



Shared Prosperity Dignified Life



Transitioning to a Circular Economy: Status and Enablers in the Arab Region

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Acknowledgments

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Abstract

The extractive and linear economies are approaching worrisome tipping points, transforming the planetary status of natural resources and biodiversity into paramount global threats. As a result, the transition to a circular economy (CE) with regenerative and restorative processes creating circular solutions in agriculture, energy, industry, construction, and services have become a necessity for long-term sustainability, with reduced climate risks, natural resource depletion, and biodiversity loss.

Despite recent focus on the circulation of resources, the CE still accounts for only 7% of total material inputs globally. The transition to CE is more and more urgent in the Arab region, given the accelerated rates of resource depletion, growing scarcity, biodiversity and ecosystem health loss, pollution, and unprecedented levels of waste and greenhouse gas emissions.

CE processes and solutions have recently gained traction in numerous Arab countries, with an increasing number of policies and projects in various sectors. Yet, progress in mainstreaming CE into policies has been slow and far from being a whole-of-government and whole-of-society objective.

The purpose of the present report is a mapping exercise with twofold objective. First, to assess the potential benefits of CE for the countries, people, and ecosystems and to what extent it could contribute to the response and mitigation of the major planetary and regional crises. Second, a review and analysis of the current status and prospects of CE in the Arab region to identify the key drawbacks and enabling factors required to accelerate the transition from linear to CE.

- 1.** There is a need for a simple and operational definition of CE to unify the narrative on circularity within and among countries in the region.
- 2.** The report highlights the myriad of factors that make the shift to circularity imperative in the Arab region; inefficiencies and depletion in resource use combined with scarcity, loss in biodiversity, the increase in greenhouse gas emissions and the alarming levels of pollutions that can reach 10 to 100 times the recommended acceptable levels in some cases.
- 3.** The report shows that CE in the Arab region is not only key to make societies and ecosystems more sustainable, but allows the creation of wealth, jobs, and sustainable economic growth. The estimated number of new jobs in waste circular management alone could generate 77.000 jobs in Saudi Arabia. It is estimated that the Gulf Cooperation Council countries could save 138 billion dollars in resource spending by 2030 by shifting to CE.
- 4.** The review of policy documents in the 22 Arab states shows that CE ambitions and actions are progressing in several sectors, including waste management, energy, industry, agriculture, water, tourism, and hospitality. Yet, a few countries are frontrunners with explicit frameworks and action plans, dedicated institutions and earmarked investments and targets.
- 5.** There is a wealth of flagship projects from countries in the region showing that the transition to circularity is moving from policy to implementation at different scales at different paces depending on the countries.
- 6.** Based on the mapping exercise and review of regional and global experiences, the report concludes by pinpoints the key drivers to mainstream and accelerate the regional transition to CE.

List of abbreviations

ESCWA	United Nations Economic and Social Commission for Western Asia
NGO	Non-Governmental Organization
CSO	Civil Society Organization
UN	United Nation
CE	Circular Economy
GHG	Greenhouse gas
GCC	Gulf Cooperation Council
NDC	Nationally Determined Contribution
SDG	Sustainable Development Goal
UNEP	United Nations Environment Programme
EU	European Union
GDP	Gross Domestic Product
CO₂	Carbon Dioxide
PPP	Pollution Pays Principle
CPP	Circular Public Procurement
EPR	Extended Producer Responsibility
CCE	Circular Carbon Economy

List of figures

- Figure 1. Possibilities within a holistic circular economy in the Arab region.
- Figure 2. Environmental impacts from the extraction and production of iron, aluminum, copper, zinc, lead, nickel, manganese, concrete, and sand and gravel-material. These 9 materials are responsible for almost 20% of all greenhouse gas emissions globally.
- Figure 3. A model of circularity built on the design changes (Rethink, Redesign, Reduce), short loops (Refuse, Reuse, Repurpose) and long loops (Recycle, Recover).
- Figure 4. In a circular economy, processes that are in the base of the hierarchical pyramid needs to be prioritized, since they are generally the most resource efficient.
- Figure 5. A simplification of the biological and technical cycle, where materials go through circular processes to form a loop.
- Figure 6. Population growth and municipality solid waste in the MENA region since 1990 and the prediction until 2050.
- Figure 7. Average of waste fractions 2019 in Egypt, Jordan, Morocco, Algeria, Tunisia, Lebanon, Syria, Libya, Saudi Arabia, Qatar, Kuwait, Oman, United Arab Emirates, Bahrain & Yemen.
- Figure 8. A simplified picture of a regenerative food system.

Contents

Abstract	4
Introduction	7
I CIRCULAR ECONOMY	9
I-1. Defining a circular economy	9
I-2. Unlocking the potential of a holistic circular economy	11
I-2.1. Climate change mitigation and adaptation	12
I-2.2. Biodiversity restoration	13
I-2.3. Pollution reduction	13
I-2.5. Employment opportunities	13
I-2.6. Health improvement	14
I-2.8. Drive innovative solutions	14
I-2.4. Wealth distribution	15
I-2.7 Economic growth	15
I-3. Designing circular systems	16
II CIRCULAR SYSTEM INITIATIVES IN THE REGION	18
II-1. National mapping of circular economy in Arab countries	19
II- 1.1. On a progressive path towards a circular economy	19
II- 1.2. Policies targeting circularity	20
II- 1.3. Structures enabling efficient governance	21
II- 1.4. Creating the capacity needed	23
II- 1.5. Prioritizing financial flows toward circularity	24
II-2. Linear chains to circular flows in selected sectors	24
II-2.1. Towards integrated solid waste management	25
II-2.2. Resilient and sustainable food systems	27
II-1.3. Renewable and Energy Efficient Approaches	29
III ACCELERATING THE CIRCULAR TRANSITION IN THE ARAB REGION	30
III-1. Get everyone onboard	30
III-2. Create benefits with circular solutions	31
III-3. Make circularity desirable	32
III-4. Build the needed capacity	33
III-5. Enhance the finance	34
III-6. Let knowledge lead the way	35
Conclusion	37
ANNEX 1. Environmental impacts of resource extraction	38
ANNEX 2. SDG targets connected to circular economy	39
ANNEX 3. Mapping of the initiatives towards a circular economy in the Arab region	42
ANNEX 4. Universal Policy Goals	65
ANNEX 5. Flagship Projects in the Arab region	66
References	68

Introduction

Natural resources have always been used and the increased usage of materials have led the way to human prosperity with developed societies (partially) fulfilling human needs and wants. Unfortunately, this development has come to a price which has been greatly ignored, and now reached a point where the resources used for development is threatening our lives. Currently, our economy is built on a strong link between economic growth and unsustainable resource use which is creating vast problems. The use of natural resources, either finite or renewable, are often done in the unsustainable manner of take, make and dispose, which is the definition of a linear economy. This has led to extensive environmental degradation and depletion of resources, which pose a severe threat to the well-being of humans, other animals, and all ecosystems on earth. It has been estimated that the unsustainable extraction and processing of natural resources are responsible for 90% of biodiversity loss and water stress, and approximately half of the total greenhouse gas (GHG) emissions.¹

The Arab region is heavily contributing to global climate change and at the same time it suffers from inadequate local natural resources for its current use. Most of the Arab region has historically had low GHG emissions, but this is changing as countries are developing, followed by lifestyle changes and an increased dependency on fossil fuels. An accelerating trend has been noted in both the Material Footprint and the Domestic Material Consumption per capita in the Arab region,² implying a change of lifestyles connected with a rapid increase in the consumption of raw biomass, fossil fuels and minerals. The GHG emissions varies greatly between Arab states, but as the rest of the world a high development standard is closely linked with high emissions. Further, the Arab region are now hosting the greatest inequality of GHG emissions in the world, where the wealthiest 10% have 15 times higher emissions than the lower 50% in the same country on average. There is now a greater inequality of GHGs within countries than between countries.³ The Arab region shares several challenges connected to its local natural resources ranked as the most water scarce region in the world; habiting large arid land masses leading to a high dependence on food import; and its geographic location in a 'climate change hotspot' where the climatic changes are exacerbating the already fragile ecosystems, leading to increased vulnerabilities of populations' and the creation of new vulnerable groups.

The urgent need to change our management of resources have been on the agenda for at least a decade in the Arab region. Since the adoption of the 17 Sustainable Development Goals (SDGs) in the 2030 Agenda for Sustainable Development, almost all Arab states have created Nationally Determined Contributions (NDCs),⁴ stating how they are contributing to the fulfillments of the Paris Agreement. But the SDGs together with several of the most urgent declarations are far away from being reached, and at the current speed no goal will be reached by 2030 and the Arab region and its populations will be left behind while other regions progress and reap the advantages of being frontrunners. The recent COVID-19 pandemic, financial crisis, increased global conflicts and environmental distress, have left a gap for questioning the linear economic model where economic profit can be made without taking into considerations its effects, encouraging us to revise our current model and providing an opportunity for systemic change.

There are several economic models claimed to solve above mentioned challenges and lead us into a sustainable future where we all can thrive. A green economy is generally focused on resource efficiency and sustainable consumption and production, and could reach great progress but are limited to efficiency measures and improvements in sectors, missing out the systemic changes needed for holistically sustainable societies. To avoid increasing the extraction of new natural resources, bound to happen by economic growth 'eating up' the resources saved by efficiency measures; all finite resources need to be within a closed loop being used again and again and again. The circulation of natural resources requires a new mindset, a rethinking and redesigning of all sectors and a societal change

including our values. A circular economy (CE) has potential to lead to this holistic transformation of the society with systemic changes achieving environmental quality and resilience, social equity, and economic prosperity.

A CE is much more than traditional waste management focus, increased technological efficiency, and improved material flows through taking care of already produced waste by recycling. A recent study has shown that through a CE it is possible to fulfill people needs and wants with just 70% of the current use of materials.⁵ A CE can facilitate increased cooperation in regions and be carried out promoting inclusive development and a high quality of life for everyone. It can also facilitate improved human health and safety, and improved circumstances for tackling the Arab region's challenges such as food security and water access, while simultaneously ensuring access to vital resources for future generations and addressing climate change. It's a new economic model focused on expanding the well-being of people, achieved through systemic changes improving our use of natural resources; the base for human life, development, and prosperity.

This report brings together the current development and usage of natural resources in the Arab region, what a CE model entails, which possibilities a transformation can bring, the current progress towards a CE, current challenges and necessary enabling conditions. The possibilities within a CE are immense, but there are global and regional gaps in both a shared understanding of the concept and the knowledge on how to accelerate the transformation.

On the quest to develop and mainstream a holistic regional perspective of CE extensive desk research was carried out, bringing together vast global knowledge and regional aspects of special importance. A mapping of the inclusion of the CE concept, circular processes, and solutions in 22 Arab states were conducted to create a snapshot of the ambitions and progress in the region towards a CE transition. The mapping was carried out through a desk review of English language documents found online, mainly focusing on policies, frameworks, and ambitions communicated by governments and their entities. It's a first step to assess and highlight the work going into the sustainable use of natural resources connected to circularity in the region, and a starting point for finding a shared understanding and taxonomy around the concept of CE.

In the beginning of March 2022 the United Nations Economic and Social Commission for Western Asia (ESCWA) and the United Nations Environment Programme (UNEP) conducted a regional consultation with experts from several Arab states titled "Circular economy transition: opportunities and challenges", their feedback has been considered in this document. A Policy Brief has been created based on this report called "Accelerating Circularity in the Arab Region".

I CIRCULAR ECONOMY

CE has been outlined as a concept, economic system, development approach or framework with a high potential for sustainable development, attracting diverse possibilities and scholarly inquiries. The CE is used by a range of stakeholders and depending on the actor different circular processes and solutions are highlighted focusing on either environmental, economic, or social development. Without a clear definition, CE has a tendency of being vague and misused to enforce practices that are still within the paradigm of linearity and an unsustainable use of natural resources.⁶ In this chapter the concept of CE is outlined, employing transparency, and creating a holistic comprehension.

I-1. Defining a circular economy

Creating a shared definition facilitates transparency, and can be a starting point for discussion, knowledge sharing and collaboration. There are many definitions of a CE found online, and the ones exemplified on the next page covers a wide range of aspects and views of what a CE is and what it entails. Some of the definitions are fuller, for example the Ellen MacArthur Foundation's, and other focus more specifically on the social issues, such as consumerism, or the more technical aspects, such as the life cycle of products.

Green economy, bio-economy and CE are currently the most used economic concepts that are encouraging an adaptation or transformation towards sustainability. They have different aim and focus, and encourage distinctive methods, but are still often confused with each other and used interchangeably.⁷ Green economy is usually focused on energy efficiency and environmental conservation, while a bio-economy is targeting rural policies and the use of bio-based materials.

A green economy is sometimes seen as an umbrella concept containing CE, but this exemplifies a limited view of CE focused on traditional waste management and efficiency-measures in industries. A holistic CE on the other hand is ideal for both urban and rural development and applies a system approach appropriate in all sectors to develop resource efficiency, nature-based solutions, environmental and social resilience, new equitable and sustainable societal practices, and profitable economic business models based on circularity. In a CE, the transition of sectors from linearity to circularity won't be enough; it needs a transformation of values, behaviors, and priorities spanning through the whole society including all sectors and all people. A CE transformation needs to be inclusive and focused on equality since it's a system with a high interdependence between people, sectors, and countries, reinforcing the importance of agency.

A working definition has been created with the ultimate objective to achieve sustainable use of natural resources while advancing environmental resilience, social equity, and economic prosperity.

The definition was based on the following considerations:

- review of existing global definitions while focusing on regional specificities
- holistic approach to resources' utilization
- cross-sectorial system thinking for efficient governance structures building resilience

Circular economy is a cross-sectoral approach to development where systems are designed to favor solutions that upgrades ecosystems and keeps the value of resources within the system for as long as possible. Renewable and finite resource management is guided by the circular model which includes the restorative and regenerative processes of rethink, redesign, reduce, refuse, reuse, repurpose, recycle, and recover, to achieve a sustainable use of natural resources while advancing environmental resilience, social equity, and economic prosperity.

... things are made and consumed in a way that minimizes our use of the world's resources, cuts waste and reduces carbon emissions. Products are kept in use for as long as possible, through repairing, recycling and redesign – so they can be used again and again.

World Economic Forum⁸

... a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution. It is based on three principles, driven by design: eliminate waste and pollution, circulate products and materials (at their highest value), and regenerate nature. It is underpinned by a transition to renewable energy and materials. Transitioning to a circular economy entails decoupling economic activity from the consumption of finite resources. This represents a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits.

Ellen MacArthur Foundation⁹

The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

European Parliament¹¹

Chatham House¹⁰

It entails redesigning products to be more durable, reusable, repairable, and recyclable, and therefore kept in circulation for as long as possible. Beyond product design innovations, it also means changing the way we consume and use goods and services, and rethinking consumerism as a society.

I-2. Unlocking the potential of a holistic circular economy

As we are closing in on dangerous environmental and social tipping points,¹² CE has been receiving attention as it holds great potential for accelerating the implementation of the 2030 Agenda for Sustainable Development. The redesigning of consumption patterns and production systems to become circular is a value creating activity, which can ‘leapfrog’ developing countries in terms of low-carbon development with improved quality of products and lifestyles.¹³ A refocus from meeting individual SDGs to a systemic change having cross beneficial implications in several of the goals is possible through an adoption of circular solutions.

CE is linked to achieving multiple SDGs, and holds particular promise for achieving SDG 1 (no poverty), 2 (zero hunger), 6 (clean water and sanitation), 7 (affordable and clean energy), 8 (decent work and economic growth), 11 (sustainable cities), 12 (responsible consumption and production), 13 (climate action), 14 (life below water), and 15 (life on land)^{14,15} along with the implementation of the Paris Agreement.¹⁶ In this report it is further argue that there are strong links to SDG 3 (good health and well-being) and 9 (industry, innovation, and infrastructure). In [Annex 2](#) there is a table with the SDG targets connected to circular economy.

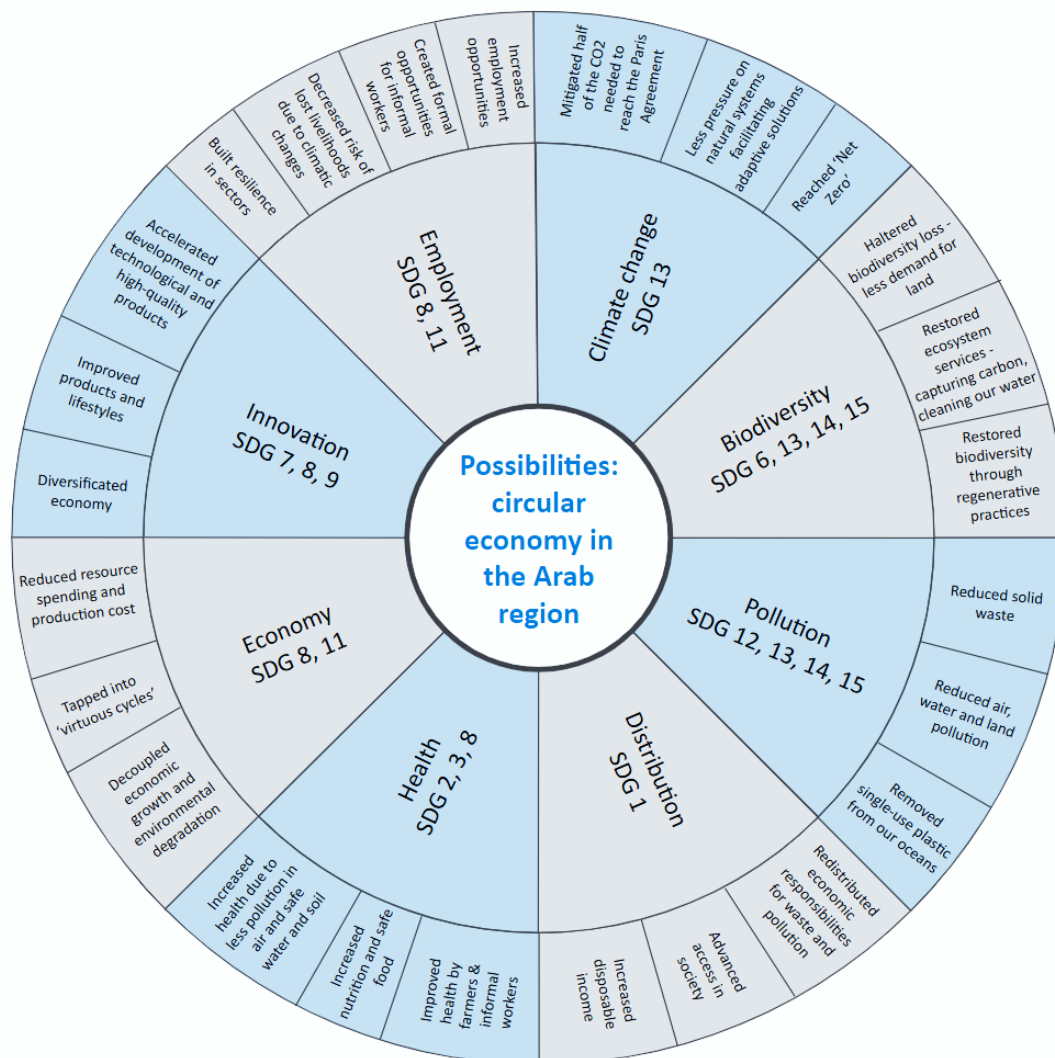


Figure 1. Possibilities within a holistic circular economy in the Arab region. Source: Created by author.

I-2.1. Climate change mitigation and adaptation

The management of materials are connected to an array of environmental issues, from the emission of warming gases to the pollution of water, air, and soil. Many environmental impacts from resource use connects to climate change. For example, by degrading the environment, ecosystems ability to regulate and store carbon are disrupted, leading to increased climate change.

An inclusion of circular processes have a great potential for mitigating climate change¹⁷ since half of the emitted GHGs are due to the extraction and processing of natural resources.¹⁸ The use of recycled materials can limit the environmental and climate impact of material use¹⁹ and by implementing a CE we can tackle the root causes of the 'Triple Planetary Crisis'; climate change, biodiversity loss, and pollution.²⁰ It is estimated that half of the reduced emissions needed to reach the Paris Agreements 1.5°C target, 7.5 billion tons carbon dioxide equivalents, could be reached by integrating the circular practices of shared ownership of transportation vehicles, chemical leasing, recovery of nutrients in agriculture and substitute materials in the construction sector.²¹

Best practices within waste management have been estimated to reduce 73 million tons of carbon dioxide (CO₂) emissions by 2035, in Saudi Arabia alone.²² Transforming to a CE, or targeting a transition in high impact value streams, could be a way to reach 'Net zero'.

Half of the emitted GHGs are due to the extraction and processing of natural resources

The Arab region has a high vulnerability to climate change and climatic variations, pressing on the importance of increased focus on climate change adaptation. Circular solutions reduce pressure on nature, and nature-based solutions can build resilience and can be included in the work towards both climate change mitigation and adaptation since they are argued able to tackle climate change, help restore and provide ecosystem services, and provide social benefits. These solutions could include smart cities or circular processes that decrease the dependence on scarce resources, leading to resilience.

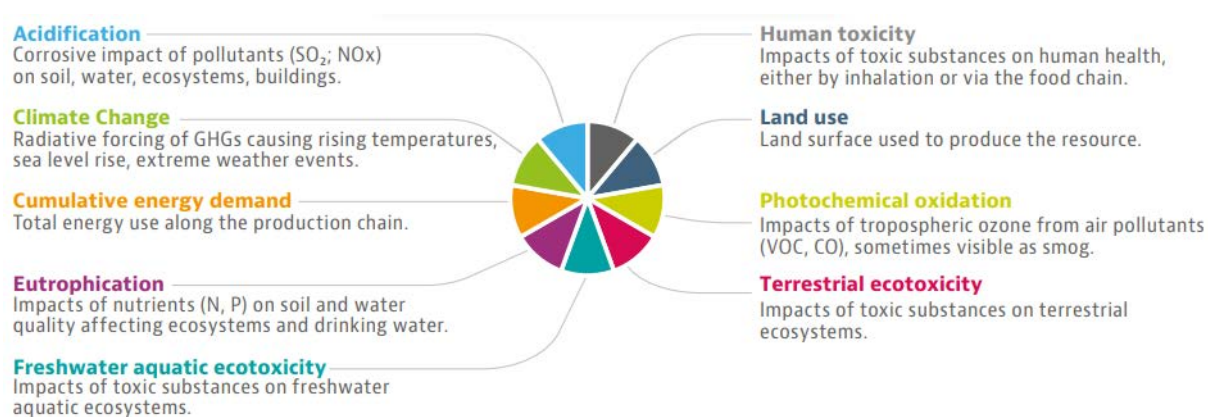


Figure 2. Environmental impacts from the extraction and production of iron, aluminum, copper, zinc, lead, nickel, manganese, concrete, and sand and gravel-material. These 9 materials are responsible for almost 20% of all greenhouse gas emissions globally. Source: International Resource Panel (2019).

I-2.2. Biodiversity restoration

Biodiversity loss are disturbing ecosystems and leading to ecosystems that can't provide their services, resulting in the major human threats of food and water-insecurity, exacerbated climate change, desertification and decreased human health conditions. It is estimated that 90% of all biodiversity loss is due to the unsustainable use of natural resources, both extraction and processing.²³ Halting biodiversity loss is of utmost importance, and by adopting restorative circular practices the demand for land driving biodiversity loss can be reduced, and through regenerative practices we can start giving back to the land facilitating restoration of systems.

A shift to a CE within the key sectors of food and agriculture; forest; building and construction; and fibers and textiles, have been argued enough to facilitate biodiversity restoration. By adopting a CE, without any other measures, it is estimated that the level of biodiversity could be restored to the global 2000 level, already by 2035.²⁴

*90% of
biodiversity loss
is due to the
unsustainable
use of natural
resources*

I-2.3. Pollution reduction

The pollution in water, air and soil have reached dangerous levels. Insufficient waste management with landfills reaching their brink, leaking out toxins in water and soil and polluting the air when burnt, and increased transportation and industrial activity, are contributing to 10-100 times the recommended acceptable levels of air pollution in parts of the Arab region.²⁵ By working towards circularity a reduction of the generation of solid waste can be achieved through design changes and recycling, and air pollution can be decreased through efficiency measures and other circular solutions such as the extension of public transport networks.

