EU - Gulf Cooperation Council (GCC) Dialogue on Economic Diversification

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Study on Circular Economy developments in the GCC region and opportunities for collaboration with the European Union

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Study on Circular Economy developments in the GCC region and opportunities for collaboration with the European Union

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Abstract

The objective of this report is to explore developments in the field of the circular economy (CE) in Cooperation Council for the Arab States of the Gulf (GCC) region and identify areas where the European Union and the GCC countries can strengthen their collaboration. This report focuses on two GCC countries where there have been recent policy developments in this area, namely Saudi Arabia and the United Arab Emirates (UAE). It first examines the current framework conditions that would shape prospects for CE and explores emerging business opportunities in the two case study countries. On the basis of this analysis, it then provides an outlook for bilateral cooperation between the EU and the GCC countries. The collection of information has been based on a literature review and online interviews with experts from the region. This report concludes that there are three main areas where the EU and GCC countries could further collaborate in the area of the CE: infrastructure development; regulatory enforcement; and funding mechanisms.

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Executive Summary

There has been a growing interest in Circular Economy (CE) in the region of the Cooperation Council for the Arab States of the Gulf (GCC). Saudi Arabia's G20 Presidency in 2020 gave a strong push for moving in this direction based on the Circular Carbon Economy (CCE) model. At the same time, the EU has included the CE model as a key pillar of its European Green Deal flagship policy and has adopted a Circular Economy Action Plan (CEAP) that establishes a comprehensive policy framework to regulate and incentivise good practices across the key sectors (electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings; food; water and nutrients), which could be of particular interest to the GCC countries. In addition, the funds that will be available for EU member states in the context of the EU recovery process will provide an opportunity to accelerate the development and adoption of novel circularity approaches across key resource-intensive sectors.

Although there are ongoing CE initiatives and projects across the GCC region, potential for market opportunities has not been fully exploited yet. In order to maximise the market potential and address existing barriers to conducting business in the region, policy intervention and targeted action on priority issues would be effective but would need to be carefully designed in accordance with national circumstances and local contexts. For this reason, given that many of the current challenges are largely characterised and defined by the GCC context, it is recommendable that the EU and GCC build on the existing CE frameworks with initiatives for regional collaboration and gradually expand interaction, thereby increasing synergy with global collaboration.

This study looks at Saudi Arabia and the United Arab Emirates (UAE) with a special focus on the emirates of Abu Dhabi and Dubai. Although a number of policies are under development in Saudi Arabia, the study finds that in addition to the high-level strategies there is a need for more targeted regulations focusing on specific waste streams or value chains. The UAE has advanced in setting up regulatory frameworks on waste management and sustainability performance in buildings. However, in both countries lack of well-developed markets for various types of waste and lack of policies aimed at making landfill a less attractive option are two identified barriers. CE policy in the GCC context thus remains largely limited within the scope of waste management. One of the first priorities that emerges from the study is the need to improve landfill diversion rates, with a focus on waste reduction and valorization. To tackle this problem, there are three major areas of improvement: proper infrastructure; proper regulations and their enforcement; and proper funding mechanisms. In addition, incentives for producers and measures to increase consumer awareness are required to reduce waste generation levels.

More concretely, the following agenda could be tabled at the next opportunity for the EU-GCC dialogue on CE. Firstly, the EU technical assistance facility could support a range of activities such as i) training of local engineers or technicians, and ii) communication and dissemination campaigns in multiple languages for migrant labour and for education programmes targeting young population. Secondly, the EU could share experience gained from European regions and cities involving both public and private sectors in CE models. One interesting form of knowledge exchange would be matching specific EU and GCC regions or cities as partners for long-term collaboration. Thirdly, greater collaboration can be promoted for the exchange of expertise in diverse fields ranging from municipal government departments in charge of waste management, to European and GCC recycling companies jointly developing sustainable technical solutions and business model

mechanisms. Lastly, the bilateral engagement in CE can be supported with efforts by commercial offices and national trade promotion organisations in the EU to create awareness and inform EU specialised companies. A possible initial focus on the management of municipal solid waste and construction and demolition waste could improve GCC consumers' awareness. Moreover, tangible results from improved quality of practical solutions to daily problems of waste management could contribute to increasing support for CE policy in the longer term.

