has taken place on the peripheries of primary cities, although, today, secondary cities are experiencing the fastest rates of growth.⁴⁷ Governments throughout the Arab region have developed policies to channel investments into secondary cities in an effort to improve rural-urban economic linkages and foster more equitable development. In general, access to services, infrastructure, health, education, etc., though varying among countries, and frequently insufficient and inadequate, is better in cities than in rural areas. However, unemployment and persistent poverty is still a growing urban concern. Where local governments provide limited services, civil society organizations have often played an important role in supplying basic services to the poor and the vulnerable.⁴⁸

Informal housing is also highly vulnerable to extreme climate events because of a lack of planning and inadequate infrastructure. Climate change will likely increase this hazard further because of more intense rainfall events. For example, inadequate drainage contributed significantly to the 2009 flash flooding in Jeddah, Saudi Arabia, where more than 90 mm of rain, equal to twice the yearly average, fell within four hours.⁴⁹ In cities with joint storm and wastewater drainage systems, flash floods can lead to public health disasters because of the overflowing of heavily polluted floodwater. Some countries in the region have made significant progress in limiting the spread of slums (removal, upgrading, and integration within urban development projects), and developing initiatives to increase the supply of affordable housing⁵⁰. However, affordable and decent housing will continue to be a major challenge throughout the region, including in the Gulf States. The steady growth in informal settlements will also continue in spite of progress so far achieved. With more than 30 per cent of the population⁵¹ under the age of 15, the demand for jobs and housing will add to the pressures on urban systems. Moreover, the high urban growth rate threatens the cultural heritage of old and traditional medieval cities, that form part of the identity of the Arab region, and their preservation is becoming a real challenge. In addition, the amount of urban solid waste, of which waste from construction and demolition constitutes a major component, is mounting and is often disposed of in open dumps. Internal and external displacement as a result of conflict, natural disasters, and environmental degradation adds to the difficulties facing some Arab cities.

44. AMF, 2018

45. UNDP, 2018

46. UN-Habitat, 2012

47. UN-Habitat, 2012

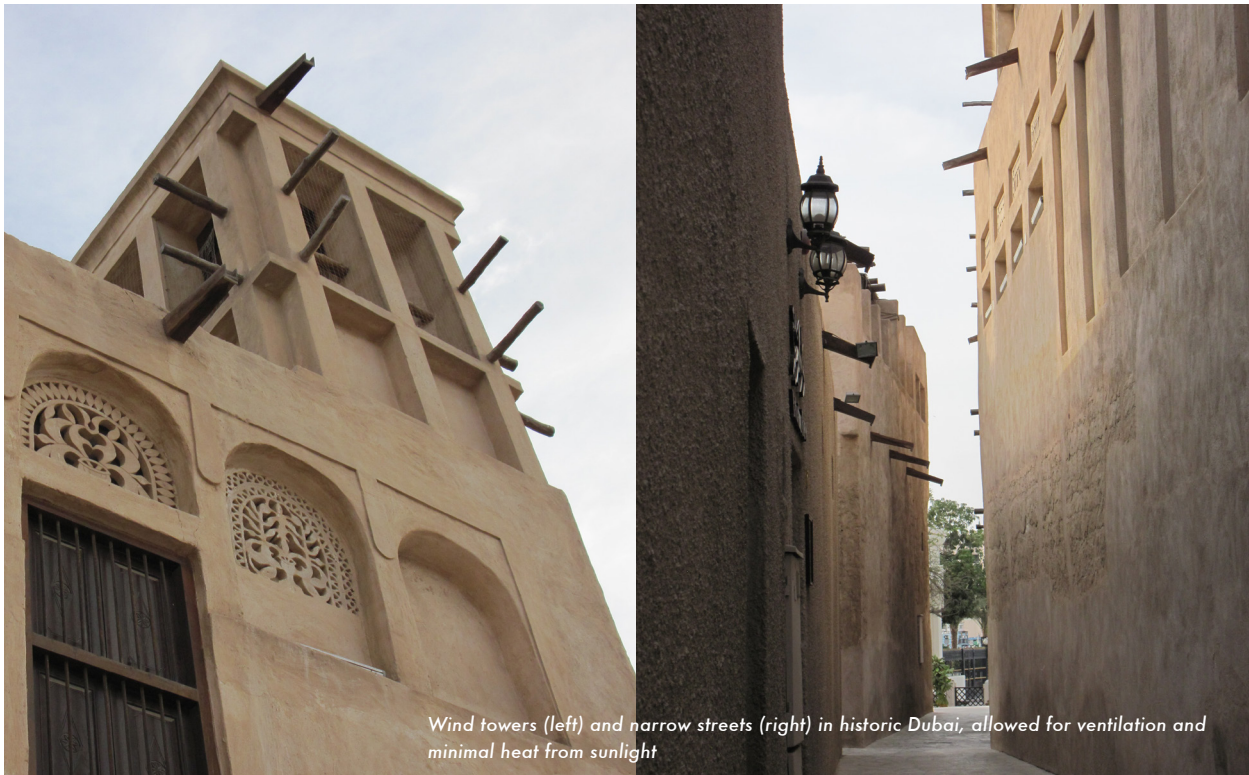
48. UN-Habitat, 2012

49. Verner, 2012

50. UN-Habitat, 2012

51. AMF, 2018

During the last three decades of the 20th century, modernist architecture styles spread far and wide in the region;⁵² inspired by western trends with regards to design, formation, and other internal and external details; despite not being compatible with the natural and social environment in the region, its historical heritage, and culture.⁵³ As a result, many Arab cities lost their defining spirit.⁵⁴ Unlike traditional architecture, modern architecture styles also had environmental consequences, such as the need for additional energy for lighting, air-conditioning, and ventilating and heating facilities.⁵⁵



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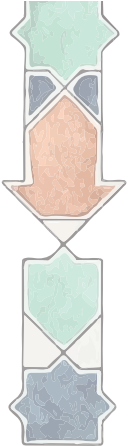
Climate change will, moreover, have significant and largely negative impacts on cities in the Arab region by displacing rural population and escalating urbanization pressures, increasing food imports and raising food prices, exacerbating water poverty, and also increasing energy demands for cooling and desalination. These pressures will raise the cost of living in cities, and there are justified concerns that it may have the potential to further destabilise the Arab region.

52. Verner, 2012

53. UN-Habitat, 2012

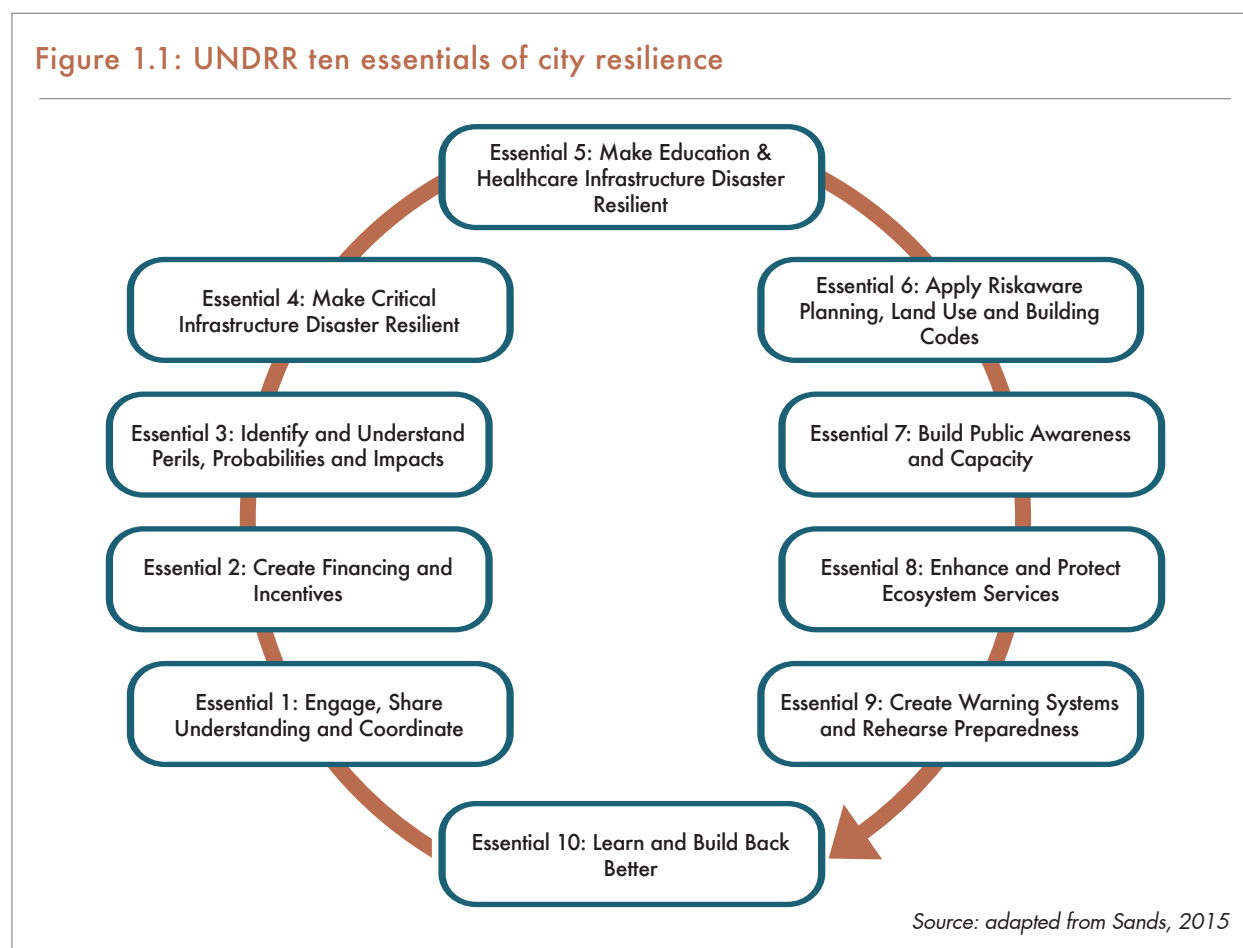
54. UN-Habitat, 2012

55. Al-Habaibeh, 2015



c. Building the resilience of Arab cities

The resilience of Arab cities needs to be built. About 142 of Arab cities have already joined the UNISDR initiative “Making Cities Resilient”, which outlines ten essential steps for ensuring the resilience of cities to climate change (Figure 1.1) and have already, or are currently, undergoing a preliminary assessment of their resilience.⁵⁶ The UNDRR ten essentials of city resilience are a practical roadmap that can help municipal authorities prioritise and plan adaptation actions. Moreover, 33 Arab cities or municipal authorities have signed up to the Global Covenant of Mayors for Climate Change and Energy (GCoM), and working towards commitments related to energy efficiency and towards implementing related adaptation plans (See Chapter 3 for further details on GCoM signatories and their commitments).⁵⁷



On the other hand, Arab country Nationally Determined Contributions (NDCs) reports to the UNFCCC place adaptation to climate change as a priority for all countries in the region, due to the increased risks they face. Water, coastal zones, agriculture and food security, and health are the sectors most frequently impacted by climate change and on which the majority of measures are focused (Table 1.1).

56. UNDRR, 2019

57. GCoM, undated

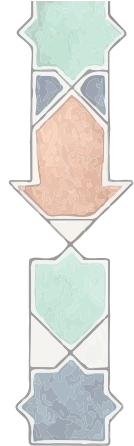


Table 1.1: Examples of adaptation measures highlighted in Arab country NDCs

Country	Adaptation Measures
Algeria	Concerning climate change adaptation, key actions include adjustments to the institutional and regulatory framework, capacity building, monitoring and early warning system, etc.
Bahrain	In terms of adaptation, measures regarding sea level rise, food security and water scarcity are included, such as: <ul style="list-style-type: none"> • Upgrade of water distribution networks and reduction of desalinated water quantities; • Actions regarding sustainable urban planning, and more specifically, more efficient buildings in terms of energy and water use, as well as improved transportation modes.
Egypt	Several adaptation actions are envisaged across a number of sectors, such as: <ul style="list-style-type: none"> • Water resources (improved irrigation, water storage, rain water harvesting, desalination, wastewater treatment, deep groundwater reservoirs); • Agriculture (changing sowing dates, good management practices); • Coastal zones (land use changes, coastal zone management, etc.); and • Health (risk identification, awareness-raising).
Jordan	Adaptation actions to focus on: <ul style="list-style-type: none"> • Residential water supply, irrigation, water quality, etc.; • Concerning health, on heat waves, etc.; and • Agriculture / food security.
Kuwait	Adaptation is also a significant part of the country's commitment. Specific projects planned are to address: <ul style="list-style-type: none"> • Coastal information systems; • Adapting to sandstorms; • Food security; • Use of district cooling in new residential areas; • Adapting to lack of water resources.
Lebanon	Some priority adaptation measures on biodiversity, water and forestry and agriculture are mentioned.
Palestine	In terms of adaptation, all sectors present high vulnerability. Some key measures including, enhancing food security (alfalfa planting, and reuse of wastewater); and increasing water availability (dams, installation of water tanks, pond construction, improved irrigation scheduling, reduced water leakage).
Saudi Arabia	Concerning the priority actions on adaptation, these include: <ul style="list-style-type: none"> • Water and wastewater management; • Urban planning; • Marine protection;

Table 1.1: Examples of adaptation measures highlighted in Arab country NDCs (Cont.)

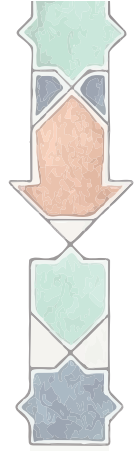
Country	Adaptation Measures
Saudi Arabia (Cont.)	<ul style="list-style-type: none"> • Reduced desertification; • Integrated coastal zone management planning; • Integrated water management planning; and • Early warning systems.
Sudan	A variety of adaptation actions are included also, addressing agriculture (crop production, rangeland and livestock), water, coastal zone and health sectors.
Tunisia	<p>With regards to adaptation, particularly to increased temperatures, precipitation, and sea level rise, some key actions include:</p> <ul style="list-style-type: none"> • Reuse of treated wastewater; • Prevention of coastal erosion and redevelopment / displacement of coastal industrial zones; • Adapting irrigated crops; • Rehabilitation of forest nurseries and the expansion of indigenous and multi-use species; and • Health sector actions such as adapting the health system to climate change, particularly combatting water-borne diseases.
UAE	Regarding adaptation, water conservation and desalination are considered for the water sector. Additional actions are planned on food security, training and awareness-raising.

Source: adapted from UNFCCC, undated

However, there are two sets of actions that can help make Arab cities more resilient.⁵⁸ These actions should be implemented through effective partnerships between the public and private sectors and civil society to provide a better quality of life for Arab citizens.

The first set of actions involves continuing to improve basic urban planning, advance service delivery, and enhance the sustainability of Arab cities by upgrading the living conditions of the urban poor. Bold urban programmes and local initiatives are needed to address the multi-sectoral impediments that constrain the functional efficiency of Arab cities. Core steps should include building capacities, reducing corruption, enforcing existing regulations and zoning, developing affordable housing away from risk zones and ensuring equitable land tenure policies. Green architecture should be promoted; with optimal use of resources and minimal negative impacts on the environment. These considerations have to be observed during both the construction and use of facilities. Traditional Arab architecture is a good example of green architecture that observes environmental aspects. Furthermore, to implement urban planning successfully and manage increasingly large and complex urban systems, Arab governments need to develop decentralized and more inclusive decision-making processes, to better coordinate

58. El Mallah, 2009



the roles of central and local governments, and to increase the participation of the private sector and civil society in urban development. Several countries have already started strengthening national-local collaboration on planning and development, creating sub-national/governorate-level planning agencies and empowering local administrations to draft and implement their own plans.⁵⁹

The second set of actions responds specifically to climate risks. Measures should include early warning systems to identify, assess and monitor risks; carry vulnerability assessments (including multi-risk) to identify critical infrastructure and risk-prone zones and their exposure to climate hazards; identify resilience options; and compare the benefits and costs of specific resilience measures. As an example, transport systems need to be rethought, first to ensure that they do not block natural water channels and contribute to flooding, and second to ensure that they act as safe evacuation routes or shelters during floods. Additionally, governments need to develop publicly-accessible and reliable information and analyses related to resilience; provide human, technical, and other resources and services to support resilience; and build climate resilience through social protection.

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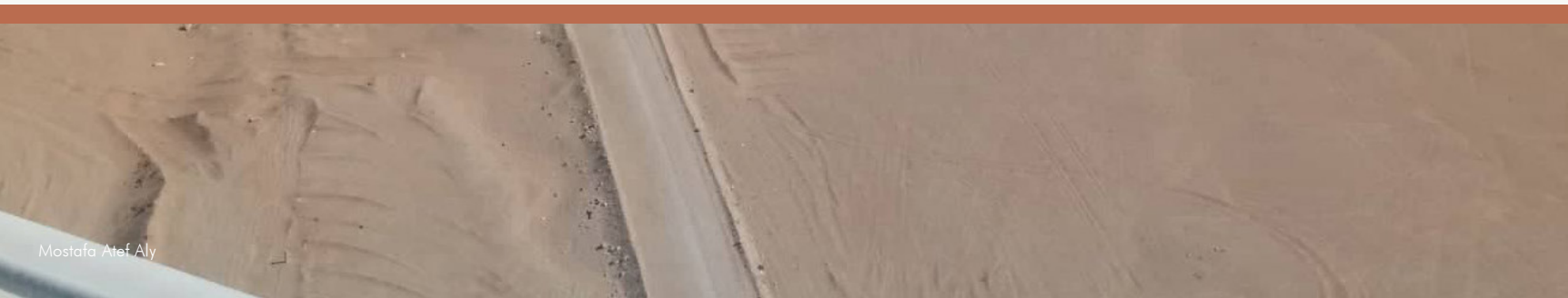
59. UN-Habitat, 2012

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Chapter 2

GHG Emissions Profile of the Arab Region and Potential for Mitigation

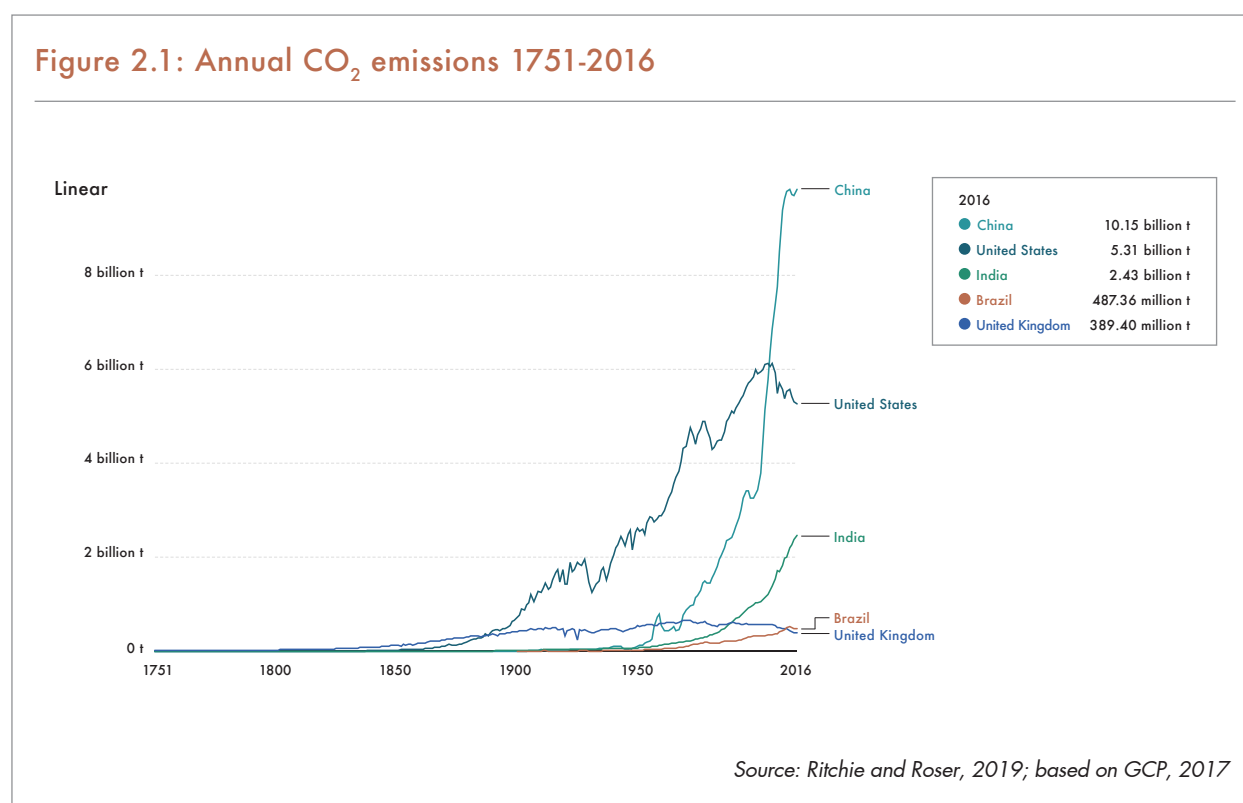


Chapter 2: GHG Emissions Profile of the Arab Region and Potential for Mitigation

As is the case in other growing economies, rapid population and economic growth in the Arab region have resulted in increased demand for energy and power, which is largely met using fossil fuels. The increasing amount of carbon dioxide (CO₂) emissions from energy consumption, as well as the remaining shortages in power supply, pose huge challenges to both developed and developing countries. These shortages also present an opportunity for policy interventions that can build on national commitments to facilitate cleaner energy solutions on the national and local levels.