Plastic is one of the fastest growing waste-streams with 20-time growth the last 50 years. Plastic is not just emitting GHGs when produced and burnt, it is also a considerable source of pollution adding 730 tons of plastic waste in the Mediterranean every day making the Mediterranean Sea one of the worst polluted in the world. Around 60% of the marine litter in the sea is just single-use plastics, effecting costal and marine biodiversity and polluting waters.²⁶ In a CE there is no room for single-use plastics, and a study made by the European Commission stated that a ban on single-use plastics could save or generate up to 900 million Euro each year in the European Union (EU).²⁷

*100 times the
recommended
levels of air
pollution*

I-2.5. Employment opportunities

The Arab Region has one of the world's highest youth unemployment's and percentage of females outside the job market. The potential for job creation in a CE for the Arab region's youth, currently with an unemployment ratio of 30%, has been highlighted by the World Economic Forum.²⁸ The development of new circular solutions will need the innovativeness of skilled youth, and by increasing the remanufacturing and recycling sector the semi-skilled urban youth could also find opportunities in new job markets. For example, the recycling sector has vast potential for job creation, one thousand

tons of waste disposal generates 0.1 jobs while the processing of the same waste creates 2 jobs for the recyclables and 0.5 jobs for the organics.²⁹ Saudi Arabia has estimated that by developing their CE within just waste management, they could generate 77 thousand employment opportunities.³⁰ It is further estimated that in the EU and the United States of America, the recycling and remanufacturing sectors are currently employing one million people.³¹

*77 000 new jobs
in circular waste
management in
Saudi Arabia*

Circular solutions can also decrease the risk of people losing their current livelihoods. Today around 30% of the Arab population is basing their livelihood in the agricultural sector, a sector heavily threatened by climate change. Circular solutions can both mitigate the risk of further climatic changes and facilitate new resilient agricultural solutions and business models, creating opportunities for vulnerable populations in the food system.

I-2.6. Health improvement

Air pollution in the Arab region kills 270 000 people and costs 2% of GDP, each year.³² Improved human health due to reduced agricultural chemicals in soil and water are expected in a CE.³³ Since pollution has a disproportionate effect on developing countries and vulnerable populations, such as children and women, circular practices have a vast potential to improve their health.³⁴ Another group experiencing detrimental health are the informal collectors of waste, working daily in polluting environments with hazardous waste. An uptake of them into a formal CE would give them better conditions for sustaining a good health.³⁵ Cooperatives can be created for a formal collection and sorting of waste, improving the conditions and health of workers.³⁶

*Air pollution in
the Arab region
kills 270 000
people each
year*

I-2.8. Drive innovative solutions

The innovative nature of circular solutions can create new entrepreneurship. This will increase the competition among businesses resulting in an acceleration of technological and high-quality products, generating more profits for companies and better products for people.³⁷ New consumption patterns and production systems can lead to a low-carbon development with improved quality of products and lifestyles.³⁸ Adopting a CE can also diversify the economy, much needed in the Arab region since the recent economic growth in the region has been based on physical capital and therefore very connected to environmental degradation.³⁹ A diversification of the economy can build resilience with less dependency on a few sectors, and an opportunity to create an economy based on knowledge or services.

*A diversified low
carbon
economy with
an accelerated
development of
technological
and high-quality
products*

I-2.4. Wealth distribution

Globally there are enough materials and wealth to provide a good quality of life for everyone in the world.⁴⁰ The challenge of distribution, especially within countries, is the main concern as a recent report state that the consumption and emissions of GHGs now are greater between the wealthy and the poor in the same country than between countries. The Arab region is estimated inhabiting the greatest inequality in the world, with 15 times more CO₂ emissions of the top 10% richest than the bottom 50%.⁴¹ This matters in a CE context, since the transformation can be built on redistributing the economic responsibilities for waste and pollution through regulations and incentives. Circular solutions can also advance access in society and increase the disposable income through abandoning ownership models based on accumulation and moving towards a sharing economy where products are shared as high-quality services.⁴²

*15 times higher
CO₂ emissions
from the top
10% than the
bottom 50%*

I-2.7 Economic growth

CE is considered a profitable economic model containing possibilities for sustainable growth. Circular solutions aim at eliminating waste and increasing the functionality of products and materials, making them easily reused and recycled, allowing a reduction in production cost leading to increased revenues favoring economic growth.⁴³ Its described as 'converting waste into income streams'⁴⁴ or value retention.

An estimation of Europe's gain by adopting a CE highlighted a reduction of resource spending by 32% per year, 600 billion Euros, and the generation of a net economic gain of 1.8 trillion Euros per year by 2030.⁴⁵ A similar estimation has been done for the Gulf Cooperation Council (GCC) states, claiming that 138 billion dollars could be saved until 2030.⁴⁶ Individual states have also made estimations, an implementation of CE in the United Arab Emirates could save 28 billion dollars from 2020 to 2030.⁴⁷

*138 billion
dollars saved in
resource
spending in the
GCC states*

Germany's waste management sector has an annual turnover of 70 billion Euros.⁴⁸ Tapping into 'virtuous cycles' where businesses are managing to offset the cost of waste management through efficiency measures, rethinking and redesigning business models and value streams, and deploying new technology, is essential for private participation and investments, and job creation.⁴⁹ In Saudi Arabia it is estimated a 32-billion-dollar addition to the economy by 2030 by just transitioning to a circular solid waste management.⁵⁰

It is further estimated that the annual economic loss due to land degradation in the Arab region is currently 9 billion dollars, a considerable part of the region's GDP.⁵¹ In 2021 the environmental degradation by solid waste was estimated to have reached 1.3 billion dollars in Saudi Arabia alone.⁵² The cost for food waste is also reaching astonishing numbers; in the Arab region food valued 60 billion dollars are wasted each year.⁵³

I-3. Designing circular systems

The CE is a system based on circular processes that favors circular solutions, making sure the resources introduced are kept within the system with minimal loss for as long as possible. It is impossible to reach a system that is 100% circular, since resources are both used for constructing long term infrastructure and losses will happen since the quality and function of materials are reduced when going through processes.

To guide this development towards a CE, a circular model can be used. Just as there are many definitions of a CE, there are many circular models. The most common ones refer to the 3 'Rs' reduce, reuse, and recycle,⁵⁴ but there are models with up to 11 'Rs'.

The figure (3) below has been developed through an extensive literature review with the aim of showing the complexity but not including more than necessary. It is built on 8 'Rs' referred to as 'processes', where design changes together with short and long loops facilitates a circular system. The 'rule of thumb' is the shorter the loop the fewer natural resources used.⁵⁵

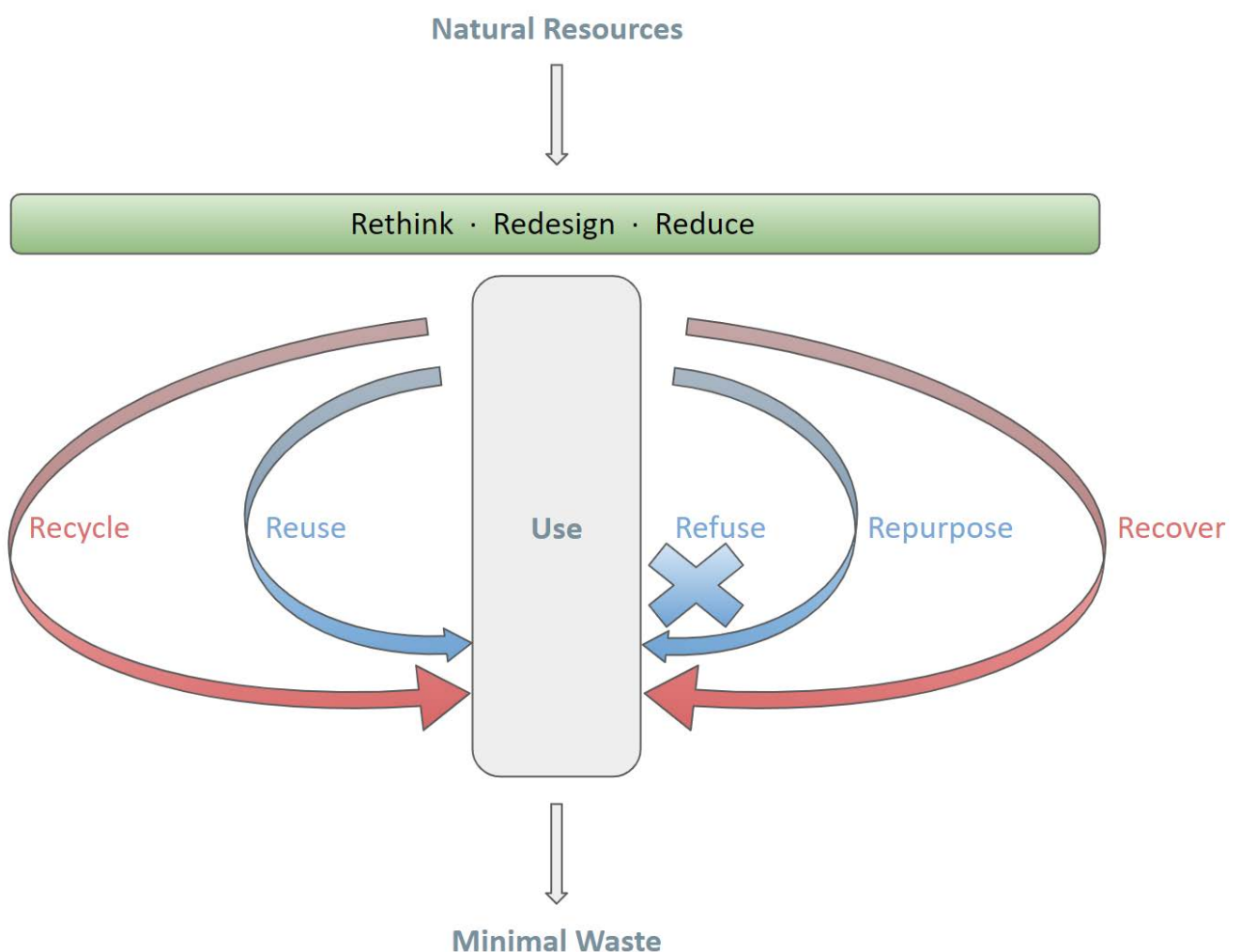


Figure 3. A model of circularity built on the design changes (Rethink, Redesign, Reduce), short loops (Refuse, Reuse, Repurpose) and long loops (Recycle, Recover). Source: Created by author.

Design changes are essential in the model and based on creating with the intent of decreasing the need of natural resources: **Rethink** business models to include used resources or a sharing of resources; **Redesign** products to last longer and be recyclable, and systems to be regenerative; and **Reduce** natural resources used in the design, production, manufacturing and during any of the circular processes, through efficiency measures.

The short loops are the most resource efficient and are either based on avoiding using resources: **Refuse** products or services that are above sufficiency levels and environmentally harmful; or extending the circularity of resources within the system through **Reuse** products until they are not fulfilling their original purpose; and **Repurpose** products, components, and materials outside their original purpose.

The long loops are a last resort since the resource lose a considerable amount of its value and they require high inputs of energy: **Recycle** through physical or chemical processes; and **Recover** energy through incineration or nutrients through biological recovery.

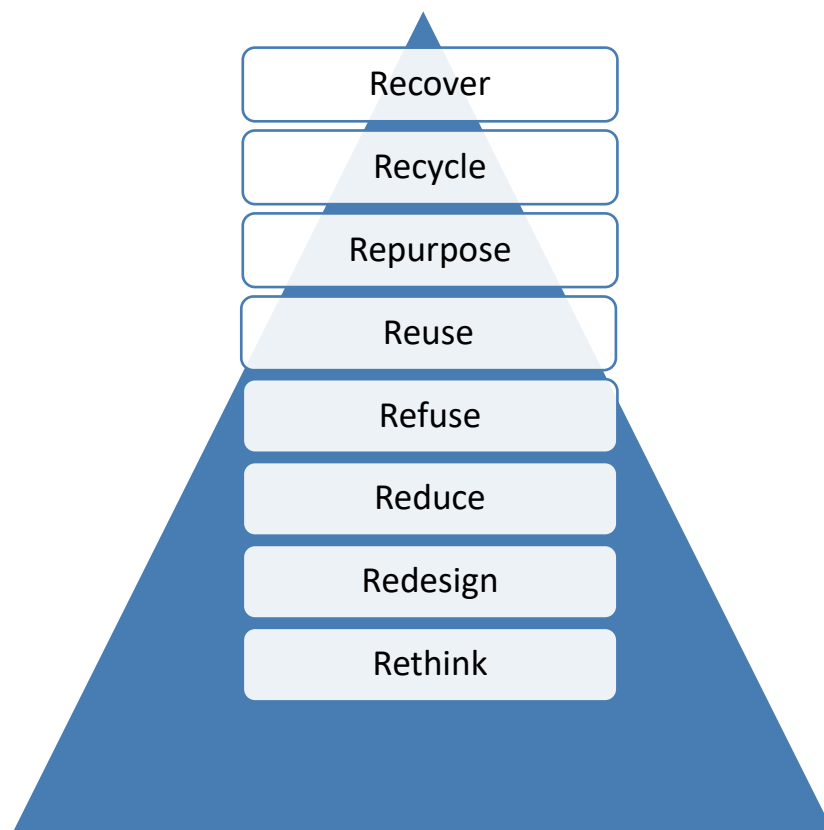


Figure 4. In a circular economy, processes that are in the base of the hierarchical pyramid needs to be prioritized, since they are generally the most resource efficient. Source: Created by author.

There are two different cycles of material flows which through circular processes can circulate in systems with closed loops: the biological and technical cycle. Material flows are simply the system which a material goes through, including all stages from production to end of use, and are often described as a chain where one process leads to another. To review the material flows can be described as 'supply chain management' and are in circular systems focused on including circular processes, such as recycling or recovering, to go from a chain to a closed loop of processes.

The biological cycle refers to renewable and biodegradable materials which are consumption products, such as food items. In a CE these flows of materials are through design changes improved and able to go through preferably several short loops until they can re-enter the natural system through processes like composting and anaerobic digestion, contributing to regenerating natural living systems.⁵⁶

The technical cycle refers to finite materials which are service products, such as metals and plastics. These materials can't re-enter the natural system safely again, and in a CE they need to be designed so their value can be captured and re-captured again and again in short circular loops for as long as possible to minimize waste. The finite materials will in the last step have to go through a long circular loop such as recycling or incineration, where they will lose value and their original properties.⁵⁷

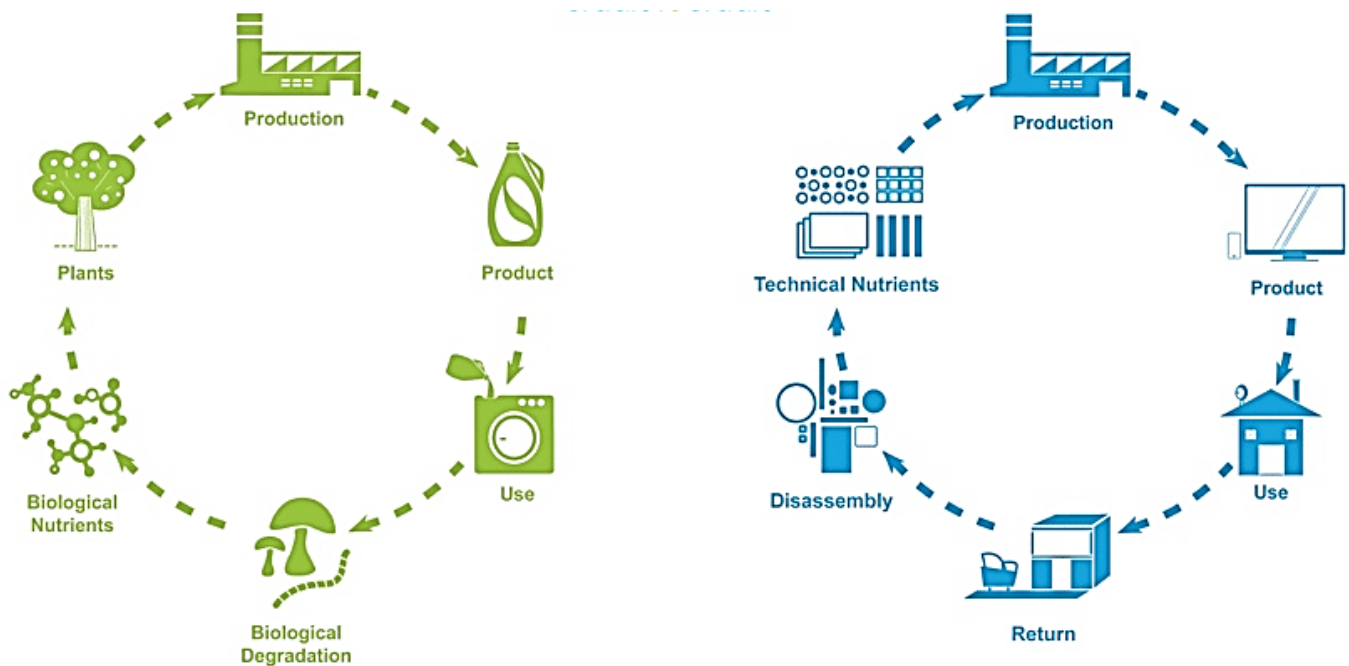


Figure 5. A simplification of the biological and technical cycle, where materials go through circular processes to form a loop. Source: C2C TW (n.d.).

II CIRCULAR SYSTEM INITIATIVES IN THE REGION

Already in the year 2000 plans and policies of a CE were created and adopted in the emergent economy of China.⁵⁸ In 2015 the European Commission followed and approved a plan moving towards a CE in the EU.⁵⁹ Even though extensive work has been carried out, the global economy is in 2023 only 7.2% circular,⁶⁰ counting the amount of materials that are cycled back into the economy after their primary use. This is a decrease of circularity compared to just a few years ago, highlighting an increased dependency of virgin materials and a strong incentive to bring all regions in the world together and start carrying out goal centered action plans. Except in China, the CE has previously gained little attention in low and middle-income countries.⁶¹ But this is changing, and in the last few years Arab states have started to question the linear economy and to investigate alternative development trajectories.

In this chapter the ambition and current status of CE in the Arab region is discussed. The results from the mapping of the inclusion of circularity in 22 Arab states are presented. A maximum of one page per country including the most progressive or extensive documents can be found in [Annex 3](#). In some states much more than presented could be found, where in others there is more space that could have been filled. This is not a full assessment of the governments work on circularity, keeping in mind that some countries use English language for most of their reports while other use French or Arabic. A few exceptions have been made for NDC's that have been informally translated to English for review.

II-1. National mapping of circular economy in Arab countries

In the review it was found that the 22 Arab states included are acknowledging the importance of CE or parts of it in their official documents, but in different degrees and with a focus on varied sectors. The mapping found that CE and circular processes and solutions are gaining increased attention in the Arab region, and that the ambitions are varied but shows great interest in a new way of natural resource use, and a high level of potential and willingness for change. Below are a selection of the ambition and inclusion of circularity in the Arab region found in the mapping. The mapping was carried out primary in English and is a snapshot of the current state, not a full picture. Further, four flag ship projects can be found in [Annex 5](#), exemplifying the transitions in the region.

II- 1.1. On a progressive path towards a circular economy

Circularity and circular process are widely mentioned and the transformation from linear to circular in the Arab region is progressively being a goal while simultaneous working on achieving Agenda 2030. In this part examples found carrying a holistic view of a CE or including progressive processes or solutions are described.

The United Arab Emirates has developed a 'Circular Economy Policy 2021 – 2031' where they state sustainable manufacturing, green infrastructure, sustainable transport, and sustainable food production and consumption, as prioritized sectors while working on monitoring the implementation.⁶² It is focused on the possibilities within a transition to CE, including a strategy with steps on how to transition and connecting the ambitions with vast investment opportunities.⁶³ Saudi Arabia's documents with a dedication to circularity are also frontrunners. They are focusing on the energy sector through the Circular Carbon Economy (CCE) and have produced a 'Circular Carbon Economy National Program'. The ambition is emissions reduction through efficiency measures, storage and capture of CO₂ and other energy focused measures.⁶⁴ Jordan has also chosen one sector to focus on, the waste sector, and have produced 'Climate and Resource Protection through Circular Economy

in Jordan 2017-2021'. This document is holistic, even though it's not cross sectoral, and are setting out the necessary conditions to implement a CE in the Greater Amman Municipality.⁶⁵

Almost all Arab states (21 of 22) have produced and submitted NDCs and the majority (20 of 21) include either circular processes or circular solutions to reach mitigation goals towards the Paris Agreement and adaptation to climate change. The ministry or department in charge of producing the NDC is generally the government without mentioning who specifically oversees the measures planned. A few states are clearly stating the importance of a holistic CE in their NDC. Lebanon is writing that the goal is a green economy, described as a sustainable development model with high human development and reduced ecological impact.⁶⁶ The United Arab Emirates has states that a CE is the goal for their waste sector,⁶⁷ while Kuwait⁶⁸ and Saudi Arabia⁶⁹ are including a CCE as the strategy to reach their mitigation targets.

The majority of the NDCs are including parts of the CE in their mitigation measures and could be found targeting an array of different sectors listed below.



II- 1.2. Policies targeting circularity

Integrated waste management is the sector with the most policies towards circularity. The circular policies often discussed are controlled dumping, promotion of the hierarchical steps of waste reduction, reuse of products, recycling with different kind of sorting, recovering of energy, and sanitization of landfills. New directions often mentioned in policies are a culture of shared responsibility to protecting the environment and public health, and a decentralization of responsibilities but with central authorities to ensure efficient recourse allocation. The circular national policies existing in the Arab region are either directly linked to a CE or tackling connected issues, such as SDG12 (responsible consumption and production), energy efficiency in industries, or the reduction of waste created.

PPPs, CPP & EPR

In Lebanon's Action Plan for the Industrial Sector, produced 2015, several policies towards improvements in the industry have been endorsed by the ministry of environment and ministry of industry. The goal is a CE, and the suggested policies to reach there includes Pollution Pays Principle (PPP), sustainable public procurement, and other fiscal policies.⁷⁰ A few Arab states have started to draft up plans of sustainable or Circular Procurement Practices (CPPs). For instance, Egypt's Ministry of Environment together with SwitchMED have recommended procurement practices in their 'National Action Plan for Sustainable Consumption and Production' (2016).⁷¹ Further development is limited to the GCC states, where Qatar⁷² and United Arab Emirates⁷³ plan to introduce CPPs. The Extended Producer Responsibility (EPR) schemes in the Arab region are almost non existing, and in the few states where it is adopted it only covers a couple of selected waste categories. Tunisia was the first state in the region which already 1996 regulated the responsibility of waste and pollution to the producer in the law. Unfortunately, these laws are not applied in Tunisia, and it is still mainly municipalities that are paying the solid waste management.⁷⁴ Palestine has introduced PPP schemes

into their environmental law to make companies degrading the environment pay for the damaged created.⁷⁵ In Qatar's Voluntary National Review (2021) the Planning and Statistics Authority was planning to host the most environmentally friendly FIFA World Cup possible 2022, including the efficient use of natural resources, through the policies of sustainable procurement and using materials with recycled content or that can be reused or recycled after use.⁷⁶

Tax & subsidies

Increasing the tax or decreasing subsidies on environmentally harmful resources and decreasing the tax or introducing subsidies for circular processes or solutions are also being carried out in the Arab region. In Egypt projects have been carried out decreasing the subsidies on energy, electricity, and oil.⁷⁷ Morocco has also been gradually phasing out fossil fuel subsidies since 2012, in particular for liquid petroleum products such as diesel, while closely monitoring the potential social impacts and putting forward the importance of solidarity with the most vulnerable.⁷⁸ Palestine and Yemen have other policies in place, Palestine will introduce Value Added Tax and increased income tax to target sustainable consumption,⁷⁹ and Yemen will introduce tax exemptions to increase reuse and recycling and lower the use of virgin materials.⁸⁰ To reach this Yemen will be establishing certification scheme by which environmental excellence as regard to energy-efficiency, materials use -efficiency, and water-efficiency, will be verified, registered, certified and rewarded. Another example is the 'Eco tax' which is a partnership agreement in Morocco, signed between the State Secretariat for Water and the Environment, involving many ministries to solve the problem of plastic bags and other negative effects of resource use by implementing taxes on waste.⁸¹

II- 1.3. Structures enabling efficient governance

Efficient governance structures can enable the above-mentioned policies to be implemented and have in the mapping been thought of as the documents including newly formed cooperation for CE, and shared visions of a CE or roadmaps, and the monitoring for an efficient implementation. CE is unlikely to be implemented if it's a policy 'sidetrack' and not in the core of development trajectories. Many states are working on their governance structures to make their ambitions of a CE going from paper to reality. Below are examples of this kind of processes in the Arab region.

Visions and governance

Several of the Arab states have produced documents with their Visions for 2030, 2035, 2040, or for an undefined time. Some examples of the most progressive vision of circularity and how to get there were found in documents produced by Oman, Saudi Arabia, Djibouti, Yemen, and Iraq.