1 Introduction

The Cooperation Council for the Arab States of the Gulf (GCC) countries have been striving for accelerating the economic diversification process to move away from hydrocarbon dependent sectors.[1] Circular economy (CE) is fast gaining ground globally as a new model of economic development that supports a more efficient utilisation of resources across the production and consumption value chain (Rizos et al., 2017a).[2] As highlighted by various studies (see for instance Preston et al. 2019), CE holds potential to support economic diversification and development of new industrial and service-led activities, such as advanced recycling processes, production of bio-based products, product as service models, amongst others.

The GCC has recognised the limits of the conventional linear economic model, which follows a 'take, make, dispose approach', with rapid resources depletion and unprecedented waste and emissions (Al-Alawi et al. 2020). As indicated by various programmes and initiatives adopted in recent years, countries in the region have started putting efforts to reduce excessive consumption of resources and increase recycling (Bejjani, et al. 2019). In January 2021, the UAE announced the Circular Economy Policy as a framework to identify priorities across sectors in line with the CE. Abu Dhabi, UAE, developed the Single Use Plastic Policy as both a framework for action and a roadmap, aiming at banning single use plastic by 2022.

Based on the above background, this report examines the current framework conditions that would shape prospects for CE and explores emerging business opportunities in two GCC countries, Saudi Arabia and the UAE. It first provides an outline of the CE concept and its emergence in the international policy arena (section 2) and then it describes key policy developments in this field in the EU (section 3). The following three sections present the policy developments in the two countries (section 4 Saudi Arabia, section 5 UAE, and section 6 the Emirates of Abu Dhabi and Dubai) covered by this assessment and the areas with potential for implementing circular economy initiatives as identified during the literature review and interviews. Section 7 provides an outlook for bilateral cooperation between the EU and the GCC countries to be complemented by multilateral initiatives. The conclusions and key messages of this study close the report. The report adopts an integrated approach, combining environmental and economic perspectives, based on literature review and a consultation consisting of six online interviews[3] with CE experts in the region from policy, research, private sector, and NGOs.

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[1] See, for example, submissions of Saudi Arabia's and the UAE's first Nationally Determined Contributions (2015) to the UNFCCC, quoting Decision 24/CP.18 in Doha in 2012 on economic diversification. https://unfccc.int/sites/default/files/resource/docs/2012/cop18/eng/08a03.pdf (last accessed on 19 October 2020).

[2] According to Rizos et al. (2017a), the concept of CE builds on three main principles: using less primary resources; maintaining the highest value of materials and products; and changing utilisation patterns.

[3] Some interviews featured more than one expert from the same organisation.

2 The concept of CE and its emergence in the international policy arena

2.1 The concept of CE

A linear growth model characterised by economic development, population growth, and urbanisation, has reached its limit by accelerating rates of resource depletion and producing unprecedented levels of wastes and greenhouse gas (GHG) emissions all over the world. Global transition to CE entails a move from linear, highly resource-depleting systems with high emissions, waste generation, and high impacts on ecosystems and natural capital towards circular, less wasteful systems that use resources more efficiently and sustainably (EC, 2020a).

While the concept of CE is used extensively by governments, businesses and academics, it is not framed or used consistently worldwide. There are two different groups of definitions/interpretations in the literature. The first group of definitions focuses on physical and material aspects and stresses the need to create closed loops of materials flows, use waste as a resource and reduce pollution throughout the life cycle of products. The second cluster features interpretations that attempt to expand the scope of the concept and move beyond the notion of management of material resources, for example, highlighting sustainable energy supply, energy efficiency and conservation, land management, soil protection and water, economic and competitiveness dimensions, or job creation (Rizos et al., 2017a). This report takes into account both clusters of CE definitions or interpretations that are particularly relevant to the context of the GCC economy. Although there is no formal definition of the concept at the EU level, the European Commission (2015, p.2), has described it as an economy "where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised''.