a. GHG emissions in the Arab region

Emissions have been increasing at a high rate in all growing economies in the last few years, with some low to middle income countries ranked as top emitters in 2014.⁶⁰ In 2016, China produced 10.15 billion tonnes of CO₂ emissions, while India produced 2.43 billion tonnes (Figure 2.1). On the other hand, total CO₂ emissions for the Arab region for the same year equal 2.021 billion tonnes.⁶¹ The contribution of the Arab region is still minimal compared to other industrial nations, particularly the USA, which contributed to 26 per cent of global cumulative CO₂ emissions (Figure 2.2).⁶²



60. Le Quéré and others, 2018

61. Boden and others, 2017; UNFCCC, 2018; BP, 2018

62. Le Quéré and others, 2018

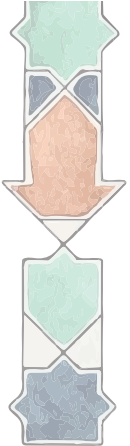
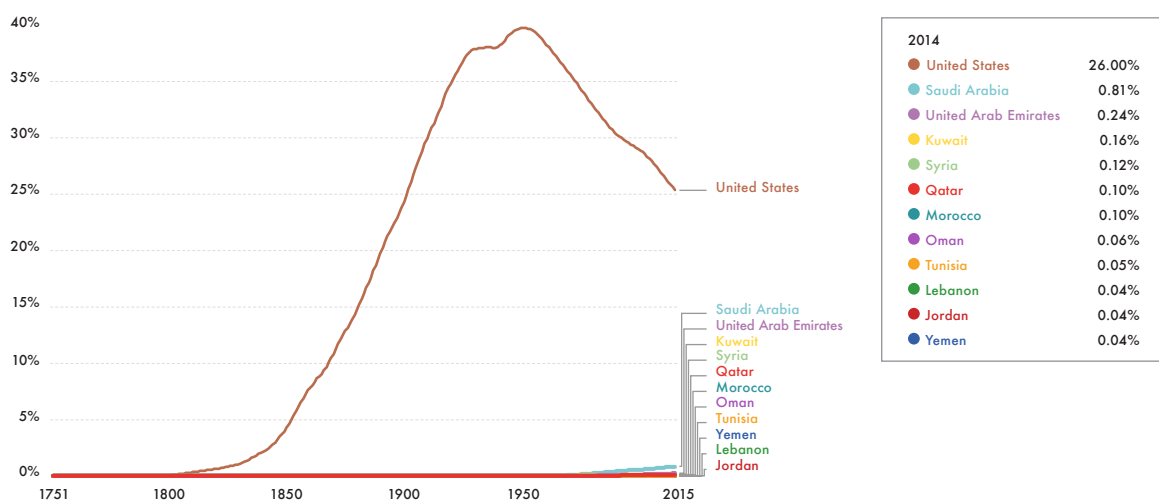
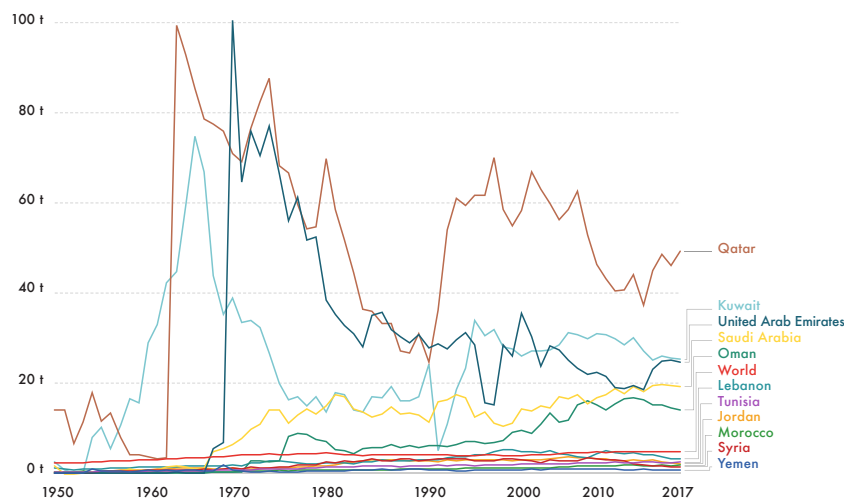


Figure 2.2: Share of global cumulative CO₂ emissions from 1751 to 2014



Source: Ritchie and Roser, 2019; based on GCP, 2017

Figure 2.3: CO₂ emissions per capita Arab countries, 1950-2017, tonnes per year



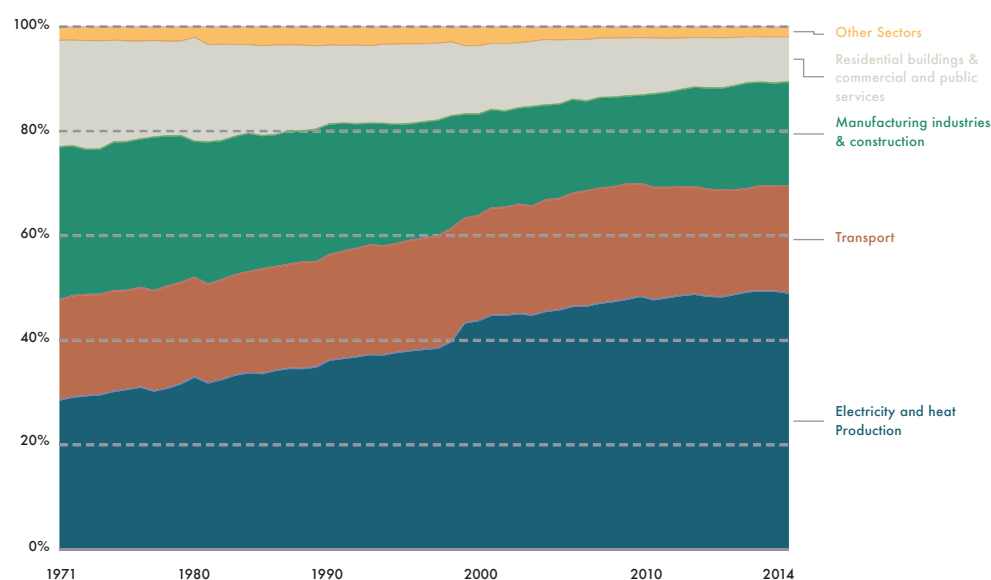
Source: Ritchie and Roser, 2019; based on GCP, 2017; data from Boden and others, 2017; UNFCCC, 2018; BP 2018

The average per capita energy consumption level in Arab countries is nearly 1.5 tonnes of oil equivalent (TOE), which is higher than that of some developing countries, such as India with 0.5 TOE per capita; and lower than that of developed countries, such as the USA with 7.2.⁶³ There are remarkable disparities in per capita energy consumption amongst Arab countries (Figures 2.3) depending mainly on income levels, standard of living, degree of urbanization, and climatic conditions.⁶⁴

63. IEA, 2014b

64. IEA, 2016

Figure 2.4: CO₂ emissions by sector or source, Arab region



Source: IEA, 2014a via The World Bank, 2019; cited in Ritchie and Roser, 2019

Industry is the major energy consuming sector in Arab countries, accounting for about 45 per cent of total consumption, followed by the transport sector (32 per cent); and residential, commercial, and agriculture sectors, collectively, at 23 per cent.⁶⁵ The electricity sector constitutes the largest source of emissions in the Arab region (50.16 per cent) while transportation represents 24.74 per cent of emissions and is the primary source of carbon monoxide emissions.⁶⁶ Lead emissions no longer represent a major issue, since many countries are now using unleaded fuels.⁶⁷ Construction, manufacturing industries, residential building and other sources represent 25 per cent of emissions in the Arab region (Figure 2.4).⁶⁸ Emissions from transportation are rising faster than from other sectors, for example three-fourths of transportation emissions are from road traffic, and are predicted to grow globally, reaching 80 per cent by 2030.⁶⁹

The continuous increase in domestic energy demand in the Arab region is putting additional stress on the region's traditional energy strategies and plans. According to the World Bank, the Arab region shared 5.1 per cent of global total primary energy supply and 7.8 per cent of the world's CO₂ emissions.⁷⁰ Most of the energy generated in the Arab region is located within the Gulf Cooperation Council (GCC) countries.⁷¹

65. IEA 2014b

66. IEA, 2014a via The World Bank, 2019; cited in Ritchie and Roser, 2019

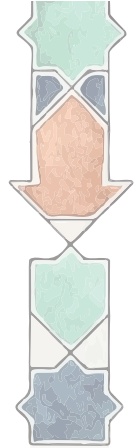
67. AFED, 2017

68. IEA, 2014a via The World Bank, 2019; cited in Ritchie and Roser, 2019

69. IEA, 2014a via The World Bank, 2019; cited in Ritchie and Roser, 2019

70. AFED, 2017

71. World Bank, 2017



b. Potential areas for mitigation

The above pattern of energy consumption determines the policy priorities and measures needed to reduce such emissions, meet the national commitments, as well as maintain sustainable economic growth. Sustainable energy development that separates economic growth from resource utilization, would be an effective approach. Therefore, there is a need to reduce the region's carbon footprint through the sustainable management of energy use and the decarbonization of the energy mix.⁷²

Table 2.1: Examples of mitigation measures in NDCs of Arab countries

Country	Energy Sector NDCs	Non-Energy NDCs
Algeria	<p>A GHG emission reduction of 7% to 22% by 2030 compared to business as usual (BAU) levels, conditional on external assistance for the financing of the development and transfer of technologies and capacity building. A 7% GHG reduction will be achieved with domestic means.</p> <p>Through ambitious programmes targeting the thermal insulation of houses and conversion of light-duty vehicles and buses to LPG, Algeria intends to reduce energy consumption by 9%. Also, large scale deployment of photovoltaics and wind, as well as other RES, will support the country's target to have 27% of the nationally produced electricity by Renewable Energy Source (RES).</p>	<p>Other sectors covered include industry, transport, agriculture and forestry, construction, and the environment. Specific measures include:</p> <ul style="list-style-type: none"> • Reduce gas flaring to less than 1% until 2030. • Management of household solid waste, achieving full coverage of waste dumps; waste valorisation; and composting. • Carbon capture through reforestation.
Bahrain	<p>A number of policies and actions that will contribute to low GHG emission development, focusing mainly on energy efficiency, carbon capture and storage, and renewable energy.</p> <p>It highlights its Economic Vision 2030, which seeks to diversify the country's economy and reduce its dependence on oil and gas.</p>	<p>The following measures are planned in order to also address mitigation and adaptation:</p> <ul style="list-style-type: none"> • Upgrade of water distribution networks and reduction of desalinated water quantities; • Actions regarding sustainable urban planning, and more specifically, more efficient buildings in terms of energy and water use, as well as improved transportation modes.
Egypt	<p>To achieve high CO₂ mitigation levels through measures that include phasing out energy subsidies within 3-5 years and, potentially, a national carbon market. Some key mitigation actions in the energy sector indicatively include:</p> <ul style="list-style-type: none"> • Efficient energy use in industry, transport, agriculture; 	<p>For non-energy sectors, mitigation measures include:</p> <ul style="list-style-type: none"> • Agriculture (manure management, enteric fermentation, burning of agricultural residues); • Waste (solid waste, wastewater treatment, incineration);

72. AFED, 2017

Table 2.1: Examples of mitigation measures in NDCs of Arab countries (cont.)

Country	Energy Sector NDCs	Non-Energy NDCs
Egypt (cont.)	<ul style="list-style-type: none"> • Modal shift to public transport; • Renewable and nuclear power sources for electricity generation. 	<ul style="list-style-type: none"> • Oil and natural gas (venting and flaring); and • Industrial processes (recycling and waste management).
Jordan	<p>Reduction of GHG emissions by a bulk of 14% until 2030. This reduction will be unconditionally fulfilled at, maximally, 1.5% by the country's own means compared to a BAU scenario level. However, Jordan, conditionally and subject to availability of international financial aid and support to means of implementation, commits to reduce its GHGs emissions by additional, at least, 12.5% by 2030.</p> <p>Key measures in the energy sector are:</p> <ul style="list-style-type: none"> • Green building codes; • Utilisation of RES; • Awareness-raising; • Diversifying energy sources and sources of natural gas imports; • Increase numbers of commuters shifting to the use of public transport; and • Implementation of the national railway system. 	<p>The outcome targets are accompanied by a diverse combination of numerous actions in all involved sectors of emissions in addition to adaptation actions in targeted sectors. Measures include:</p> <ul style="list-style-type: none"> • Development of a system for sorting, reusing and recycling solid waste; • Encouraging investments in solar and wind energies; and • Afforesting 25% of barren forest areas in the rain belt areas.
Kuwait	<p>To move to a low-carbon equivalent economy and avoid an increase in emissions above BAU projections, conditional on international support.</p> <p>Some mitigation measures in the energy sector include:</p> <ul style="list-style-type: none"> • Construction of a new and more efficient refinery; • Production of cleaner fuels; • Energy production from municipal solid waste and renewables; and • Mass transport systems. 	
Lebanon	<p>Unconditional target</p> <ul style="list-style-type: none"> • A GHG emissions reduction of 15% compared to BAU scenario in 2030. 	<p>A developing country with scarce water resources and high population density in the coastal areas, Lebanon is already facing and will continue to face, significant challenges as a result of climate change.</p>

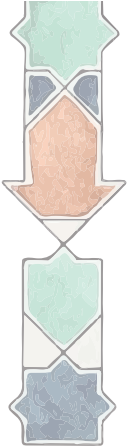


Table 2.1: Examples of mitigation measures in NDCs of Arab countries (cont.)

Country	Energy Sector NDCs	Non-Energy NDCs
Lebanon (cont.)	<ul style="list-style-type: none"> • 15% of the power and heat demand in 2030 generated by RES. • 3% reduction in power demand through energy-efficiency measures in 2030 compared to the demand under the BAU scenario. <p>Under the conditional target of 30% reduction, 20% by RES and 10% demand reduction are envisaged.</p>	<p>The country is already taking significant measures at the strategic level, in terms of key policy documents to address these challenges.</p>
Morocco	<p>A national GHG emissions reduction target of 32% below BAU by 2030, which can only be reached under the condition of benefitting from substantial support from the international community. Morocco also commits to an unconditional reduction target of 13% below BAU levels by 2030, taking into account reductions in Agriculture, Forestry, and other Land Use (AFOLU).</p>	<p>Even though Morocco is focusing its efforts in the energy sector, its GHG emission reduction targets will be achieved through economy-wide actions based on strategies and sectoral action plans designed, amongst others, for the following areas of intervention: agriculture, water, waste, forests, energy, industry, and housing.</p> <p>Besides energy production and demand, additional priority sectors include industrial processes (cement, steel, etc.), agriculture (enteric fermentation and manure management, cropping systems, land use), waste, and LULUCF.</p>
Oman	<p>An unconditional 2% emissions cut in 2030, relative to BAU levels. This will be achieved through increase in renewables, increase of energy efficiency projects among industries, and new legislation for low-carbon and energy-efficient technologies. Additional efforts would require international support.</p>	<p>Among priority measures for the attainment of targets from other sectors, are:</p> <ul style="list-style-type: none"> • Reduction in gas flaring in oil industries; • Reduction in hydrochlorofluorocarbon (HCFC) use in foam and refrigeration sector.
Palestine	<p>Reduction of CO₂ emissions, conditional on receiving international support in the form of finance, technology transfer, and capacity building, as per the two following scenarios.</p> <ul style="list-style-type: none"> • Independence: 24.4% from BAU by 2040 • Status quo: 12.8% from BAU by 2040 <p>Key priority mitigation actions include solar PVs, promotion of energy efficiency in buildings (building standards, regulations), use of waste for electricity generation, reduction of methane from landfills, hybrid electric vehicles, efficient lighting, etc.</p>	<p>Additional actions include utilisation of waste for cement production, afforestation, modal shift programmes, etc.</p>

Table 2.1: Examples of mitigation measures in NDCs of Arab countries (cont.)

Country	Energy Sector NDCs	Non-Energy NDCs
Qatar	<p>Focuses on economic diversification and emissions reductions, though does not set a target. Mitigation actions include:</p> <ul style="list-style-type: none"> • Promotion of energy efficiency, especially in the energy industry; • Utilising renewables, such as wind and solar; and • Promoting public transportation. 	<p>Additional actions in the non-energy sector include:</p> <ul style="list-style-type: none"> • Water management (conservation, desalination); • Enhancement of drinking water, wastewater, and treated sewage networks; • Waste management (reuse, recycle, and waste-to-energy); and • Awareness-raising.
Saudi Arabia	<p>Expected emissions reduction; through renewable energy investment, economic diversification, energy efficiency, and carbon capture and storage; of up to 130 million tonnes of CO₂ equivalent in 2030, relative to BAU. Mitigation actions envisaged by the Kingdom include:</p> <ul style="list-style-type: none"> • Promotion of energy-efficiency in industry, buildings, and transportation, as well as power production (combined cycle); • Investment in RES (wind, solar PV, solar thermal, geothermal, and waste-to-energy); • Carbon capture and storage; • Gas utilisation; and • Methane recovery and flare minimisation. 	
Sudan	<p>The target is to reach 20% renewable share in the power mix by 2030. Includes detailed per-technology aims and targets for energy efficiency and renewable energy, such as:</p> <ul style="list-style-type: none"> • 20% RES in energy sector by 2030 (wind, solar PV, CSP, waste-to-energy, biomass, geothermal, small hydro); • Energy-efficient technologies (grid transmission losses, labelling system for electric appliances, CFL and LED lamps in residential sector, etc.) • Electricity production from natural gas; • Incentives provision for energy substitution to liquefied petroleum gas (LPG). <p>This pledge is conditional on international support.</p>	<p>Specific mitigation actions on other sectors include:</p> <ul style="list-style-type: none"> • Reforestation / afforestation of 25% of Sudan by 2030; • Collection of waste and use of sanitary landfills. Adoption of the zero waste concept.

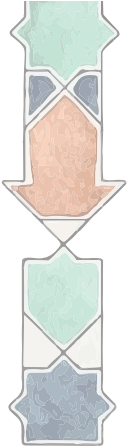


Table 2.1: Examples of mitigation measures in NDCs of Arab countries (cont.)