'Oman Vision 2040' are stating the goal of ensuring a sustainable use of natural resources to support their economy which will be achieved partly through a green economy and CE, measured by indicators in environmental performance, water index, domestic material consumption etc. capturing the transition. This document is cross-sectorial and captures the shared vision at the same time as it sets a mission of a CE.⁸²

The Council for Economic and Development affairs in Saudi Arabia created in 2016 a 'Saudi Arabia's Vision 2030'. This vision is including the practices of recycling and decreasing water consumption through efficiency measures, to preserve the environment and the natural resources. The document further contains a whole section about the importance of the development of the council to achieve efficient governance structures to implement the vision, with the creation of an office that will solely work on the coordination of different government programs.⁸³

In the 'National Vision for the Modern Yemini State' produced in 2019, the government of Yemen is focusing on improving infrastructure for waste management including both treatment and recycling. The Vision also includes the circular indicators of 'Percentage of treated and re- cycled waste' and 'Utilization of industrial technology to recycle waste and transform it into an essential part of development', showing an ambition to develop a more sustainable use of natural resources. One important part of an enabling structure is to include monitoring, without it there is no way of assessing the results and for governance to improve necessary cooperation or remove bottlenecks.⁸⁴

The Government of Djibouti has created 'Vision 2035' capturing the pressing needs of improved waste and agricultural practices in the country and follows with recommending alternative, more sustainable, and circular agricultural and food practices, such as diversification of food harvesting, recycling of agricultural wastewater, foraging crops, and planting gardens to combat decertification. To be able to develop in the described way the country is recognizing the need for further integration in the region to enable trade and to attract international investment.⁸⁵

In 2019 Iraq's Ministry of Planning created 'The Future We Want: Iraq's Vision for Sustainable Development 2030'. The environmental goal is to find an environmental balance, for the current and future generations possibility to live in a clean, safe, and sustainable environment. There are several circular processes and solutions mentioned to reach the goal, including developing sustainable cities, raising awareness about consumption and its negative sides, and to build out the public transport network. This vision is described as a way forward, making an aspiring vision in which all ministries and local governments will feel confident in and can implement 'to ensure the visions realization'.⁸⁶

Extended cooperation

Newly formed cooperation for a CE, circular processes, or solutions, can be found in several documents. A regional cooperation started in 2016 for the implementation of a CE in Africa, called 'The African Circular Economy Network' has been created. The Arab states of Morocco, Sudan, Tunisia, and Somalia have joined the network with the goal of building a restorative African economy through knowledge sharing, research, networking, trainings, and awareness raising.⁸⁷ Some examples of national documents focused on the importance and with the mindset of incorporating new cooperation for reaching a CE are created by the United Arab Emirates, Bahrain, Saudi Arabia, Lebanon, and Egypt. International engagement and cooperation are key in the 'Circular Carbon Economy National Program' developed by the Ministry of Energy in Saudi Arabia, they want to take global leadership in this domain and help other states to follow.⁸⁸ The United Arab Emirates 'Circular Economy Council' is focused on the national cooperation and coordination between different ministries, nation and regional strategies, sectors, and the public and private domain.⁸⁹ Bahrain's development of the 'Strategic and Sustainable Development Cooperation Framework 2021-2022' is a great example of an effort towards improving the structures needed to implement a CE. It's a partnership between the government and the UN, highlighting cooperation opportunities throughout the document.⁹⁰ Similar efforts between national sectors or states could be a key to accelerate the progress through cooperation across the region or across sectors.

Roadmaps

SwitchMed, founded by the EU and led by the United Nations Industrial Development Organization, are guiding states in the Mediterranean through in collaboration creating roadmaps for a transformation to a CE or a transition to circularity in selected sectors. So far, they are guiding 7 Arab states, including Algeria, Morocco, Tunisia, Egypt, Palestine, Jordan, and Lebanon.⁹¹ This kind of collaboration between national governments and international governmental organizations can

transfer international capacities to national actors, and if carried out in an appropriate way could lead to regional cross sectorial cooperation. Further, many of the created documents in the SwitchMed series are focused on improving governance, for example Egypt's 'National Action Plan for Sustainable Consumption and Production' (2016) which has a focus on the reformation on governance and institutional structures, with long term visions that promotes circularity.⁹² ACTED is another organization that has investigated the current state, potential, and enablers for a CE in Arab states. So far, they have created documents for Jordan and Lebanon, containing many of the important part of a roadmap. They are mapping and collecting data from many stakeholders, increasing the inclusion of a range of actors within the public and private sectors, as well as consumers. Both documents are mainly focused on waste management.⁹³

Monitoring

In the Arab region indicators and different monitoring frameworks have been created by both international organization and national governments. The most used framework is the SDGs containing 17 goals, 169 targets and 247 indicators. Many of them are connected to circularity as can be seen in [Annex 2](#). The 'Circularity Gap Report' developed by the organization Circle Economy gives a global snapshot of the current circularity in the world. So far it has been published six years in a row, facilitating metrics around circularity for impactful action.⁹⁴

SwitchMed has created a Mediterranean regional index in combination with interactive maps based on a framework for sustainable consumption and production.⁹⁵ Their indicators are largely SDG indicators, but the framework has also included other aspects that may be advantageous to include for measuring the progress of a CE. The Arab Monetary Fund has created a 'Transformation Measurement Index' as a way for Arab states to measuring their economic progress of transitioning to a CE.⁹⁶ It can be used as a starting point for thinking through how to measure circularity on a country or regional level and the index are suggesting indicators within economic and business; environmental; governance; infrastructure; and social levels. Another initiative to measure progress are the CCE Index developed by the King Abdullah Petroleum Studies and Research Center. Its solely focusing on energy to within the CCE to be able to quantify and compare countries performance's. They have two years in a row assessed oil producing and the G20 countries to get a picture of their performance and the work on enabling the circularity.⁹⁷

Many national governments have suggested or set up indicators to measure the progress aimed for in their development documents. Oman has suggested the relevant indicators including domestic material consumption, renewable energy consumption, GDP per unit of energy use, water index, environmental performance index, and self-sufficiency ratio. They have also put-up targets in the goal to measure their progress towards a CE.⁹⁸ Other states who have developed and communicated circular indicator in their documents are the United Arab Emirates,⁹⁹ Egypt,¹⁰⁰ Algeria,¹⁰¹ Palestine,¹⁰² and Yemen.¹⁰³

II- 1.4. Creating the capacity needed

Capacity

The need for capacity building in the region is acknowledged, and several states have introduced efforts to start the process. Lebanon has introduced the project 'Energy and Waste Solutions – Promoting Waste Management Practices and the 3R by Utilizing New Technologies and Circular Economy Approach (2020-2024)'.¹⁰⁴ It's a collaboration between Lebanese ministries with the vision of strengthening the capacity to move towards a CE. Capacity will be increased by educating government officials in waste management, and by an internet platform for CE. Other capacity building programs

in the region are carried out by MedWaves and the UNEP Mediterranean Action Plan. Their programs span across countries in the Mediterranean region and their 'Switchers' program has so far targeted capacity building needs in the Arab states of Palestine, Lebanon, Jordan, Morocco, Tunisia, Egypt, and Algeria.¹⁰⁵ For example, in Algeria SwitchMed has implemented 10 capacity building projects, guiding the practical development of circular business models, and providing a handbook in how to build a successful green business.¹⁰⁶

Awareness

Public awareness is also targeted as a capacity building strategy, acknowledging the need of communicating the message of circularity and getting everyone onboard for change. In Sudan they have created the 'First State of Environment and Outlook Report' where they describe their public awareness and education campaigns; development of standards on packaging materials; and the promotion of sorting of waste at the source. The goal is to reduce waste for landfills with 25% and increase recycling rates to 40% by 2030 with public and company awareness and training.¹⁰⁷ Another example is found in 'The Future We Want: Iraq's Vision for Sustainable Development 2030', where awareness raising about consumption will conquer its negative effects.¹⁰⁸ Other states focusing on awareness raising are Bahrain,¹⁰⁹ Tunisia,¹¹⁰ and Somalia.¹¹¹

II- 1.5. Prioritizing financial flows toward circularity

The lack of monetary resources for transitioning to a CE is discussed as the main problem in parts of the region and discussed in many documents. There are several ambitious plans to redirect, increase or find new ways of financing the necessary shift in resource use. As discussed in a previous section is SwitchMed and their 'Switchers' program influential in the region. They also provide finance for new businesses to encourage entrepreneurship for circularity and green businesses in the Mediterranean region. A fund called the 'Switchers Fund' has been developed and works as an instrument to finance circular solutions.¹¹² Another initiative towards finance can be found in Morocco's 'The New Development Model' developed in 2021 by the Special Commission.¹¹³ In their development model they aim for a green economy by using a CE approach, and are preparing for the skills needed by redirecting finance towards capacity building through encouraging 'innovative initiatives' by financial stakeholder, academia and the industry.

Almost everywhere in the region there are calls for further private, or public-private partnerships with blended finance, to secure monetary resources for circular solutions. Kuwait is working on improving their private sector by promoting best practices within the CE,¹¹⁴ while the United Arab Emirates new CE Council has the role of encouraging further private sector participation and cooperation between the public and private sector to reach a CE.¹¹⁵

II-2. Linear chains to circular flows in selected sectors

To strategically choose sectors to start transitioning can speed up the transformation through restructuring or closing the loops of high-impact value chains, leading to both tackling large emitters, building resilience in vulnerable sectors, and boosting a shared vision among all stakeholders of what a healthier economy can bring. Recent research, with a global focus, has estimated that by transitioning four key systems to circular we could move towards regaining balance in ecological systems. The transition of four systems: food systems; manufactured good and consumables; built environment; and mobility and transport, could reduce the global material extraction by 34%, limit the emissions of GHGs enough to keep global temperature rise to 2 degrees, and reduce the aerosol loading, freshwater use, ocean acidification, phosphorus cycle, nitrogen cycle, and land system change.¹¹⁶ Based on the

above-mentioned assessment of four key systems with high impact and keeping in mind the Arab region’s specific challenges the key systems of solid waste management, food systems, and energy, have been chosen to be explored below.

II-2.1. Towards integrated solid waste management

The agenda to improve waste management has been developed by all Arab states and started over a decade ago, when landfills were reaching their limits and the direct environmental impacts of dumping unsorted waste were receiving increased attention.

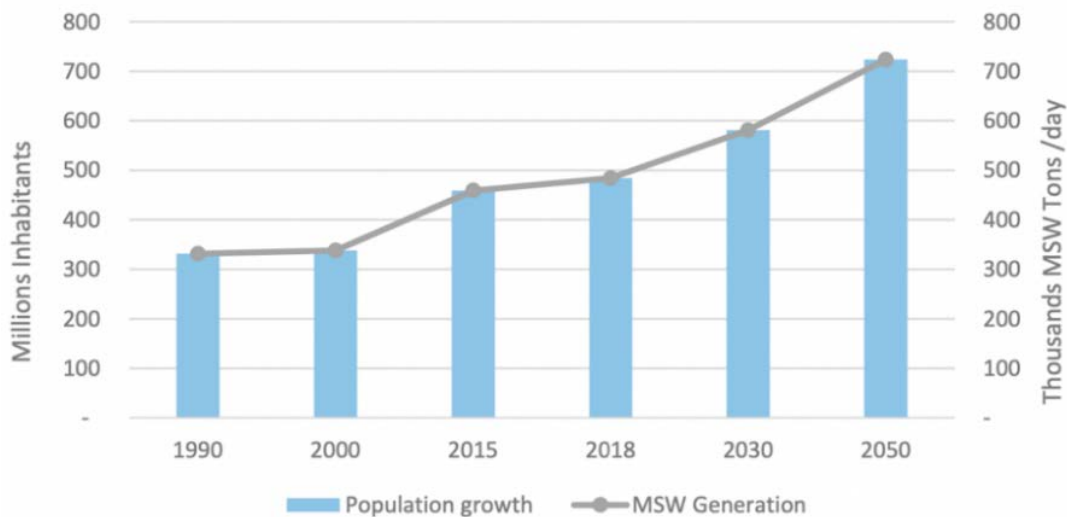


Figure 6. Population growth and municipality solid waste in the MENA region since 1990 and the prediction until 2050. Note: this source uses the region Middle East and North Africa, which is not the same as the Arab region but can still be valid as an overview since the regions are greatly overlapping. Source: Thabit et.al. (2022).

There is still much to do within the waste sector; 90-95% of all municipal solid waste goes to landfills in the region and the amount of produced solid household waste is increasing and has now reached 2.7 kilo per day and person in some parts of the Arab region.¹¹⁷

Depending on the type of waste different circular processes can be applied. In figure 7 the average waste fractions of 15 Arab states are estimated, noting that this is not the waste fractions in the region,

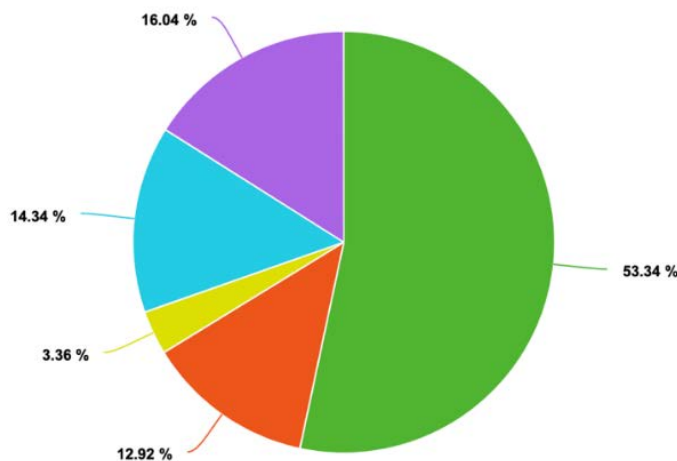


Figure 7. Average of waste fractions 2019 in Egypt, Jordan, Morocco, Algeria, Tunisia, Lebanon, Syria, Libya, Saudi Arabia, Qatar, Kuwait, Oman, United Arab Emirates, Bahrain & Yemen. Source: Adapted from Thabit et.al. (2022).

but the average per state combined. Different states are producing different waste, where the GCC states produce less organic waste and the highest amount of solid waste per person.¹¹⁸

Most of the current development in waste management in the Arab region is focused on principles with long loops, such as recycling and incinerating waste, which are the least resource efficient. These principles can be the ones easiest to implement since they are tech-based and have a low dependence on socio-institutional changes.¹¹⁹ The region's biggest recycling plant is in Saudi Arabia and incineration plant in United Arab Emirates.

An upstream focus is needed in the current solid waste management in the region since up to 80% of the environmental impact of a product can be reduced in the design stage.¹²⁰ Recycling and incinerating waste are great steps towards circularity but will never be able to close the material loops by themselves. To target optimal waste reduction, several sectors need to start rethinking ownership and redesigning products to reach a paradigm shift of a sharing economy with products that can be disassembled and regenerated. **Rethinking** ownership can for example include a transition towards a sharing economy with high collaboration and exchange of resources, limiting the resources needed and still fulfill the social needs and wants. A sharing economy can include everything from co-riding cars, rental of housing, rental of temporary private accommodations, car rentals, public transport, and book libraries to more progressive options such as co-living solutions, urban bike rentals, toy and tool libraries, urban gardening, co-working spaces, and rental of clothes for special occasions. Other business models with high potential includes reuse and reduce business models, targeting a shift by renting high quality products instead of buying single use plastics, reuse of clothes and furniture in secondhand markets, and reducing food waste through apps facilitating surplus food to be 'saved'. Generally, there are many products we could share as services or borrow instead when needed, this is essential for reducing waste, diversifying the economy, and creating inclusive growth and inclusion.

The **redesigning** of a product can reduce toxicity and materials needed, and increase durability, ease of disassembly, repair, remanufacture, reuse, and recyclability.¹²¹ The redesigning stage has a high potential and is important to make the products in the new business models under 'rethink' sustainable, but also for the possibility to implement the longer circular loops such as recycle and recover. For an example, plastic is a fast-growing waste-stream which has increased more than twenty times the last 50 years, leading to huge amounts of emitted GHGs and a polluted environment from their toxic additives. Plastic used as packaging or 'single time use' can be phased out through new business models, discussed above, and through redesigning creative and smart product designs.¹²² When plastics are ready to be recycled much of plastics don't fulfil the requirements to be recycled, since they contain a mix of polymers, other materials, and chemicals, or are not optimized to continue carry a high material quality or economic resell value after processing, making it hard to create an economically sustainable recycling sector at all.¹²³

The short loops within waste management are refuse, reuse, and repurpose, which are very resource efficient and can create new jobs within resell, repair, and similar businesses. **Refuse** is a process that is valid for societies with an already high consumption and development, where people consume above sufficiency levels and there are options which have varied sustainability. To reach a mindset based on refuse is hard since there need to be a high public awareness about sustainability and the impact of different options, and governance structures facilitating more sustainable options through trade and regulations.

Reuse and **repurpose** are easier processes to implement but are also dependent on societal changes where reuse markets are available and beneficial to individuals through regulations and incentives. Electronics is the fastest growing waste-stream in the world and the discarded materials contain a large

quantity of usable materials which could through appropriate strategies be reused and repurposed/remanufactured saving billions of dollars and vast resources.¹²⁴ Another especially important sector in the Arab region, due to the rapid urbanization, is the construction sector; responsible for up to 40% of all solid waste in some Arab countries. The sector is in desperate need of building design encouraging long term use, new business models within real estate, and recycling of all used materials.¹²⁵

When waste is produced, it needs to be reevaluated and used as a resource in long loops, either through **Recycling** of products, components, or materials, or **Recovering** of the energy through incineration through waste-energy production or regeneration through bringing biological nutrients to natural systems. Waste is generally in the region viewed as only a problem, losing the enormous potential of circular processes with quite easy implementation. For example, incinerating municipal solid waste would emit less than half of the CO₂ emissions compared to the current storage in landfills (840 kg to 415 kg/ton).

II-2.2. Resilient and sustainable food systems

Food systems embrace the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption, and disposal (loss or waste) of food products that originate from agriculture (incl. livestock), forestry, fisheries, and food industries, and the broader economic, societal, and natural environments in which they are embedded.¹²⁶ Food systems are highly complex since they include many stakeholders and are integrated and driven by many factors, such as politics, culture, economy, infrastructure, environment, biophysics, and technology.¹²⁷ It can also have many different outcomes, of which food security is essential to mention since it is linked to sustainable practices, availability of food and resources, accessibility and stability.

A major challenge to achieve food security in the Arab region is the ability to produce enough food for its population, or at least decrease the dependence of food trade. By introducing a sustainable use of natural resources and following circular processes and solutions the ability and productivity in food systems could be improved. Increased food production and productivity cannot be achieved without mastering the way to utilize the available water more efficiently, for example through improved water management including reuse of wastewater and efficiency measures in irrigation.



Figure 8. A simplified picture of a regenerative food system. Source: Ellen MacArthur Foundation. (n.d.).

In most dry countries in the Arab region the water use for agriculture is higher than the global average; 85% of the total water use in Arab states goes to agriculture. In some countries it is even higher, for example, 88% of the water in Saudi Arabia goes to the agricultural sector even though the added value of the agricultural sector is only 2% of the country's GDP.¹²⁸ In addition, Food loss and food waste are recognized as challenging dilemmas facing the Arab region today with serious repercussions on food security, the environment, and global as well as regional and national economies. Food loss and food waste in the Arab region generated per person sometimes exceeds 210 kg per year.¹²⁹

ESCWA has worked substantially on supporting Arab states to transform their food systems towards sustainability. Many of the initiatives in research of best practices and data development are directly like to a CE. For example, a monitoring framework has been created including waste water management,¹³⁰ sustainable agricultural development,¹³¹ greater food production and rain fed agriculture,¹³² and a study of the reduction of food loss and waste in Morocco has been carried out.¹³³ Further, in 2021 the water-food nexus challenges were addressed in the Arab region, with a specific focus on consumption awareness and treated wastewater including both an overview of the issues and policy challenges.

A CE for food mimics natural systems of regeneration without any waste creation. The **rethinking** and **redesigning** of food systems to become circular includes creating new business models with an increased sharing of resources and advancement of closed local systems, strengthening both access to food in cities and resilience in rural areas. The biological cycle needs to become regenerative, while the manufacturing and transportation of the produce should be based on restorative practices. Food systems that include circular regenerative practices are directly linked to resilience. There are different circular processes that can be involved, for example in agricultural practices rotational schemes or agroforestry can be introduced, to **reduce** the need of pesticides and fertilizers, developing enhanced soil quality with improved water holding capacity, sequestering carbon, and an improved nutritional quality of the produce. The unsustainable feedback loop of adding fertilizers to increase production but at the same time harming the quality of the soil, making it a necessity to add more fertilizer next time¹³⁴ will have to be broken through new circular solution reaching the potential in soil quality and increasing harvests.

Reuse and **repurpose** are circular processes that are not very common within food but can be applied to water management in the agricultural sector through new technology, harvesting of rainwater, and reusing water from households on the fields. The finite materials, such as tools and machines, in the industrial factories processing food and in the vehicles transporting the food can become reused and repurposed through new management of materials and the inclusion of renewable vehicle fuels. The process of **refuse** is more common when discussing the biological cycles and can be achieved by increased consumer awareness towards organic, locally produced, 'saved' food, or plant-based protein option with reduced environmental impacts. But it can also be achieved within the finite materials, in a culture where plastic packaging for example is seen as unwanted.

Recycling and recover in food systems are linked to recycling of package materials and the recovering of nutrients by the practices managed in the section above about waste management.

II-1.3. Renewable and Energy Efficient Approaches

The industry, energy and transport sector are high emitters of GHGs, polluting the local surroundings, and built on vulnerable systems dependent on finite materials and with a low social inclusion. In a report from 2020 the Arab region has the world's lowest regional share of renewable energy in their energy mix, and the world's highest regional energy intense transportation sector.¹³⁵ To make this sector circular and thereby sustainable and resilient, some of the essential strategies is to increase the share of renewable energy, together with energy efficiency measures and expanded public transport.

In 2017, the renewable energy stood at 11% in the region and in the countries with a higher degree of renewables, a considerable part came from solid biofuels while several states more or less only used fossil fuels for their energy needs.¹³⁶ Things are changing though, and in 2022 Egypt had the biggest installed solar and wind capacity while Morocco is estimated to have the highest installed capacity by 2030.¹³⁷ The commitments to expand the renewable energy in the region are found in all states. In this regard, ESCWA completed the "Regional Initiative for Deploying Small-Capacity Renewable Energy Applications in Rural Areas in the Arab Region (REGEND)" project which aims to improve livelihoods and achieve economic benefits, social inclusion, and gender equality for rural communities by addressing the problems of energy poverty, water scarcity, vulnerability to climate change and other challenges related to natural resources in three Arab states. One project that has been carried out has resulted in 400 mini-solar systems in Lebanon for people former without electricity.

The traditional way of burning fossil fuels have no space in a CE, since finite resources are burnt and combusted when used, making a circular system impossible. CCE is a new circular model focusing on energy and carbon flows to achieve net-zero carbon emissions. It's built on the principles of **reduce, reuse, recycle** and **remove**. The last principle of remove is argued being able to close the circle through new technology and natural sinks capturing the carbon emissions. A circular energy system can also include new smart solutions, such as local biogas production from organic waste or solar power panels on household roofs. The CCE is heavily technology based, but with a great potential in combination with a strong focus on expanding the renewable energy. Energy efficient approaches together with the use of renewables have been argued being able to reduce up to 90% of the energy-related carbon emissions needed to meet the Paris Agreement.¹³⁸

The public transport networks have previously not been put in focus but are now being developed in many Arab states.¹³⁹ The **rethinking** and **redesigning** of energy intense sectors can also include a circular transport system, which can be developed through four circular solutions: The mainstreaming and possibility to mainly cycle or walk within urban areas can be encouraged by new infrastructure and smart solutions for accessibility in cities. The extension of public transport networks and other ways of sharing vehicles can make it possible for people to continue (or start) being mobile but decrease the resources used by sharing products as services and the efficiency measures of being several people in the same vehicle. The travel mode of flights needs to be reduced since it has high emissions and very little global inclusion, this can be encouraged with the extension of long-haul train networks and increased use of digitalization tools. The last solution is to electrify all vehicles still needed, both within public and private transport systems.¹⁴⁰

Improved energy efficiency in the manufacturing of products can be reached by including **recycling**. The energy saved varies depending on the material used, and generally the use of recycled aluminum is seen as the most resource saving with a decrease of up to 95% of the energy needed if produced from new raw materials.¹⁴¹ Including **recovering** processes into the flow of materials, also have vast potential for saving energy and thereby emissions and resources. For example, incinerating waste through combustion creating heat to generate electricity has an efficiency of 15-27%, but it also emits CO₂, making it inferior to other renewable energy options but superiors to the burning of fossil fuels.¹⁴²

III ACCELERATING THE CIRCULAR TRANSITION IN THE ARAB REGION

The Arab region is in high need of transforming its resource centric linear economy to a circular economic model but are at the same time experiencing region specific challenges. Even though many states are working on enabling governance structures for a CE, there are gaps in most states' documents. The most obvious one is the lack of an Arab regional cooperation for enabling circular solutions. Since the Arab states have different resources and capacities, they need to enable elevated trade and cooperation between them. A vision of how circular flows of materials can be designed for, both nationally and regionally, need to be created and shared. There are national roadmaps towards a CE in a few Arab states, but it is essential that all states have one. Further, a CE cannot be achieved by sector specific focus, it needs to be a cross sectoral mainstreaming of circularity giving CE the core space in development efforts in a multitude of sectors to be able to go from a limited transition of flows to a societal transformation.