2.2 CE as part of G20 discussions

The CE has attracted world-wide attention from policymakers and stakeholders in the context of the G20 policy agenda. In 2017, Rizos et al. (2017b) presented a first set of policy recommendations to G20 governments, stressing the need to develop frameworks that enhance the CE and, more generally, sustainable production and consumption modes. In this context, G20 countries should:

1) integrate the CE into discussions on implementing the 2030 Agenda for Sustainable Development, Sustainable Development Goals (SDGs) and the Paris Agreement[4],
2) work towards agreed terminologies for CE products and processes,
3) support demand for CE products and services,
4) support transparency across global supply chains,
5) facilitate financing for establishing circular supply chains and
6) proactively address the transition issues (Rizos et al. 2017b).

Although new circular business models and innovations are emerging at a growing scale in the global market, their share in the market is still small compared to traditional 'linear' models (Rizos

[4] For example, see the G20 Action Plan on Marine Litter for SDG14: Life below water (https://www.unido.org/news/unido-advises-g20-how-address-challenge-marine-plastic-litter-using-circular-economy-methods; https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-life-below-water.html).

et al., 2018). On the basis of this observation, Ghose and Kapur (2019) recommended[5] that G20 governments should support the adoption of circular business models through following measures: (i) policy instruments that improve access to finance, the provision of tax incentives and subsidies, integrating resource efficiency criteria in procurement policies and practices, and enabling industrial symbiosis; (ii) promotion of design and material re-use standards, certification schemes, labelling requirements, and extended producer responsibility; (iii) developing indicators and targets for resource efficiency, harmonizing waste and material use regulations, and facilitating partnerships between key resource users; and (iv) consumer awareness and education programmes, feedback mechanisms, and peer-based nudges.

In 2020, Saudi Arabia, chaired G20/T20. Under the Saudi presidency of the G20, one of the main focus areas was the Circular Carbon Economy (CCE).[6] The Riyadh Summit in November 2020 endorsed the CCE Platform with its 4Rs framework (Reduce, Reuse, Recycle and Remove), recognising the key importance and ambition of reducing emissions, taking into account system efficiency and national circumstances. G20 Leaders declared that the CCE is a ''voluntary, holistic, integrated, inclusive, pragmatic, and complementary approach to promote economic growth while enhancing environmental stewardship through managing emissions in all sectors including, but not limited to, energy, industry, mobility, and food'' (G20 2020, p.9). The Leaders' declaration was complemented by presentation of a comprehensive database of various voluntary opportunities and their acceleration spanning across industrial, mobility and food sectors, supported by G20 countries at both national and international levels (see G20 Climate Stewardship Working Group, 2020). G20 acknowledge this output and recommend it to be utilised as a toolbox in addressing sustainability including climate change in the context of national circumstances (G20 Climate Stewardship Working Group, 2020).

2.3 Initiatives for promoting global transition towards CE

Recently, the EU has launched together with the United Nations Environment Programme and in coordination with the United Nations Industrial Development Organization the Global Alliance on Circular Economy and Resource Efficiency (GACERE).[7] This action took place in the context of the 2020 Circular Economy Action Plan by the European Commission (see section 3.1). As of 22 February 2021, the following countries have joined the coalition: Canada, Chile, Colombia, Japan, Kenya, New Zealand, Nigeria, Norway, Peru, Rwanda and South Africa.[8] Among the key objectives of the alliance will be to identify knowledge and governance gaps in advancing global circular economy and take forward partnership initiatives, including with major economies (see more details below). There are a number of reasons for which transitions towards CE could be scaled up to the global level[9]:

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[5] Recommendations were provided as part of the Think20 (T20) network that supported G20 activities under the Japanese presidency.