Country	Energy Sector NDCs	Non-Energy NDCs
Tunisia	<p>Reduction of GHG emissions across all sectors (energy; industrial processes; agriculture, forestry and other land use; waste) in order to lower carbon intensity by 41 per cent by 2030, relative to 2010. Tunisia, which has already made significant strides towards mitigation in its baseline, is looking to reduce its carbon intensity unconditionally and through its own efforts by 13% compared to 2010, i.e. about 1/3 of its commitment. To achieve the rest, i.e. an additional drop in carbon intensity of 28% in 2030 compared to 2010, Tunisia is relying on the support of the international community for funding, capacity building, and technology transfer. Tunisia's commitment covers both a mitigation contribution and an adaptation contribution.</p> <p>As part of the energy transition policy advocated by the State, it is estimated that the energy sector will reduce its carbon intensity by 46% by 2030 compared to 2010.</p>	<p>Besides the mitigation actions in the energy sector, other sectors are also a priority for the country; namely, industrial processes, forestry and other land uses, agriculture, and waste.</p>
UAE	<p>To limit emissions and increase clean energy share in the energy mix to 24% by 2021, up from 0.2% in 2014. The above-mentioned targets will be achieved through renewable and nuclear energy. Specific mitigation actions in the energy sector indicatively include:</p> <ul style="list-style-type: none"> • Further efficiency in energy intensive industries and the oil and gas sector; • Electricity and water tariffs reform; • Building and efficiency standards; • Demand-side management; • District cooling; • Appliance efficiency standards; • Shift 25% of governmental vehicles to natural gas; and • Adoption of a federal freight railway network. 	<p>Waste is another sector included in the mitigation actions, and in particular legislative actions to regulate and oversee waste management, a roadmap for integrated waste, and a database to collect relevant information.</p>

Source: adapted from UNFCCC, undated

Generally speaking, the NDCs in Arab countries vary in terms of their ambition level (Table 2.1), with some countries mentioning reduction targets even above 25-30 per cent. The majority of mitigation measures adopted in country reports focus on the promotion of renewable energy technologies, such as solar, wind, biomass, as well as some hydro and geothermal technologies. Energy production from waste and carbon capture and storage are two additional solutions that will contribute to GHG emissions' reduction.⁷³

With regards to energy efficiency, a range of technologies and policies are planned in the building, industry, and transport sectors. The reformation of tariff policies in electricity, water, and fossil fuels (diesel, gasoline) is also quite frequently mentioned, especially among GCC countries. Non-energy sectors contributing to reduction targets include agriculture; Land use, Land Use Change, and Forestry (LULUCF); and waste.⁷⁴

Renewable energy technologies provide an exceptional opportunity for mitigating GHG emissions and reducing global warming by replacing conventional energy sources. The transformation of the global energy system to reduce CO₂ emissions requires engagement at all levels of society – from communities, regions, and governments to numerous other stakeholders across the public and private sectors. This requires investment in, and creates opportunities for, renewable energy, sustainable transportation, and climate-smart agriculture that supports climate change mitigation. Renewables could supply four-fifths of the world's electricity by 2050, massively cutting carbon emissions and helping to mitigate climate change.⁷⁵ Solar and wind power have to be fully integrated, with sustainable bioenergy providing another key part of the mix, which means speeding up innovations in business and technology.

In 2015, implementation increased to nearly 6 per cent of the energy supply, with 3,000 MW of new-renewable power capacity under construction in the region (Figure 2.5),⁷⁶ and many Arab countries have set medium- or long-term national targets for renewable energy plans and strategies.⁷⁷ For example, the UAE has set a national clean energy target of 24 per cent by 2021,⁷⁸ including 44 per cent of renewables in the national power supply to meet its targeted 70 per cent reduction in carbon emissions by 2050.⁷⁹ On the other hand, Djibouti, has declared its intension to achieve 100 per cent renewable energy for its power supply by 2025.⁸⁰ Saudi Arabia has declared that it will increase its renewable energy target threefold to reach more than 60 gigawatts of installed capacity by 2040, and shift from oil consumption in the power sector to more sustainable energy resources.⁸¹ Table 2.2 includes details of renewable energy targets in the Arab region.

73. UNFCCC, undated

74. UNFCCC, undated

75. IRENA, 2018

76. IRENA, 2016a

77. IRENA, 2016a

78. IRENA, 2016a

79. IRENA, 2019a

80. IRENA, 2016a

81. World Economic Forum, 2019

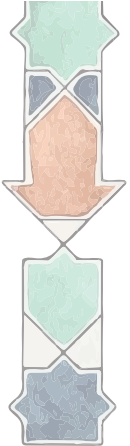


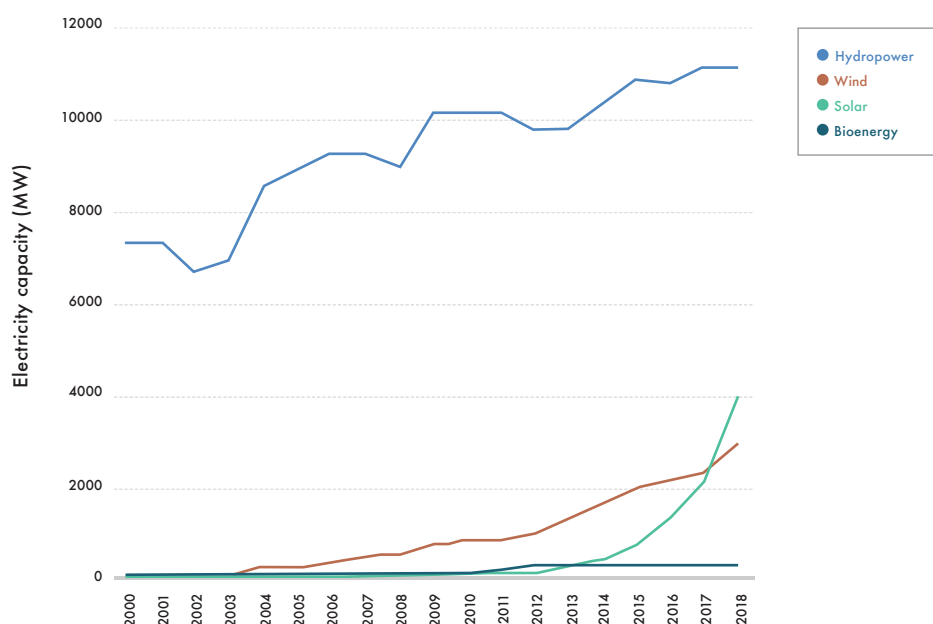
Table 2.2: Renewable energy targets in Arab countries

	Renewable Energy Targets							Target Date
	Wind	PV	CSP	Biomass	Geothermal	Total		
	MW	MW	MW	MW	MW	MW	%	
Algeria	1,010	3,000	-	360	5	4,375	15	2020
	5,010	13,575	2,000	1,000	15	21,600	37 ³ /27 ²	2030
Bahrain	-	-	-	-	-	250	5 ³	2030
Djibouti	300	200	-	-	500	1,000	100 ²	2025
Egypt	7,200	2,300 +	-	-	-	9,500	20 ²	2022
Iraq	-	300	-	-	-	300	1 ²	2020
Jordan	800	800	100	50	-	1,750	10 ⁴	2020
Kuwait	700	4,600	5,700	-	-	11,000	15 ²	2030
Lebanon	400	150-100	-	-	-	950-900 ⁵	12 ²	2020
Libya	600	344	125	-	-	1,069	7 ²	2020
	1,000	844	375	-	-	2,219	10 ²	2025
Mauritania	30	30	-	-	-	60	20 ²	2020
Morocco	2,000	2,000	-	-	-	6,000 ⁶	42 ³	2020
	4,200	4,560	-	-	-	10,090	52 ³	2030
State of Palestine	44	45	20	21	-	130	10 ²	2020
Qatar	-	-	-	-	-	1,800	20 ³	2030
Saudi Arabia	9,000	16,000	25,000	3,000 ⁷	1,000	54,000	30 ³	2040
Sudan	680	667	50	68	54	1,582 ⁸	11 ³	2020
	1,000	1,000	100	-	-	~2,100	20 ²	2030
Syrian Arab Republic	1,000	2,000	1,300	250	-	4,550	30	2030
Tunisia	1,755	1,510	460	-	-	3,725	30 ³	2030
UAE	Abu Dhabi	-	-	-	-	-	7 ³	2020
	Dubai	-	5,000	-	-	-	25 ²	2030
Yemen	400	8.25	100	6	200	714.25	15 ³	2025

Source: IRENA, 2016a, adapted from IRENA, 2016b, and LAS and RECREE, 2016

Arab countries are realizing that it is essential to reorient their energy strategies towards balanced and comprehensive long-term resource management policies. These strategies should be based on enhancing energy efficiency, rationalization of energy consumption, and the critical need to transition to sustainable forms of energy resources and consumption patterns.⁸² However, Arab countries face substantial challenges to their capacity to implement strategies for national renewable energy plans. These challenges include political commitments, legal frameworks, and institutional capacities. There are also financial, economic, technological, and infrastructure constraints.⁸³ Ultimately, the Energy transition in Arab countries will require the transformation of economic structures, to minimize dependency on fossil fuels through diversification in the energy mix, development of human capital, particularly in the energy sector, and minimizing of fossil fuel subsidies.⁸⁴

Figure 2.5: Renewable energy production in Arab countries by technology, 2000-2018



Source: Adapted from IRENA, 2019b

82. Al-Jayyousi 2015

83. IRENA, 2014

84. World Economic Forum, 2019

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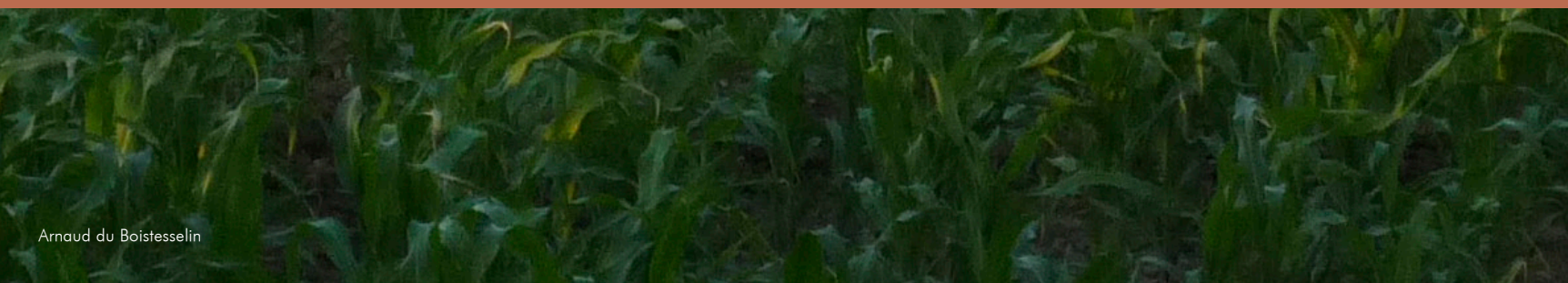
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Chapter 3

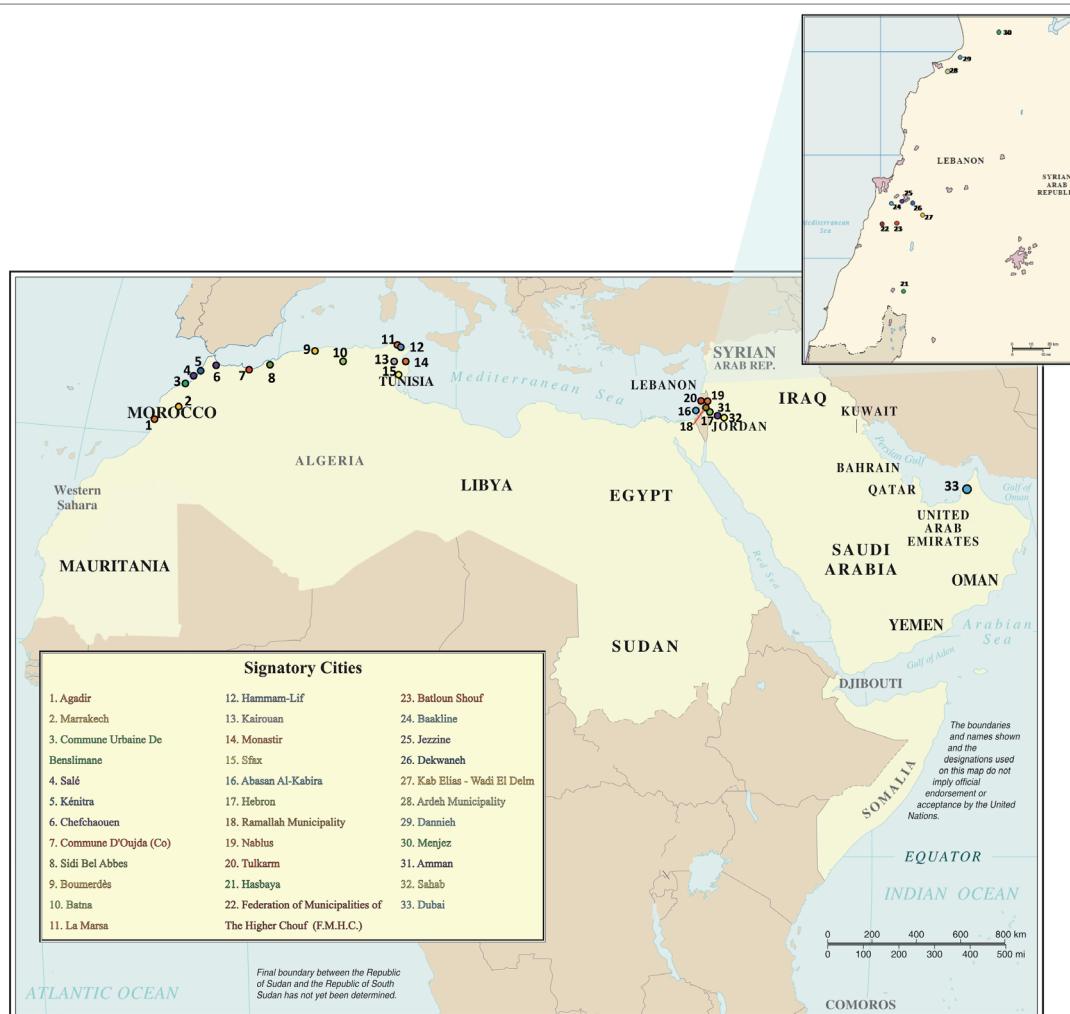
Developing Coordination Capacity on Climate Policies among Stakeholders



Chapter 3: Developing Coordination Capacity on Climate Policies among Stakeholders

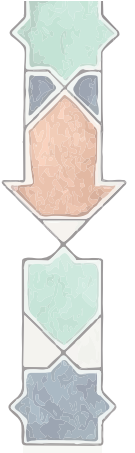
Throughout the world, governments are making various commitments in the fight against climate change. In this task, bottom-up engagement from local and subnational authorities is required. To this end, in 2008, the Covenant of Mayors Initiative was launched, aiming to gather local governments voluntarily committed to achieving and exceeding the European Union’s ambitious climate and energy targets. In June 2016, the Covenant of Mayors entered a major new phase of its history when choosing to join forces with another city initiative, the Compact of Mayors. The resulting “Global Covenant of Mayors for Climate and Energy” (GCoM) is the largest movement of local governments committed to going beyond their own national climate and energy objectives, to which more than 9,180 authorities from 131 countries have adhered.⁸⁵ In the Arab region, 33 municipalities have so far signed up to the GCoM (Figure 3.1).

Figure 3.1: Arab country signatories to the GCoM



Source: CEDARE, adapted from UN Geospatial Information Section, 2019; and UN Department of Field Support Cartographic Section, 2010; with data from GCoM 2019

85. GCoM, undated



a. Mainstreaming climate adaptation into national strategies and policies

Mainstreaming climate action involves the integration of information, policies, and measures to address climate change into ongoing development planning and decision-making.⁸⁶ To achieve set targets through the implementation of all envisaged climate mitigation and adaptation actions, the engagement and contribution of all governance levels should be sought, with the role of local and other subnational authorities being increasingly recognized, not only in their contributions to climate actions but in their ability to thus influence national urban policies.⁸⁷

Thematic areas such as the development and update of NDCs (see Table 2.1 for details of Arab country NDCs), the implementation of Low Emission Development Strategies (LEDs), and the elaboration of Climate Change Adaptation Strategies, require the collaboration of interdisciplinary multi-level actors across different levels of governance. The NDCs cover sectors requiring a multi-disciplinary field of expertise and responsibilities. As a result, there are different ministries, authorities, and stakeholders engaged in their implementation, a fact that puts additional strain on coordination efforts.

This is a difficulty that has only in the past years gained attention, especially at the EU level, through multi-level governance. Multi-level governance (MLG) is a term originally developed by the EU's Committee of the Regions (CoR) in 2009. It outlines the European Commission's aim to 'build Europe in partnership' and have an inclusive European decision making process: "Multi-Level Governance means coordinated action by the European Union, the Member States and Local and Regional authorities, based on partnership ... to create and implement EU policies. It leads to responsibility being shared between the different tiers of government."⁸⁸ Central to this concept, is the recognition that delivering policies, actions, and strategies, is more effective when we work together. In its simplest form, MLG means working together across different levels of government, in a vertical and/or horizontal cooperation process, to deliver policies and plans more effectively. Focusing on the coordination capacity required between the different actors on climate action, is an exercise in MLG, whether at the horizontal level (e.g., between ministries), or the vertical one (e.g., between ministries and regions, governorates, and local authorities).

By working together (through an MLG approach), public authorities can combine their expertise to benefit the planning process. This can achieve multiple benefits, helping them to:⁸⁹

- **Ensure coherence between plans:** a collaborative process can help to integrate plans and policies at national, subnational, and local levels (for greater efficiency).
- **Develop clear and consistent visions:** sharing knowledge and ideas between authorities can enable ambitious and realistic visions. Proper attention is paid to local realities, alongside the strategic needs (helping to achieve targets).
- **Share expertise, skills, and knowledge:** this can fill important skills gaps in the planning process and facilitate the spread of good practices, and innovative and pooled actions (for instance joint planning or joint procurement).

86. Klein, Schipper, and Dessai, 2003

87. UN-Habitat, 2016

88. EU, 2009, p.7

89. C-Track 50, 2018, p.2

- **Establish more favourable financing mechanisms:** partnering up with other authorities can create more secure and stable conditions to attract investments.
- **Communicate more effectively:** defining objectives collaboratively ensures that messages are harmonised between stakeholders (avoiding confusion).
- **Establish consistent monitoring and reporting tools or reporting structures,** to ensure plans are monitored more coherently between the local, subnational, and national levels.

Improved coordination capacity can be achieved through specific steering and technical committees established, e.g., at the ministerial level. To this end, the steering committee undertakes the decision-making process of how synergies between different ministries can be accomplished in the context of achieving the policies planned. The technical working groups plan the different actions to be presented. An advisory committee is also suggested in order to bring in private sector stakeholders. The key function of this committee is dialogue with actors in the private sector and civil society, whose frame of action falls within the area of climate policy planning.