There is a lack of extensive holistic research being carried out concerning the enablers for a CE in the region, and this part has been developed through discussions with experts, a review of the limited research of region-specific enablers, global circular frontrunners reviews and the results from the extensive mapping described in the previous section.

Transitioning to a CE is a systemic process that can be accelerated through political commitment, adequate policies, effective governance with strong institutions and adequate policies, sustainable financing mechanisms, capacity building programs, and a cross sectoral engagement of all stakeholders and actors. Several aspects should be considered when starting; where is the least resistance, circular potential, and higher impact.

Six necessary steps have been identified; get everyone onboard; create benefits with circular solutions; make circularity desirable; build the needed capacity; enhance the finance; and let knowledge lead the way. Enablers to start or continue the path towards circularity were then created and are described below.

III-1. Get everyone onboard

A recent study about the solid waste management in the Arab region highlighted inefficient governance as the main issue, including political factors, decentralization, and multi-level management and responsibilities. This can only be solved through adopting a shared vision and developing cooperation between international companies, local private companies, and municipalities.¹⁴³ Another study, mapping the main barriers to a circular food supply chain, highlighted the lack of a long-term shared vision among stakeholders as one of the main barriers.¹⁴⁴

Create a shared vision

Creating a shared vision of what a sustainable Arab region can look like and how we can reach there are crucial, and need created and shared among us all. A shared vision of a sustainable Arab region is essential since the CE is dependent on a system with strong cooperation, where resources are exchanged and with a high interdependence among actors.¹⁴⁵ To close material loops partnerships and international standards will have to be embedded in institutional processes bringing together actors across governments and at different levels of governments. To facilitate these necessary enablers for circular production will be crucial for Arab producers to join the global market with the best opportunities for economic growth and contribution to global closed value loops of resources. Without a shared vision, the necessary trade that will enable local, regional, and global circular practices won't be possible.¹⁴⁶

Mainstream circularity

CE is unlikely to be implemented if it's a policy 'sidetrack' and not in the core of development trajectories. It has been pointed out that sustainable production and consumption measures have a low political priority, and often seen as environmental management and handed to actors with low influence and or limited budgets.¹⁴⁷ Circular practices are beneficial within environmental, social, and economic sustainability and should therefore be given space in all policy development, and within all projects in all sectors. Linkages and synergies between new and old projects are also in need of being highlighted, to make the transformation unified and efficient.¹⁴⁸ A shared vision can enable efficient governance where coherence, coordination, collaboration and cooperation between different ministries, sectors, public and private actors, and between states, leading to less overlapping of work, facilitation of necessary flows of resources, and a streamlining of cost-efficient implementation efforts.

Build a roadmap

The Arab countries have different challenges, capabilities and economic revenues and the transformation should therefore not be mapped out the same; each state need their own plan to succeed. A roadmap can be built through mapping the current situation, identifying key stakeholders and enablers, strategically choosing transitioning sectors, and finally planning the actions that will lead to transformation. Other factors to keep in mind while developing a CE roadmap is to make sure the actions suggested are developed by a large group of stakeholders from different sectors and parts of the society, and that the actions are driven and owned nationally. A successful roadmap can create a shared mindset engaging stakeholders with ownership on a clear path from strategy to action.¹⁴⁹ The creation of a roadmap can be used to map out stakeholders and which coordination effort that are needed to make actors cooperate, carry ownership, and mainstream the transformation to commence public agency. Mainstreaming the CE within all development plans and sectors will be a challenge but is essential for creating efficient governance. Carrying out national and regional forums across ministries, sectors and stakeholders can help build the capacity needed.

III-2. Create benefits with circular solutions

To break the current linear economic model, where economic profits can be achieved without taking into consideration the consequences on our shared environment and with low consideration of social equity; new regulations encouraging circular processes, solutions and businesses need to be set up. Circular enterprises are dependent on a framework of enabling policies creating the right environment for them to form, grow and survive. Without appropriate regulations and laws there is little capacity to encourage new circular enterprises but also to regulate and limit emissions in current businesses. The possibility for governance to follow up and act when needed is based on framework conditions where circularity or sustainability are measured and enforced. Policies enabling circular enterprises can include different tax benefits and value added tax reductions; certifications of circular products and services to increase their attraction; and fiscal regulations to mobilize financial instruments to absorb new enterprises into the market efficiently.¹⁵⁰

Enforce already created laws and regulations

Most Arab states already have, even if limited, environmental laws and regulations which need to be enforced and could be developed with new enforcements, for example of single use plastics. Penalties for policy violations need to be administered, and ineffective current structures in standards, polices and administrative processes will have to be developed to facilitate new circular enterprises.

Promote circularity through CPPs

CPPs that promotes circularity and ensures the highest positive environmental quality, social equity, and economic prosperity, is a well-argued policy instrument for encouraging sustainable, circular development. Where the public spending is allocated has a huge impact on sustainability efforts by itself, but it can also help establish circular products, materials, or services on the market which after establishment can have a fairer chance to compete for the private sector. There are three different models of CPP focusing on the system level, including product leasing and companies using EPR; supplier level, including products reparability and disassembly; and product, including recyclable and recycled materials.¹⁵¹ A first step for implementation of CPP is to establish clear guidelines of responsibilities, strategies for appropriate integration and measuring indicators for validating chosen procurements.

Responsibility where it belongs: EPR

EPR schemes are encouraging improved resource use through extending the responsibility of the product to the producer to include the stage after it is used by the consumer. The benefits recorded when introducing EPR are immense, including increased material recovery, limited dumping of hazardous waste and a higher degree of waste collection. There is also evidence that the schemes can reduce the public money spent on waste management and transfer costs to the private producers. The most common measure for implementation is through tack-back instruments for electronic, package and battery products.¹⁵² The EPR can also encourage new business models where reuse are in focus, such as return systems and redistribution of used products.

Create attractive certifications

Circular certifications can help to encourage both producers to limit their use of natural resources and consumers to make more environmentally sustainable choices. They should be designed considering attractiveness and environmental benefits.

III-3. Make circularity desirable

In a EU study about the main barriers to a CE, technology or finance were not in the top; the top barrier was within the cultural realm - lacking consumer interest and awareness.¹⁵³ Another study highlighted a limited awareness and understanding of the concept of CE in Saudi Arabia, and linked it to a negative correlation with age and a positive correlation with educational level.¹⁵⁴ Sustainable resource use does not mean the same thing for everyone, for many within the Arab region it means consuming differently, and not necessarily less.

Raise awareness

Through raising consumer awareness two barriers can be lifted: the demand and acceptance of circular products or services since they are viewed as superior; and the interest in circular processes and solutions which can awaken innovation. It may be more important catching the consumers interest within circular practices than other sustainability practices since circular practices often have a high 'participatory architecture'.¹⁵⁵ A basic understanding of the connection between products and services contribution to environmental degradation or social unjust systems should start to be highlighted in informational campaigns, educational institutions, and within marketing. An encouragement of sustainable consumption patterns and lifestyle choices that have a high utility, meaning a low resource intensity but still fulfills the desired lifestyle, should be promoted, and explained. For example, a lifestyle with a high mobility, but where that desired mobility is fulfilled with public transport,¹⁵⁶ could be highlighted as a sustainable choice in marketing and 'nudged' through affordable prices.

Make circularity the norm and create agency

Consumer behavior can be considered impacted by economic factors, fit between need, and offering, information used for choices, social factors, and preferences and beliefs. To make circular processes or solutions the norm by consumers, they must become more attractive which can be achieved by targeting on of the mentioned impactors.¹⁵⁷ The advantages of circular practices, not just the environmental but the social and economic also need to be better communicated. Accessibility, a move in the society towards facilitating the circular processes and solutions may need to come first, since it's hard for consumers to recycle if there are no recycling facilities or shop second hand without a market for used products. People need to feel empowered and consider their actions as meaningful parts of a bigger system, with an increased agency innovation can be born.

III-4. Build the needed capacity

The capacity needed in the Arab region to transform to a CE, consists of both technical and human capacities, often in combination. Increased efficiency and other technological advances are an important part for achieving relative decoupling, where the material intensity is reduced or the process emits less harmful emissions, but the products purposes remain the same. It is important to take notice of that this kind of resource efficiency won't be enough for achieving a stabilization in the global material use.¹⁵⁸

Increase technical capacity

The outdated industrial sector in parts of the region is in urgent need for an update to encompass the latest energy efficiency technologies¹⁵⁹ and the capacity for circular processes. To build recycling facilities, extended sustainable public transport networks, renewable energy systems and other technically advanced infrastructure, some parts of the region need technical assistance and training programs to develop the necessary national capacity. New technical solutions can both increase the ease of circularity and create new circular solutions in sector or systems.

Increase human capacity

The need for new technology is not necessary for starting the transition in many sectors and in society; the lack of human capacities is often referred to as a greater limitation. Human capital can be built at any part of a human's life and needs to be expanded with greater inclusion of sustainability knowledge, skills, and practices created throughout their lifetimes. The knowledge on how to create eco-designs, build sustainable cities and how to maintain circular infrastructure can be transferred from leading national or international stakeholders. Appropriate policies include the inclusion of sustainability and circular solutions in curriculums at all educational institutions and public trainings, and public campaigns targeting a shift in specific unsustainable practices to transform them into circular solutions. Workshops, forums, and conferences can also facilitate a space where the latest knowledge and best practices can be shared between stakeholders.¹⁶⁰

Utilize existing capacity

In the Arab region the unutilized human capacity, both when it comes to women and youth participation and empowerment, is considered a limiting factor for equity and economic growth. They are excluded from labor markets even though they are well educated. There is an enormous potential within the inclusion of this capacity to the job market, and new perspectives can fuel

innovation. To harvest their unused potential, circular solutions such as extended public transportation can increase their mobility inclusion and fair chances to fully participate.

III-5. Enhance the finance

Financing sustainable development in the Arab region is discussed as one of the major barriers to a CE. In the region it has been stated that there is a limited fiscal space leading to the insufficient ability to fund for example climate action¹⁶¹ and other necessary capacity building measures. This may limit the progress of a CE, since a big shift like this will need high investments for it to kick-off.

Direct climate change finance towards circularity

Climate finance, both mitigation and adaptation, can be used for the scaling up of the CE since circular solutions can both reduce emissions and increase resilience. When it comes to climate change adaptation in the Arab region, public international and national funding is the biggest source of financing. The data of international public funding, from climate adaptation grants and funds, as well as from development banks, are easy to access while the national budgets for climate change adaptation is harder to access.¹⁶²

Market circular solutions as profitable

The funding problems for a CE is not just due to limited fiscal space, but the lack off and inefficiency of received funding are also based on a failure in marketing circular solutions as profitable and a short-term focus of implemented projects. National private financial inputs can be developed by improving the bridging between the finance institutions and specific CE plans, clarifying investment areas and economic returns.¹⁶³

Create regulations and policies guiding financial flows

International funding is needed in the region, but it needs to be nationally owned, built up to sustain and increasingly directed towards capacity building.¹⁶⁴ Another blockade is the lack of regulations and policy guiding financial flows and investment. The measurement framework for development, in GDP, is inappropriate for sustainable development and new measurements need to be developed to account for the increased sustainability of focused financing. This will lead to encouraging a greater mobilization of monetary and other resources towards sustainability in development plans. To market circular solutions as projects with financial benefits may also enhance financing.

Stimulate public-private partnerships

Long term mechanisms and finance instruments for financing environmental sustainability and especially budgets to scale up all pilot projects in the Arab region are crucial. Public monetary flows are insufficient in many parts of the region which can be improved with circular regulations directing costs to the private sector (e.g. EPR), and policies stimulating public-private partnerships. Research strengthening the incentives and reducing the knowledge gaps on efficient implementation should be prioritized to guide and mobilize financial flows and investments towards activities with high impacts on the sustainable use of natural resources. Public finance needs to take a big role in the transformation, with both unlocking necessary circular practices that may not give instant high monetary returns, invest in capacity building of human resources to make it inclusive, and invest in or facilitate for blended finance of infrastructure projects.¹⁶⁵ Since public money will be the funds 'cleaning' up the damaged created through the unsustainable usage of natural resources, it would be advantageous if instruments could be used to make the private sector take partial

responsibility or if public money were directed to preventive measures. Blended finance has potential, and is not just a monetary resource, it can also harness the expertise the private sector is inhabiting.

III-6. Let knowledge lead the way

There are currently gaps in the research about a CE, from how the development paradigm can be implemented closing the inequalities between people, instead of continuing the trend of increasing wealth inequality, to cost efficiency and best practices in transitions.

Assess situations to make informed decisions

Assessments of financial needs, returns and social and environmental benefits within different circular processes and solutions could make it easier for stakeholder to make informed decisions and get all actors onboard. This could

also facilitate a wider interest from private investments and the public's participation in the CE. Research and data can enable investor to know where there is an economically feasible need for intervention, for example hotspots for waste or value chains with currently high inefficiency.

Prioritize research to develop best practices

Research on best practices and lock-ins, could navigate the hard climate of measuring the benefits of easier to reach but not optimal circular practices and their contribution to lock-in's, risking making further progresses reaching best practices or

higher resource efficiency hard. One example is waste incineration, using waste to create energy is an improvement compared to landfills but can create a lock-in where we need waste to create energy, making the reduction of waste non-beneficial. Another example is research on the 'freed monetary capital' from participating in a shared economy, and if that could lead to increased resource use in societies with already high consumption.¹⁶⁶ More research is needed, but the available research will also have to be transferred from a small segment of the population to the wider public and transitioned from science or assessments to real pilot projects. There must be a clear demonstration of the benefits with a CE visible for everyone.

Fill the data gaps

In the Arab region there are also gaps in data produced. For example, in SDG 12 'Responsible Consumption and Production' only 2 out of 13 indicators had enough data to be assessed in 2020.¹⁶⁷ Since circularity

may be even harder to measure and produce data on, since its interconnectedness, producing new data are as important as making existing data available for stakeholders to make informed decisions. The lack of data is considered the main hinder to assess a picture of the circularity in states or the region.

Measure progress in an index

A transition from one way of arranging an economy to another, as in the case of a CE, will be benefitted if measured and tracked.¹⁶⁸ To be able to measure progress a concrete goal must be set, followed by designed standardized indicators to capture the goal, and finally a

monitoring system that produce, collect, and present current data progress. Without tracking the progress, it will be hard to know if interventions, such as the enabling conditions mentioned in this chapter, have any or the desired effect. A monitoring system should facilitate regional comparison, consistency, and comparability. Further it's important that a CE index measures more than efficiency, to capture the effort of maintain the value of resources and includes social, economic, and environmental impacts within a system perspective.¹⁶⁹ If countries or businesses can be selective in what they measure, the holistic importance in circularity may be lost and the results can be misleading.

Conclusion

The present report is an overview of the status of circular economy (CE) in the Arab region. The report shows that the transition to circularity is an imperative dictated by the unsustainability of the currently prevailing linear economic models.

Overall, there is a recognition in policy development documents, stressing the necessity of the transition. Yet the disparities in levels of development of the economies makes the benchmarking at regional level difficult between countries.

In parallel, there are disparities in progress to circularity between sectors. Waste management remains the sector commonly referred to as a priority for the transition. Other sectors are still at pilot with the ambition to scale-up or more commonly a project.

The gaps and needs to accelerate the transition identified during the review can be clustered in the following categories:

- 1.** The policy documents are often aspirational and not translated into programs, Nationally Determined Contributions are an eloquent example
- 2.** Lack of, or low performing dedicated institutions with a high level of coordination and indicators to monitor progress and accelerate the transition. The prevailing sectoral approach is a challenge to consider in to accelerate the transition. Moreover, the pool of competencies needed for the transition is not sufficient in most of the countries. A new generation of capacities is yet to be developed
- 3.** Regulations, laws and above all the enforcement of existing laws. An illustration is the Public Private Partnerships and Extended Producer Responsibility schemes
- 4.** Investment and financing the transition is challenging in most of the non-oil countries
- 5.** Knowledge, data, and research. The regional approach to the transition to CE will surely enhance the regional capacities, data and innovation particularly in emerging sectors of CE
- 6.** Engaging youth and young entrepreneurs equipped with technology tools

CE transition offers an extraordinary opportunity for regional cooperation and economic integration with a clear potential for economic prosperity, social inclusion and resilience, a sustainable use of resources and a readiness to respond to shocks while mitigating risks.

ANNEX 1. Environmental impacts of resource extraction

LAND & SOIL	Between 2000 and 2010, total global cropland area increased by 1.34% from 15.2 million to 15.4 million km². By 2060, and in the absence of urgent action, the area of agricultural land will increase by more than 20%, reducing forests by over 10 % and other habitats by around 20%.^(a) Land use gives rise to various environmental impacts including soil degradation that encompass processes such as erosion, compaction, salinization, acidification and put at risk the productivity of the land. In the Arab region, 73% of arable land is affected by land degradation, the economic cost of which in the region has been estimated at \$9 billion each year (between 2% and 7% of the GDP of individual countries). Salinity in the soil reduces productivity and crop yields, causing economic losses estimated at \$1 billion annually across the region.^(b)
FOOD LOSS & WASTE	Globally, 1/3 of food produced for human consumption is lost or wasted which amounts to about 1.3 billion tons per year.^(c) Lost and wasted food means the loss of water resources, soil nutrients, energy, and the emission of CO² and other GHGs. Food waste represents a large proportion of global waste and causes more than 3.3 Gt of CO₂-equivalent emissions per year.^(d) Food loss and waste in the Near East and North Africa (NENA) region estimates indicate on average 250 Kg of food per cap/year and over \$60 billion USD annually. This quantity of lost and wasted food amounts to an estimated 42 Km³ of water and 360 million hectares of land used to grow and distribute food that are lost.^(e)
WATER	Water stress affects more than 2 billion people around the world with a world average at almost 13% with significant differences among regions: 32 countries with water stress between 25 and 70%; 22 countries above 70%; 15 countries with water stress above 100%; 11 of these 15 countries are from the Arab region with four countries, Kuwait, Libya, Saudi Arabia, and the United Arab Emirates, having water stress above 1,000%.^(f) Agriculture is the main water consumer in the global economy and is responsible for almost 90 % of global water stress impacts.^(g) At global level, fossil fuel extraction was 2.5 times higher in 2017 (6 billion tons) in comparison to 1970 (15 billion tons) contributing to 16% of global climate change impacts.^(h) In 2019, around 11% of global primary energy came from renewables.⁽ⁱ⁾ In Q1 2020, global use of renewable energy in all sectors increased by about 1.5% relative to Q1 2019.^(j) In 2015, renewable power production in the Arab region (including hydro) did not exceed 6% of total generation capacity (mostly in the form of hydropower (4.7%), wind (0.9%) and solar energy (0.4%)) while 94% of power generation is from non-renewables.^(k)
BIODIVERSITY	11% of existing species threatened to become globally and irreversibly extinct.^(l) In Arab region, 78% of marine stocks at biologically unsustainable levels in 2018.^(m) 85 % depletion in the stocks of two key fish species in the Arab Gulf.⁽ⁿ⁾
MATERIAL CONSUMPTION	In the Arab region, over 20% increase in MF/cap in the last two decades, 7 of the Arab countries above MF global average.^(o) Over 60% increase in DMC/cap almost reaching global average; DMC/cap in GCCs of 26.68 tons while global average is 11. 83 tons.^(p)

Sources: (a) IRP, 2019; (b)ESCWA, 2020; (c) FAO, 2013; (d) IRP, 2019; (e) FAO, (2020); (f) FAO, (2018); (g) IRP, 2019; (h) IRP, 2019; (i) Our World in Data, 2020; (j) IEA, (2020); (k) IRENA, 2016, (l) IRP, 2019; (m) ESCWA, 2020; (n) ESCWA, 2020;(o) ESCWA, 2017; (p) ESCWA, 2020

ANNEX 2. SDG targets connected to circular economy

Goals	Targets
1 NO POVERTY 	1.4. By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance 1.5. By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters
2 ZERO HUNGER 	2.1. By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round 2.3. By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment 2.4. By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality 2.a. Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks to enhance agricultural productive capacity in developing countries, in particular the least developed countries
3 GOOD HEALTH AND WELL-BEING 	3.9. By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
6 CLEAN WATER AND SANITATION 	6.3. By 2030, improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally 6.4. By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity 6.a. By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling, and reuse technologies
7 AFFORDABLE AND CLEAN ENERGY 	7.2. By 2030, increase substantially the share of renewable energy in the global energy mix 7.3. By 2030, double the global rate of improvement in energy efficiency 7.a. By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

8 DECENT WORK AND ECONOMIC GROWTH 	8.2. Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors 8.3. Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity, and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services 8.4. Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead 8.9. By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	9.1. Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all 9.4. By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities 9.a. Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological, and technical support to African countries, least developed countries, landlocked developing countries, and small island developing States
11 SUSTAINABLE CITIES AND COMMUNITIES 	11.2. By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons 11.6. By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management 11.b. By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels
12 RESPONSIBLE CONSUMPTION AND PRODUCTION 	12.2. By 2030, achieve the sustainable management and efficient use of natural resources 12.3. By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses 12.4. By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment 12.5. By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse 12.8. By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature 12.a. Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

	12.c. Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities
	13.1. Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
	13.2. Integrate climate change measures into national policies, strategies, and planning
	13.b. Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth, and local and marginalized communities
	14.1. By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution
	14.2. Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and act for their restoration to achieve healthy and productive oceans
	14.c. Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want”
	15.1. Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with
	15.3. By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
	15.5. Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species
	15.9. By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts
	15.a. Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems
	15.c. Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

ANNEX 3. Mapping of the initiatives towards a circular economy in the Arab region

REGIONAL AND NON-GOVERNMENTAL INITIATIVES

INITIATIVE	ACTOR	INCLUSION OF CIRCULARITY
List of Indicators to Measure the SCP in the Mediterranean Region (2020) ¹⁷⁰	SwitchMed	SwitchMed has created a Mediterranean regional index to measure the progress of Sustainable Consumption and Production in the region. It contains many of the SDGs that are connected to SCP, but also other ones that have a more specific focus on circularity.
Towards a Circular Economy in The Arab Region: Development of Transformation Measurement Index (2022) ¹⁷¹	Arab Monetary Fund	CE Index developed by the Arab Monetary Fund in 2022. They define it as “The CE Index is an economic index designed to measure the Arab countries’ degree of transformation from a linear economy system to a CE system. In this index, the country that scores the highest value has a better track record of achieving the CE transformation. It indicates that a country’s economy can maximize resource efficiency by reducing waste, maintaining long-term value, reducing primary resources, and closing loops with products, parts, and materials within a framework that benefits society, protects the environment, and enhances economic sustainability.”.
The Circular Carbon Economy Index (2021) ¹⁷²	KAPSARC	Another index, but this one is not focused on a holistic CE but on a circulation of carbon flows. It was developed during Saudi Arabia’s G20 leadership and has been benchmarking the region 2 years in a row while developing interactive maps for visualization of the progress in the region.
African Circular Economy Alliance ¹⁷³	ACEA	African cooperation for a CE formed in 2016 and is a government led cooperation platform to support the transition to a CE in the region.
Green Industries Labeling Programme (2022) ¹⁷⁴	Emirate of Abu Dhabi	The ‘Green Industries’ environmental label launched in 2022 by the Emirate of Abu Dhabi is a voluntary assessment program to work towards a greener and eco-friendlier industries in the emirate.
Arab SDG index and Dashboard Report 2022 ¹⁷⁵	The United Nations	A report assessing the development in the region through the framework of progress towards the SDGs.
Towards a Circular Economy in Lebanon (2020) ¹⁷⁶	ACTED	A report made by the NGO ACTED to examine the effort in Lebanon to reach a CE. Includes an arrange of important factors and finished with policy recommendations and the focus on solid waste management.
Circular Economy National Study – Jordan (2021) ¹⁷⁷	ACTED	A report made by the NGO ACTED presenting the current initiatives in the Jordan towards a CE, assessing the potential for change, and delivering policy recommendations.
The Circularity Gap Report 2023 ¹⁷⁸	Circle Economy	An extensive report of the current circularity in the world. The organization has delivered new report for several years in a row and assess the circularity in a holistic manner. The conclusion is that the circularity in the world is decreasing, but it also lays forward a positive message assessing the impact from just transitioning a few key sectors to circularity.