[6] For more details regarding the CCE concept see section 4.1.

[7] See https://ec.europa.eu/environment/news/eu-launches-global-alliance-circular-economy-and-resource-efficiency-2021-02-22_en#:~:text=Bringing%20together%20governments%20and%20relevant,and%20sustainable%20consumption%20and%20production.

[8] See https://ec.europa.eu/environment/international_issues/gacere.html.

[9] Session "Towards a Global Alliance on Circular Economy and Resource Efficiency", Circular Economy Stakeholder Conference: Together for a cleaner and more competitive Europe, 3 November 2020. https://www.eesc.europa.eu/en/agenda/our-events/events/european-circular-economy-stakeholder-conference/programme (last accessed on 26 January 2021).

- Because consumption and production patters are global, it is necessary to act globally and there is need for a vehicle to do so;
- Business operates in global value chains, but experience borders in their operations;
- In order to create markets for CE, the EU needs other countries to move forward as well;
- Such countries will be a light and flexible group of friends to advocate for CE in multilateral fora where it makes sense to do so;
- Such a group of friends will not be a permanent fixture, and see its success becoming redundant with other partnerships.

This Alliance could be also linked with G7/G20 processes to build upon and profit from their achievements. Examples of such processes of particular interest to CE include the G7 Alliance on Resource Efficiency (launched in 2015) and the G20 Resource Efficiency Dialogue (2017)[10]; both could be utilised to share knowledge and best practices, and advance resource efficiency. One interesting example of other multilateral fora is the World Circular Economy Forum which was launched in 2017 by Finland and the Finnish Innovation Fund Sitra to facilitate multi-stakeholder engagement in CE solutions with a view of prompting business to seize growing opportunities, thereby gaining competitive advantages.[11]

The following list addresses potential roles for the Global Alliance (European Commission, 2020a) with an emphasis on areas particularly relevant to the scope of this report:

- help map domestic policies and regulatory frameworks in third countries on the management of natural resources (e.g. water, soil, minerals, biomass) and the circular economy transition,
- disseminate and exchange best practices and, where relevant, compare the different circular economy initiatives being developed in selected countries and regions, and by relevant stakeholders (international organisations, global businesses etc.), to take forward partnership initiatives;
- identify, disseminate and exchange knowledge about just transition policies and practices towards circular economy, such as promoting green and decent work, or developing accompanying measures in sectors that may be negatively affected by the transition;
- identify global barriers to the circular economy transition and bottlenecks in decoupling economic growth from emissions, resource use and biodiversity loss, reducing exposure and vulnerability to climate change and disasters, including through long-term circular materials and products with a low environmental footprint;
- advise on possible global governance improvements to address such barriers and bottlenecks; and
- promote a global data base on resources mapping and resources monitoring solutions based on the Copernicus Earth observation and modelling services aiming at establishing a planetary resource ‘budget’ plan, in the light of the definition of a ‘safe operating space’.

[10] See https://g20re.org/news.html (last accessed on 18 October 2020).

[11] See https://www.sitra.fi/en/projects/wcef/#about-wcef (last accessed on 18 October 2020).

Similarly, recent panel discussions suggest the following potential roles for the Global Alliance: identify not only barriers but also knowledge and governance gaps and bottlenecks, identify opportunities and help maximize the benefits of circularity.[12]

In order to fulfil these potential roles, the Global Alliance could bring together other global champions of CE and sustainable resource management, including relevant international organisations and bodies, selected partner countries and regions, business associations, NGOs, and academia (European Commission, 2020a).

3 Circular economy in the EU

3.1 Circular economy as a key element of the EU Green Deal

The European Green Deal is the growth strategy of the current European Commission (2019, p.2) that aims to 'transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use''. The circular economy falls under the pillar 'Mobilising industry for a clean and circular economy' of the Green Deal[13] and in this context the Commission adopted in March 2020 a new Circular Economy Action Plan[14] for the period 2020-2024 including 35 actions along the entire life cycle of products.