Finally, the subnational or governorate level can be a valuable actor in guiding local authorities in climate actions in line with national policies.

b. Assisting local authorities in the design, implementation, and monitoring of SEACAPs

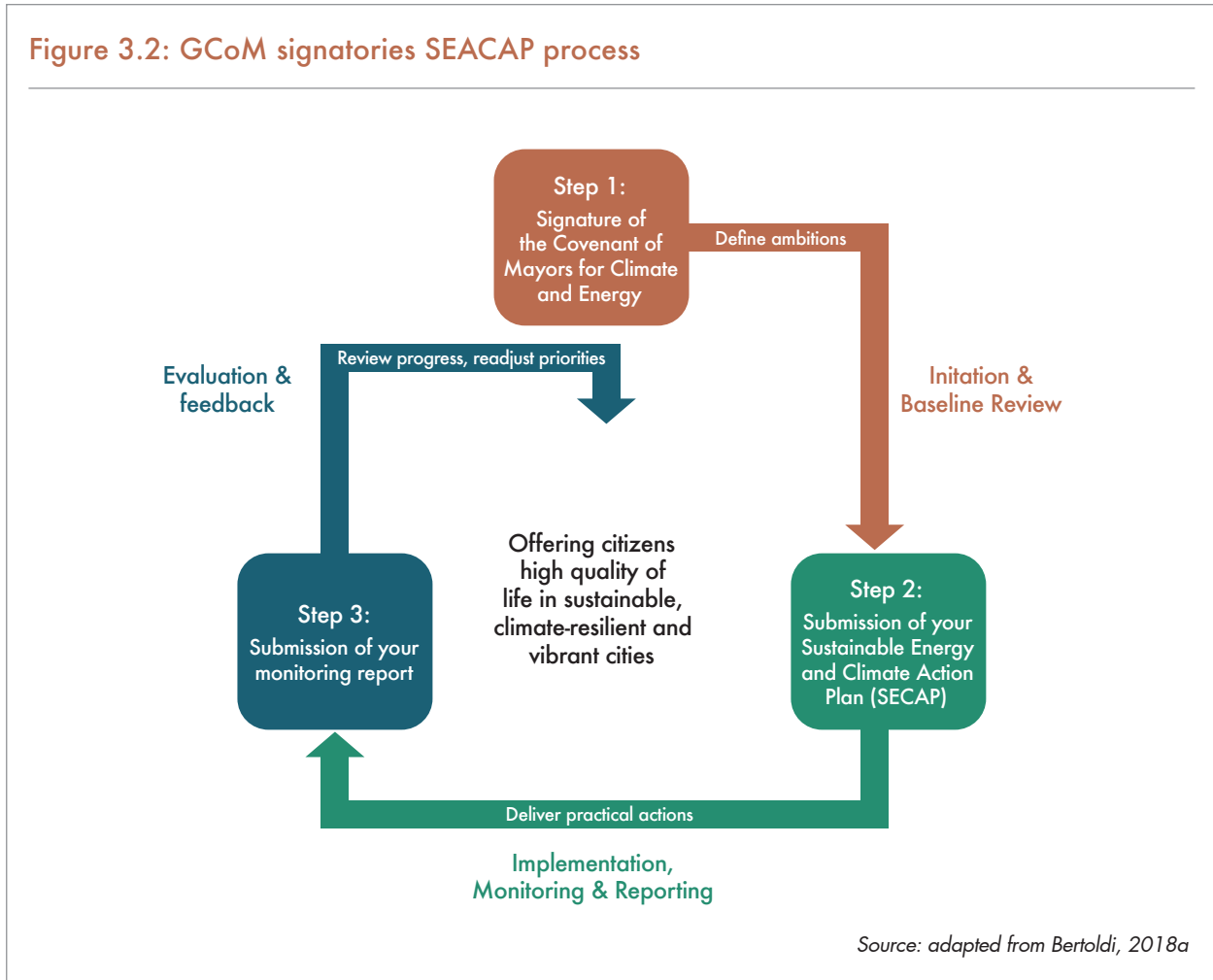
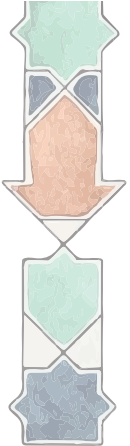
Although local and subnational authorities do not necessarily have the legislative obligation to prepare relevant strategies and policies, the GCoM movement, having recognised the importance of mainstreaming climate mitigation and adaptation into local strategies and policies, offers them the possibility to voluntarily work in this direction.

The Sustainable Energy Access and Climate Action Plans (SEACAPs)⁹⁰ are the key strategic policy document expected by the GCoM from local and subnational authorities, in which not just climate mitigation, but also climate adaptation, is embedded (See Figure 3.2). It shows how the signatory will achieve its commitments by 2030.⁹¹ Funded by the European Union (EU), the Clima-Med project⁹² works closely with numerous municipalities in the Arab region, to support their development and implementation of SEACAPs. The tools utilised for this are intensive capacity-building activities at the national level, as well as the development of simplified guidelines and templates, in order for municipal personnel to be able to respond to local needs. Finally, documentation summarising the key actions for addressing both climate mitigation and adaptation has been developed, in order to support the municipalities in the selection of the majority of their actions. Moreover, in order to support proper mainstreaming of these actions, monitoring indicators are provided.

90. The term SEACAP, also often referred to as SECAP in the literature, as used in this publication, commonly refers to a sustainable energy plan developed at the city level, that includes both mitigation and adaptation policies and actions. For some of the cities mentioned in the publication, however, the plans developed focused on their 2020 commitments were Sustainable Energy Action Plans (SEAPs), and did not include an adaptation parameter.

91. Bertoldi, 2018a. For further details and guidance on the preparation of SEACAPs under the GCoM, see Rivas and others, 2018; Bertoldi, 2018a; 2018b; and 2018c.

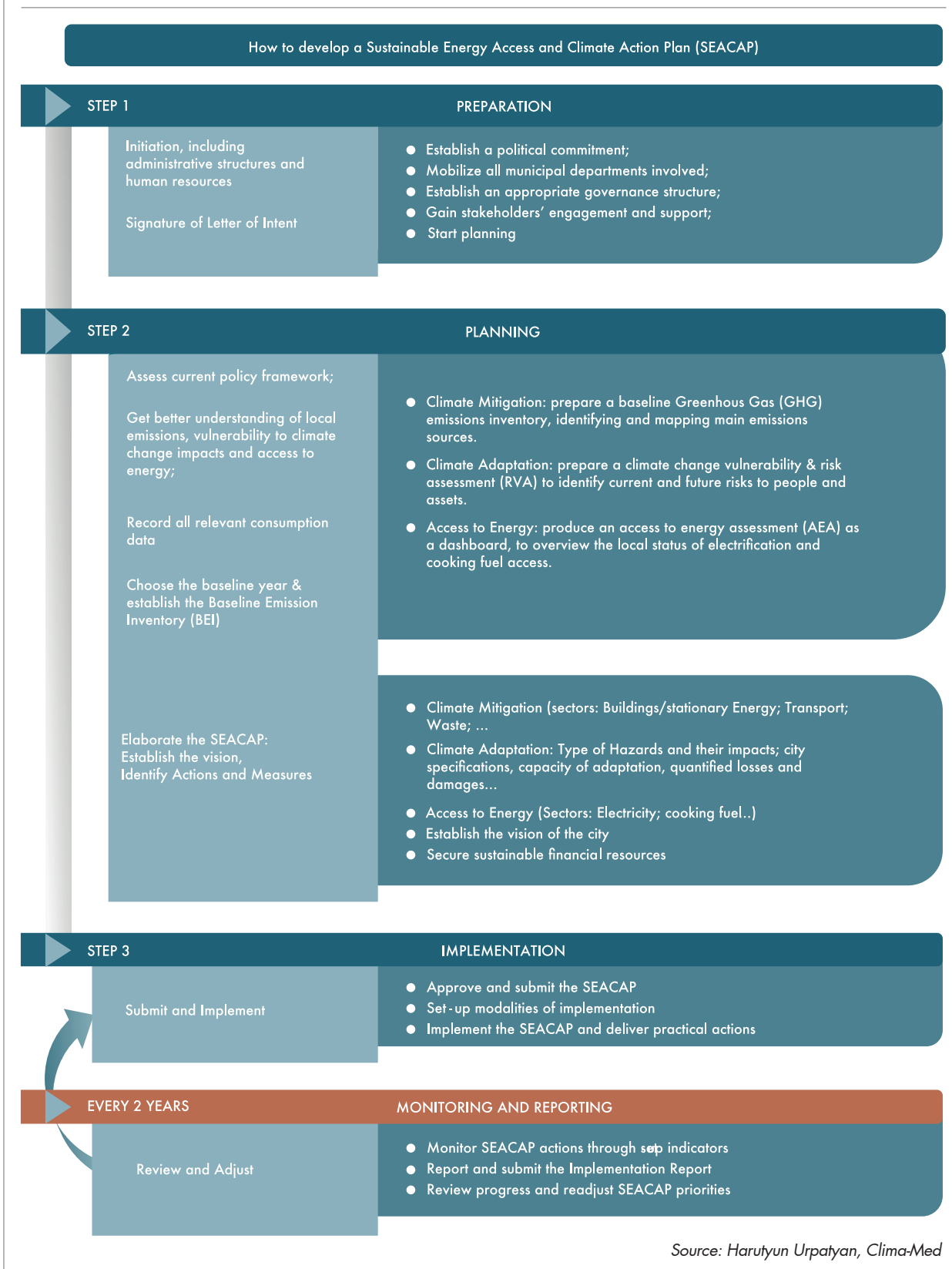
92. <https://www.climamed.eu/>

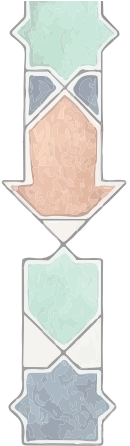


Cooperation among project related activities at each country level is achieved through the establishment of National Coordination Groups (NCGs), where stakeholders from engaged ministries and other relevant authorities take part. The basic objective of the NCG is to ensure that all carried out activities with national authorities are harmonised and closely coordinated. Besides the representatives from engaged ministries and authorities mentioned above, the Focal Point or National Representative and the Clima-Med Team Leader participate as well. The NCG works closely with other established coordination mechanisms in place, strengthening their operation.

Municipalities are also supported in the development of project fiches for priority projects in their region. Project fiches are a synoptic document of 4-5 pages, with a technical description of the action, the actors engaged, previous actions conducted to this end, as well as an approximate calculation of the overall cost, energy savings, or renewable energy production envisaged, as well as GHG emission reduction. Clima-Med works closely with several donors and International Funding Institutions in the region, that are highly interested in climate adaptation projects. To this end, the most mature project fiches, also in line with national priorities on climate adaptation, are presented for financing, in an effort to ensure their bankability.

Figure 3.3 Steps for developing a SEACAP





Municipalities have limited human and financial resources to achieve Covenant commitments. Clima-Med, and the Cleaner Energy Saving Mediterranean Cities project (CES-MED) before it, have worked with numerous municipalities in the Arab region on their energy and climate planning, in a systematic process of information analysis on their energy supply and demand, identifying and implementing the right set of strategies to mitigate GHG emissions and adapt to future climate change risks. Bundling efforts on SEACAP preparation, implementation and monitoring across multiple municipalities or governorates can make it easier to build a common vision, prepare an emissions inventory, and define a set of actions to be implemented. Moreover, high-impact actions can be more easily identified within the administrative boundaries of a pool of neighbouring local authorities, as the joint approach to energy planning allows for more effective results. Also, bundling of smaller projects across unions of municipalities or neighbouring local authorities closely collaborating, can lead to projects of a significant budget that can attract the interest of international financing institutions.

Table 3.1: Municipalities that have prepared SEAPs or SEACAPs in the Arab region

Algeria	Egypt	Jordan	Lebanon	Morocco	Palestine	Tunisia
Batna	The Red Sea	Aqaba	Baakline	Agadir	Hebron	Kairouan
Boumerdes	Luxor	Irbid	Beirut	Benslimane	Nablus	Sfax
Sidi Bel		Karak	Kab Elias	Oujda	Tulkarm	Sousse
Abbas		Sahab	Achkout	Chefchaouen	Abasan Al	
			Menjez		Kabira	

Source: GCoM, 2019

Clima-Med is working on mainstreaming the approach for SEACAP development through the following:

- Developing simplified tables on municipal facilities' consumption, accompanied by short and clear tailored guidelines, on the actors the local authority needs to contact in order to acquire the data, as well as the exact format of the data they will request. Basic knowledge is provided in the form of visuals, for example demonstrating where the required data is situated in an electricity bill, as it is not always certain especially in smaller municipalities, that the people carrying out this task have an engineering or similar background.
- Based on the experience acquired through the existing SEACAPs in place in all the Clima-Med countries, a customised approach is developed on how these plans can be deployed on a country basis. This includes not only the establishment of the Baseline Emission Inventory (BEI), but also the adoption of measures and actions that besides serving local needs, are also compatible with national priorities. Straightforward templates are also being developed.
- Working with national and subnational authorities to develop a data observatory for municipal consumption, in close collaboration with utilities (electricity, gas, water, etc.) providers. The data collection process across all energy consuming sectors can often be quite challenging. Having this data collected in a uniform way in an observatory, which municipalities can access, simplifies the SEACAP development process. As these energy markets are regulated, the process is envisaged to be more straightforward.



Local authorities are also assisted in the implementation and monitoring of their actions. Extensive capacity building activities are conducted for municipal staff on how to develop, implement, and monitor their plan, as well as prepare funding proposals addressed to national donors and financing institutions.

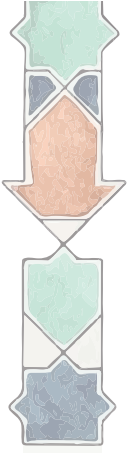
c. Establishing a framework for cooperation with national and local authorities

Besides the NCG, that can serve as a mechanism for coordination at the national level, another cooperation framework that was established for the development of SEACAPs is the SEACAP Support Mechanism (SSM). Its purpose is to:

- Improve national and local level cooperation, accountability, decentralization and local empowerment;
- Improve the 'bankability' of Energy Action projects;
- Support (urban) environmental/energy planning units in municipalities; and
- Exchange of knowledge and expertise.

The SSM has two levels:

- **Energy Actions (short term):** Technical Assistance to finance and implement the Energy Action Fiches and the further development of the Actions listed in the SEACAP to develop (bankable) projects fiches.
- **Sustainable Energy and Climate Action Plans (long term):** Dissemination of SEACAP development and implementation to other municipalities and potential adherence to the GCoM.



Part of the responsibilities of the SSM would be to follow up on the support and implementation of energy actions and SEACAPs, and to disseminate this comprehensive energy planning tool to other municipalities.

It is intended that the SSM would:

- Take on the role of the GCoM coordinator.
- Be responsible for emissions and energy data collection. The BEI sheet of the GCoM could be used as a basis.
- Coordinate with donors on energy projects and related technical assistance. The Action Fiches would be very helpful for this.
- Coordinate with municipalities, especially neighbouring ones, in case of small projects in the same thematic field (particularly street lighting that constitutes a priority for the majority of municipalities), for the purpose of bundling these projects into one common fiche to attract investor interest.
- Follow up on the monitoring of energy consumption and CO₂ emissions reductions.
- Facilitate information exchange between pilot municipalities.

d. Creating synergies at the national and global levels

Policies address mitigation and adaptation differently, while they complement each other, and both must be implemented at multiple scales, from global to regional to national to local. At the global level, responses have focused more on reducing GHGs in the atmosphere, i.e., mitigation; than on reducing the vulnerability of societies and ecosystems to climate change, i.e., adaptation. In Arab countries, the subnational and local dimensions of climate change are rarely addressed; and so is the integration of mitigation and adaptation policies at subnational and local levels. Clima-Med is therefore exploring ways and aims to provide answers to create synergies at global, subnational, and local levels; as well as for the integration of mitigation and adaptation in South Mediterranean countries.

Synergy between mitigation and adaptation from global to subnational to local

Developing policies and measures integrating adaptation and mitigation, from global to subnational to local in the Arab world is challenging, therefore creating synergies that are well adapted to the context of the region is essential. The Clima-Med project attempts, through the identification and implementation of strategies for coordinating and mainstreaming climate actions at the national level, to translate these synergies into concrete, bankable, low-carbon projects at the local level, and to demonstrate that these challenges are worth overcoming for the integration of a climate approach into policies and strategies that benefit the global environment while contributing to local development.

Synergies are possible. But mitigation measures can also affect the adaptation of local populations. For example, to protect the carbon stock, a project may prohibit, or reduce, local people's access to natural resources and thus limit opportunities for development and adaptation. The mere presence of ecosystems providing services is insufficient; vulnerable populations still need to benefit, have rights over resources, and have access to them. Safeguards are needed so that mitigation projects do not

harm local people. These issues are well addressed in the Clima-Med project approach, which aims to identify low-carbon projects for greater resilience of South Mediterranean cities while reconciling mitigation and adaptation at the regional, national, subnational, and local levels.

Therefore, adaptation and mitigation are not limited to ecosystem services. They are part of the larger issue of sustainable local development that assumes that local people should have diversified livelihoods over the long term, particularly to prevent ecosystem degradation. Adaptation and mitigation measures also involve creating synergies where populations, national, or local institutions can exchange knowledge and expertise, and coordinate their practices. Finally, they require flexibility to adapt to rapid changes and the possible negative impacts of measures taken through development policies and projects. This involves observing and analysing the effects of the measurements, making adjustments and putting them into practice. In order to reconcile the issues of a global environment with local development, Clima-Med creates links and synergies between adaptation and mitigation measures and also integrates both approaches into policies, whether national or local.



Arnaud du Boistesselin

Benslimane, Morocco, GCoM signatory with completed a SEAP

For example, development or nature conservation policies would address the adaptation of local populations and ecosystems to climate change through projects addressing urgent issues, and would also benefit from international funding for their contribution to mitigation.

Such integration requires the establishment of new forms of governance, local, national, and international. For example, it is essential to create links between institutions and between sectors, between those who

manage ecosystems and those who benefit from services. Directly involved, local actors are expected to play a major role in policy integration. For policies to be effective and equitable, local interests must be represented in policy development and implementation, for example within the trading and negotiation platforms to be created through the constitution of the NCGs. NCGs and Clima-Med experts can also be mobilised as mediators between policy makers and local actors, facilitating information transfer and engaging in platforms for dialogue between researchers, politicians and citizens.

e. Promoting awareness-raising and stakeholder dialogue

General information campaigns as well as targeted awareness-raising actions seek to engage citizens and stakeholders to play their part in building a sustainable energy and climate friendly future. Local authorities can implement such campaigns through a set of communication tools to promote their plans, share their objectives within their territories, and help raise the awareness of citizens about sustainable policies.

Citizen awareness and pro-environmental actions play a crucial role in making environmental policies successful. Developing and implementing efficient participative communications campaigns can lead to tangible energy savings and climate-friendly behaviour change. The campaigns should engage all citizens and stakeholders and encourage them to play their part in building a sustainable, energy efficient, future.

This approach must be participatory and tailored in order to:

- Raise awareness among local and national authorities as well as civil society;
- Change behaviours and engage citizens to commit to necessary efforts;
- Ensure greater visibility of projects by communicating news and results to local populations;
- Educate those who are already motivated to promote energy efficiency but lack the knowledge to do so; and
- Promote the GCoM movement.

To succeed, awareness campaigns and actions should combine the following characteristics:

- Consistency (clear definition of target group and articulation of measures);
- Well distributed cost among stakeholders and the State;
- Flexibility;
- Administrative simplicity;
- Quality of information and awareness;
- Participation and motivation of different actors;
- Continuity (introduction of structural, planned and sustainable policy); and
- Substantial environmental benefits.

Defining the CAPP

Through the experience gained in working with local authorities on their energy and climate planning under the CES MED project, the need for local authorities to successfully engage with their citizens arose.



To this end, a Citizens Awareness Promotion Plan (CAPP) can be developed in order to make citizens more aware of selected issues and to hopefully secure a certain level of commitment and participation from them to the cause at hand. The CAPP focuses on raising awareness on priorities identified by local authorities in the process of SEACAP development and from the final SEACAP during implementation. The CAPP may contribute to raising awareness on renewable energy solutions and energy efficiency, thus contributing to reduction of CO₂ emissions, as well as efficient water and waste management, environmentally-friendly public transport, etc.

The purpose of the CAPP is to ensure that both local authorities and citizens have adequate opportunities early on in the planning process to discuss, understand, and try to resolve issues related to the perceived impacts of a proposed project. It is meant to facilitate ongoing communication between the authority, the citizens, and interested stakeholders.

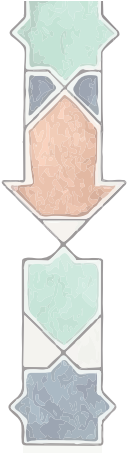


Malek Mardam

The CAPP contains a study of local needs and potential, the description of the programme proposed to fulfil those needs, and the way in which it can be implemented. A CAPP guidelines manual has been developed to be used alongside the SEACAP guidelines; in particular, as it concerns two main aspects of communication and awareness: engagement of stakeholders, and behavioural change measures.