KINGDOM OF BAHRAIN

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Voluntary National Review of the progress of the SDGs (2018) ¹⁷⁹	Supreme Council for Environment	Vision and national priority Sustainable resource use and economy. Focus on waste management, renewable energy, and sustainable transport. Strategies of awareness raising, development of appropriate legal frameworks, encouragement of institutions to adopt policies concerning recycling, 'smart public transport', increase of renewable energy, and 'recycling rates'.	Projects: 'a resource and energy efficiency program' in government buildings; the construction of solar power plants, reduction of food waste; and a 'Green building assessment guide'.
Strategic and Sustainable Development Cooperation Framework 2021-2022 ¹⁸⁰	The Government of the Kingdom of Bahrain & UN	Adaptation and mitigation and rational use of natural resources towards a resilient society. Strategies: climate smart agriculture, protect biodiversity, improve water efficiency, promote green technologies, increase renewable energy, consumption awareness raising and promoting investments in green industry and economy.	N/A
Green Industrial Development – Pathways Towards a Circular Economy (2018) ¹⁸¹	Supreme Council for Environment, DERASAT & UNIDO	N/A	A five-day course for policymakers in CE. Action towards cooperation, knowledge raising and sharing, and leadership within the CE.
National Renewable Energy Action Plan (2017) ¹⁸²	The Ministry of Electricity and Water Affairs	The national plan for implementing renewable energy contains biogas production, landfill gas recovery and other waste to energy opportunities. Strategies: Produce biogas from the organic materials, sewage sludge and fish waste. A model of waste handling hierarchy is suggested, including reduction, re-use, recycling, resource recovery and disposal.	Policy includes decentralized urban generation and addressing market and regulation barriers. It also includes targets for different renewable sources.

STATE OF KUWAIT

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Voluntary National Review of the progress of the SDGs (2019) ¹⁸³	Government of Kuwait	Strategies include increasing the renewable share in the electricity mix to 15% (2030), planning to reduce the fossil fuel dependency, and letting the KEPA carry out a project to assess the solid waste management.	Recycling and re-use of water, different materials and industrial waste, and an energy transition to renewable sources.
Kuwait National Development Plan 2020-2025 ¹⁸⁴	General Secretariat of the Supreme Council for Planning and Development	Working on achieving a dynamic private sector through promoting best practices within the CE. A program focuses on building 'a livable and harmonious environment'.	Policies: building eco-cities (Public Authority for Housing Welfare), integrating solid waste management to improve resource recovery (Kuwait Municipality), and boost the use of renewable energy (Ministry of Electricity and Water).
Nationally Determined Contributions (2021) ¹⁸⁵	Kuwait Environment Public Authority	CCE to reach the Paris agreement. Strategy of adopting CCE within the sectors which contributes with the most GHGs.	CCE projects: Increasing renewable energy and improving energy distribution efficiency (emission reduction); Cultivating mangroves (decarbonization); Carbon capture and storage (reuse).
Waste Management Atlas of Kuwait (2022) ¹⁸⁶	Kuwait Environment Public Authority	Mapping of waste generation and landfills, and 'Kuwait's National Waste Management Strategy 2040'. Vision: Effective waste management includes 5 objectives and 25 targets, that should be carried out between 2022 and 2040. Strategies: Developing infrastructure, new waste management laws, inclusion of the waste management hierarchy, sustainable financial system, and a monitoring system. Targets: a timeline and a division of responsibility (prohibition of 'high organic content' waste in landfills (2025, KEPA), and the goal of 65% recycled or recovered solid municipality waste (2034, KEPA & KM)).	N/A
Eco-cities (2022) ¹⁸⁷	GSSCPD and UNDP	A workshop about how to build Eco-cities. Knowledge sharing workshop, including CE and CCE, as an action towards KNDP 2020-2025.	N/A

SULTANATE OF OMAN

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
2022 Sustainability Report ¹⁸⁸	Be'ah (Oman's Environmental Service Holding Company)	Objective: Usage of the waste management hierarchy and environmental behaviors. Strategies: 'support, educate and promote environmentally friendly behaviors', recovering lost value from waste, offering investment opportunities, and identifying waste streams that can be recycled or repurposed.	Action plan: Support of paper recycling plants, a PET recycling project, the development of monitoring material to support the transition, and a Ramadan food waste campaign. Future projects: an online platform for waste (recycling) trade, recycling green waste, electronic and electrical waste, and a cooking oil to biodiesel plant.
Oman Vision 2040 ¹⁸⁹	Implementation Support and Follow-up Unit	Vision: Ensuring a sustainable use of natural resources to support the economy. Objective: Environmental awareness in accordance with sustainable consumption and production, a green and CE, renewable energy, and rationalized consumption of energy.	N/A
The Sultanate of Oman's National Strategy for an Orderly Transition to Net Zero (2022) ¹⁹⁰	Ministry of Energy and Minerals	Strategy: CCE practices for reaching a Net Zero transition by 2050.; to decarbonize the five sectors (industry, oil and gas, power, transport, and buildings) responsible for the majority of the net emissions.	Action plan: 'energy and resource efficiency', 'electrification and renewables', 'battery electronic technology', 'sustainable green hydrogen', 'capturing and storing carbon', and 'negative-emission solutions'.
Second Nationally Determined Contribution (2021)	Government of Oman	NDC focus on energy efficiency to reach a low carbon economy together with a diversification of the economy. Strategy: improving energy efficiency, innovation, and renewable energy, and promote an energy conservation culture, with phasing out subsidies on water and electricity.	N/A

KINGDOM OF SAUDI ARABIA

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Circular Carbon Economy National Program ¹⁹¹	Ministry of Energy	A general framework for CCE, a mission, strategic objectives, key activities, and partners. Objectives: climate protection, socio-economic impact, and global leadership.	Developing CCE technology, implementing CCE domestically and engaging internationally.
Updated First Nationally Determined Contribution (2021) ¹⁹²	Government of Saudi Arabia	Developing and scaling up the use of different technologies, such as waste to energy production, carbon capture and storage, and green hydrogen.	CCE to reach the country's climate ambitions.
Towards Saudi Arabia's Sustainable Tomorrow: First Voluntary National Review (2018) ¹⁹³	Ministry of Economic and Planning	Objectives: save natural resources, creation of jobs and a reduction of emissions. Strategies for sustainable consumption and production: waste management, recycling, reuse, and energy recovery.	Actions: recycling of food as an organic fertilizer; integrated waste management in Jubail industrial city containing increased efficacy, recycling of many different materials and awareness raising to decrease waste; and increased waste management in Riyadh.
Saudi Arabia's Vision 2030 (2016) ¹⁹⁴	Council of Economic and Development Affairs	Vision: preserving the environment and the natural resources. Strategy: increased efficiency of waste management, recycling projects, decreased water consumption and reduction of pollution.	N/A
National Center for Waste Management ¹⁹⁵	MWAN (board members from different Ministries. Chairman is the Minister of Environment, Water and Agriculture)	Vision: include CE principles to enhance environmental protection and improve quality of life. Strategy: organizing waste management, encouraging, and stimulating investments, granting licenses with conditions and control functions, building capabilities, and encouraging research, innovation, and cooperation.	N/A

UNITED ARAB EMIRATES

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
National Sustainable Consumption & Production Plan (2019 – 2030) Framework ¹⁹⁶	Ministry of Climate Change and Environment	N/A	Green infrastructure and development (infrastructure, development, transport); sustainable food production and consumption (agriculture, food waste); sustainable public procurement (all goods); and sustainable manufacturing (LC).
Circular Economy Policy 2021 – 2031 ¹⁹⁷	Ministry of Cabinet Affairs; Climate Change and Environment; Economy; State for Artificial Intelligence Office	Strategy: includes priority sectors, overarching priorities, policy recommendations and suggested indicators for monitoring for CE transition.	Prioritized sectors: sustainable manufacturing, green infrastructure and development sustainable transport, and sustainable food production and consumption.
Circular Economy Council ¹⁹⁸	Ministry of Climate Change and Environment	The Council's responsibilities are to oversee the draft on how to implement the CE Policy, approve performance indicators, coordinate national and local policies, develop sectoral plans and projects, encourage private sector participation, and cooperation between public and private sectors.	Action: created in 2021 the council to implement the CE Policy
Efforts to Achieve Green Economy ¹⁹⁹	Several agencies, companies, authorities, and government departments	N/A	Actions: green industry labeling system, development of carbon capture and storage technologies, increased efficiency standards on electrical appliances, modeled eco-cities, and introducing new public transport modes.
Updated Second Nationally Determined Contribution of the United Arab Emirates (2022) ²⁰⁰	Ministry of Climate Change and Environment	Vision: reduction of municipal solid waste and the introduction of strategies to divert waste from landfills. Other focus areas: carbon capture, sequestering, utilization and storage; wastewater treatment; green building design and refurbish; and food waste initiatives.	Actions: regulations, technology, and consumer awareness. Projects: the 22 policies recently approved to facilitate a CE, joining the coalition CIRCLE; signing the Scale360° initiative; introduced single use plastic ban in Abu Dhabi; and developing waste to energy plants.

STATE OF QATAR

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Qatar National Climate Change Action Plan 2030 (2021) ²⁰¹	Ministry of Municipality and Environment	Vision: CE within waste management and the construction sector. Strategy: to decrease the domestic waste, food waste and electricity consumption, and reuse of wastewater, increase the recycling of solid waste, energy efficiency and environmental awareness.	Actions: practices of recycling and reuse by the Public Works Authority in construction sector.
Nationally Determined Contribution (2021) ²⁰²	Government of Qatar	Strategy: Reduction of waste for preserving the environment and improving business efficiency.	Actions: Awareness Campaigns raising the awareness within schools, companies, and institutions, by the Qatar Green Building Council.
Qatar's Voluntary National Review (2021) ²⁰³	Planning and Statistics Authority	Objective: host the best environmentally friendly FIFA World Cup possible 2022, with the circular practices of efficient use of natural resources (sustainable procurement, using recycled/ reused/ reduced materials).	Actions: the establishment of a solid waste from household's treatment center, producing organic fertilizer, biogas, and electric energy.
Circular Economy Policy Paper (2022) ²⁰⁴	Investment Promotion Agency, chaired by Minister of Commerce and Industry	Objective: target Sustainability-conscious investors, working within the CE. Strategy: showcase steps to transition waste to CE. Focus on connecting the sustainability ambitions of the country to investment opportunities.	N/A

ARAB REPUBLIC OF EGYPT

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Egypt's First Updated Nationally Determined Contributions (2022) ²⁰⁵	Government of Egypt	Strategies: recycling of plastic and making green petrochemicals, producing alternative green fuels, expanding the public transport, making public buses use low carbon intensive fuels, promoting green buildings, encouraging citizens to walk or bike in cities, and improving recycling and energy recovery rates of solid waste.	Projects: decreased subsidies on energy, electricity, and oil; increased renewable energy share; increased energy efficiency in electricity production leading to a decreased electricity consumption in total; increased public transport, with metro and new projects around sharing buses through a mobile platform; improved waste management; and attracted international investment for financing sustainable plans, like renewable energy, clean transport and reduced pollution.
Sustainable and Green Growth Strategy (2021) ²⁰⁶	The Egyptian Cabinet, Information and Decision Support Center	Objectives: supporting the emergence of a CE based on recycling and reuse of resources; targeting better practices of human behavior through conscious consumption; creating new job opportunities and markets related to recycle processes and clean energy; introducing new products and services that consider the preservation of the environment; compelling market experts to include environmental and social priorities when developing private sector plans and policies; and developing the role of companies to become more environmentally conscious in society.	Projects: advancing public transport; and integrating agricultural management methods to raise efficiency of water use, improving irrigation, adjusting crop composition, and reusing agricultural water.
National Action Plan for Sustainable Consumption and Production (2016) ²⁰⁷	Ministry of Environment (SwitchMed)	Vision: Recognizing the need of making a shift towards a green CE. Focus: reformations of governance and institutional structures, long term visions that promote sustainable lifestyles, and sustainable consumption. Strategy: efficient allocation and use of water and energy resources; enhancing sustainable agriculture development; and developing waste management with prevention, reduction, recycling, reuse, and recovery.	28 projects proposed to support the shift, including procurement practices, energy efficiency, eco-design within enterprises, pilot model of a sustainable community, agricultural waste recycling, new renewable energy plants, EPP, reduction of single-use plastic, and usage of industrial waste.
National Climate Change Strategy 2050, Summary for Policymakers (2022) ²⁰⁸	Ministry of Environment	N/A	Sustainable economic growth and low emissions, through increased public transport based on electricity and promoted to consumers, Circular Carbon practices, promote reduce, reuse, recycle and recover in municipal and agricultural waste and 'Enhancing Adaptive Capacity and Resilience to Climate Change and Alleviating the Associated Negative Impacts', through policies to reduce waste and raise the efficiency of water resource use, more efficient technologies to rationalize water and energy consumption etc. Indicators to measure progress as well as proposed enabling policies.

REPUBLIC OF TUNISIA

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Updated Nationally Determined Contribution (2021) ²⁰⁹	Ministry of the Environment	Objective: Reducing the average daily amount of household waste produced in the city. Strategies: increasing the recycling rate, the rate of composting used as energy, reducing landfilling of waste, increase of electricity from landfill biogas, and energy recovery.	Actions: carbon pricing instruments and the use of solid waste alternative fuels in the cement industry; organic agriculture including using composting, encouraging legumes in field crops and conservation agriculture.
Tunisian National Strategy and Action Plan for Biodiversity 2018-2030 (2018) ²¹⁰	Ministry of Local Affairs and Environment	N/A	Actions: establishing an integrated waste management system with collection and recovery to prevent coastal and marine pollution; and develop sustainable agricultural practices with integration of weeds, crop diversification, agroforestry, fewer pesticides, and regenerative models to fight against pollution in ecosystems and a sustainable usage of natural resources.
Ten-Year Agri-Food Action Plan 2016-2025 (2016) ²¹¹	Ministry of Environment and Sustainable Development (SwitchMed)	Vision: Ensure a sustainable food chain that improves economic, social, and environmental performance along the product life cycle. Strategies: ensure sustainable production of agricultural products, through energy efficiency, limiting the inputs and using environmentally sound processes; promoting sustainable products and ensuring no proliferation market competing; and promoting a culture of sustainable consumption.	Action plans: involvement of all stakeholders, integration of product lifecycle assessments, integration to other national plans and strategies, and capacity building and awareness raising about the interconnectedness of issues. The action plans consist of four parts: 1- an extensive study will be made mapping capacities and status, 2- technical assistants will be carried out to make sure the recommended actions can be carried out, 3- training programs will be launched, 4- communication and awareness part where actors can become aware of issues and opportunities.
Ten-Year Tourism Action Plan 2016-2025 (2016) ²¹²	Ministry of Environment and Sustainable Development (SwitchMed)	Vision: Develop tourism that is less polluting, consumes less non-sustainable resources, has a greater impact, more balanced in space and more stable over time, on regional development and poverty reduction, based on the enhancement of natural and cultural wealth of Tunisia. Objectives: develop sustainable management of waste and its valuation, support sustainable resource management and collective action to achieve it, and promote sustainable accommodations.	

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Strategy and National Action Plans for the Biodiversity 2016-2030 ²¹³	Ministry of Environment and Renewable Energy	Objectives: Promote positive incentive systems and reforms of negative incentives for the sustainable development of the natural capital of Algerian ecosystems.	Action plans: Define a national ecological compensation mechanism; Test economic incentive mechanisms for the development of sectors based on biodiversity; Waste recovery centers; Develop biodegradable packaging; Waste reduction; Encourage ecological production processes.
SwitchMed Magazine: Algeria (2018) ²¹⁴	Ministry of Environment and Renewable Energy & Ministry of Industry and Mines (SwitchMed)	The multi-stakeholder national consumption and production action plan, called "42 Actions to Develop Sustainable Consumption and Production 2016-2030". Focus: integrating sustainable consumption and production patterns into national policies and plans; ensuring the energy transition by promoting energy efficiency and the development of renewable energies; and development of an economy with zero waste by 2030.	Projects: a CE value chain in the date sector; textile shop support increasing the recycling, upcycling, eco design, energy efficiency and usage of natural materials; partnerships with 12 companies within the food sector; capacity building projects for 10 circular business models; development of a manual for community and civil society empowerment; and the Switchers Fund which is an instrument to enable access to finance for circular solutions.
Intended Nationally Determined Contribution (2015) ²¹⁵	Government of Algeria	N/A	Projects: Waste valorization, composting of organic waste, energy recovery, recycling of methane from landfill sites, treating wastewater, increasing renewable energy used, and improving isolation of buildings for energy efficiency.
Voluntary National Review (2019) ²¹⁶	Government of Algeria	Strategies of involving large companies more in the process, awareness raising, increasing the share of renewable energy, control, and reduction of waste, and rational use of natural resources, especially water.	N/A

KINGDOM OF MOROCCO

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Voluntary National Review of the Implementation of the Sustainable Development Goals (2020) ²¹⁷	Government of Morocco	Initiatives have been carried out promoting the inclusion of a CE within different laws (EPR within batteries, tires, oils, electric and electronic waste), which would affect all public policies.	Implementation of The National Waste Reduction and Recovery program. Projects: waste recovery, green jobs, eco-labeling, environmental certification systems, waste reduction streams (planned to be in full action by 2030).
The New Development Model (2021) ²¹⁸	Special Commission on the Development Model	Strategy: Preserve natural resources and strengthen the territories climate-resilient', including an approach of CE, focusing on solar energy, wind power, liquid sanitation, and waste management.	Training programs dedicated to green jobs, research, and development and innovation. Public transport is envisioned as a basic public service.
Sustainable Consumption and Production National Action Plan (2015) ²¹⁹	Ministry of Environment and Sustainable Development (SwitchMed)	Strategies: CE and low-carbon economy. Focus: sustainable agriculture and food (to optimize the materials and energy used in the production and improve the consumption chain, promote sustainable food& waste management), and eco construction (resource efficiency, low carbon& resilience).	Policy: incentives for enterprises to produce sustainably, eco-labeling, environmental certification schemes, promoting eco-responsibility by information and awareness.
Implementing the First Nationally Determined Contribution of the Kingdom of Morocco (2018) ²²⁰	Government of Morocco	N/A	Projects: National Wind Energy Plan 2020; National Solar Energy Plan 2020; Sustainable Transport (extension of trams and electric buses within cities); A Waste to Energy Plant (1/3 of the electricity used in Fes); and Fossil Fuel Subsidies Reform (started already 2012 and are continuing to phase out subsidies on petroleum products).
Updated Nationally Determined Contribution (2021) ²²¹	Government of Morocco	Focus: mitigation (waste management, energy, agriculture, and transport.) Objectives: Within energy where the energy sources should become renewable, and the consumption decrease in buildings, industry, and transport.	Action: waste sector will develop towards recycling of household, industrial, and vehicle waste; and recovery of organic matter and other waste to energy recovery (creating green jobs) In the agricultural sector: improve soil conditions and an increased usage of local renewable energy. The public transport networks: will be extended with renewable energy vehicles.
ECO Tax ²²²	Several Ministries	N/A	Solving the problems of the over usage of plastic bags through an Eco tax

LEBANESE REPUBLIC

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Lebanon's Nationally Determined Contribution (2020) ²²³	Government of Lebanon	Vision: Green economy which is described as a sustainable development model with high human development and reduced ecological impact. The NDC: to reach the 'Low Emission Development Strategy', and envisions a CE with increased development, and a decoupling of economic growth and GHG emissions. Strategies: promoting a sustainable use of natural resources, restoring degraded landscapes, increasing forest coverage, strengthening the resilience of the agriculture sector through climate smart initiatives, and developing sustainable water services and irrigation systems.	Actions: technological transfer to access best practices and avoid additional GHGs within industry, agriculture, waste, energy, and the construction – sector, and to introduce a Green Climate fund.
Policy Summary on Integrated Solid Waste Management (2018) ²²⁴	Ministry of Environment	Vision: Reduce production, reuse, recycle, energy recovery, and sanitary landfill deposit. Strategy: working towards a culture of shared responsibility where there is a protection of the environment and public health through decentralization, but with central authorities as main responsible to ensure efficient resource allocation.	Actions: preparing a communication program on integrated solid waste management for stakeholders (in coordination with the Ministry of Education and Higher Education and the Ministry of Information.)
Energy and Waste Solutions – Promoting Waste Management Practices and the 3R by Utilizing New Technologies and Circular Economy Approach (2020-2024) ²²⁵	Ministry of Environment, other Ministries and Local Stakeholders	Vision: Strengthening the country and communities' capacity to move towards a CE, social stabilization by improving recycling of plastic and reducing the amount of plastic waste. Strategy: the phasing-out of single use plastic bags and to introduce a circular plastics economy in Lebanon (by strengthening the institutional capacity and developing monitoring mechanisms).	Action plan: increase the number of government officials who comprehend waste management through training and to enable municipalities or communities to benefit from improved recycling systems. A platform for CE has been established, with the purpose of awareness rising and capacity building.
Sustainable Consumption and Production Action Plan for the Industrial Sector (2015) ²²⁶	Ministry of Environment & Ministry of Industry (SwitchMed)	Objectives: promote a sustainability-driven innovation with knowledge integration of 'best practices' within the whole value chain of goods production; develop laws and policy to promote a sustainable consumption, production and recovery within the industrial sector and raise awareness and educate all stakeholders.	Actions: promote, use, and develop eco-design and ecolabels; implement the waste management hierarchy for a CE; and implement the Pollution Pays Principle, fiscal instruments to integrate a sustainable consumption and production, and sustainable public procurement with priority to the key aspects related to sustainable consumption and production in the industrial sector.

HASHEMITE KINGDOM OF JORDAN

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
National Strategy and Action Plan for Sustainable Consumption and Production in Jordan 2016-2025 ²²⁷	Ministry of Environment (SwitchMed)	Objective: Sustainable consumption and production patterns are integrated into the national sustainable development agenda in Jordan. Focus: Food production, transport, and waste management, which will lead to job creation, economic benefits, and sustainable development. Strategic objectives: establishing a national platform to facilitate the implementation of a sustainable consumption and production within all sectors, implementing national sustainable consumption and production operational objectives to achieve a circular and green economy, and engaging key national stakeholders in the development, practice, and evaluation of CE measures for an efficient transition.	Objectives: followed up by operational objectives and suggested actions within the key sectors (agriculture and food industry, transport, and waste management). Important stakeholder, possibilities for monitoring, budget, and needed support are also included for an efficient implementation.
Climate and Resource Protection through Circular Economy in Jordan 2017-2021 ²²⁸	Greater Amman Municipality	Objective: set out the conditions for the implementation of a CE in Greater Amman Municipality, with the goal to protect the climate and conserve resources. Focus: improve waste management through separation and treatment of recyclables and organics and to reduce GHG emissions.	Project: three pilot areas to see what kind of regulations that need to be strengthened to carry it out to full scale. A concept to develop full training of in-service in CE within management, administration, finance, gender equality, and skills training for targeted groups.
Updated Submission of Jordan's First Nationally Determined Contribution (2021) ²²⁹	Ministry of Environment	Objective: mitigating GHGs, strategies include improving energy efficiency in all sectors, using regenerative burners within the steel industry, using recycled or alternative materials within industries, implementing composting units, developing urban tree plantations, and reinforcing climate smart agriculture.	Projects: food security, to minimizing food loss and waste; major extensions of the public transport system, including both buses and the railway; and resource efficiency and sustainable consumption and production within the industry sector.
A National Green Growth Plan for Jordan (2017) ²³⁰	Ministry of Environment	Objectives: biodiversity, ecosystems, and resource efficiency; GHGs, reductions, and avoidance; and social, economic, and environmental resilience. Priority sectors: green growth, these are energy, water, transport, agriculture, waste, and tourism.	Policy suggestions: Circular solutions included are an improvement of the solid waste management framework containing waste to energy improvements; public awareness raising about recycling; and to build and promote eco-tourism options reducing the resource usage within tourism and expanding the options to reach the tourist destinations with public transport.

REPUBLIC OF IRAQ

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Nationally Determined Contribution (2021) ²³¹	Government of Iraq	N/A	The NDC contains strategies that are circular. Within the energy sector the mitigation efforts are based on efficiency measures in production and sustainable public transport systems in the consumption. Waste management is stated in need of improvement, and an integrated waste management system with both recycling and waste-energy production.
National Development Plan 2018-2022 ²³²	Government of Iraq & Ministry of Planning	N/A	Plan: the strategies of recycling, using environmentally friendly materials in construction, build out the solar energy capacity, adopt modern irrigation methods to optimally use water, and sustainably use resources in the agricultural sector.
The Future We Want: Iraq's Vision for Sustainable Development 2030 (2019) ²³³	Government of Iraq & Ministry of Planning	Strategies: are to protect and improve air and soil quality, develop a waste recycling system that takes care of 50% of all waste, develop sustainable cities, raise awareness about consumption and its negative sides, mainstream environmental standards in industries, create an environmental monitoring system, and build out the public transport system.	Action plan: to create a clean, safe, and sustainable environment for the current and future generations.
Eden in Iraq: Wastewater Garden Project ²³⁴	Supported by Ministry of Water Conservation & Local Municipalities	Mitigating GHGs, through reducing the methane gas production from wastewater and build natural carbon sinks. And to purify the wastewater to decrease pollution in water and soil and provide clean water for the local people.	Project: building a closed circular system with environmental, social, and economic benefits through natural processes of cleaning wastewater. The project will build a garden of 65,250 square meters where it used natural techniques for cleaning 7500 peoples' sewage water. The different planted vegetation will diminish odor and clean it through transform the organic content to mineral substances with bacteria. The garden will also create a beautiful place with a rich culture and is within a circular system since the nutrients are used for plants and fruit trees.