The Plan aims to establish a coherent product policy framework for developing more sustainable and circular value chains and consolidates the various actions under six key pillars. The first key pillar is **Sustainable Product Policy Framework** which includes action on the ecodesign front in order to improve product durability, reusability, upgradability, reparability and recycled content. Other key actions under this pillar are the introduction of a product passport to improve transparency across value chains, the development of a reporting and certification system for industrial symbiosis and measures aimed at consumers (e.g., revision of the EU consumer law, establishing a new 'right to repair principle) and public buyers (e.g., minimum mandatory green public procurement criteria). Under the second key pillar **Key product value chains** a number of legislative and other initiatives are foreseen for electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings; food; water and nutrients (European Commission, 2020b).

The third pillar is **Less waste, more value** and foresees the introduction of specific waste reduction targets for more complex streams, harmonization of separate waste collection systems, review of

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[12] Session "Towards a Global Alliance on Circular Economy and Resource Efficiency", Circular Economy Stakeholder Conference: Together for a cleaner and more competitive Europe, 3 November 2020. https://www.eesc.europa.eu/en/agenda/our-events/events/european-circular-economy-stakeholder-conference/programme (last accessed on 26 January 2021).

[13] The other pillars are 'Increasing the EU's climate ambition for 2030 and 2050', 'Supplying clean, affordable and secure energy', 'Building and renovating in an energy and resource efficient way', 'Accelerating the shift to sustainable and smart mobility', 'From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system', 'Preserving and restoring ecosystems and biodiversity' and 'A zero pollution ambition for a toxic-free environment'.

[14] The 2020 Circular Economy Action Plan is the follow-up of the 2015 Plan which included 54 actions that were completed by March 2019. Some of the most prominent actions in this Plan were the adoption of the EU Strategy for Plastics, the introduction of legal rules for single-use plastic items as well as a revised waste legislative framework including new recycling targets and waste prevention measures. According to the Commission's assessment of the plan, between 2016 and 2020 about €10 billion of public funds were channelled towards innovation and investments in the area of the circular economy, see: https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1480.

EU rules on waste shipments, the development of strategy on chemicals for sustainability and the introduction of new criteria specifying when certain waste streams can cease having a waste legal status and obtain a status of a product (or a secondary raw material). The fourth pillar is **Making circularity work for people, regions and cities** and includes measures to support skills and job creation, while the fifth includes **cross-cutting actions** such as development of metrics for measuring the impact of circularity on climate change mitigation and adaptation. In addition, the **Leading efforts at global level** pillar recognises the importance of global value chains and the need for global cooperation. In this context, the European Commission has recently launched a Global Circular Economy Alliance (see section 2.3) and will seek to ensure that Free Trade Agreements take into account the circular economy objectives. Finally, as part of the last pillar, the Commission will update and enhance the **Monitoring Framework for the Circular Economy** that was originally introduced in 2018 (European Commission, 2020b). Therefore, a very wide range of policy initiatives spanning across different value chains and product life cycle stages will be implemented in the EU between 2020 and 2024. These initiatives can create collaboration opportunities in the form of knowledge and lessons learned exchange between the GCC countries and the EU (see more details in section 7).

3.2 The EU recovery process and financing the circular economy transition

A recovery process has commenced in Europe as a response to the COVID-19 crisis which will also provide opportunities for investments in the circular economy field. Specifically, the European Commission, the European Parliament, and EU leaders have agreed on a **Multiannual Financial Framework (MFF)** for the period 2021-27 and a recovery plan to help Europe rebuild its economy while supporting the green and digital transition. Total value of the package is €1.8 trillion, of which about €1.07 trillion equals the size of the multiannual financial framework for the period 2021-27, while €750 billion will be allocated to the **Next Generation EU (NGEU)** recovery instrument. The biggest programme under the NGEU is the **Recovery and Resilience Facility** which will make available to EU member states €672.5 billion in loans and grants.[15] In order to gain access to these funds, member states will need to prepare national **Recovery and Resilience Plans** that present investments and reforms in support of growth, job creation, as well as social resilience and green and digital transition. To accelerate the green transition, member states are invited to include in these plans[16] climate and environmental investments with the circular economy falling under the latter category of investments. In this context, plans can feature investments in the areas of sustainable use and protection of water, waste prevention and recycling, pollution prevention control and the greening of urban areas, among others (Rizos et al., 2020).