Engaging with the population / stakeholders

The preparation and implementation of the CAPP requires the involvement of all project stakeholders, including national authorities, industries, media, funding institutions, opinion leaders, non-governmental



organisations (NGOs), and citizens. While the CAPP is directly aimed at citizens, its success largely depends on the ownership of the process and engagement of all afore-mentioned groups in order to identify the best tools, tone, and activities with which to convey the desired message to each target group.

Stakeholder engagement and commitment can be secured if they are empowered with clear responsibilities and kept abreast with effective communication channels, thus ensuring that they are consulted on a regular basis throughout the process of identification of SEACAP actions and CAPP activities. The sooner stakeholders are involved, preferably as early as the planning level, the more likely they are to engage in the actual implementation of activities.

Steps to be carried out when developing the CAPP

The CAPP preparation follows the sections below in order to provide guidance actions and be useful in stakeholder engagement through setting out considerations when carrying out the following activities that are all indirectly linked to CAPP:

- Establishing a City Profile (needs assessment survey, audience segmentation, etc);
- Setting the communication objectives in relation to the city's vision;
- Defining actions for the challenges and priorities identified by local authorities in the SEACAPs development;
- Identifying previous awareness raising actions and formulating future plans;
- Identify the profile of all stakeholders concerned and engage appropriate actions to involve them;
- Identification of the residents, property owners, interested parties, political jurisdictions, and public agencies that may be affected by the proposed development;
- Conduct a media mapping and analysis;
- Setting a communication plan;
- Defining CAPP activities;
- Selecting communication tools; and
- Establishing the action plan and budget.

Integrating the awareness raising component in the SEACAP

In addition to the public consultation requirement of the SEACAP, a reference to the CAPP is to be included in each SEACAP document. For each identified SEACAP action, parties are invited to create, propose, and implement a related CAPP activity.

During CAPP training workshops conducted for the cities in coordination with the SEACAP consultants, a presentation of the CAPP Guidelines and the methods on how to prepare and implement a communication and an awareness campaign showing techniques, materials, and models demonstrating benchmark examples and references to best practices from across the world are delivered.

Afterwards, a 'Communication Kit' is handed out to participants. This 'Communication Kit' contains methodologies, templates, and other descriptive materials on how stakeholders can develop innovative

awareness-raising actions and materials specifically tailored to the needs of the cities. Participants begin by identifying and analysing their communication purposes based within and (sometimes) outside the local authority; they attempt to assess which kinds of content the LA typically communicates, how, when and to whom; as well as which recipients receive active and passive communicators. They are then invited to select specific priority topics on which they wish to build awareness and to identify the most suitable and available communication channels through which they would transmit their message. These findings are then included in the awareness-raising chapter of the SEACAP.

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Chapter 4

Case Studies of Climate Action at the Local Level

Chapter 4: Case Studies of Climate Action at the Local Level

a. Methodology for identifying and selecting case studies

The methodology for identifying and selecting case studies followed four key steps:

Step 1: Literature review and data collection

A thorough literature review and data collection process preceded and formed the basis for this chapter. The existing literature, such as publications by the GCoM, the Joint Research Centre (JRC), local strategy papers and agendas, and other reports were searched to identify successfully implemented actions on the local level in line with local adaptation, mitigation, and climate action plans. Furthermore, the 'Building Capacities for Climate Action at the City Level in the Arab Region' workshop that was held in Beirut, Lebanon, from the 18th to the 20th of February 2019 served as a source for data collection through the discussions and presentations made by participating local authorities.

Step 2: Case selection

Cases were selected from the Arab region and internationally, based on:

1. Geographical coverage: sub-regional diversity in selection of case studies from the Arab region.
2. Sectoral coverage: In GCoM guidelines,⁹³ sectoral analysis is highlighted to ensure broad coverage of climate adaptation and mitigation measures.
3. Socio-economic diversity, i.e., countries with different income levels.

Step 3: Data verification and validation

To verify and validate the findings, information from different reports was cross-checked. In case of discrepancies, advice was sought from the local authority.

Step 4: Where possible, some initial conclusions will be drawn between Arab and international case studies, their challenges and successes, as well as their differences and similarities.

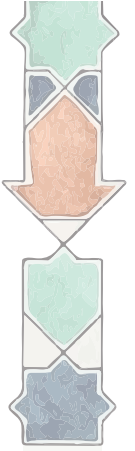
b. Best practices on adaptation action at the local level from the Arab region

This section illustrates some of the best practices on adaptation projects implemented in the Arab region. According to the GCoM methodology for Southern Mediterranean adaptation, nine types of climate hazards can potentially negatively affect communities, their economies, and the environment: extreme heat, extreme cold, extreme precipitation, floods, sea-level rise, droughts, storms, landslides, and forest fires.⁹⁴ These are intrinsically linked in the context of the investigated countries, where issues of water scarcity, heat waves, and coastline vulnerability constantly reappear.

The presented cases come from Saudi Arabia and Palestine, and while the first focuses on water management, the second is a multi-sector one. The review shows that often, municipalities are pushed to act on climate change as a response to the broader landscape of economic, social, and health needs of the community.

93. Rivas and others, 2018

94. Rivas and others, 2018



Water Sector

The Arab region is considered the most water-scarce region of the world. Disputes over water can lead to tensions, and unreliable water services can prompt people to migrate in search of better water access opportunities. Water investments take up large amounts of public funds, which might often be diverted from education, health, or energy. As the region's population continues to grow, water availability per capita is set to fall and if climate change affects weather and precipitation patterns as predicted, the Arab region may see more frequent and severe droughts and floods (See Chapter 1). A broad range of options exist to manage water properly; reducing demand, increasing supply, transfer between different sectors, transfer within different sectors, increasing storage, and water harvesting technologies,⁹⁵ like in the case study at hand.

Case Study No. 1: The city of Jeddah and water management

Saudi Arabia is one of the driest countries in the world and issues of water use, water management, and desalination are at the top of the policy agenda. At the same time, the country is facing rapid urbanization and population growth. Although seawater desalination alone will not be able to provide sufficient supplies to meet the country's increasing freshwater demand, unsurprisingly, the desalination plants currently installed in the country account for 30 per cent of the world's desalination capacity.⁹⁶ On the local level, the city of Jeddah has consistently faced water challenges and disasters - flash floods in 2011, torrential rainfall in 2014, a major flooding in December 2015 with storm water runoff, heavy rains in 2017, all causing significant damage; the 2009 flooding (Figure 4.1) caused 150 casualties, and the intense raining dumped 90 mm of rain in four hours over an area that normally receives 45 mm per year.⁹⁷

Figure 4.1: An aerial view of Quwaiza, Jeddah, in the aftermath of 25 November 2009 floods in Jeddah



AN photos by Ghazi Al-Mahdi

95. Terink and others, 2011

96. Drewes, Garduño, and Amy, 2012

97. Verner, 2012

In order to respond to the described challenges, the city of Jeddah has undertaken multiple measures to address water management and water re-use. Accordingly, Jeddah was ranked 39 in the Arcadis Sustainable Cities Water Index examining the water sustainability of 50 cities from 31 countries across all continents of the world.⁹⁸ The index is based on the three pillars of water sustainability: resilience, efficiency, and quality. The same ranking puts Jeddah, Riyadh, and Los Angeles as the leaders in wastewater reuse.⁹⁹ Furthermore, the case of Jeddah is of interest given its inclusion as a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site.¹⁰⁰ Actually, historic Jeddah is seen as “the last surviving urban site along the Red Sea coast that still preserves” the attributes of a unique culture.¹⁰¹

In 2012, Jeddah Municipality launched several permanent flood and rainwater drainage projects, including new dams, drainage channels in the north, south, and east, and a new floodwater drainage system at the airport. However, in a report issued in 2015, the municipality said it was able to cover only about 25 per cent of the city with the rainwater drainage system.¹⁰² Hence, the municipality of Jeddah has continued its efforts in addressing the issues and building the resilience of its territory. In 2018, the Saudi government started work on a comprehensive rainwater drainage project in Jeddah worth US\$799 million and covering 30 critical and sensitive locations in the city.¹⁰³

In 2019, the Minister of Environment, Water, and Agriculture, Eng. Abdulrahman Al-Fadhli, signed agreements to build the Jeddah 2 Independent Sewage Treatment Plant. With a design capacity of 500,000 cubic metres per day, the plant will serve Jeddah city and meet its increasing needs.¹⁰⁴ It is part of an ambitious national plan targeting water production and sewage treatment projects being offered to investors in various regions of the Kingdom.¹⁰⁵ In this sense, the case of Jeddah Municipality also showcases participation of the private sector in economic development. Although the municipality has allocated significant resources from the national budget, it is also exemplary in utilising public-private partnership in sustainable water management. In 2008, private entities won the water and sanitation services management contract to serve Jeddah for a 7-year period, where the purpose of the contract was to upgrade and modernise the water and sanitation services in Jeddah and improve the quality of the service delivered to users.¹⁰⁶ The contract included a training centre delivering employee training over the first two years accredited by renowned European certification bodies such as the International Water Office.

This case illustrates the constant struggles and expenses that a municipality needs in relation to climate change. The city has adopted various technical measures over the years, and climate adaptation remains a smart option to target issues of health, as well as resource use and efficiency.

98. Arcadis, 2016

99. Arcadis, 2016

100. UNESCO, undated

101. UNESCO, undated

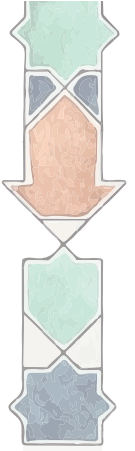
102. Saudi Gazette, 2018

103. Saudi Gazette, 2018

104. Saudi Gazette, 2019

105. Saudi Gazette, 2019

106. SUEZ, undated



Multi-sectoral

Given the vulnerability of the region, it is of a particular importance to implement actions that address overall urban resilience. As in the case of the city of Jeddah, it is recommended that a variety of actions are implemented in order to effectively tackle the issues linked to climate change. In addition, awareness-raising for citizens, and dissemination of the right message in favour of sustainability and adaptation, are essential for the achievement of long-term results and behaviour change. At the same time, public buildings, public transport, and public lighting have been identified as key sectors under the GCoM Framework since they fall under the mandate of the municipalities.¹⁰⁷ Hence, coupling construction or upgrade of public spaces and buildings with awareness raising can be a useful course of action for any local authority.

Case Study No. 2: Towards sustainable schools initiative in Gaza

Ensuring sustainable services to citizens is a priority for Palestine. Environmental and energy challenges in the country include, among other things, non-efficient use of renewable energy, water shortages, environmental degradation, and absence of well-planned green areas and open spaces.¹⁰⁸ Furthermore, the Gaza Strip and West Bank demographics are characterised by rapid growth and a young population living in challenging economic conditions, while schools were used as designated emergency shelters for displaced families who had to flee their homes during the various hostilities.¹⁰⁹

Actions targeting climate adaptation through system resilience and disaster risk reduction measures are not new to the city of Gaza. In the spirit of long-term sustainable development and reduction of vulnerability of communities, the UNDP Programme of Assistance to the Palestinian people funded reconstruction of educational institutions integrating eco-sustainable infrastructure and renewable energy. Under the “Right to Education in the Gaza Strip” Programme Student Design Teams were established “to lead beautification initiatives at five public schools across Gaza, with themes that range from recycling waste materials and greening the school environment to promoting Palestinian heritage.”¹¹⁰

One of the main services provided by the Municipality of Gaza is public awareness for the preservation of public health and the environment. For this purpose, the Municipality took part in 2016 in the project “Towards Sustainable Schools Initiative” implemented by the Arab Youth Climate Movement (AYCM) - Palestine and Natuf Organization for Environment and Community Development in cooperation with the Directorate of Education - West of Gaza; a multi-stakeholder collaboration involving civil society organizations (CSOs) in the implementation of climate actions. The initiative aimed “at promoting environmental trends among school students by involving them in activities designed to provide them with sound environmental behaviours and environmental practices that contribute to the preservation of society and the environment.”¹¹¹ It further aimed to change cultural values related to waste reuse and recycling and empower young people to be leaders in their schools, their families, and their communities.

107. Rivas and others, 2018

108. Asfour, 2014

109. Seitz, 2017

110. UNDP, 2017

111. AYCM, 2016

The initiative targeted students and teachers in four schools in Gaza City and included tree planting and reuse of used tires as containers to collect waste within the school (Figure 4.2). It had a gender-balanced approach to participation by targeting two schools for girls and two schools for boys. The outcome included 100 planted seedlings and 40 containers made with used wheels. The activities are documented and available through a dedicated social media page with the motto “Hugging a tree is nice. Planting one is even better.” and using hashtags such as #ParisAgreement #Trees4Earth to raise awareness of international climate negotiations.¹¹²

Figure 4.2: Tree Planting and waste reuse activities from ‘Towards Sustainable Schools Initiative in Gaza’



c. Best practices on mitigation action at the local level from the Arab region

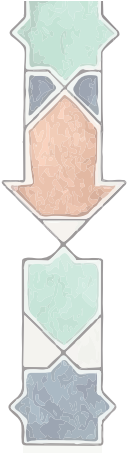
This section presents some of the best practices in mitigation projects developed by Arab cities. The cases chosen represent countries with different development status as well as countries that are not signatories of the GCoM. They cover different sectors and demonstrate that there is a vast variety of initiatives that can be undertaken according to community needs and resources. It should be noted that such mitigation efforts are not necessarily undertaken within national climate change policies; rather, in most instances, they are adopted to achieve certain economic, social, or environmental objectives.

Transportation Sector

In the transport sector, Arab cities can benefit from some of the policies and measures that aim at creating sustainable transport systems, and some have started already.¹¹³ These include the development of road transportation master plans, efficient traffic management systems to reduce traffic idle times, improvement of transport infrastructure, imposition of tariffs or taxes on vehicles, application of varied road tolls, discouragement of the use of private vehicles, improvement of the public transport system, and improvement of vehicle maintenance or replacement of old vehicles.

112. AYCM, 2016

113. ESCWA, 2009



Case Study No. 1: Cairo Vehicles Scrapping and Recycling Programme

Cairo is considered as the source of 40 per cent of the total gas pollution emitted by transportation in Egypt. The city's atmosphere also traps GHGs including CO₂, increasing health risks, such as heart disease, asthma attacks, and cancer. The Egyptian government has been trying to combat the harmful effects of aging vehicles with higher GHG emissions for a long time.¹¹⁴



Guillén Pérez / CC BY-ND 2.0

Older taxis in Tahrir Square, Cairo, 8 May 2009

In 2008, the Egyptian government issued the new Traffic Law Number 121/2008 which prohibited issuing or renewal of operating licenses for mass transport vehicles that are 20 years or older, with the aim of improving air quality and reducing GHGs. Without specifying how affected vehicles are to be disposed of and proper enforcement, the law then gives vehicle owners the chance to: a) continue to operate their vehicles; b) sell said vehicles to areas with poor law enforcement to operate as taxis; c) convert vehicles to their own private use in case of taxis (such conversion to private vehicles is allowed by the law); and/or d) dismantle the vehicles and sell the engines for use in other vehicles. Unfortunately, without a scrapping and recycling component to ensure that older vehicles are taken off the road and that the vehicle components are permanently and safely disposed of, the law cannot have its intended impact on safety, air quality, and GHG mitigation.¹¹⁵

In this regard, in April 2009, the Egyptian Ministry of Finance in cooperation with Cairo Governorate initiated the Vehicle Scrapping and Recycling Programme for the Cairo region. Under this initial phase, a

114. Tawfeek, 2018

115. UNFCCC, 2011

taxi replacement and recycling programme on a voluntary basis was launched, where private taxi owners receive financial and other incentives to surrender their old vehicles for new, fuel-efficient models (Figure 4.3); while the older vehicles are scrapped and recycled. With an initial focus on taxi replacement in Cairo, this collaborative effort between the government and the private sector offers an attractive financial package for owners of taxis older than 20 years. This includes a 25-30 per cent reduction in the price of a new replacement vehicle, US\$3,595 in subsidies and tax waivers, discounts on loan terms and insurance agreements, and other incentives. The estimated total programme cost could reach about US\$620.24 million, depending on the number of participants, share of each model, etc..¹¹⁶ The new taxis have been modified to use less gas, therefore producing fewer emissions. Less gas consumption also benefits the drivers by increasing their profit margin. The new vehicles operate on compressed natural gas, which is more environmentally friendly and produces the least possible amount of GHGs.

Figure 4.3: Older taxis (left), replaced by newer ones (right) through the Vehicle Scrapping and Recycling Programme



The programme was registered as a Clean Development Mechanism (CDM) programme of Activity on May 2011, fully supported by the World Bank. Taxi owners in Cairo have given the government more than 45,000 taxis to scrap and recycle, helping decrease Egypt's CO₂ emissions between 2013 and 2018 by 350,000 tonnes.¹¹⁷

Building and Construction Sector

Energy use in buildings accounts for nearly 40 per cent of global energy consumption and 36 per cent of total energy-related CO₂ emissions.¹¹⁸ In general, two major strategies have been used to improve energy efficiency in the building sector and thus reduce its GHG emissions: The first strategy is to improve the energy efficiency of the building envelope, i.e. external walls, floors, roofs, ceilings,

116. ESMAP, 2010

117. ESMAP, 2010

118. IEA, undated

windows, and doors; which is critical for determining how much energy is required for heating and cooling. The building envelope's impact on energy consumption should not be underestimated: globally, space heating and cooling account for over one-third of all energy consumed in buildings, rising to as much as 50 per cent in cold climates and over 60 per cent in the residential sub-sector in cold climate countries.¹¹⁹ The second strategy is to improve the efficiency of energy-consuming equipment used inside the buildings, such as home appliances, lighting systems, air conditioning systems, computers, and other office equipment.

In this regard, many Arab countries like Egypt, Tunisia, Lebanon, UAE, Algeria, Syria, and Kuwait have already established different kinds of building codes, energy efficiency standards and energy labels for common home appliances. If enforced, it is estimated that these codes and standards would save about 20 per cent of building energy consumption.¹²⁰

Case Study No. 2: Masdar City in Abu Dhabi, UAE

A pioneering initiative in the UAE is Masdar city, Abu Dhabi; the world's first zero-carbon, zero-waste, and car-free city. The project is led by Masdar, a subsidiary of Mubadala Development Company. Initiated in 2006, the city was envisioned to cover 6 square kilometres, to host 40,000 residents and another 50,000 daily commuters, and estimated to cost US\$18-22 billion.¹²¹

Construction began on Masdar City in 2008 and the first six buildings of the city were completed and occupied in October 2010. However, due to the impact of the global financial crisis in 2008, the initial 300,000 square metres only completed in 2016; and final completion date is now estimated to be 2030¹²². Masdar's philosophy of urban development is based on the three pillars of economic, social, and environmental sustainability. Masdar City is a 'greenprint' for the sustainable development of cities through the application of real-world solutions in water, energy efficiency, and waste reduction.