STATE OF LIBYA

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
United Nations Sustainable Development Cooperation Framework 2023-2025²³⁵	Ministry of Planning & different UN Agencies	Vision between government of Libya and the UN: Facilitating peacebuilding and development. Strategic: 'Climate Change, Environment, and Water'. Objective: increase capacity around water scarcity and the expansion of sustainable waste management; and increase environmental awareness and action by people and institutions.	Plans: transfer knowledge, skills, and technologies to be able to recycle wastewater; and to develop policies and incentives to increase energy efficiency and the transition to renewable energy.

ISLAMIC REPUBLIC OF MAURITANIA

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Mauritania's Nationally Determined Contribution (2021) ²³⁶	Government of Mauritania	Strategies: a transition to more sustainable energy production, the inclusion of improved waste management, and agroforestry practices for mitigation efforts.	Recommended measures: the extension of the public transport system, development of an incineration and production plant, promote energy efficiency through specially designed program, improve reuse and recovery of sludge, and build new housing from local materials.

FEDERAL REPUBLIC OF SOMALIA

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Updated Nationally Determined Contribution (2021) ²³⁷	Government of Somalia	Strategy: to increase public awareness by education and communication about climate change.	Mitigation action: reducing their expected GHGs and develop sustainably, implement agroforestry practices and climate smart agricultural practices; develop renewable energy electricity with decentralized solutions; increase the energy efficiency of cooking and promote clean energy for cooking; and to increase energy efficiency in lamps and electricity transmissions.

STATE OF PALESTINE

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Updated Nationally Determined Contributions (2021) ²³⁸	Government of Palestine	N/A	Agriculture sector: to implement climate smart agriculture with climate resilient land planning and management including improved water use efficiency, the use of alternative water sources, the use of animal and agricultural waste for energy production, the reduction of fertilizers, and other conservation principles. Energy sector: to promote domestic renewable energy production and increase energy efficiency, encouraging public transport. Waste management sector: improved by reducing the amount of waste for final disposal and increase the amount of waste going to reuse and recycle. Waste-energy.
Sustainable Consumption and Production Action Plan (2016) ²³⁹	Environment Quality Authority & Ministry of National Economy (SwitchMed)	Strategy: develop different policy and legal frameworks, participatory research, certification systems, awareness raising, knowledge sharing, education in school systems and of all stakeholders, empowerment of small farmers and cooperatives, access green financing, monitoring systems with indicators measuring sustainability aspects within agriculture, agricultural insurance, SPP, building waste management, green building measures with retrofitting already existing buildings, and the capacity to market and communicate sustainable tourism and identify eco-tourism sites. Mainstreaming of environmental issues and healthy food, green buildings and sustainable lifestyles.	Priority areas: Agriculture and Food (developing, promoting, and implementing sustainable agricultural practices, food production and consumption), Housing and Construction (mainstreaming SCP and Green construction and Green SPP), and Tourism (Eco-tourism).
National Voluntary Review of the Implementation of the 2030 Agenda (2018) ²⁴⁰	Government of Palestine	Sustainable consumption, this includes value added tax, income tax on supplied goods, PPP schemes, green loans, recycling activates, and gas collection from landfills.	Priorities: improve the solid waste management, treat wastewater and reuse, reducing pollution, and develop sustainable management of all natural resources.
National Development Plan 2021-2023 ²⁴¹	Government of Palestine	Vision of sustainable development: by effectively control pollution; adapt to climate change and mitigate GHG emissions; promote integrated solid and hazardous waste management and recycling; expand wastewater management, treatment, and reuse; manage, protect, and promote sustainable use and conservation of natural resources; conserve biodiversity, establish nature reserves, and expand green spaces; and increase reliance on renewable energy.	N/A

REPUBLIC OF SUDAN

Document	Department or ministry	Vision, objective & strategy	Policy, action plan & project
National Adaptation Plan (2016) ²⁴²	Ministry of Environment, Natural Resources and Physical Development ; Higher Council for Environment and Natural Resources	Objective: include several circular activities. Agricultural sector: crop rotation, water harvesting, and improved irrigation technologies. Strategies within land management: raising awareness of sustainable natural resource use, and a focus on agroforestry practices. Waste management will be improved by recycling and reuse, 'to attain rational use of natural resources'. Biogas productions are also mentioned to produce renewable energy and organic fertilizers.	N/A
Nationally Determined Contribution (2021) ²⁴³	Higher Council for Environment and Natural Resources	Low Carbon Development intended in the sectors of energy, forestry, and waste. Improvement to energy sector: a decrease of electricity loss in transmission and distribution, introduction of energy efficient appliances, extension of public transport system in Khartoum, a switch to rail transport, introduction of biofuels, and an improvement of fuels usage in 'light duty' vehicles. Objective: to compost 60% of organic waste, recycle 15% of the total solid waste, establish landfills in all large urban areas, and develop a sludge to biogas production plant.	N/A
Sudan's First State of Environment and Outlook Report (2020) ²⁴⁴	Government of Sudan & UNEP	N/A	Projects: Energy and Waste Treatment Services Company within waste management are public awareness and education campaigns; development of standards on packaging materials; and the promotion of sorting of waste at the source. The goal is to reduce waste for landfills with 25% and increase recycling rates to 40% by 2030.

SYRIAN ARAB REPUBLIC

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Nationally Determined Contribution Under Paris Agreement on Climate (2018) ²⁴⁵	Government of Syria	N/A	Mitigation strategies, both conditioned and not, include increasing the ration of renewable energy to 10% of the power production by 2030; improve waste management of agricultural waste through increasing recycling rates and convert agricultural waste and liquids to energy through modern plants; introduce conservation agriculture; develop urban transportation systems that are sustainable; develop and rehabilitate railways systems and put in use to reduce pollution; improve the fuel efficiency and the type of fuel used in vehicles to sustainable options such as electricity and hybrid, green fuel, and blue gasoline; establish plants to take care of waste water and produce biogas; encourage the implementation of sorting of solid waste at source and at plants in big cities; regulate and encourage the recycling industry with appropriate standards; develop the treatment of sanitary landfills with biogas production; and develop green architectural techniques that uses environmentally friendly materials and are focused on thermal isolation. The adaptation strategy includes reducing water losses through efficiency measures and improving the organic content of soil and using non-traditional water sources such as treated industrial wastewater and sewage water.

REPUBLIC OF YEMEN

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
National Vision for the Modern Yemini State (2019) ²⁴⁶	Government of Yemen	Objective: Providing an infrastructure for waste management, treatment, and recycling'. Under this there are two circular indicators, without goals, 'Percentage of treated and re- cycled waste' and 'Utilization of industrial technology to recycle waste and transform it into an essential part of development'.	N/A
Intended Nationally Determined Contribution under the UNFCCC (2015) ²⁴⁷	Government of Yemen	N/A	3 circular practices are suggested to reach the mitigation and adaptation goals: Develop energy efficiency measures through standards, awareness raising, energy use regulation, and labels; increase the use of solar energy, especially at household levels; and generate bioenergy through capture the gases from landfills.
National Biodiversity Strategy and Action Plan II "Achieving a Resilient, Productive and Socio-ecosystem by 2050" ²⁴⁸	Ministry of Water and Environment & Environment Protection Authority	Strategies: transition to renewable energy, introduce smart agricultural practices, and to start producing bio energy from solid waste and wastewater to reduce the GHG emissions threatening the biodiversity (through payment schemes for ecosystem services, realized with polluter-pay principles, tradable pollution permits, individual transferable quotas and other resources user fees).	Circular practices to reach a resilient, productive, and sustainable socio-ecosystem. Introduce incentives and tax exemptions to reach a lower use of virgin raw materials, lower disposal of waste, and facilitating the use of green technology, the use of recycled and recyclable products. To protect ecosystems, the reduction of pollution and contamination will be carried out through control mechanisms and improved waste management including design changes, improved production processes, recycling, and the production of 'non-wasteful products'.

REPUBLIC OF DJIBOUTI

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Intended Nationally Determined Contribution of Djibouti (2015) ²⁴⁹	Government of Djibouti	N/A	The projects include energy efficiency measures in 10 building with the goal of capacity building, reduction of energy consumption in public building, electricity production through household waste, and the installation of a large area with agroforestry system.
Vision 2035 (2014) ²⁵⁰	Government of Djibouti	N/A	Improving agriculture and waste management by diversifying the use of food harvesting and production of the pastoralists with the models of oasis culture (foraging crops, and planting gardens). Recycling of wastewater from agricultural production.

UNION OF THE COMOROS

DOCUMENT	DEPARTMENT OR MINISTRY	VISION, OBJECTIVE & STRATEGY	POLICY, ACTION PLAN & PROJECT
Nationally Determined Contribution (2021) ²⁵¹	Ministry of Agriculture, Fisheries, Environment, Tourism and Handicrafts	N/A	A few circular solutions are mentioned as way to reduce the GHG emissions: develop biogas production in the energy sector, compost organic waste in improved waste management, and develop agroforestry to reach a sustainable use of land and increased efficiency.

ANNEX 4. Universal Policy Goals

Five universal goals for enabling a large-scale implementation of CE have been developed by the Ellen MacArthur Foundation.²⁵² These general goals are policy oriented and designed for governments and businesses to start rethinking the whole economy, lower their cost of transition and reach the full potential of a transformation. The table below is a summary of the goals which can serve as a base for creatively explore policy options with different goals.

Stimulate Design for Circular Economy	Manage Resources to Preserve Value	Make the Economics Work	Invest in Innovation, Infrastructure and Skills	Collaborate for System Change
Develop policies that entail product durability; facilitates circularity within the building and construction sector; creates opportunities for regenerative production and land-use; improves chemical legislations; and stimulates supportive trade schemes that foster circularity in goods, services, and systems.	Develop policies that incorporates taxation and conscious procurement encouraging circular models; creates recycling systems within both technical and biological cycles; stimulates markets for used materials and by-products; rethinks flow and use of materials; enforces Extended Producer Responsibility and Deposit Return Schemes; and applies classification of waste and disincentives of unsustainable waste handling.	Develop policies that enable circular solutions through incentives and taxations; reforms and deploys subsidies; re-focus funds, state aid and public procurement; and reviews intellectual property rights, trade policies, transparency and accounting rules, competition policy, labor market policies, and digital and data regulations.	Develop policies that stimulate public and private sector investments through research funds and venture funding; includes circularity within school curriculums and trainee programs; promotes blended finance possibilities; and directs foreign aid towards capacity building.	Develop policies that fosters collaboration on all levels and across all sectors through encouraging multi-stakeholder and cross-value-chains; builds, aligns, and mainstreams policies that are based on CE; raises public and private awareness; and develops data measurements and efficient monitoring of progress.

ANNEX 5. Flagship Projects in the Arab region

Morocco: innovative solutions in agriculture is strengthening local farmers' resilience

Morocco is one of few Arab countries which has a high food self-sufficiency, and agri-food production accounts for 33% of all employment.²⁵³ But the fertility of the land and profit in the sector is decreasing with changed market conditions and a lack of natural resources available. The agriculture sector is also responsible for a considerable amount of the world's GHG emissions, partly due to an inefficient use of natural resources through uncontrolled methane production from waste, an extensive use of inputs such as fertilizers, and the use of fossil fuels in the production.

In a collaboration between the company Biodôme du Maroc and the EU funded Switchmed Program a new solution for farmers in Morocco was developed to help them include circular practices to decrease their emissions and increase their profits and resilience. The solution is based on a small-scale local tank which produce biogas and fertilizer through the methane production from organic waste, animal waste and wastewater. Instead of leaving the waste untreated on the farms, leaking GHGs, it is used to supplement the previous use of oil to run irrigation systems and other energy demanding systems on the farm, as well as local organic fertilizers instead of bought fertilizers. The project has also brought the possibility for the farmers to sell organic fertilizers, and for new employment opportunities as the solution is meant to be self-sustained by local farmers. The solution is being prepared for expanding on a national level and to educate all relevant stakeholders to form public-private partnership for sustainable agricultural circular solutions²⁵⁴.

Egypt: a public-private partnership is battling air pollution through public transport

Egypt has the largest population in the Arab region, with one of the highest population concentrations in the world around the Nile River. The urban population is rapidly increasing and is expected to grow from 43% (2022) to 75% in 2050.²⁵⁵ Cairo suffers from high air pollution, mainly due to transportation, industry, and the open burning of waste, and is experiencing 10 to 100 times the recommended international acceptable levels of dangerous air particles.²⁵⁶ Air pollution is mainly a health hazard, and can lead to extreme temperatures, shortness of breath, disease, and premature death.

Egypt has put up ambitious plans to lower their air pollution by 50% by 2050 and has several projects ongoing and proposed for the near future. With a focus on public transport two projects have been carried out and one is expected to be carried out. The Cairo Metro system with the goal of 'low carbon mass transit' has been expanded, and now has 3 lines expecting to serve 2 million people within the near future. A private sector company has also introduced 200 buses in a high-quality bus service, targeting car drivers to shift to a more sustainable mobility option. Further measures planned are both a transition of the fuel used to natural gas in public buses, and public encouragement of bicycling through new infrastructure development.²⁵⁷

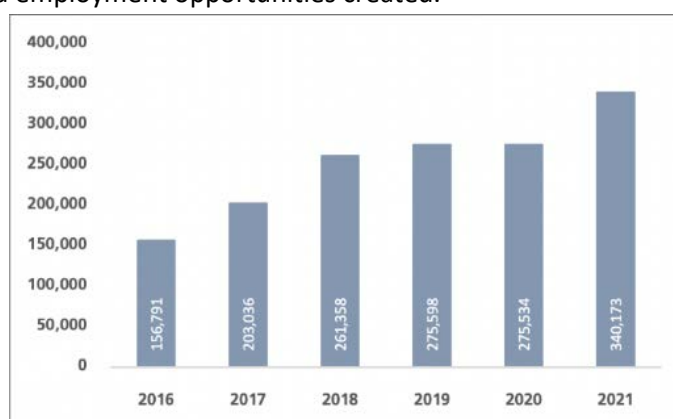
Public transportation is a circular solution with a short loop, with multiple positive outcomes. A strong public transport system is a part of a shared economy, where people can buy a service when it's needed instead of a product. This leads to a decrease of natural resources used in production since fewer vehicles are needed, but also a decrease of used natural resources when used since it's a shared service. Benefits include lower emissions in production, lower emissions in consumption, lower air pollution, increased biodiversity, safer and healthier cities to live in, and other socio-economic benefits such as a higher degree of mobility inclusion, and strong investment opportunities and returns.

Saudi Arabia: increased recycling rates through best practices in industrial waste management

Rapid population growth, industrialization, urbanization, and GDP growth have led to recent economic prosperity in Saudi Arabia, but with the drawback of an extensive use of natural resources. The state suffers from insufficient solid waste handling with landfills that have reached their brink, leaking out toxins affecting water, land, and air –quality, emitting GHGs and contributing to bad health. It was estimated that in 2021 the environmental degradation by solid waste reached 1.3 billion dollars in Saudi Arabia.²⁵⁸

Saudi Arabia has now put waste management of its 53 million tons of waste as a top priority for the state and produced a strong framework document and a waste management law, with the goal of switching to a CE. The National Center for Waste Management has set the ambitious 2030 goal of diverting 82% of its waste from landfills mainly through recycling, composting and incineration, and to reach a 100% handling of new waste through recycling, fuel, and energy production.²⁵⁹ The expected outcomes by 2035 are 73 million tons of reduced CO² emissions, 346 million BTU produced, 120 billion SAR added to the economy, and 77 thousand employment opportunities created.²⁶⁰

Results in the state have already been recorded in Jubail, the largest industrial city in the Middle East, and Yanbu.²⁶¹ They have managed to improve their industrial waste handling considerably through strong governance and best practices. Smart waste containers, practical waste management plans, waste valorization plants, public-private partnerships and new private investors have been a part of the success.



Recycled industrial waste in Jubail and Yanbu grew by 23% in 2020 and have now reached more than 60% of the collected waste.

Source: The General Authority for Statistics (see reference 260).

Jordan: reuse program is facilitating sustainable consumption patterns and creating new jobs

The new project REUSEMED is being implemented in Jordan, through a partnership between the Ministry of Local Administration and the New Deir Allaa Municipality. The project is EU funded with the aim of strengthen the culture of reusing products and create networks to facilitate these. With a focus on reuse of compost, clothes, books, furniture, and household appliances, the project is promoting both regenerative and restorative solutions. In 2022, they organized the first reuse festival, raising the local publics' awareness on reuse and inviting them to participate in reuse activities. Other achievements include a reuse center where people can turn in old products which then are resold for a minimal price, a repair café, and a compost factory.

The project is within waste management, but instead of the usual focus on recycling and incineration of waste, the more resource efficient processes of reuse is used. The goal is to target the increasing waste production through taking care of already produced products to decrease waste and the need for new production. The project is promoting changed consumption patterns by enhancing the possibilities with used products, raising awareness of waste management, capacity building of reuse, repair, and composting practices, and creating new green jobs and solidarity. Another future goal is to involve the private sector to increase the medium- and long-term revenues of the municipality.²⁶²

References

- ¹ International Resource Panel. (2019). *Global Resources Outlook 2019: Natural Resources for the Future We Want*.
- ² ESCWA. (2017). *Progress on Sustainable Consumption and Production in the Arab Region*; ESCWA. (2020). *Arab Sustainable Development Report 2020*.
- ³ Chancel, L., Bothe, P., Voituriez, T. (2023). *Climate Inequality Report 2023* (World Inequality Lab Study). <https://wid.world/wp-content/uploads/2023/01/CBV2023-ClimateInequalityReport-2.pdf>
- ⁴ UNDP. (2022). *Regional Snapshot Arab States: The State of Climate Ambition*. https://climatepromise.undp.org/sites/default/files/research_report_document/UNDP%20-%20Arab%20States%20Regional%20Snapshot%202022%20-%20State%20of%20Climate%20Ambition%20.pdf
- ⁵ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ⁶ Kirchherr, J., Reike, D., & Hekkert, M. (2017). *Conceptualizing the circular economy: An analysis of 114 definitions. Resources, Conservation and Recycling*.
- ⁷ D'Amato, D., Droste, N., Allen, B., Kettunen, M., Lhtinen, K., Korhonen, J., Leskiinen, P., Matthies, B. D., & Toppinen, A. (2017). *Green, circular, bio economy: A comparative analysis of sustainability avenues*. *Journal of Cleaner Production*, 168, 716-734.
- ⁸ World Economic Forum. (2022). *What is the Circular Economy and why does it matter?* Retrieved 2023-02-21 from <https://www.weforum.org/agenda/2022/06/what-is-the-circular-economy/#:~:text=In%20a%20circular%20economy%2C%20things,be%20used%20again%20and%20again>
- ⁹ Ellen MacArthur Foundation. (n.d.). *Finding a common language – the circular economy glossary*. Retrieved 2023-02-21 from <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/glossary>
- ¹⁰ Chatham House. (2021). *What is the circular economy?* Retrieved 2023-04-11 from <https://www.chathamhouse.org/2021/06/what-circular-economy>
- ¹¹ European Parliament. (2015). *Circular economy: definition, importance and benefits*. Retrieved 2023-02-21 from <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>
- ¹² IPCC. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
- ¹³ Chatham House. (n.d.). *Circular economy*. Retrieved 2023-04-11 from <https://www.chathamhouse.org/topics/circular-economy>
- ¹⁴ UN General Assembly & UN Economic and Social Council. (2018). *Circular Economy for the Sustainable Development Goals: From concept to practice* (concept note). https://www.un.org/en/ga/second/73/jm_conceptnote.pdf
- ¹⁵ Schroeder, P., Anggraeni, K., & Weber, U. (2019). *The Relevance of Circular Economy Practices to the Sustainable Development Goals*. *Journal of Industrial Ecology*, 23(1), 77-95; UN General Assembly & UN Economic and Social Council. (2018). *Circular Economy for the Sustainable Development Goals: From concept to practice* (concept note). https://www.un.org/en/ga/second/73/jm_conceptnote.pdf
- ¹⁶ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ¹⁷ IPCC. (2022). *Climate Change 2022: Mitigation of Climate Change*. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
- ¹⁸ International Resource Panel. (2019). *Global Resources Outlook 2019: Natural Resources for the Future We Want*.
- ¹⁹ International Resource Panel. (2019). *Global Resources Outlook 2019: Natural Resources for the Future We Want*.
- ²⁰ UNFCCC. (2022). *What is the Triple Planetary Crisis?* Retrieved 2023-04-11 from <https://unfccc.int/blog/what-is-the-triple-planetary-crisis>
- ²¹ Schroeder, P., Anggraeni, K., & Weber, U. (2019). *The Relevance of Circular Economy Practices to the Sustainable Development Goals*. *Journal of Industrial Ecology*, 23(1), 77-95.
- ²² ITA. (2022). *Waste Management*. Retrieved 2023-04-11 from <https://www.trade.gov/country-commercial-guides/saudi-arabia-waste-management>
- ²³ Ellen MacArthur Foundation. (n.d.). *Shaping a nature-positive future with the circular economy*. Retrieved 2023-04-11 from <https://ellenmacarthurfoundation.org/topics/biodiversity/overview>
- ²⁴ Sitra & Vivid Economics. (2022). *Tackling Root Causes – Haltering biodiversity loss through the circular economy*.
- ²⁵ IQAir. (2023). *Air Quality in Egypt*. <https://www.iqair.com/ca/egypt>

-
- ²⁶ UNEP & MED IG. (2022). *Programme: 1. Towards a pollution and litter free Mediterranean sea and cost embracing a circular economy*. https://wedocs.unep.org/bitstream/handle/20.500.11822/38371/UNEPMAP_MTS_2022-2027_05-1_eng.pdf
- ²⁷ UNEP. (2018). *Phasing out 'single use plastic bags' in the Mediterranean*. Retrieved 2023-04-11 from <https://www.unep.org/unepmap/news/news/phasing-out-single-use-plastic-bags-mediterranean>
- ²⁸ World Economic Forum. (2015). *How can we create jobs for young people in the Middle East and Africa?* Retrieved 2023-04-11 from <https://www.weforum.org/agenda/2015/05/how-can-we-create-jobs-for-young-people-in-the-middle-east-and-africa/>
- ²⁹ Tellus Institute with Sound Resource Management. (2013). *More Jobs, Less Pollution: Growing the Recycling Economy in the U.S.* https://www.nrdc.org/sites/default/files/glo_11111401a.pdf
- ³⁰ MWAN. (n.d.). *Circular Economy Adoption*. Retrieved 2023-04-11 from <https://mwan.gov.sa/en/Circular-Economy-Adoption>
- ³¹ World Economic Forum. (2015). *How can we create jobs for young people in the Middle East and Africa?* Retrieved 2023-04-11 from <https://www.weforum.org/agenda/2015/05/how-can-we-create-jobs-for-young-people-in-the-middle-east-and-africa/>
- ³² The World Bank. (2022). *MENA's Polluted Skies And Seas Hurt Economies, Livelihoods*. Retrieved 2023-02-21 from <https://www.worldbank.org/en/news/press-release/2022/02/07/mena-s-polluted-skies-and-seas-hurt-economies-livelihoods>
- ³³ Ellen MacArthur Foundation. (n.d.). *The Circular Economy in Detail*. Retrieved 2023-04-11 from <https://ellenmacarthurfoundation.org/the-circular-economy-in-detail-deep-dive>
- ³⁴ Chatham house. (2022). *A global roadmap for an inclusive circular economy*
- ³⁵ Chatham house. (2022). *A global roadmap for an inclusive circular economy*
- ³⁶ Qantara. (2017). Morocco's recycling pioneers. <https://en.qantara.de/content/waste-separation-and-recycling-in-morocco-moroccos-recycling-pioneers>
- ³⁷ Ellen MacArthur Foundation. (2015). *Towards A Circular Economy: Business Rationale for an Accelerated Transition*. https://www.ellenmacarthurfoundation.org/assets/downloads/TCE_Ellen-MacArthur-Foundation_9-Dec-2015.pdf
- ³⁸ Chatham House. (n.d.). *Circular economy*. Retrieved 2023-04-11 from <https://www.chathamhouse.org/topics/circular-economy>
- ³⁹ Ben Ali, M. (2021). *Toward a Circular Economy in the MENA Region: Insights from the Water-Food Nexus*. Perspectives on Development in the Middle East and North Africa (MENA) Region, pp. 139-159.
- ⁴⁰ O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). *A good life for all within planetary boundaries*. Nature Sustainability, 1(2), 88-95.
- ⁴¹ Chancel, L., Bothe, P., Voituriez, T. (2023). *Climate Inequality Report 2023* (World Inequality Lab Study). <https://wid.world/wp-content/uploads/2023/01/CBV2023-ClimateInequalityReport-2.pdf>
- ⁴² Circle Economy. (2023). *The Circularity Gap Report 2023*; Ellen MacArthur Foundation. (n.d.). *The Circular Economy in Detail*. Retrieved 2023-04-11 from <https://ellenmacarthurfoundation.org/the-circular-economy-in-detail-deep-dive>
- ⁴³ World Economic Forum. (2014). *Towards the Circular Economy: Accelerating the scale-up across global supply chains*.
- ⁴⁴ McKinsey. (2017). *Mapping the benefits of a circular economy*. <https://www.mckinsey.com/capabilities/sustainability/our-insights/mapping-the-benefits-of-a-circular-economy>
- ⁴⁵ McKinsey. (2015). *Growth within: A circular economy vision for a competitive Europe*.
- ⁴⁶ Strategy&. (2019). *Putting GCC cities in the loop: sustainable growth in a circular economy* (The Ideation Center).
- ⁴⁷ Arab Monetary Fund. (2022). *Towards a Circular Economy in The Arab Region: Development of Transformation Measurement Index*. https://www.amf.org.ae/sites/default/files/publications/2022-10/Towards%20a%20Circular%20Economy%20in%20the%20Arab%20Region_final.pdf
- ⁴⁸ Thabit, Q., Abdallah, N., & Nelles, M. (2022). *Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region*. Waste (1), 52-80. 10.3390/waste1010005.
- ⁴⁹ Heggy, E., Bermudez, V., & Vermeersch, M. (2022). *Applying the Circular Economy Model in Improving Waste Management and Treatment Systems in the Arab Gulf States*. Sustainable Energy-Water-Environment Nexus in Deserts. Switzerland: Springer International Publishing AG.
- ⁵⁰ MWAN. (n.d.). *Circular Economy Adoption*. Retrieved 2023-04-11 from <https://mwan.gov.sa/en/Circular-Economy-Adoption>