Other key programmes under the new MFF that can provide financial support for the circular economy are InvestEU, European Structural and Investment Funds and Horizon Europe. **InvestEU** provides guarantees, loans, equity, and technical assistance for critical investments in Europe, mainly through the European Investment Bank (EIB) Group. The **European Structural and Investment Funds** programme includes five funds which aim to strengthen economic and social cohesion in the EU namely European regional development fund, European social fund, Cohesion

[15] See more details: https://ec.europa.eu/info/strategy/recovery-plan-europe_en.

[16] These plans will be assessed by the European Commission via the European Semester mechanism which is s a framework for the coordination of economic policies across the European Union.

fund, European agricultural fund for rural development, European maritime and fisheries fund. These funds and particularly the European regional development fund include calls in the field of environment and low-carbon economy.[17]

Horizon is the biggest EU programme supporting research and innovation projects. **Horizon 2020** was the programme for the period 2014 and 2020 and made €80 billion of funding[18] available for research and innovation (R&I) projects. Up to 2018, around €1.4 billion[19] were used for projects[20] in the areas of sustainable process industries, waste and resource management, circular bio-economy and plastics. **Horizon Europe** is the EU's next funding programme for the period 2021-2027 with a total budget of €95.5 billion.[21] The programme will include three key pillars for implementation namely 'Excellence Science', 'Global Challenges and European Industrial Competitiveness' and 'Innovative Europe'. Circular economy is included in the Global Challenges pillar with the first work programmes expected to be published by April 2021.[22]

4 Circular economy policy developments in Saudi Arabia

This section focuses on Saudi Arabia and presents information collected from literature review as well as expert interviews and analysis of this information.

4.1 Policy framework in the country

Announced in 2016 and launched across 24 government bodies, **Saudi Arabia's Vision 2030** establishes a strategic framework for the country's future growth model. The overarching aim is to reduce oil dependence, diversify development, improve competitiveness, create jobs, strengthen the private sector, and promote investments in sectors where the country can grow business in global markets. It sets 96 strategic objectives across 13 Vision Realisation Programmes, including objectives to ensure sustainability of vital resources.[23] Among other objectives, the Vision aims to increase the efficiency of waste management, establish comprehensive recycling projects, and reduce consumption and utilise treated and renewable **water** (EU-GCC Dialogue, 2020b). On **food** waste, the Vision mentions investments in efficient waste management, and a plan to create a food reserve programme incorporating an early warning system and timely information for agricultural markets to reduce waste (Government of Saudi Arabia, 2016 in Baig et al., 2016).

A recent study published by the King Abdullah Petroleum Studies and Research Centre (KAPSARC) outlines the green growth options for Saudi Arabia under the 2030 Vision. It emphasises the need for economic diversification but also the **Circular Carbon Economy** (CCE)

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17 See https://ec.europa.eu/info/research-and-innovation/research-area/environment/circular-economy_en.

18 See https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020.

19 See https://www.switchtogreen.eu/?p=846.

20 A list of successful circular economy research projects that received funding from the Horizon 2020 programme is available here: https://ec.europa.eu/research/infocentre/theme_en.cfm?item=Environment&subitem=Clean%20technology%20and%20recycling.