119. IEA, 2013

120. AFED, 2009

121. Goldenberg, 2016

122. Goldenberg, 2016

Figure 4.4: Electric PRT vehicles at Masdar City, Abu Dhabi



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Cars are banned within the city; travel is by public mass transit and personal rapid transit (PRT) systems (Figure 4.4), with roads and railways connecting commuters to other locations outside the city. The city is walled, to keep out the hot desert wind.¹²³ The lack of cars allows for narrow, shaded streets that also improve air circulation and reduce demand for air conditioning.¹²⁴ The city was oriented northeast to minimise the amount of direct sunlight on building sides and windows, while solar panels and solar collectors on roofs and elsewhere generate enough electricity to meet most of the city's electricity needs, and water is provided through a solar-powered desalination plant.¹²⁵ Landscaping within the city and crops grown outside the city are irrigated with the treated wastewater produced by the city.¹²⁶

Masdar City is open to the public. It brings together tourists, residents, students, academics, entrepreneurs, business leaders, and investors in a collaborative environment. It is envisioned to be a free zone and clean-tech cluster home to around 1,500 visionary companies and research centres.¹²⁷

123. Economist, 2008

124. Economist, 2008

125. Economist, 2008

126. Economist, 2008

127. Masdar, 2019

Masdar City was elected to host the newly established International Renewable Energy Agency (IRENA); a milestone achievement for Abu Dhabi, and marks the first time that an Arab city plays host to the headquarters of an international organization. The IRENA headquarters complex covers about 32,064 square metres. Passive design and smart-energy management systems enable the complex to consume 64 per cent less energy than typical office buildings in Abu Dhabi.¹²⁸

Waste Sector

Waste management in Arab countries is generally characterised by a high percentage of uncollected waste, with much of it directed to open or controlled dumpsites, rather than designated dumpsites, or sanitary landfills.¹²⁹ In addition to being poorly managed, these sites generally lack most of the engineering and sanitary measures for leachate collection and treatment, as well as methane capture. Sorting and composting facilities are being operated with limited capacity in some countries, e.g., Egypt, Syria, Lebanon, Tunisia, Morocco, Saudi Arabia, and Qatar.

Organic waste still represents more than 50 per cent of the composition of solid waste in many Arab countries. This is a large, and mostly untapped, potential source of methane emissions.¹³⁰

Case Study No. 3: Fès landfill gas recovery, reuse, and flaring project

The Fès landfill is the first controlled landfill built in Morocco in April 2004. The landfill was constructed by the consortium Edgeboro-Ecomed, and to be operated by them for a period of 10 years, later extended to 30. After six months of receiving municipal solid waste from the Urban District of Fès, the landfill started to produce gas that started to escape from the underlying leachate collection system.

Although there was no regulatory requirement to deal with the gas, an internal decision was made by the project developer to temporarily burn it for safety reasons. The burning of the gas took place on an average of 10 days per year through an open pipe extended from the leachate collection system. The Commune Urbaine de Fès and the operator studied several alternatives to deal with the overall landfill gas collection (LFG) and treatment on a long term basis. They finally decided to implement a flare gas recovery system which included the installation of enhanced LFG extraction and flaring equipment for the destruction of the landfill gas and the installation of electricity generation (aggregating to 3.0 MW) equipment for the production of onsite electricity also using LFG. These activities involved the combustion of methane contained in the LFG, leading to the reduction of GHG emissions.¹³¹ The captured LFG will be utilised in gas engines that will generate electricity and be sold to the grid after factoring in the auxiliary consumption of the gas engines and project site. If the LFG is ever in excess when gas engines are not operating, it will be burnt using the flare system (Figure 4.5).¹³²

128. Gelil, 2009

129. AFED, 2011

130. AFED, 2011

131. UNFCCC, 2014

132. UNFCCC, 2014

Figure 4.5: LFG collection system, Fès landfill, Morocco



As the project was not financially viable due to the high construction and operation cost, the project was developed under the umbrella of the CDM programme of the Kyoto Protocol in order to offset part of the cost of the project by selling Certified Emission Reductions earned by implementing the project.¹³³

Renewable Energy Sector

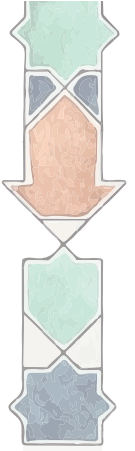
The potential for wide-scale deployment of renewable energy technologies in the Arab region is considerable. Rapid demographic growth and the rising need for economic development call for additional, stable, energy sources that can satisfy demand while protecting the environment (See Chapter 2 for a detailed discussion of this issue).

Since 2014, most Arab countries have scaled-up their interest in renewable sources of energy, especially wind and solar power generation, which offer the highest technological and market maturity.¹³⁴ Most Arab countries have, or are in the process of creating, a viable market for renewable energy investments. This is accomplished through enabling conditions (feed-in-tariffs, net metering, auctions, etc.) and attractive tariffs to encourage private investors to enter the market. These enabling conditions are being increasingly supported by official, long-term renewable energy targets set by governments to ensure a tangible impact for scaled-up renewable energy investments in the Arab world.¹³⁵

133. UNFCCC, 2014

134. IRENA, 2016

135. IRENA, 2016



Case Study No. 4: Utilization of PV technology in mosques in Amman, Jordan

Jordan faces a serious and complicated challenge in meeting its growing energy demand at a rate of more than 5 per cent annually. Jordan currently imports about 96 per cent of its energy needs costing annually about 20 per cent of GDP. Renewable energy, particularly wind and solar, offer great potential for securing a good portion of the country's energy needs. Jordan's recently released energy strategy aims to increase the renewable energy share in the energy mix to 10 per cent by the year 2020¹³⁶. In addition, Amman is one of more than 70 cities worldwide that are aiming to become carbon neutral by 2050, meaning they will produce no climate-changing emissions more than they can offset.

Figure 4.6: The Hamdan al-Qara mosque in southern Amman covered in rooftop PV panels



Middle East Online, 2018

Mosques are major electricity consumers as five prayer times throughout the day keep their doors open pre-dawn to well after sundown. They require artificial lighting and often feature mechanically heated and cooled air to keep worshippers comfortable. The Jordanian government spends over US\$70 million annually to run and maintain its existing inventory, and construct an average of 150 new mosques every year.¹³⁷

136. Hussein, 2015

137. O'Keefe, 2015

In this regard, the Ministry of Religious Affairs started a programme in 2014 to make mosques 'greener' in Amman by using solar energy (Figure 4.6) and power-saving LED lightbulbs. The programme is financed through Zakat contributions (Zakat is one of the five pillars of Islam that requires Muslims to give to charity), and government funds. Almost all mosques in Amman now cover 100 per cent of their energy needs with renewable power and many are selling excess energy back to the national grid¹³⁸.

d. Success stories on climate action in cities at the international level

This section will focus on international experiences, giving more insight gleaned from success stories from Europe, Latin America, and India, that could be of relevance to climate action at the local level in the Arab region. They cover the transport, wastewater, and public sectors, with a special focus on electric urban mobility, wastewater treatment, and street lighting.

Transportation Sector

In the Arab region, the population growth has seen a noticeable increase of 11 per cent in the period between 2010 and 2015.¹³⁹ This increase has led to an expansion in the number of road vehicles leading to serious implications on air pollution as well as road traffic casualties. Therefore, there needs to be practical solutions, such as urban electric mobility, to reduce CO₂ emissions and fill gaps in public transportation services.

Case Study No. 1: Ecoelétrico, Curitiba, Brazil

Similar to Arab cities, cities in Latin America also face severe climate change threats and increasing urbanization.

In its efforts to reduce GHG emissions from motorised vehicles, and motivated by its desire to effectively manage traffic and avoid long commutes, the city of Curitiba in Brazil, started a project, the first of its kind by any municipality in Brazil, to have a municipal fleet of vehicles using low-carbon energy integrated it into its existing transport infrastructure.

The "Ecoelétrico" project in the city of Curitiba was launched on the 5 June 2014, in partnership with Itaipu Binacional, Renault-Nissan do Brasil and the Centre for Excellence and Innovation in the Automobile Industry (CEIIA) of Portugal.¹⁴⁰ In total, 13 electric vehicles were assigned to public service in the first phase, making it the largest pilot project supporting electric mobility in Brazil. Furthermore, 10 electric stations were installed (figure 4.7) in May 2014 to support the initiative.¹⁴¹ The project is currently in its third phase (Figure 4.8), and shall have mobility services integrated into an intelligent city network allowing for the generation of a single invoice for mobility and hence more savings to the user.

138. Suliman, 2018

139. RECREE, 2017

140. ICLEI, 2016a

141. ICLEI, 2016a

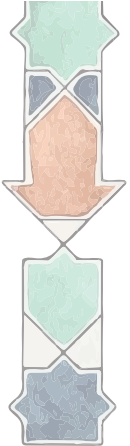
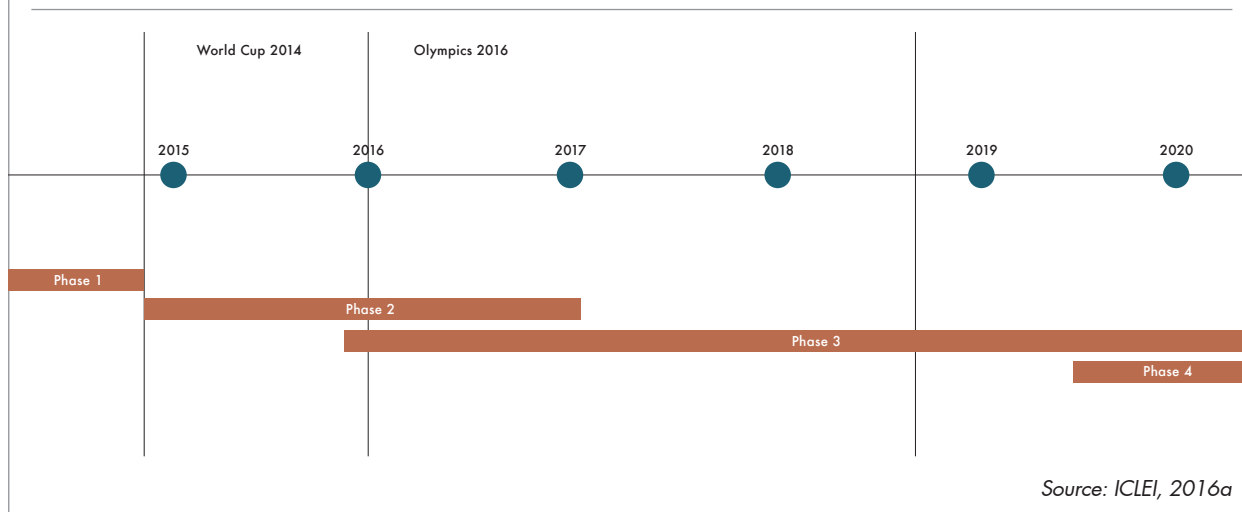


Figure 4.7: Zero emission electric cars provided through the Ecoelétrico project being charged



Renault do Brasil, 2015

Figure 4.8: Timeline of the Ecoelétrico project



Source: ICLEI, 2016a

In the first phase of the project, the vehicles travelled almost 16.2 thousand km over a period of 84 days, which resulted in a CO₂ emissions reduction of a total of 2,000 kg.¹⁴² They also reduced noise generation as well as emissions of other pollutants that usually result from the burning of fossil fuels. Moreover, the project generated economic benefits to the city by saving more than 83 per cent of fuel costs, or US\$1,770.¹⁴³

When it comes to the costs of the project, it is worth noting that the municipality has borne the costs of installing the electric stations within its existing civil works and electrical installation budget, requiring no extra costs especially dedicated to the project. As for the materials and services, they were reclaimed and reused from existing supplies found in municipal departments. The maintenance of the power stations will be conducted by the partners until the end of the loan, while the cost for the electricity consumed is being covered by the municipality.¹⁴⁴

Wastewater Treatment

Decentralised wastewater treatment systems (DTS) are a solution for areas not covered by central wastewater treatment systems. The benefits of a DTS are the reduced energy need for pumping wastewater from low-lying areas and the elimination of health threats from untreated sewage flowing through streams into surfaces and groundwater. These systems also produce biogas which can be used to power households¹⁴⁵.

Case Study No. 2: Jilla Garden DTS, Rajkot, India

The central sewage treatment system of Rajkot does not have the capacity to cover the whole city, leaving 40 per cent of it unconnected to the infrastructure. Rajkot's sewage treatment systems, serving only about 60 per cent of generated domestic wastewater, harmed the communities living close by the river, as well as regional biodiversity. Through analysis and consultation of the local community, the Rajkot Municipal Corporation identified Jilla Garden, described as a slum-like settlement, as the area of implementation for a DTS. The area contains 236 houses with a small restaurant, some local enterprises, and commercial establishments. The water from Jilla Garden flowed into streams and open drains called Vokhdas, which then lead to the Aji River. The pollution from Jilla Garden for the Vokhda contained 98 mg/L of biological oxygen demand (BOD); more than three times over Indian government standards (30 mg/L)¹⁴⁶.

The community was looking forward to a more hygienic environment and was continuously consulted throughout the implementation period. The wastewater undergoes primary, secondary, and tertiary treatment¹⁴⁷ resulting in a BOD of 20 mg/L. Municipal staff working in wastewater management were trained to operate

142. ICLEI, 2016a

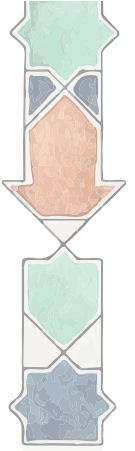
143. ICLEI, 2016a

144. ICLEI, 2016a

145. ICLEI, 2016b

146. ICLEI, 2016b

147. "...primary treatment (sedimentation and flotation), secondary treatment (anaerobic filters reduce the BOD by 70-90 per cent), and tertiary treatment in aerobic/anaerobic media filters..." (ICLEI, 2016b).



and monitor the DTS.¹⁴⁸ The DTS saved 15 tons of GHG emissions a year, as well as 4,000 kWh of electricity compared to conventional wastewater treatment. A further 8,212 cubic metres of biogas are produced a year and are used, e.g., in cooking. The treated wastewater is being partially used to irrigate nearby gardens. The Jilla Garden pilot project resulted in a domino effect in the planning and implementation of several similar DTS projects in the city, with the potential to reduce 1,715 tonnes CO₂ GHG emissions and to generate 944,437 cubic metres of biogas. This showcases the importance of well-planned pilot projects that include the local community in order to replicate such a best-practice example¹⁴⁹.

Public Street Lighting

Street Lighting is a good opportunity for municipal governments to take action against climate change. It is projected that by the year 2050, 60 per cent (or 5 billion) of the total world population will be living in cities, and that by 2030 the lighting demand will be 30 per cent higher than in 2005¹⁵⁰. Implementing energy saving measures by introducing light-emitting diode (LED) lamps for street lighting can save 40-60 per cent of energy, and lower GHG emissions accordingly. Improving lighting services can improve security in cities; crime rates have decreased in areas with improved lighting by up to 20 per cent¹⁵¹; as well as road safety, reducing crashes by 30-35 per cent¹⁵².



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Solar powered LED lighting in a mall parking lot, Ras Al Khaimah, UAE.

148. ICLEI, 2016b

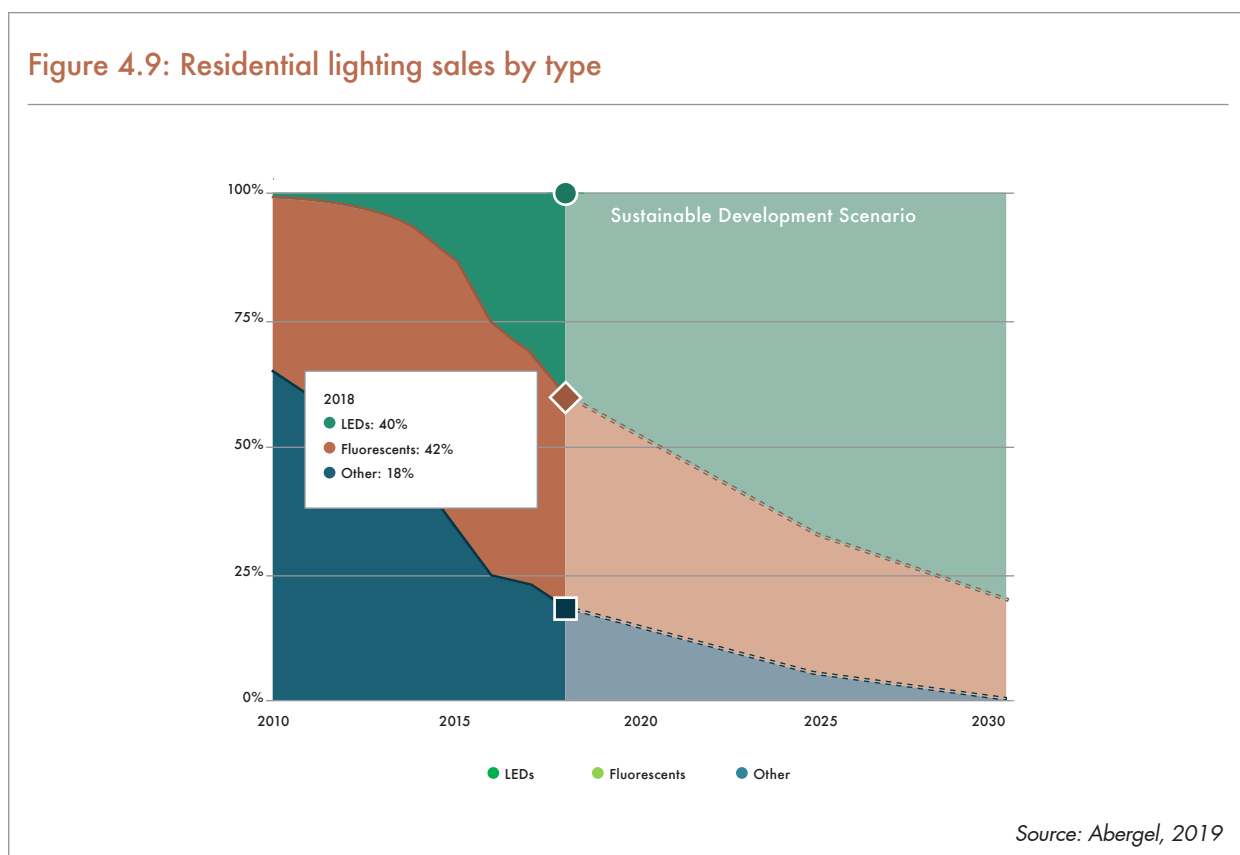
149. ICLEI, 2016b

150. Li and Makumbe, 2017

151. Makumbe, Weyl, Eil and Li, 2016

152. Jackett and Frith, 2013

Since the lifetime of LED lighting is at least four times longer than that of traditional bulbs, the operation and maintenance (O&M) costs are lower and the investment return time is relatively short. However, one of the reasons why cities are not all changing towards LED lighting are the initial capital costs which are still significantly higher than those of traditional light bulbs. The costs depend on different factors such as project size, whether they are manufactured locally, taxes, and policies¹⁵³. With improved quality and cost reduction, sales of energy efficient lighting, such as LED, reached 40 per cent of market sales in 2018¹⁵⁴ (Figure 4.9).