-
- ⁵¹ ESCWA. (2020). *ESCWA and FAO discuss regional production and consumption for sustainable land management*. <https://www.unescwa.org/news/escwa-and-fao-discuss-regional-production-and-consumption-sustainable-land-management#:~:text=The%20annual%20economic%20cost%20of,billion%20annually%20across%20the%20region>
- ⁵² ITA. (2022). *Waste Management*. Retrieved 2023-04-11 from <https://www.trade.gov/country-commercial-guides/saudi-arabia-waste-management>
- ⁵³ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ⁵⁴ Kirchherr, K., Reike, D., & Hekkert, M. (2017). *Conceptualizing the Circular Economy: An analysis of 114 definitions*. *Resources, Conservation & Recycling* 127, 221-232.
- ⁵⁵ Potting, J., Hekkert, M.P., Worrell, E., & Hanemaaijer, A. (2017). *Circular Economy: Measuring innovation in the product chain*.
- ⁵⁶ CPMR & MedWaves. (2022). *A Circular Blue Economy for the Mediterranean: Current practices and opportunities*. <https://south.euneighbours.eu/wp-content/uploads/2022/07/A-Circular-Blue-Economy-for-the-Mediterranean-SwitchMed-1.pdf>
- ⁵⁷ Ellen MacArthur. (2015). *Towards A Circular Economy: Business Rationale for an Accelerated Transition*. https://www.ellenmacarthurfoundation.org/assets/downloads/TCE_Ellen-MacArthur-Foundation_9-Dec-2015.pdf
- ⁵⁸ Bleischwitz, R., Yang, M., Huang, B., XU, X., Zhou, J., McDowall, W., . . . Yong, G. (2022). *The circular economy in China: Achievements, challenges and potential implications for decarbonisation*. *Resources, Conservation and Recycling*, 183, 106350.
- ⁵⁹ European Commission. (n.d.). *First circular economy action plan*. Retrieved 2023-04-11 from https://environment.ec.europa.eu/topics/circular-economy/first-circular-economy-action-plan_en
- ⁶⁰ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ⁶¹ Schroeder, P., Anggraeni, K., & Weber, U. (2019). *The Relevance of Circular Economy Practices to the Sustainable Development Goals*. *Journal of Industrial Ecology*, 23(1), 77-95.
- ⁶² Government of United Arab Emirates. (2021). *UAE Circular Economy Policy 2021-2031*.
- ⁶³ Invest Qatar. (2022). *Circular Economy Policy paper*. https://invest.qa/storage/1435/62ab10b2e9f14_Invest_Qatar_Circular_Economy_Report.pdf
- ⁶⁴ Circular Carbon Economy National Program. (n.d.). *Circular Carbon Economy program - About us*. Retrieved 2023-02-22 from <https://www.cce.org.sa/Pages/Aboutus.aspx>
- ⁶⁵ GIZ. (n.d.). *Climate and resource protection through the circular economy in Jordan*. Retrieved 2023-02-22 from <https://www.giz.de/en/worldwide/75116.html>
- ⁶⁶ Government of Lebanon. (2020). *Lebanon's Nationally Determined Contribution*. <https://climatechange.moe.gov.lb/viewfile.aspx?id=319>
- ⁶⁷ United Arab Emirates Ministry of Climate Change & Environment. (2022). *A Bridge to Greater Climate Ambition: Updated Second Nationally Determined Contribution of the United Arab Emirates*. <https://unfccc.int/sites/default/files/NDC/2022-09/UpdateNDC-EN-2022.pdf>
- ⁶⁸ Kuwait Environmental Protection Agency. (n.d.). Retrieved 2023-02-22 from <https://epa.org.kw/Portals/0/PDF/KuwaitNDCEN.pdf>
- ⁶⁹ Kingdom of Saudi Arabia. (2021). *Updated First Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/resource/202203111154---KSA%20NDC%202021.pdf>
- ⁷⁰ Republic of Lebanon's Ministry of Environment & Ministry of Industry. (2015). *Sustainable Consumption and Production Action Plan for the Industrial Sector*. https://www.oneplanetnetwork.org/sites/default/files/full-report_scp-ap_lebanon.pdf
- ⁷¹ Egypt's Ministry of Environment. (2016). *National Action Plan for Sustainable Consumption and Production in Egypt*. <https://d1bf23g64f8xve.cloudfront.net/sites/default/files/01.%20SCP-NAP%20Egypt.pdf>
- ⁷² State of Qatar's Planning and Statistics Authority. (2021). *Qatar Voluntary National Review*. https://sustainabledevelopment.un.org/content/documents/280362021_VNR_Report_Qatar_English.pdf
- ⁷³ United Arab Emirates Ministry of Climate Change & Environment. (n.d.) *UAE National Sustainable Consumption and Production Plan (2019-2030)*. https://www.oneplanetnetwork.org/sites/default/files/from-crm/167-a7c844279ec966eb4114e5334dd5224e_SCP_framework_EN.PDF
- ⁷⁴ Thabit, Qahtan & Abdallah, Nassour & Nelles, Michael. (2022). *Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region*. *Waste* (1). 52-80. 10.3390/waste1010005.
- ⁷⁵ State of Palestine. (2018). *Palestinian National Voluntary Review of the Implementation of the 2030 Agenda*. <https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf>

-
- ⁷⁶ Qatar's Planning and Statistics Authority. (2021). *Qatar's Voluntary National Review*. https://sustainabledevelopment.un.org/content/documents/280362021_VNR_Report_Qatar_English.pdf
- ⁷⁷ Government of Egypt. (2022). *Egypt's First Updated Nationally Determined Contributions*. <https://unfccc.int/sites/default/files/NDC/2022-07/Egypt%20Updated%20NDC.pdf.pdf>
- ⁷⁸ Government of Morocco. (2018). *Implementing the First Nationally Determined Contribution of the Kingdom of Morocco*. http://www.4c.ma/files/ugd/3c9136_05e36a1136b24626803c226958b90962.pdf?index=true
- ⁷⁹ State of Palestine. (2018). *Palestinian National Voluntary Review of the Implementation of the 2030 Agenda*. <https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf>
- ⁸⁰ Yemen's Ministry of Water and Environment & Environment Protection Agency. (2017). *National Biodiversity Strategy and Action Plan II 'Achieving a resilient, productive and sustainable socio-ecosystem by 2050'*. <https://www.cbd.int/doc/world/ye/ye-nbsap-v2-en.pdf>
- ⁸¹ Morocco's Ministry of Environment. (n.d.). *The Ecotax*. Retrieved 2023-04-11 from <https://www.environnement.gov.ma/fr/117-theme/dechets/228-l-ecotaxe>
- ⁸² Oman Government. (2019). *Vision Document*. https://isfu.gov.om/2040/Vision_Documents_En.pdf
- ⁸³ Kingdom of Saudi Arabia. (n.d.). *Vision 2030*. Retrieved 2023-02-22 from https://www.vision2030.gov.sa/media/rc0b5oy1/saudi_vision203.pdf
- ⁸⁴ Republic of Yemen Supreme Political Council. (2019). *National Vision for the Modern Yemeni State*. <https://andp.unescwa.org/sites/default/files/2020-10/National%20Vision%20for%20the%20Modern%20Yemeni%20State.pdf>
- ⁸⁵ Republic of Djibouti. (n.d.). *Vision Djibouti 2035*. <https://economie.gouv.dj/wp-content/uploads/vision-2035-anglais.pdf>
- ⁸⁶ Government of Iraq & Ministry of Planning. (2019). *The future we want: Iraq's vision for sustainable development 2030*. <https://andp.unescwa.org/sites/default/files/2021-05/The%20future%20we%20want-Iraq%20vision%20for%20Sustainable%20Development%202030.pdf>
- ⁸⁷ African Circular Economy Alliance. (n.d.). *About ACEA*. Retrieved 2023-04-11 from <https://www.aceafrica.org/about-acea>
- ⁸⁸ Circular Carbon Economy National Program. (n.d.). *Circular Carbon Economy Program - About us*. Retrieved 2023-04-11 from <https://www.cce.org.sa/Pages/Aboutus.aspx>
- ⁸⁹ The United Arab Emirates Governmental Portal. (n.d.). *Circular economy*. Retrieved 2023-02-25 from <https://u.ae/en/about-the-uae/economy/circular-economy>
- ⁹⁰ Government of the Kingdom of Bahrain & United Nations. (n.d.). *Strategic and Sustainable Development Cooperation Framework 2021-2022*. <https://bahrain.un.org/sites/default/files/2021-06/Signed%20SCF.pdf>
- ⁹¹ SwitchMed. (n.d.). *Regional and National Policy frameworks*. Retrieved 2023-02-23 from <https://switchmed.eu/policy/>
- ⁹² Egypt's Ministry of Environment. (2016). *National Action Plan for Sustainable Consumption and Production in Egypt*. <https://d1bf23g64f8xve.cloudfront.net/sites/default/files/01.%20SCP-NAP%20Egypt.pdf>
- ⁹³ ACTED. (2020). *Towards a Circular Economy in Lebanon*. <https://www.acted.org/wp-content/uploads/2018/01/acted-lebanon-circular-economy-final.pdf>; ACTED. (2021). *Circular Economy National Study Jordan*. <https://www.acted.org/wp-content/uploads/2018/01/circular-economy-national-study-final.pdf>
- ⁹⁴ Circle Economy. (n.d.). *Global*. Retrieved 2023-04-11 from <https://www.circularity-gap.world/global>
- ⁹⁵ SwitchMed & Regional Activity Centre for Sustainable Consumption and Production. (2020). *List of Indicators to measure progress on SCP in the Mediterranean region*. https://switchmed.eu/wp-content/uploads/2020/04/SCP-Indicators-list_2020_EN.pdf
- ⁹⁶ Arab Monetary Fund. (2022). *Towards a Circular Economy in The Arab Region: Development of Transformation Measurement Index*. https://www.amf.org.ae/sites/default/files/publications/2022-10/Towards%20a%20Circular%20Economy%20in%20the%20Arab%20Region_final.pdf
- ⁹⁷ KAPSARC. (n.d.). *CCE Index*. Retrieved 2023-04-11 from <https://cceindex.kapsarc.org/cceindex/visualization>
- ⁹⁸ Oman Government. (2019). *Vision Document*. https://isfu.gov.om/2040/Vision_Documents_En.pdf
- ⁹⁹ Government of United Arab Emirates. (2021). *UAE Circular Economy Policy 2021-2031*.
- ¹⁰⁰ Egypt Ministry of Environment. (n.d.). *Egypt National Climate Change Strategy*. <https://www.eeaa.gov.eg/Uploads/Topics/Files/20221206130720583.pdf>
- ¹⁰¹ Ministère De L'environnement et des Energies Renouvelables. (n.d.). *Strategie et Plan D'action Nationaux pour la Biodiversite 2016-2030*. Retrieved 2023-04-12 from <https://andp.unescwa.org/sites/default/files/2021-10/dz-nbsap-v2-fr.pdf>

-
- ¹⁰² Palestine Environment Quality Authority. (2016). *Sustainable Consumption and Production National Action Plan*. <https://switchmed.eu/wp-content/uploads/2020/04/02.-SCP-NAP-Palestine.pdf>
- ¹⁰³ Republic of Yemen Supreme Political Council. (2019). *National Vision for the Modern Yemeni State*. <https://andp.unescwa.org/sites/default/files/2020-10/National%20Vision%20for%20the%20Modern%20Yemeni%20State.pdf>
- ¹⁰⁴ UNDP. (n.d.). *Energy and waste solutions - Promoting Waste Management Practices and 3R (Reduce, Reuse, Recycle) by Utilizing New Technologies and Circular Economy Approach; Activity 8*. Retrieved 2023-02-22 from <https://www.undp.org/lebanon/projects/energy-and-waste-solutions-0>
- ¹⁰⁵ The Switchers Community. (n.d.). *The Switchers*. Retrieved 2023-04-12 from <https://www.theswitchers.eu/en/>
- ¹⁰⁶ Ministry of Environment and Renewable Energy, Ministry of Industry and Mines & SwitchMed. (2018). *SwitchMed Magazine: Algeria*. <https://switchmed.eu/wp-content/uploads/2020/03/National-Supplement-EN-Algeria.pdf>
- ¹⁰⁷ UNEP & Sudan Higher Council for Environment and Natural Resources in Sudan. (2020). *Sudan First State of Environment and Outlook Report 2020*. https://www.unep.org/resources/report/sudan-first-state-environment-outlook-report-2020?_ga=2.251511695.882135204.1676364007-978935238.1667825596
- ¹⁰⁸ Government of Iraq & Ministry of Planning. (2019). *The future we want: Iraq's vision for sustainable development 2030*. <https://andp.unescwa.org/sites/default/files/2021-05/The%20future%20we%20want-Iraq%20vision%20for%20Sustainable%20Development%202030.pdf>
- ¹⁰⁹ Government of Bahrain. (2018). *The Kingdom of Bahrain's First Voluntary Nation Review on the Implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals*. https://sustainabledevelopment.un.org/content/documents/2132920181231_Bahrain_VNR_English_translation.pdf
- ¹¹⁰ Ministère Tunisien de l'Environnement et du Développement Durable. (2016). *Plan D'action National Sur Les Modes De Production Et De Consommation Durables*. <https://switchmed.eu/wp-content/uploads/2020/04/02.-SCP-NAP-agriculture-Tunisia-in-french.pdf>
- ¹¹¹ Government of Somalia. (2021). *Updated Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/NDC/2022-06/Final%20Updated%20NDC%20for%20Somalia%202021.pdf>
- ¹¹² Ministry of Environment and Renewable Energy, Ministry of Industry and Mines & SwitchMed. (2018). *SwitchMed Magazine: Algeria*. <https://switchmed.eu/wp-content/uploads/2020/03/National-Supplement-EN-Algeria.pdf>
- ¹¹³ Government of Morocco. (2021). *The New Development Model*. https://www.csmd.ma/documents/CSMD_Report_EN.pdf
- ¹¹⁴ Kuwait General Secretariat of the Supreme Council for Planning and Development. (n.d.). *Kuwait National Development Plan 2020-2025*. Retrieved 2023-04-12 from https://media.gov.kw/assets/img/Ommah22_Awareness/PDF/NewKuwait/Revised%20KNDP%20-%20EN.pdf
- ¹¹⁵ The United Arab Emirates Governmental Portal. (n.d.). *Circular economy*. Retrieved 2023-02-25 from <https://u.ae/en/about-the-uae/economy/circular-economy>
- ¹¹⁶ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ¹¹⁷ Thabit, Qahtan & Abdallah, Nassour & Nelles, Michael. (2022). *Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region*. Waste (1), 52-80. 10.3390/waste1010005
- ¹¹⁸ Thabit, Q., Abdallah, N., & Nelles, M. (2022). *Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region*. Waste (1), 52-80. 10.3390/waste1010005
- ¹¹⁹ Potting, J., Hekkert, M.P., Worrell, E., & Hanemaaijer, A. (2017). *Circular Economy: Measuring innovation in the product chain*.
- ¹²⁰ Chatham House. (2022). *A global roadmap for an inclusive circular economy*. <https://static.resourcetrade.earth/2022-05-23-stockholm50-circular-economy-roadmap-FINAL.pdf>
- ¹²¹ Chatham House. (2022). *A global roadmap for an inclusive circular economy*. <https://static.resourcetrade.earth/2022-05-23-stockholm50-circular-economy-roadmap-FINAL.pdf>
- ¹²² PACE. (n.d.). *The Plastics Program*. Retrieved 23-04-12 from <https://pacecircular.org/action-agenda/plastics>
- ¹²³ Ampliphi. (2022). *How to Reduce Plastic Waste - Redesigning for Circularity*. Retrieved 23-04-12 from <https://ampliphi.io/how-to-reduce-plastic-waste/>
- ¹²⁴ PACE. (n.d.). *The Electronics Program*. Retrieved 23-04-12 from <https://pacecircular.org/action-agenda/electronics>
- ¹²⁵ ARUP & United Nations One Planet Network Sustainable Buildings and Construction Programme. (2020). *State of Play for Circular Built Environment in Gulf Cooperation Council (GCC) countries*

-
- ¹²⁶ The Scientific Group for the UN Food Systems Summit. (2021). *Food Systems – Definition, Concept, and Application for the UN Food Systems Summit*. https://sc-fss2021.org/wp-content/uploads/2021/03/ScGroup_Food_Systems_paper_March-5-2021.pdf
- ¹²⁷ ECA, ECLAC, ESCAP, ESCWA, & ECE. (2021). *Transforming Food Systems*. <https://www.unescap.org/kp/2021/transforming-food-systems>
- ¹²⁸ Ben Ali, M. (2021). *Toward a Circular Economy in the MENA Region: Insights from the Water-Food Nexus*. Perspectives on Development in the Middle East and North Africa (MENA) Region, pp. 139-159.
- ¹²⁹ Abiad, M.G., & Meho, L.I. (2018). *Food loss and food waste research in the Arab world: a systematic review*. Food Sec 10, pp. 311–322. <https://doi.org/10.1007/s12571-018-0782-7>
- ¹³⁰ ESCWA. (2017). *Wastewater: An Arab Regional Perspective*. https://www.unescwa.org/sites/default/files/event/materials/escwa_presentation_wwd_17.pdf
- ¹³¹ ESCWA. (2021). *Enhancing Resilience and Sustainability of Agriculture in the Arab Region*. <https://www.unescwa.org/news/enhancing-resilience-and-sustainability-agriculture-arab-region>
- ¹³² ESCWA. (2023). *Virtual Expert Meeting on Unlocking the Potential of Rainfed Agriculture in the Arab Region*. https://www.unescwa.org/sites/default/files/event/materials/InformationNote%26Agenda_Virtual%20EGM%20_Rainfed-Agriculture.pdf
- ¹³³ ESCWA. (2022). *Study on Food Loss in Morocco*. <https://www.unescwa.org/events/study-food-loss-morocco>
- ¹³⁴ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ¹³⁵ ESCWA. (2020). *Advancing SDG 7 in the Arab Region*. <https://www.unescwa.org/sites/default/files/pubs/pdf/advancing-sdg7-arab-region-english.pdf>
- ¹³⁶ ESCWA. (2020). *Advancing SDG 7 in the Arab Region*. <https://www.unescwa.org/sites/default/files/pubs/pdf/advancing-sdg7-arab-region-english.pdf>
- ¹³⁷ Global Energy Monitor. (2022). *A Race to the Top: Arabic-Speaking Countries on pace to grow their utility-scale wind and solar capacity more than 500% by 2030*. <https://globalenergymonitor.org/wp-content/uploads/2022/06/A-Race-To-The-Top-final-English-version.pdf>
- ¹³⁸ Kapsarc. (2020). *CCE Guide Overview*.
- ¹³⁹ ESCWA. (2020). *Advancing SDG 7 in the Arab Region*. <https://www.unescwa.org/sites/default/files/pubs/pdf/advancing-sdg7-arab-region-english.pdf>
- ¹⁴⁰ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ¹⁴¹ The Aluminum Association. (n.d.). *Circular Economy Solutions*. Retrieved 23-04-12 from <https://www.aluminum.org/Recycling>
- ¹⁴² Energy Saving Trust. (n.d.). *Generating energy from waste*. Retrieved 23-04-12 from <https://energysavingtrust.org.uk/generating-energy-waste-how-it-works/#:~:text=Combustion%3A%20Burning%20up%20what's%20left,lot%20of%20potential%20for%20improvements>
- ¹⁴³ Hemidat, S., Achouri, O., El Fels, L., Elagroudy, S., Hafidi, M., Chaouki, B., . . . Guo, J. (2022). *Solid Waste Management in the Context of a Circular Economy in the MENA Region*. Sustainability, 14(1), 480.
- ¹⁴⁴ Pannila, N., Jayalath, M., Thibbotuwawa, A., Nielsen, I., & Uthpala, T. (2022). *Challenges in Applying Circular Economy Concepts to Food Supply Chains*. Sustainability, 14(24), 16536.
- ¹⁴⁵ Chizaryfard, A., Trucco, P., & Nuur, C. (2021). *The transformation to a circular economy: Framing an evolutionary view*. Journal of Evolutionary Economics, 31(2), 475-504.
- ¹⁴⁶ Barrie, J., Schröder, P., & Schneider-Petsinger, M. (2022). *The role of international trade in realizing an inclusive circular economy*. London: Royal Institute of International Affairs.
- ¹⁴⁷ ESCWA. (2020). *Arab Sustainable Development Report 2020*. <https://asdr.unescwa.org/sdgs/pdf/en/ASDR2020-Final-Online.pdf>
- ¹⁴⁸ Palestine Environment Quality Authority. (2016). *Sustainable Consumption and Production National Action Plan*. <https://switchmed.eu/wp-content/uploads/2020/04/02.-SCP-NAP-Palestine.pdf>
- ¹⁴⁹ Järvinen, L., & Sinervo, R. (2020). *Sitra Studies 170 - How to create a national circular economy road map*.
- ¹⁵⁰ UN Environment, MAP SCP, & RAC. (2022). *Set of regional measures to support the development of green and circular businesses and strengthen the demand for more sustainable products in the Mediterranean*.
- ¹⁵¹ EU. (2017). *Public Procurement for a Circular Economy*.
- ¹⁵² OECD. (2016). *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management*.