21 Of which €5 billion will come from the Recovery and Resilience Facility instrument.

22 See https://ec.europa.eu/info/horizon-europe_en.

23 See https://vision2030.gov.sa/en (last accessed on 19 October 2020).

through the recycling of carbon by-products (Howarth et al., 2020; Williams, 2019).[24] Saudi Arabia sees this concept as a pragmatic way of addressing CO_2 emissions. An emerging consensus from G20 under Saudi Arabia's Presidency is that the CCE approach is complementary to and builds on existing methods for waste management, including the various existing CE and other resource efficiency approaches and the '3Rs' model (Reduce, Reuse, Recycle) while adding a fourth element, Remove**.** CCE can play an analytical, voluntary, and complementary role in helping countries to achieve international and domestic climate and development goals or national economic development strategies. The CCE's '4Rs' create a voluntary, holistic, inclusive, integrated, and complementary approach that countries can use to manage emissions and apply to other key areas such as material resource efficiency (G20 Climate Stewardship Working Group, 2020).

In Saudi Arabia more than 95% of waste is still landfilled, and 98% of landfills are un-engineered landfills. In 2014, the World Bank conducted a study on waste management in Saudi Arabia. A draft **National Waste Strategy** based on the outcome of the study sets out a strategic direction for solid waste management and proposes a series of interventions to improve the technical, financial, and environmental performance of waste operations in line with good international practice. It adopts an integrated solid waste management approach determining that waste should be minimized, recovered, and reused where economically feasible.[25] The strategy aims to improve the management of municipal solid waste (MSW) and generate business opportunities by establishing material recovery and waste-to-energy facilities (Zafar, 2018 in Al-Alawi et al., 2020).

The national waste strategy sets several targets, such as those of landfill diversion and recycling. The current targets are set under the waste management national regulatory framework for 2035. By 2035, the country aims at reaching 82% landfill diversion of all waste, 77% recycling of all waste, 100% landfill diversion of MSW (currently 5%), 81% recycling of MSW (currently 1%), 60% landfill diversion of construction and demolition waste (CDW), and 12% recycling of CDW (SIRC, 2020).

In order to reach the targets, the government has taken a series of decisions to set in place the relevant regulations. In 2017, a regulation was introduced in Saudi Arabia to stop the import of non-biodegradable **plastic** and to allow only the use of oxo-biodegradable plastic. This regulation covers disposable plastic bags as well as disposable tableware (Möhr, 2019 in Al-Alawi et al., 2020). In 2020, the Ministry of Environment, Water and Agriculture circulated a draft Waste Management Policy in which Extended Producer Responsibility (EPR) is mandated and regulated. According to interview consultations held, the first steps will be to look into source segregation of waste and to build the infrastructure for waste treatment and recycling, and then to focus on EPR and circularity.

Among the priority sectors of the EU CEAP, two sectors where regulatory development has not been very advanced in Saudi Arabia are food and vehicles. In addition, as of 2015, Saudi Arabia had no clear regulation focusing on **e-waste** management (Alameer, 2015 in Filimban et al., 2019).

A recent research provides the first comprehensive overview of **food** waste in the country, and acknowledges current limits, namely lack of data availability, quality of data, and sparsity of information. Much of the data about policies and current practices are not publicly available (Baig

[24] See https://www.kapsarc.org/research/publications/green-growth-pathways-for-saudi-arabia/ (last accessed on 19 October 2020).

[25] See https://www.worldbank.org/en/news/feature/2016/03/14/waste-management-key-to-regaining-public-trust-arab-world (last accessed on 26 January 2021).

et al., 2019a, 2019b). As of 2019, Saudi Arabia had no national laws or policies aimed at reducing food waste at the source. Local media has reported that the Shura Council, the Kingdom's formal advisory body, has explored the possibility of introducing laws addressing and penalising food waste (Al Arabiya, 2017 in Baig et al., 2019a). The Food and Agriculture Organization (FAO) has been supporting Saudi Arabia frame laws and strategies to reduce the waste volumes (Baig et al., 2019a).