Case Study No. 3: Dobrich, Bulgaria

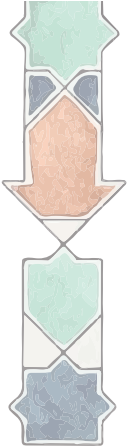
The municipal administration of the Bulgarian city of Dobrich, population 93,500 citizens, which is the authority responsible for energy consumption in public buildings and street lightning, set up a working group to formulate and implement energy policy.¹⁵⁵ The town developed an action plan with three key actions; 1) improving the energy performance of buildings, 2) establishing a municipal information desk for energy efficiency, and 3) improving energy efficiency in street lighting.¹⁵⁶

153. Li and Makumbe, 2017

154. Abergel, 2019

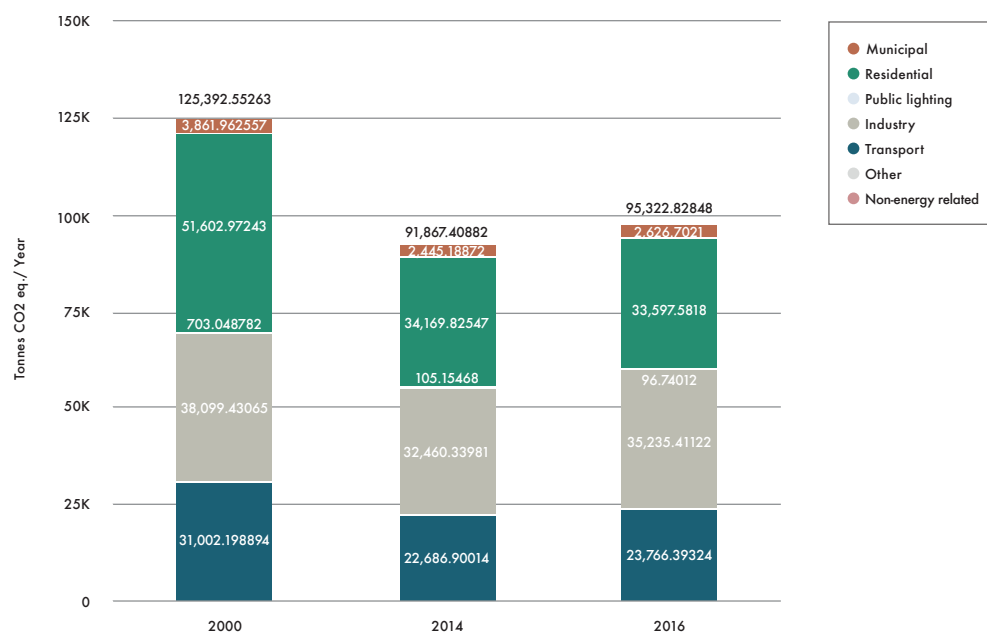
155. Covenant of Mayors, 2018

156. Covenant of Mayors, 2018



Street lighting costs in Dobrich amounted to about US\$53,196 annually. The street lighting project (2010-2020) was financed by the municipal budget (75 per cent), and a national grant (25 per cent).¹⁵⁷ Funds from the municipal budget were used in several stages for different energy-efficient measures set out in the Energy Efficiency Programme 2001-2006, as well as in the Municipal Energy Programme 2008-2013.¹⁵⁸

Figure 4.10: GHG emissions per sector, Dobrich, Bulgaria



Source: Covenant of Mayors, 2018

In total, 6,350 50, 70, 100, and 150 watt sodium-vapour lamps; as well as 1,000 24 and 36 watt LED lamps were installed.¹⁵⁹ This had a positive impact on the environment, the social climate, as well as the municipal budget.¹⁶⁰ The old street lighting system used to consume over 1,209,354 watts, which dropped to 437,384 watts, at a reduction of 64 per cent.¹⁶¹ Public lighting accounted for 703 tonnes of GHG emissions per year in 2000, which fell to 96 tonnes by 2016 (Figure 4.10).¹⁶²

157. Covenant of Mayors, 2018

158. Dobrich Municipality, 2010

159. Covenant of Mayors, 2018

160. Dobrich Municipality, 2010

161. Dobrich Municipality, 2010

162. Covenant of Mayors, 2018

e. Potential for and barriers against replication

The case studies reviewed above all highlight solutions to climate change challenges faced by many countries in the region, such as climatic conditions, as well as universal challenges, such as street lighting. Accordingly, the potential for replication within the region is high; in fact, several of these projects started out as replicas of similar projects themselves.

That is not to say that replication is always easy and there are some lessons learned from these initiatives. For example, projects serving lower-income households require awareness-raising at the local and national levels. On the other hand, giving decision makers a complete tool at hand that simply needs their support for realization, can catalyse implementation.

Financing is often another barrier, as communities are taken aback by high initial investment costs. Awareness-raising among decision makers and community members with regards to cost comparison between high initial costs with lower long-term costs and savings, compared to low initial costs and higher long-term costs with high energy consumption or other climate unfriendly side effects, is very important to lowering initial investment resistance. Starting small-scale environmentally friendly projects in communal spaces such as Mosques and schools is often a practical entry point, familiarizing households in the community with sustainable concepts and heightening their interest, leading to wider awareness and buy-in for energy efficiency and renewable energy policies, as well as, possibly to household investments.

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Chapter 5

Access to Climate Finance and Project Implementation



Chapter 5: Access to Climate Finance and Project Implementation

In the Arab region, mitigation strategies mainly include expanding RES uses (e.g. solar, wind, and small hydro); developing sustainable transport in cities (e.g., rapid bus transit, electric vehicles, and biofuels); promoting energy efficient buildings; and reducing GHG emissions resulting from industrial process improvements. Renewable energy projects are mostly mandated by national energy transition policies and private investments, while city transport and public building projects require the commitment of local authorities.

Ministries dealing with environmental affairs are usually appointed as the coordinating agency for NDC implementation and are supported by a national climate change committee. However, financing of NDC implementation, particularly the unconditional targets, depends on the national budget. Most beneficiary countries are seeking international support from donors such as the Green Climate Fund (GCF), and bilateral cooperation, etc. Countries are also willing to deploy international market-based mechanisms for carbon trading, as well as cooperate with the private sector.

While there is no single definition of climate finance, the closest one can get is provided by the UNFCCC, which defines it as: “finance [that] aims at reducing emissions, and enhancing sinks of greenhouse gases and aims at reducing vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts.”¹⁶³

a. Mitigation and adaptation finance in the region

Mitigation finance in the Middle East and North Africa (MENA) makes up 78.93 per cent of climate action funding.¹⁶⁴ Large investments are more likely to be directed towards mitigation rather than adaptation activities, because the measurement and reporting of mitigation benefits is better established than that of adaptation. Projects in renewable energy and transport are also more widely accepted as having mitigation benefits and a higher return on investment.

However, finance is not dispersed equally across the region. Organisation for Economic Cooperation and Development (OECD) data on partner climate-related development finance, in 2016, shows that there is more mitigation finance only in Algeria (USD\$11.08 million), Jordan (USD\$273.6 million), and Morocco (USD\$294.3 million). In Tunisia, climate finance in the energy sector is only USD\$79.7 million, and adaptation measures have received more financing.¹⁶⁵ Similarly, in Palestine, USD\$5.01 million in energy finance is outranked by finance in water and agriculture projects. In Egypt, the highest share of climate finance is in the transport and energy sectors (Figure 5.1).¹⁶⁶

With regards to sectoral distribution, the ‘transport and storage’ sector received most of the climate funds committed, while energy generation from renewable sources constituted the second largest funding category. The third sector was agriculture, particularly the development and strengthening of

163. UNFCCC, 2014, p.5

164. CFU, 2019b

165. OECD, 2018a

166. OECD, 2018a

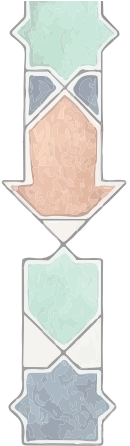
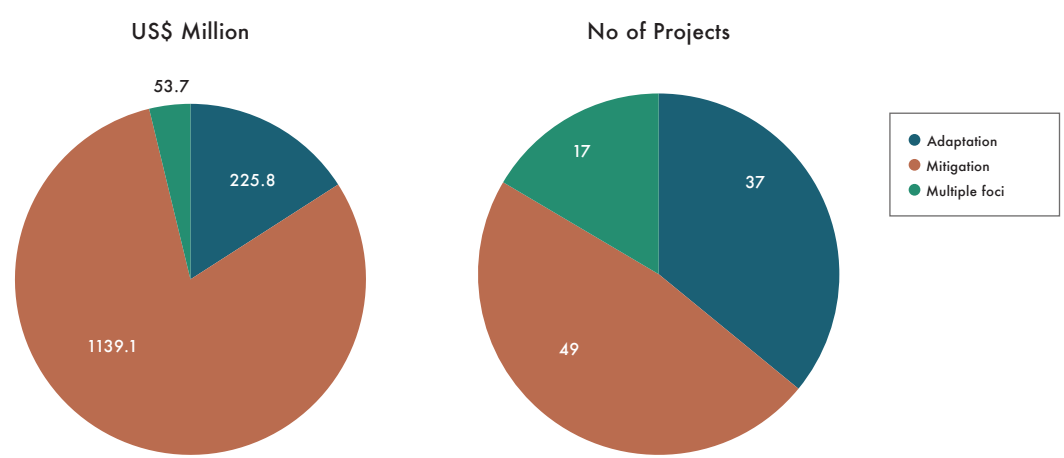


Figure 5.1: Approved funding for climate change projects in MENA countries (2003-2018)



Source: African Development Bank and others, 2019

agricultural capacity and institutions, land management, resource management, and support services for agricultural policy and management. Finally, banking and financial services; industry, with a focus on the development of environmentally-friendly chemicals, energy industries and businesses; energy distribution, mainly through electric power transmission and distribution; and management of integrated urban-energy programmes, all received climate financing.¹⁶⁷

Overall, Arab countries have received only a fraction of climate finance available (Figures 5.2 and 5.3).¹⁶⁸ The top two recipient countries are Egypt and Morocco, with the largest amount of funding and number of projects (Table 5.1). They account for more than 80 per cent of the projects in the region, and almost 50 per cent of total investment.¹⁶⁹

167. UFM, 2016

168. African Development Bank and others, 2019

169. CFU, 2019b

Figure 5.2: MDB adaptation finance by sector and by region, 2018

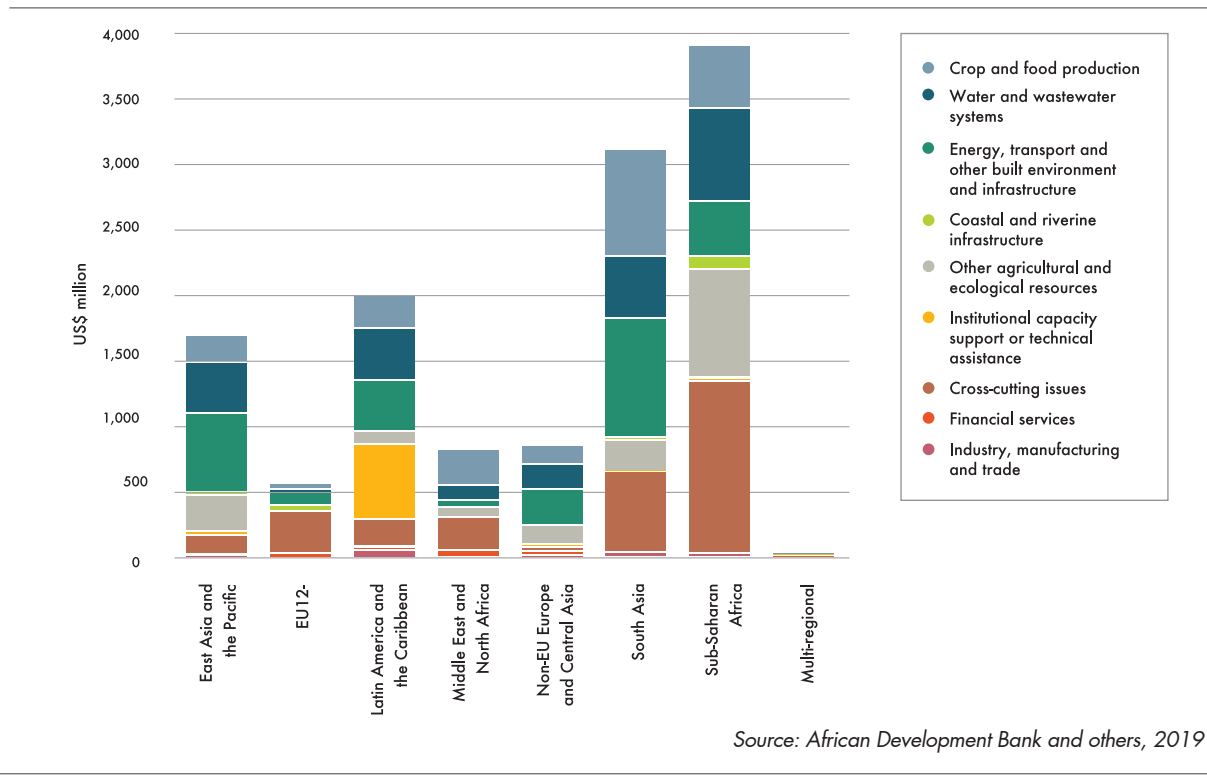
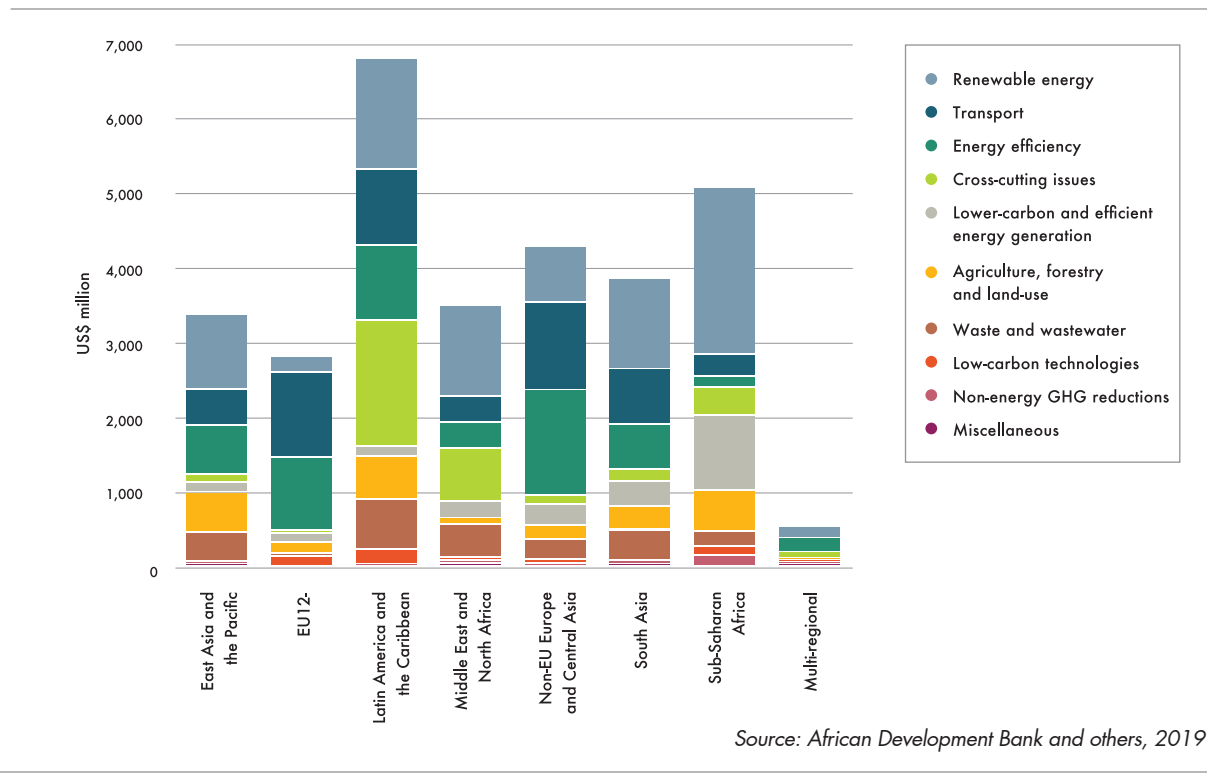


Figure 5.3: MDB mitigation finance by sector and by region, 2018



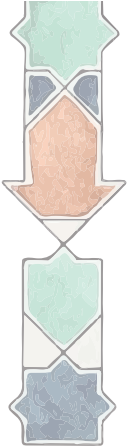


Table 5.1: Climate finance in the Arab region, 2015-2018 (in US\$ million)

Economies	2015	2016	2017	2018	Total
Algeria	1	-	-	0	1
Bahrain	-	-	-	0	-
Comoros	5	-	4	0	9
Djibouti	-	2	0	41	43
Egypt	511	693	1,585	1,597	4,386
Iraq	8	610	321	446	1,385
Jordan	238	412	517	272	1,439
Kuwait	-	-	-	0	-
Lebanon	303	27	82	581	993
Libya	-	-	-	0	-
Mauritania	-	6	-	11	17
Morocco	914	729	668	1,057	3,368
Economies	2015	2016	2017	2018	Total
Oman	-	-	-	0	-
Qatar	-	-	-	0	-
Saudi Arabia	-	-	-	0	-
Somalia	-	8	-	1	9
Sudan	5	-	13	41	59
Syria	-	-	-	0	-
Tunisia	19	96	387	265	767
United Arab Emirates	-	-	-	0	-
West Bank And Gaza	5	1	2	15	23
Yemen	-	-	-	78	78

Source: African Development Bank and others, 2019

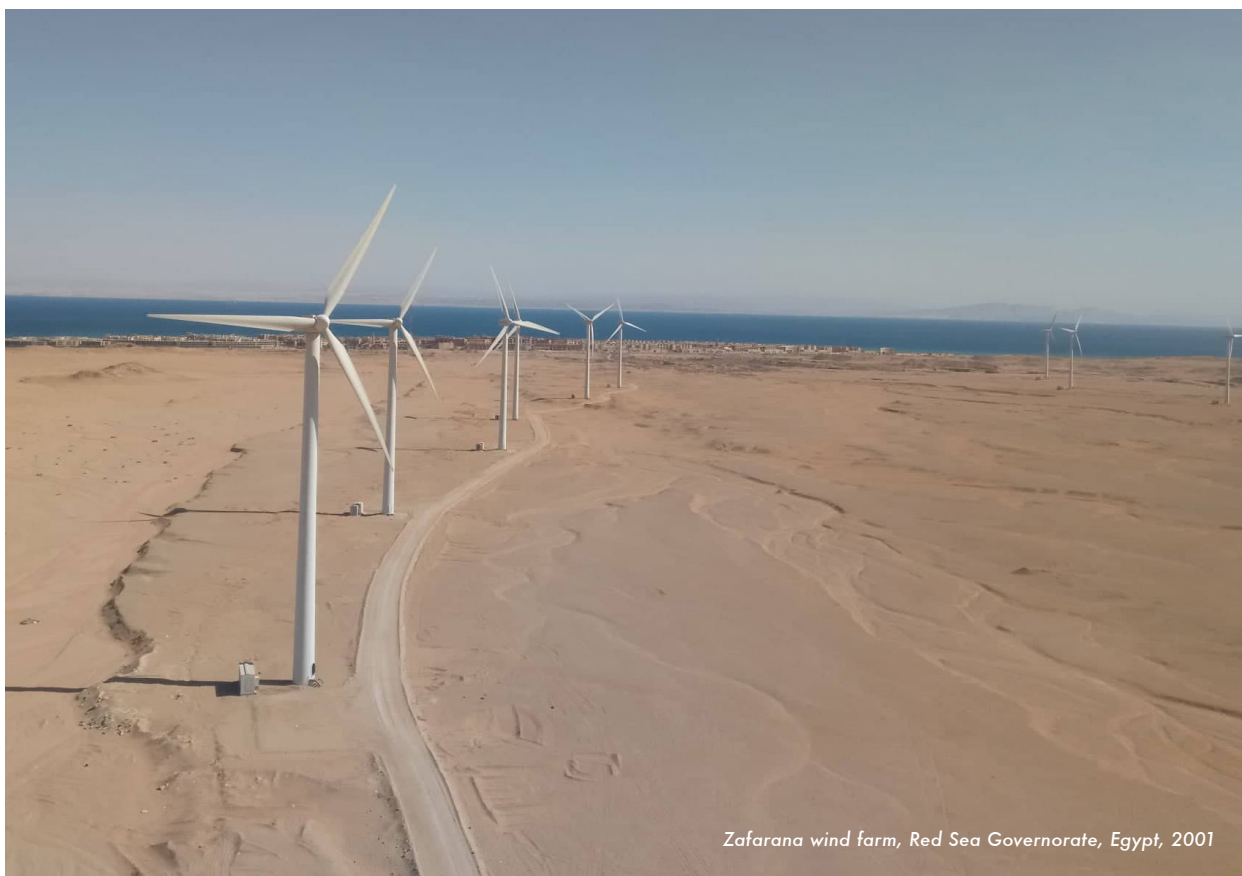
When it comes to financing sources, the major part of funding was channelled through multilateral development banks (MDBs).¹⁷⁰ Since 2016, the Global Environment Fund (GEF) provided the largest number of grants, and one non-grant; whereas the European Bank for Reconstruction and Development (EBRD) provided a grant of the highest value, USD\$63.8 million, to Egypt through the Southern and Eastern Mediterranean Sustainable Energy Financing Facility (SEMED).¹⁷¹ The French Development

170. UfM, 2016

171. UfM, 2016

Bank (Agence Française de Développement) (AFD) provided a broad combination of grants, mixed grant/loans and loans, and the European Investment Bank (EIB) provided nine loans for energy and transport improvement.¹⁷² There is great potential for climate finance in the region, then; however, this momentum needs a boost, such as the work carried out by the Clima-Med project, particularly with regards to access issues (See Table 5.2 for more details). During its implementation, the Clima-Med programme will play an important role in building the capacity of key actors at the national and local level in terms of procurement procedures, as well as design and development of PPP projects in energy and climate change sectors.