-
- ¹⁵³ Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A., & Hekkert, M. (2018). *Barriers to the Circular Economy: Evidence From the European Union (EU)*. *Ecological Economics*, 150, 264-272.
- ¹⁵⁴ Almulhim, A., & Abubakar, I. (2021). *Understanding public environmental awareness and attitudes toward circular economy transition in Saudi Arabia*. *Sustainability*, 13(18), 10157.
- ¹⁵⁵ De Bernardi, P., Bertello, A., & Forliano, C. (2023). *Circularity of food systems: A review and research agenda*. *British Food Journal*, 125(3), 1094-1129.
- ¹⁵⁶ UNEP. (2015). *Sustainable Consumption Guide for policymakers: Debunking Myths and Outlining Solutions (Asia Edition)*.
- ¹⁵⁷ European Environment Agency. (2022). *Enabling Consumer Choices for a Circular Economy*. Retrieved 23-04-12 from <https://www.eea.europa.eu/publications/influencing-consumer-choices-towards-circularity/enabling-consumer-choices-towards-a>
- ¹⁵⁸ OECD. (2021). *Towards a more resource-efficient and circular economy*. <https://www.oecd.org/environment/waste/OECD-G20-Towards-a-more-Resource-Efficient-and-Circular-Economy.pdf>
- ¹⁵⁹ Regional Activity Center for Cleaner Production. (2011). *Steps Towards Sustainable Consumption and Production in the Mediterranean*.
- ¹⁶⁰ OECD. (2020). *The Circular Economy in Cities and Regions*. <https://www.oecd-ilibrary.org/sites/ccf71ccd-en/index.html?itemId=/content/component/ccf71ccd-en>
- ¹⁶¹ ESCWA. (2022). *Climate Finance Needs and Flows in the Arab Region*. <https://www.unescwa.org/sites/default/files/pubs/pdf/climate-finance-needs-flows-arab-region-english.pdf>
- ¹⁶² UNEP. (2023). *Adapting to a new climate in the MENA region*. <https://www.unepfi.org/themes/climate-change/adapting-to-a-new-climate-in-the-mena-region/>
- ¹⁶³ Arab Forum for Environment and Development. (2018). *Financing Sustainable Development in Arab Countries*.
- ¹⁶⁴ Ellen MacArthur Foundation. (2021). *Universal Circular Economy Policy Goals*. <https://emf.thirdlight.com/file/24/GgC25OAGLztng9GgtcoGqo7OJA/%5BEN%5D%20Universal%20circular%20economy%20policy%20goals.pdf>
- ¹⁶⁵ Ellen MacArthur Foundation. (2021). *Universal Circular Economy Policy Goals*. <https://emf.thirdlight.com/file/24/GgC25OAGLztng9GgtcoGqo7OJA/%5BEN%5D%20Universal%20circular%20economy%20policy%20goals.pdf>
- ¹⁶⁶ Geissinger, A., Laurell, C., Öberg, C., & Sandström, C. (2019). *How sustainable is the sharing economy? On the sustainability connotations of sharing economy platforms*. *Journal of Cleaner Production*, 206, 419-429.
- ¹⁶⁷ ESCWA. (2020). *Arab Sustainable Development Report 2020*. <https://asdr.unescwa.org/sdgs/pdf/en/ASDR2020-Final-Online.pdf>
- ¹⁶⁸ Ekins, P., Domenesch, T., Drummond, P., Bleischwitz, R., Hughes, N., & Lotti, L. (2019). *Circular Economy: What, Where, How, Where?* <https://www.oecd.org/cfe/regionaldevelopment/Ekins-2019-Circular-Economy-What-Why-How-Where.pdf>
- ¹⁶⁹ Garcia-Saravia Ortiz-de-Montellano, C., & van der Meer, Y. A. (2022). *Theoretical Framework for Circular Processes and Circular Impacts Through a Comprehensive Review of Indicators*. *Glob J Flex Syst Manag* 23, 291–314
- ¹⁷⁰ SwitchMed & Regional Activity Centre for Sustainable Consumption and Production. (2020). *List of Indicators to measure progress on SCP in the Mediterranean region*. https://switchmed.eu/wp-content/uploads/2020/04/SCP-Indicators-list_2020_EN.pdf
- ¹⁷¹ Arab Monetary Fund. (2022). *Towards a Circular Economy in The Arab Region: Development of Transformation Measurement Index*. https://www.amf.org.ae/sites/default/files/publications/2022-10/Towards%20a%20Circular%20Economy%20in%20the%20Arab%20Region_final.pdf
- ¹⁷² KAPSARC. (2021). *The Circular Carbon Economy Index – Methodological Approach and Conceptual Framework*. <https://www.kapsarc.org/research/publications/the-circular-carbon-economy-index-methodological-approach-and-conceptual-framework/>
- ¹⁷³ African Circular Economy Alliance. (n.d.). *About ACEA*. Retrieved 2023-04-11 from <https://www.aceafrica.org/about-acea>
- ¹⁷⁴ Abu Dhabi Environment Agency. (n.d.). *Green Industries Labelling Program*. Retrieved 2023-04-11 from <https://www.ead.gov.ae/en/Join-the-Movement/Government-and-Businesses/Green-Industries-Labelling-Programme>
- ¹⁷⁵ Bayoumi, M., Luomi, M., Fuller, G., AlSarihi, A., Salem, F., & Verheyen, S. (2022). *2022 Arab Region SDG Index and Dashboard Report*. <https://www.sdgindex.org/reports/arab-sdg-index-and-dashboard-report-2022/>
- ¹⁷⁶ ACTED. (2020). *Towards a Circular Economy in Lebanon*. <https://www.acted.org/wp-content/uploads/2018/01/acted-lebanon-circular-economy-final.pdf>

-
- ¹⁷⁷ ACTED. (2021). *Circular Economy National Study Jordan*. <https://www.acted.org/wp-content/uploads/2018/01/circular-economy-national-study-final.pdf>
- ¹⁷⁸ Circle Economy. (2023). *The Circularity Gap Report 2023*.
- ¹⁷⁹ Government of Bahrain. (2018). *The Kingdom of Bahrain's First Voluntary Nation Review on the Implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals*. https://sustainabledevelopment.un.org/content/documents/2132920181231_Bahrain_VNR_English_translation.pdf
- ¹⁸⁰ Government of the Kingdom of Bahrain & United Nations. (n.d.). *Strategic and Sustainable Development Cooperation Framework 2021-2022*. <https://bahrain.un.org/sites/default/files/2021-06/Signed%20SCF.pdf>
- ¹⁸¹ WAM. (2017). *UNIDO highlights existing cooperation with Bahrain*. Retrieved 2023-04-11 from <http://wam.ae/en/details/1395302652304>
- ¹⁸² The Ministry of Electricity and Water Affairs. (2017). *Bahrain's National Renewable Energy Action Plan*. Retrieved 2023-02-21 from <https://www.climate-laws.org/geographies/bahrain/policies/bahrain-s-national-renewable-energy-action-plan-nreap>
- ¹⁸³ Government of Kuwait. (2019). *Kuwait Voluntary National Review 2019*. https://sustainabledevelopment.un.org/content/documents/23384Kuwait_VNR_FINAL.PDF
- ¹⁸⁴ Kuwait General Secretariat of the Supreme Council for Planning and Development. (n.d.). *Kuwait National Development Plan 2020-2025*. Retrieved 2023-04-12 from https://media.gov.kw/assets/img/Ommah22_Awareness/PDF/NewKuwait/Revised%20KNDP%20-%20EN.pdf
- ¹⁸⁵ Kuwait Environment Public Authority. (2021). *Nationally Determined Contribution*. Retrieved 2023-02-22 from <https://www.climatewatchdata.org/ndcs/country/KWT/full>
- ¹⁸⁶ Environment public authority Kuwait. (n.d.). *Waste Management Atlas of Kuwait*. Retrieved 2023-02-22 from https://epa.org.kw/Portals/0/PDF/Atlas_En.pdf
- ¹⁸⁷ GSSCPD & UNDP. (2022). *Eco cities towards the achievement of Kuwait's national development plan*. <https://www.undp.org/kuwait/news/eco-cities-towards-achievement-kuwait-national-development-plan-kndp>
- ¹⁸⁸ Be'ah. (2022). *2022 Sustainability Report*. Retrieved 2023-02-22 from <https://www.beah.om/Other/Sustainability-Report2022>
- ¹⁸⁹ Oman Government. (2019). *Vision Document*. https://isfu.gov.om/2040/Vision_Documents_En.pdf
- ¹⁹⁰ Saudi Arabia's Ministry of Energy and Minerals. (2022). *The Sultanate of Oman's National Strategy for an Orderly Transition to Net Zero*. https://www.ea.gov.om/media/aaslyc3l/oman-net-zero-report-2022_screen.pdf?csrt=3065760150508843569
- ¹⁹¹ Saudi Arabia's Ministry of Energy. (n.d.). *Circular Economy National Program - About us*. Retrieved 2023-02-22 from <https://www.cce.org.sa/Pages/AboutUs.aspx>
- ¹⁹² Kingdom of Saudi Arabia. (2021). *Updated first Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/resource/202203111154---KSA%20NDC%202021.pdf>
- ¹⁹³ Ministry of Economic and Planning. (2018). *Towards Saudi's Sustainable Tomorrow*. https://sustainabledevelopment.un.org/content/documents/20230SDGs_English_Report972018_FINAL.pdf
- ¹⁹⁴ Kingdom of Saudi Arabia. (n.d.). *Vision 2030*. Retrieved 2023-02-22 from https://www.vision2030.gov.sa/media/rc0b5oy1/saudi_vision203.pdf
- ¹⁹⁵ MWAN. (n.d.). *National Center for Waste Management – Vision and Mission*. Retrieved 2023-02-22 from <https://mwan.gov.sa/en/vision-mission>
- ¹⁹⁶ United Arab Emirates Ministry of Climate Change & Environment. (n.d.) *UAE National Sustainable Consumption and Production Plan (2019-2030)*. https://www.oneplanetnetwork.org/sites/default/files/from-crm/167-a7c844279ec966eb4114e5334dd5224e_SCP_framework_EN.PDF
- ¹⁹⁷ Government of United Arab Emirates. (2021). *UAE Circular Economy Policy 2021-2031*.
- ¹⁹⁸ The United Arab Emirates Governmental Portal. (n.d.). *Circular economy*. Retrieved 2023-02-25 from <https://u.ae/en/about-the-uae/economy/circular-economy>
- ¹⁹⁹ The United Arab Emirates Government Portal. (n.d.). *Effort to Achieve a Green Economy*. Retrieved 2023-04-12 from <https://u.ae/en/information-and-services/environment-and-energy/the-green-economy-initiative/efforts-to-achieve-green-economy->
- ²⁰⁰ United Arab Emirates Ministry of Climate Change & Environment. (2022). *A Bridge to Greater Climate Ambition: Updated Second Nationally Determined Contribution of the United Arab Emirates*. <https://unfccc.int/sites/default/files/NDC/2022-09/UpdateNDC-EN-2022.pdf>

-
- ²⁰¹ Qatar's Ministry of Municipality and Environment. (2021). *Qatar National Climate Change Action Plan*. <https://www.mme.gov.qa/cui/view.dox?id=1642&siteID=2>
- ²⁰² Government of Qatar. (2021). *Nationally Determined Contribution*. <https://www.mme.gov.qa/pdocs/cview?siteID=2&docID=23348&year=2021>
- ²⁰³ Qatar's Planning and Statistics Authority. (2021). *Qatar's Voluntary National Review*. https://sustainabledevelopment.un.org/content/documents/280362021_VNR_Report_Qatar_English.pdf
- ²⁰⁴ Invest Qatar. (2022). *Circular Economy Policy Paper*. https://invest.qa/storage/1435/62ab10b2e9f14_Invest_Qatar_Circular_Economy_Report.pdf
- ²⁰⁵ Government of Egypt. (2022). *Egypt's First Updated Nationally Determined Contributions*. <https://unfccc.int/sites/default/files/NDC/2022-07/Egypt%20Updated%20NDC.pdf.pdf>
- ²⁰⁶ The Egyptian Cabinet. (2021). *Sustainable and Green Growth Strategy*. https://idsc.gov.eg/Upload/DocumentLibrary/Attachment_A/5903/13-Green%20Economy%20Policies%20and%20Sustainable%20Development%20in%20Egypt.pdf
- ²⁰⁷ Egypt's Ministry of Environment. (2016). *National Action Plan for Sustainable Consumption and Production*. <https://d1bf23g64f8xve.cloudfront.net/sites/default/files/01.%20SCP-NAP%20Egypt.pdf>
- ²⁰⁸ Egypt's Ministry of Environment. (n.d.). *Egypt National Climate Change Strategy*. Retrieved 2023-02-25 from <https://www.eeaa.gov.eg/Uploads/Topics/Files/20221206130720583.pdf>
- ²⁰⁹ Tunisia's Ministry of Environment. (2021). *Updated Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/NDC/2022-08/CDN%20-%20Updated%20-english%20version.pdf>
- ²¹⁰ Tunisia's Ministry of Local Affairs and Environment. (2018). *Tunisian National Strategy and Action Plan for Biodiversity 2018-2030*. <https://www.cbd.int/doc/world/tn/tn-nbsap-v3-fr.pdf> (Translated from French)
- ²¹¹ Tunisia's Ministry of Environment and Sustainable Development. (2016). *Ten-Year Agri-Food Action Plan 2016-2025*. <https://switchmed.eu/wp-content/uploads/2020/04/02.-SCP-NAP-agriculture-Tunisia-in-french.pdf> (Translated from French)
- ²¹² Tunisia's Ministry of Environment and Sustainable Development. (2016). *Ten-Year Tourism Action Plan 2016-2025*. <https://switchmed.eu/wp-content/uploads/2020/04/03.-SCP-NAP-tourism-Tunisia-in-french.pdf> (Translated from French)
- ²¹³ Algeria's Ministry of Environment and Renewable Energy. (n.d.). *Strategy and National Action Plans for the Biodiversity 2016-2030*. <https://andp.unescwa.org/sites/default/files/2021-10/dz-nbsap-v2-fr.pdf> (Translated from French)
- ²¹⁴ Ministry of Environment and Renewable Energy, Ministry of Industry and Mines & SwitchMed. (2018). *SwitchMed Magazine: Algeria*. <https://switchmed.eu/wp-content/uploads/2020/03/National-Supplement-EN-Algeria.pdf>
- ²¹⁵ Government of Algeria. (2015). *Intended Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/NDC/2022-06/Algeria%20-%20INDC%20%28English%20unofficial%20translation%29%20September%2003%2C2015.pdf>
- ²¹⁶ Government of Algeria. (2019). *Voluntary National Review*. <https://andp.unescwa.org/sites/default/files/2020-09/Responsabilit%C3%A9%2C%20culture%20de%20paix%2C%20mixit%C3%A9%20et%20pluralit%C3%A9%20au%20service%20de%20l'E2%80%99Agenda%202030.pdf> (Translated from French)
- ²¹⁷ Government of Morocco. (2020). *Voluntary National Review of the Implementation of the Sustainable Development Goals*. https://sustainabledevelopment.un.org/content/documents/26405VNR_2020_Morocco_Report_French.pdf (Translated from French)
- ²¹⁸ Special Commission on the Development Model. (2021). *The New Development Model*. https://www.csmd.ma/documents/CSMD_Report_EN.pdf
- ²¹⁹ Ministry of Environment and Sustainable Development & SwitchMed. (2015). *Sustainable Consumption and Production National Action Plan*. <https://switchmed.eu/wp-content/uploads/2020/04/04.-Factsheet-SCP-NAP-Morocco.pdf>
- ²²⁰ Government of Morocco. (2018). *Implementing the First Nationally Determined Contribution of the Kingdom of Morocco*. http://www.4c.ma/files/ugd/3c9136_05e36a1136b24626803c226958b90962.pdf?index=true
- ²²¹ Government of Morocco. (2021). *Updated Nationally Determined Contribution*. https://unfccc.int/sites/default/files/NDC/2022-06/Moroccan%20Updated%20NDC%202021%20_Fr.pdf (Translated from French)
- ²²² Morocco's Ministry of Environment. (n.d.). *The Ecotax*. Retrieved 2023-04-11 from <https://www.environnement.gov.ma/fr/117-theme/dechets/228-l-ecotaxe> (Translated from French)
- ²²³ Government of Lebanon. (2020). *Lebanon's Nationally Determined Contribution*. <https://climatechange.moe.gov.lb/viewfile.aspx?id=319>

-
- ²²⁴ Lebanon's Ministry of Environment. (2018). *Policy Summary on Integrated Solid Waste Management*. <https://www.moe.gov.lb/getattachment/c409cf6d-41fb-48fd-976f-e4228006dab1/Policy-Summary-Presentation-2018.aspx>
- ²²⁵ Lebanon's Ministry of Environment et.al. (n.d.). *Energy and Waste Solutions – Promoting Waste Management Practices and the 3R by Utilizing New Technologies and Circular Economy Approach (2020-2024)*. Retrieved 2023-02-25 from <https://www.undp.org/lebanon/projects/energy-and-waste-solutions-0>
- ²²⁶ Lebanon's Ministry of Environment, Ministry of Industry, & SwitchMed. (2015). *Sustainable Consumption and Production Action Plan for the Industrial Sector*. https://www.oneplanetnetwork.org/sites/default/files/full-report_scp-ap_lebanon.pdf
- ²²⁷ Jordan's Ministry of Environment & SwitchMed. (n.d.). *National Strategy and Action Plan for Sustainable Consumption and Production in Jordan 2016-2025*. Retrieved 2023-02-25 from <https://wedocs.unep.org/bitstream/handle/20.500.11822/34027/NSAP.pdf?sequence=1&isAllowed=y>
- ²²⁸ Greater Amman Municipality. (n.d.). *Climate and Resource Protection through Circular Economy in Jordan 2017-2021*. Retrieved 2023-02-25 from <https://www.giz.de/en/worldwide/75116.html>
- ²²⁹ Jordan's Ministry of Environment. (2021). *Updated Submission of Jordan's First Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/NDC/2022-06/UPDATED%20SUBMISSION%20OF%20JORDANS.pdf>
- ²³⁰ Jordan's Ministry of Environment. (2017). *A National Green Growth Plan for Jordan*. <https://www.greengrowthknowledge.org/sites/default/files/A%20National%20Green%20Growth%20Plan%20for%20Jordan.pdf>
- ²³¹ Government of Iraq. (2021). *Nationally Determined Contribution*. <https://faolex.fao.org/docs/pdf/irq205646.pdf>
- ²³² Government of Iraq & Ministry of Planning. (n.d.). *National Development Plan 2019-2022*. Retrieved 2023-02-25 from <https://andp.unescwa.org/sites/default/files/2021-05/National%20Development%20Plan%202018-2022.pdf>
- ²³³ Government of Iraq & Ministry of Planning. (2019). *The future we want: Iraq's vision for sustainable development 2030*. <https://andp.unescwa.org/sites/default/files/2021-05/The%20future%20we%20want-Iraq%20vision%20for%20Sustainable%20Development%202030.pdf>
- ²³⁴ Eden in Iraq. (n.d.). *Wastewater Garden Project*. Retrieved 2023-02-25 <https://edeniniraq.com/>
- ²³⁵ Libya's Ministry of Planning et.al. (n.d.). *United Nations Sustainable Development Cooperation Framework 2023-2025*. Retrieved 2023-02-25 from https://unsdg.un.org/sites/default/files/2022-11/UNSDCF_Libya_2023-2025.pdf
- ²³⁶ Government of Mauritania. (2021). *Mauritania's Nationally Determined Contribution*. https://unfccc.int/sites/default/files/NDC/2022-06/CDN-actualisé%202021_%20Mauritania.pdf (Translated from French)
- ²³⁷ Government of Somalia. (2021). *Updated Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/NDC/2022-06/Final%20Updated%20NDC%20for%20Somalia%202021.pdf>
- ²³⁸ Government of Palestine. (2021). *Updated Nationally Determined Contributions*. https://unfccc.int/sites/default/files/NDC/2022-06/Updated%20NDC_%20State%20of%20Palestine_2021_FINAL.pdf
- ²³⁹ Palestine Environment Quality Authority. (2016). *Sustainable Consumption and Production National Action Plan*. <https://switchmed.eu/wp-content/uploads/2020/04/02.-SCP-NAP-Palestine.pdf>
- ²⁴⁰ Government of Palestine. (2018). *National Voluntary Review of the Implementation of the 2030 Agenda*. <https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf>
- ²⁴¹ Government of Palestine. (n.d.). *National Development Plan 2021-2023*. Retrieved 2023-02-25 from https://andp.unescwa.org/sites/default/files/2021-06/National%20Development%20Plan%202021-2023_English.pdf
- ²⁴² Ministry of Environment, Natural Resources and Physical Development & Higher Council for Environment and Natural Resources. (2016). *National Adaptation Plan*. <https://www4.unfccc.int/sites/NAPC/Documents%20NAP/National%20Reports/Sudan%20NAP.pdf>
- ²⁴³ Higher Council for Environment and Natural Resources. (2021). *Nationally Determined Contribution*. <https://unfccc.int/sites/default/files/NDC/2022-10/Sudan%20Updated%20First%20NDC-12102021.pdf>
- ²⁴⁴ Government of Sudan & UNEP. (2020). *Sudan's First State of Environment and Outlook Report*. https://www.unep.org/resources/report/sudan-first-state-environment-outlook-report-2020?_ga=2.251511695.882135204.1676364007-978935238.1667825596
- ²⁴⁵ Government of Syria. (2018). *Nationally Determined Contribution Under Paris Agreement on Climate*. <https://unfccc.int/sites/default/files/NDC/2022-06/FirstNDC-Eng-Syrian%20Arab%20Republic.pdf>
- ²⁴⁶ Republic of Yemen Supreme Political Council. (2019). *National Vision for the Modern Yemeni State*. <https://andp.unescwa.org/sites/default/files/2020-10/National%20Vision%20for%20the%20Modern%20Yemeni%20State.pdf>
- ²⁴⁷ Government of Yemen. (2015). *Intended Nationally Determined Contribution under the UNFCCC*. <https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Yemen/1/Yemen%20INDC%2021%20Nov.%202015.pdf>

-
- ²⁴⁸ Yemen's Ministry of Water and Environment & Environment Protection Agency. (2017). *National Biodiversity Strategy and Action Plan II 'Achieving a resilient, productive and sustainable socio-ecosystem by 2050'*. <https://www.cbd.int/doc/world/ye/ye-nbsap-v2-en.pdf>
- ²⁴⁹ Government of Djibouti. (2015). *Intended Nationally Determined Contribution of Djibouti*. https://unfccc.int/sites/default/files/NDC/2022-06/INDC-Djibouti_ENG.pdf
- ²⁵⁰ Government of Djibouti. (2014). *Vision 2035*. <https://economie.gouv.dj/wp-content/uploads/vision-2035-anglais.pdf>
- ²⁵¹ Ministry of Agriculture, Fisheries, Environment, Tourism and Handicrafts. (2021). *Nationally Determined Contribution*. https://unfccc.int/sites/default/files/NDC/2022-06/CDN_révisée_Comores_vf.pdf (Translated from French)
- ²⁵² Ellen MacArthur Foundation. (2021). *Universal Circular Economy Policy Goals*.
- ²⁵³ Worldbank. (2019). *Employment in Agriculture*. Retrieved 2023-02-25 from <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=MA>
- ²⁵⁴ SwitchMed. (2018). *SwitchMed Magazine: Morocco*. <https://switchmed.eu/wp-content/uploads/2020/03/National-Supplement-EN-Morocco.pdf>
- ²⁵⁵ Government of Egypt. (2022). *Egypt's first updated nationally determined contribution*. <https://unfccc.int/sites/default/files/NDC/2022-07/Egypt%20Updated%20NDC.pdf.pdf>
- ²⁵⁶ IQAir. (2023). *Air Quality in Egypt*. <https://www.iqair.com/ca/egypt>
- ²⁵⁷ Government of Egypt. (2022). *Egypt's First Updated Nationally Determined Contributions*. <https://unfccc.int/sites/default/files/NDC/2022-07/Egypt%20Updated%20NDC.pdf.pdf>
- ²⁵⁸ ITA. (2022). *Waste Management*. Retrieved 2023-02-25 from <https://www.trade.gov/country-commercial-guides/saudi-arabia-waste-management>
- ²⁵⁹ ITA. (2020). *Saudi Arabia and Environmental Technologies*. Retrieved 2023-02-25 from <https://www.trade.gov/market-intelligence/saudi-arabia-environmental-technologies>
- ²⁶⁰ MWAN. (n.d.). *Circular Economy Adoption*. Retrieved 2023-04-11 from <https://mwan.gov.sa/en/Circular-Economy-Adoption>
- ²⁶¹ Saudi Arabia's General Authority for Statistics. (2021). *Environment Statistics Publication 2021*. <https://www.stats.gov.sa/sites/default/files/Environment%20Statistics%20Publication%202021En.pdf>
- ²⁶² REUSEMED. (n.d.). *Mediterranean Basin Reuses*. Retrieved 2023-04-11 from <https://www.enicbcmmed.eu/projects/reusemed>

Figure 1. Created by Author.

Figure 2. International Resource Panel. (2019). *Global Resources Outlook 2019: Natural Resources for the Future We Want*.

Figure 3. Created by Author.

Figure 4. Created by Author.

Figure 5. C2C TW (n.d.). *Cradle to Cradle Terms & Definition*. <https://www.c2cplatform.tw/en/c2c.php?Key=3>

Figure 6. Thabit, Q., Abdallah, N., & Nelles, M. (2022). *Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region*. Waste (1), 52-80. 10.3390/waste1010005.

Figure 7. Thabit, Q., Abdallah, N., & Nelles, M. (2022). *Facts and Figures on Aspects of Waste Management in Middle East and North Africa Region*. Waste (1), 52-80. 10.3390/waste1010005.

Figure 8. Ellen MacArthur Foundation. (n.d.). *Food and the circular economy*. <https://ellenmacarthurfoundation.org/food-and-the-circular-economy-deep-dive>