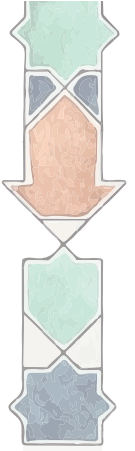
The current architecture for adaptation finance has been shaped by a series of provisions and decisions by the UNFCCC COP. The Marrakesh Accords established the Adaptation Fund to finance concrete adaptation projects and programmes in developing countries that are parties to the Kyoto Protocol and are particularly vulnerable to the adverse effects of climate change. The Special Climate Change Fund (SCCF) was established to finance activities, programmes and measures relating to climate change that are complementary to those funded by the climate change focal area of the Global Environment Facility Trust Fund (GEFTF), and through bilateral and multilateral sources.



Mostafa Atef Aly

Zafarana wind farm, Red Sea Governorate, Egypt, 2001

172. UfM, 2016



To complement the structure, GEF was asked to mobilize resources for “pilot or demonstration projects to show how adaptation planning and assessment can be practically translated into projects that will provide real benefits.”¹⁷³ Accordingly, the GEF Council decided to launch the Strategic Priority on Adaptation (SPA) in 2005 as a USD\$50 million allocation within the GEFTF, with the objective of reducing vulnerability and increasing adaptive capacity to the adverse effects of climate change within GEF focal areas.¹⁷⁴

Table 5.2: Climate finance approved for MENA countries by fund (2003-2018)

Fund	USD millions	Projects
Clean Technology Fund (CTF)	864.8	10
Green Climate Fund (GCF)	287.8	6
Global Environment Facility (GEF4, 5, 6)	108.6	47
Adaptation Fund	48.7	10
Special Climate Change Fund (SCCF)	43.6	8
Least Developed Countries Fund (LDCF)	35.1	8
Adaptation for Smallholder Agriculture Programme (ASAP)	23.0	4
Global Energy Efficiency and Renewable Energy Fund (GEEREF)	16.6	1
Partnership for Market Readiness	11.0	6
MDG Achievement Fund	7.6	2
Global Climate Change Alliance (GCCA)	3.4	1

Source: CFU, 2019a

b. Barriers to climate financing in the Arab region

However, Southern and Eastern Mediterranean Countries still face challenges in accessing finance for adaptation. Different countries, with different needs and circumstances; and different actors, face different challenges (e.g. central governments, local authorities, and non-state actors). Accessing dedicated multilateral climate funds may bring different challenges to the countries than accessing bilateral or private sector finance.

Arab countries struggle to mobilise climate funding sources at their disposal due to different reasons. These barriers include: (i) the lack of familiarity with and knowledge of climate financing sources and instruments, (ii) the complexity of funding mechanisms, (iii) difficulty in presenting attractive projects to investors, especially private investors, and (iv) a lack of enabling legislative and regulatory frameworks.

The available literature on climate finance highlights a broad range of possible issues that may cause problems in accessing climate finance. For a start, developing country institutions face many challenges in gaining accreditation as implementing entities for international climate funds. Some of these challenges

173. IEO GEF, 2005

174. IEO GEF, 2005

have to do with domestic capacity to integrate climate change into development processes, but there are also more operational and technical barriers, such as a lack of capacity and resources to engage with complex accreditation requirements.



Julien Harneis / CC BY-SA 2.0

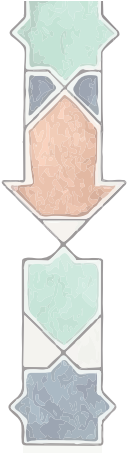
Conflicts and security threats pressure national and local infrastructure. These solar powered refrigerators for vaccines, Raymah health centre, Yemen, provided by UNICEF; are a more sustainable, adaptive, and resilient solution to energy supply issues.

Efforts are needed to mobilise innovative financing resources, and especially to finance projects at the local level. Much capacity-building and training is needed to help local actors understand and master different climate financing instruments, and to be able to plan and bundle climate action initiatives with neighbouring areas in similar circumstances to make sure that projects are bankable. In addition, reforms are needed for legislative, regulatory, and institutional frameworks, to attract investors and ensure effective project planning and implementation.

c. Formulating solid replicable financing proposals

As stated in the UNFCCC Standing Committee on Finance Biannual Assessment and Overview¹⁷⁵ of the climate finance flow, fair and equitable access to climate finance depends not only on the ability of a developing country or institution to attract climate finance, but also on the modality through which that finance flows.

175. UNFCCC, 2018



Most Arab countries do not have fully functioning climate finance governance frameworks nor the required institutional structures and procedures. Project or programme development is impeded when required actors from the public, private, and civil society sector do not come together under an umbrella governance framework with its related structures and processes.

The first challenge may sometimes be identifying the right sources of funding for the relevant project. To this end, the UNFCCC offers a Funding for Adaptation Interface which provides a platform to access and screen information on funding options available for adaptation worldwide from various sources. The database also gives example of projects that would fit the respective fund's priorities and criteria.

In addition, there are initiatives to enhance developing country access to climate finance, such as the GCF Readiness Programme. The NDC Partnership is also one way in which readiness is now transforming into the wider process of implementation and scaling up ambitions towards 2020 and beyond.¹⁷⁶ The Partnership aims to enhance cooperation so that countries have access to the technical knowledge and financial support they need to achieve major climate targets and SDGs, as quickly and effectively as possible.¹⁷⁷

On the regional level, there is also the Catalyst MENA Clean Energy Fund (CMCF).¹⁷⁸ This fund targets private-sector investments in clean energy in Jordan, focusing on renewable energy infrastructure projects, and in mid-sized companies. The aim is to improve energy supply, foster employment growth, increase tax revenues and improve stability.¹⁷⁹ Catalyst has two solar PV projects in Jordan in its portfolio. Further investments may be made in Egypt, Morocco, and Tunisia.¹⁸⁰ This is the second fund launched by Catalyst Private Equity, an energy fund manager in the region. Its major contributors are public and private bodies, particularly the DEG (Deutsche Investitions-und Entwicklungsgesellschaft) which is part of the German development bank (KfW), the Finnish Finnfund, the Dutch FMO, and the Global Energy Efficiency and Renewable Energy Fund (GEREEF), which is a fund-of-funds advised by the EIB. The GEREEF leverages public sector funds to catalyse private sector finance in renewable energy and energy efficiency projects, and has invested USD\$16.6 million into the CMCF (See Chapter 3 for information on how Clima-Med support during the SEACAP development process can help local authorities access climate finance).

176. NDC Partnership, undated

177. NDC Partnership, undated

178. CMCF, undated a

179. KfW DEG, 2016

180. CMCF, undated b

The SEMED Private Renewable Energy Framework (SPREF): Supporting the implementation of concrete local sustainable actions

To support the implementation of concrete local action, EBRD has built one of the most important mitigation financing frameworks of the region, the SEMED Private Renewable Energy Framework (SPREF), which aims to provide finance to private developers of renewable energy generation projects in Morocco, Tunisia, Egypt, and Jordan; catalysing the private sector and reducing GHG emissions.

The goal of SPREF is to break down barriers preventing the development of private renewable energy markets and the utilisation of the region's outstanding renewable resources by initiating a policy dialogue to help establish the necessary regulatory framework and finance, accompanied by concessional finance, to demonstrate the success of the initial projects under these new private models. This involves regulatory risk and uncertainty about pipeline delivery, but has the potential for significant transition impact. This is necessarily an iterative process, where incremental improvements in an initially inadequate legal and regulatory framework are validated and built upon by new investments, which in turn builds momentum for further regulatory reforms.

The EBRD aims to invest approximately USD\$250 million in private renewable energy projects of varying sizes, avoiding 675,000 tons of CO₂ emissions annually. EBRD finance will be accompanied by concessional finance from the Clean Technology Fund (USD\$35 million) and GEF (USD\$15 million). The combined concessional finance will be capped at 10 per cent of total project costs and will not exceed USD\$10 million in any single project. The technologies financed under SPREF are expected to be mainly onshore wind and solar PV, but other renewable energy technologies would be considered, including small hydro, biomass, energy-from-waste, and geothermal technologies.

Since 2015, and within the framework of the SPREF, EBRD has financed the construction and operation of a 120MW wind farm located near Tangiers in Morocco, Khalladi Wind Farm. The project is one of the first private projects to be developed under the current regulatory framework in Morocco that allows private renewable projects to sell their electricity directly to high voltage clients, and will support the country in increasing its renewable energy capacity and reducing its reliance on costly hydrocarbon imports.

Source: EBRD, 2017

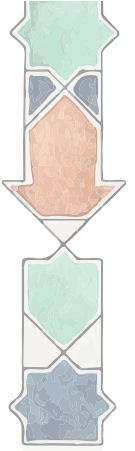
d. Boosting innovative Public-Private Partnerships

Public Private Partnerships (PPPs) are a promising and innovative mechanism for financing renewable energy, energy efficiency, and other climate change action projects. A public-private partnership ("PPP") is defined by the OECD¹⁸¹ as: "an agreement between the government and one or more private partners (which may include the operators and the financiers) according to which the private partners deliver the service in such a manner that the service delivery objectives of the government are aligned with the profit objectives of the private partners and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partners."

The European Commission adopts the following broad definition:¹⁸² "PPPs are forms of cooperation between public authorities and the private sector that aim to modernise the delivery of infrastructure and strategic public services". This means that in a PPP project, the resources, authority, responsibility, and risks are shared between the public and the private partner.

181. OECD, 2008b, p.17

182. EC, 2009



During the last decade, PPP's mechanisms have been promoted in different countries to finance sustainable development. Despite success stories such as the Moroccan Ouarzazate solar project, the number of PPP projects to finance energy sector and climate actions in southern and eastern Mediterranean countries remains substantially lower than in other regions. A number of factors are hampering the involvement of private sector investment in these sectors, mainly (i) limited PPP expertise; (ii) weak legal and financial frameworks; and (iii) limited capacity and insufficient resources available for PPP project preparation.¹⁸³



Sara Fouad - World Fish / CC BY-NC-ND 2.0

Solar energy unit installed on one of the fishing camps in Lake Nasser, under the Youth Employment in Aswan Governorate project funded by the Swiss Agency for Development and Cooperation (SDC)

In practice, solid legal and regulatory frameworks and clear policies are prerequisites for a successful PPP programme. Some Arab countries have or are drafting PPP laws and frameworks, e.g., Kuwait, Egypt, Lebanon, Tunisia, Morocco, UAE, Oman, Qatar, Jordan, and KSA, recognizing that PPP is an important alternative mode of financing projects. Egypt, for example, has enacted specific PPP legislation and has created in 2006 an active PPP central unit at the Ministry of Finance. Morocco, Tunisia, and Lebanon have adopted new PPP laws in 2014, 2015, and 2017, respectively.¹⁸⁴

However, despite important laws having been adopted and reforms having been implemented, with the high costs and complexity of preparing PPPs, countries still have material difficulties in putting together pipelines of bankable PPP energy and climate projects. In addition, government experience and expertise in designing and implementing PPP projects is sometimes lacking and there is a need for

183. FEMIP, 2011

184. OECD, 2016

training to better understand the functioning and benefits of PPPs, and for support to develop PPPs in energy and climate sectors.

For Arab cities, investment projects and key actions in the area of climate and energy sectors could be financed through Public-Private Partnership (PPP) mechanisms that offer an innovative option to implement the actions contained in their SEACAP(s) in a very effective approach. Cooperation between the local authority, local investors, and local citizens are deemed to be vital factors of success for realizing these projects.

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Chapter 6

Conclusions and Recommendations



Chapter 6: Conclusions and Recommendations

To keep the rise in global temperatures below 1.5°C this century, global CO₂ emissions would have to be cut by 45 per cent by 2030.¹⁸⁵ The feasibility of any global commitment to a 1.5°C pathway depends, in part, on the cumulative influence of the NDCs. The current NDCs, extending only to 2030, do not limit warming to 1.5°C. Despite their meagre contribution to cumulative GHG emissions, countries in the Arab region are projected to be some of the worst impacted by the changing climate, and therefore, have a vested interest in climate action. Besides mitigation actions to fulfil their NDCs and minimize their GHG emissions, Arab countries will need to dedicate considerable efforts to enacting adaptation plans, strategies, and actions, particularly in cities and coastal zones.

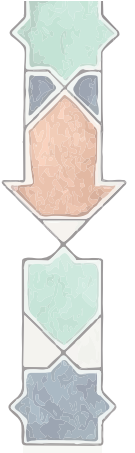


In the end, global emissions will be cut through countless actions on the local level, while adaptation will depend first and foremost on local conditions. The information and analysis included in the chapters above highlight some of the policies and measures that can be conducive to a critical mass of local climate action in the Arab region, primarily:

- ***Mainstreaming climate action into policies and plans***

While many countries in the region have already developed their National Climate Change Strategies, including NDCs (Table 1.1; and 2.1); to explore opportunities provided by climate change and ensure low carbon and climate-resilient development; ensuring effective implementation of climate actions

185. IPCC, 2018



and strategies calls for the alignment and mainstreaming of these actions and strategies into regional, national, and local development objectives, priorities, and plans. This will require identifying entry points for climate actions into sectoral plans, harmonising sectoral policies with climate actions, as well as addressing the technical and financial barriers to effective implementation. Thus, MLG, and collaboration between tiers of government, are needed and might involve policy changes across all relevant sectors that affect GHG emissions and risk growth, not just, for example, environmental authorities.

Urban adaptation is of particular significance in climate change policies around the world¹⁸⁶, and should take priority in urban planning policies and strategies in Arab countries. Smaller cities in particular need support from national policies because of their higher urbanization rates and weaker planning capacity especially since adaptation requires access to research capacities not always available to local authorities.¹⁸⁷

- ***Institutional strengthening and capacity building***

Numerous cities in the region are participating in capacity building activities, aiming among others, to equip them with the knowledge and expertise to be able to select, plan, and implement mitigation and adaptation actions in their area. Targeted capacity building to promote a paradigm shift at the institutional level towards low-carbon and climate-resilient development is still needed. An assessment of the capacity of municipal authorities to mainstream climate change into their development plans and priorities may be needed to plan such an endeavour on the local level, similar for example to the GCF readiness programme for national governments.¹⁸⁸ The relevant institutions need to possess the skills and capacities to develop standards, procedures, legislations, and necessary frameworks to effectively implement climate actions.

- ***Supporting local authorities to lead by example***

Climate action does not always have to begin on the national level, but is sometimes more feasible on the regional and local levels. The influence and impact of individual regional and local climate actions on national climate efforts and policies should not be underestimated. On the local level, projects can be easily formulated, tested, and readjusted to achieve the best outcome, and then scaled-up and replicated when their feasibility has been proven. Local actions are also easily customized to local needs, ensuring citizen participation and successful implementation.

Local action does still need to be aligned with national policies, particularly where central government funding or support is needed. The NDCs and other national level political commitments are the correct reference point for local authorities to formulate the advocacy strategies most likely to garner national backing for their plans. Arab country NDCs not only include their mitigation commitments (Table 2.1), but often indicate where adaptation is more likely to fit into national policies and plans (Table 1.1). In this regard, a number of mechanisms and tools are available, to facilitate the work of local and regional authorities in the region and their coordination with national authorities (See Chapter 3 for guidance on what the EU funded CES-Med and Clima-Med projects have developed and can offer as support

186. UN-Habitat, 2009

187. UN-Habitat, 2009

188. GCF, undated

to local authorities). Signing up to international networks such as the GCoM¹⁸⁹ and the UNDRR's Making Cities Resilient¹⁹⁰ initiative provides cities with an internationally recognised benchmark and recognition system for climate action planning, as well as other resources such as monitoring guidelines and technical backstopping to help them develop bankable projects and secure funding.

Citizen buy-in is necessary for the success of any policies, therefore, an efficient communication campaign that raises awareness and engages all stakeholders must be a part of any policy plan.

- **Planning energy efficiency and mitigation actions**

A comprehensive plan for energy and climate action at the local level (such as a SEACAP, see Chapter 3), can act as the city's identity card for all interested stakeholders, and illustrate the potential for bundling projects and initiatives with neighbouring municipal authorities. Municipal authorities can also make use of the free CURB tool developed by the World Bank¹⁹¹ to help them to choose the best interventions based on maximum impact potential and implementation feasibility, using local data or even alternative data from comparable cities, countries, or regions.

While different cities have different profiles, some common entry points that can be considered by local authorities in the Arab region as evidenced by the case studies in Chapter 4 are: energy efficient lighting in streets and other public areas, traffic management systems, LFG methane capture and burning for energy generation, and DTS. Other policy options that are relevant but may require national policies such as legislative measures and financial incentives: energy efficient building, solar powered water desalination, electric mobility, and vehicle replacement programmes.

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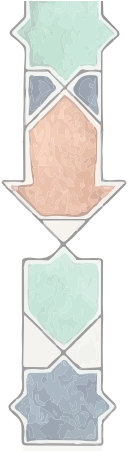


Habibah S. Al-Menaie, a senior research scientist in the Desert Agriculture and Ecosystems Program of the Kuwait Institute for Scientific Research (KISR) in the experimental field of a mutant barley population developed using gamma ray irradiation to be more resilient to drought, salinity, as well as limited water resources.

189. GCoM, undated

190. UNDRR, undated

191. The World Bank, 2016



- **Ensuring access to Information**

Access to local climate and other related information is important to developing appropriate adaptation and mitigation options. This might require data collection and / or access, as well as the creation of databases, for use at the local, regional, and national level. These data would include, for example, climate models, sea level rise projections, socio-economic and demographic data, and vulnerability mapping. The data and information also need to be effectively interpreted and disseminated to a wide variety of stakeholders with varying degrees of skills and responsibilities including policy makers, local communities, sectoral experts, academia, end-users, etc. Accessible information helps to create awareness of climate change and sustainable development issues amongst a wide variety of stakeholders, thus ensuring effective participation, cooperation and coordination in the implementation of climate actions.

- **Mobilizing private sector and climate finance**

Currently, mitigation financing attracts much more resources, compared to adaptation, as mitigation is considered to be more easily measurable. Most mitigation financing so far has been directed towards renewable energy and energy efficiency technologies, as well as the transport sector. Water and wastewater systems, as well as crop and food production are the thematic areas that receive the highest funds for adaptation in the Arab region.

Financing climate actions is where the most support and capacity building is needed. But besides the intense capacity building that local authority staff need to be able to better cope with the requirements set by financing institutions as well as effectively design bankable projects that will attract climate finance in the region; reforms are needed for legislative, regulatory, and institutional frameworks, to attract investors and ensure effective project planning and implementation.

In addition to advocating for increased public spending on climate action, there is a need to effectively mobilise financing from the private sector in order to close the huge funding gaps in implementing climate actions. This requires strengthening financial and capital markets, improving the investment climate, and providing fiscal incentives, in order to stimulate and promote private sector investments to complement public spending on climate change initiatives.

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The impacts of climate change are not simply a factor of the intensity of the phenomenon itself, but also of the capacity of local communities to react to it. Local Climate Action in the Arab Region provides municipal and city authorities with a policy resource that can support their decision-making process while planning climate action at the local level. The report comes at a time when climate change is becoming a major threat to humanity, with the Arab region one of the most vulnerable to its impacts. It sheds light on the impacts of climate change at the city level, and provides guidance on improving climate governance and multilevel climate action. A number of case studies on adaptation and mitigation from cities across the Arab region and the world are showcased, as well as opportunities to access climate finance at the city level and to boost public-private partnerships. The findings of the report constitute a set of policy recommendations for city leaders to guide their work towards achieving more sustainable and climate-resilient cities.