While the number of discarded tires is growing in Saudi Arabia, their markets have not been developed yet to catch up with the speed. As of 2016, Saudi Arabia had no regulation focusing on End-of Life-Tire (ELT) management set in place or an ELT management organisation. However, there are ongoing discussions on such regulations and public-private agreements to encourage development of solutions for ELT management. ELT could be used in the **construction** sector for material and energy recovery. For example, ELT can be used as alternative fuel in cement kilns. Municipal authorities were attempting to find solutions to waste tires including contracts with cement producers (Chaperon, 2016 in WBCSD, 2018).

Beyond the scope of waste management, there have been efforts to standardise sustainable practices in the **construction and building** sector. In October 2019, Saudi Arabia established a green building rating system known as **Mostadama**, which is tailored to the country's need to promote sustainable construction standards. The National Housing Company, a subsidiary of the Ministry of Housing appointed Alpin, a consultancy, to develop a new green building rating system specifically for the Saudi market (Younis, 2020 in Al-Alawi et al., 2020) in line with the Saudi Vision 2030.[26]

4.2 Key challenges and areas with potential for implementing circular economy projects and initiatives

This section first discusses key challenges outlined at a national level, then looks at implementation of CE projects and initiatives, and lastly explores business opportunities.

Among the suggestions resulting from this study's consultation with experts from the GCC region was that working towards achieving the 2035 waste management targets (see section 4.1) will require focusing on three key elements: infrastructure development; regulations and their enforcement; and a funding mechanism. Firstly, there is a need to build proper infrastructure, for example, in terms of sorting facilities or composting facilities. Secondly, it is important to have proper regulations as well as mechanisms for their proper enforcement. Saudi Arabia still lacks progress in regulatory enforcement in sectors such as agriculture, e-waste, vehicles and sewage (SIRC, 2020). Thirdly, there is a need for a proper funding mechanism. In Saudi Arabia, the costs of waste collection and disposal are paid by the government (SIRC, 2020), and only to a limited extent by private entities. How and which infrastructure will be funded is therefore a government decision. For example, on MSW, currently there is no sorting at source, while scavenging of discarded products informal trading or zero-cost landfilling are common in the country. On CDW, there is widespread and illegal dumping (SIRC, 2020).

In Saudi Arabia most of the population is either Saudi national or comes from countries like Pakistan or Bangladesh, where transition towards CE is still falling behind. In terms of consumer behavior,

[26] See https://www.alpinme.com/mostadam-saudi-arabia/ (last accessed on 19 October 2020).

an observation shared in the consultation was that although there is room for further government interventions, there is a push from consumer themselves for sustainability. Thanks to social media and the internet, people are better informed. About 70% of the population is less than thirty years old, and young population is more sensible to sustainability. It is expected from the consultation that, as consumers usually drive the change, the government will follow, and that awareness and education will play a big role in the transition process.

In the face of these challenges, the Ministry of Economy and Planning (MEP) carried out the first voluntary national review to measure progress toward Sustainable Development Goals (SDGs) (Saudi Arabia, 2018). The review identified indicators for current performance, gaps between present status and targets, and the areas for which data need to be improved (Howarth et al., 2020). In the context of SDG12 Sustainable Consumption and Production, MEP regards the process of waste management, recycling, re-use, energy recovery, and CE as important elements of the country's approach to conservation of natural resources, creation of job opportunities, reduction of GHG emissions from landfills, and conversion of waste to energy. In line with this view, the government launched several projects and initiatives for waste management and recycling in order to boost waste disposal and to improve issues related to recycling, re-use, energy recovery, and promotion of the CE concept. Such projects include (Saudi Arabia, 2018):

- Initiative to set up a Saudi recycling company
- Upgrading of municipal waste management systems
- Initiative for waste management in Jubail city
- Integrated strategy for waste disposal in Riyadh city
- Initiative to recycle food waste

As the above list shows, a number of such projects and initiatives are implemented at a province or city level.

The government has taken action to establish organisations to execute and enforce regulations for waste management and recycling. In 2017, the government founded the Saudi Investment Recycling Company (SIRC), a subsidiary of the Public Investment Fund of Saudi Arabia. In 2019, the government established the National Waste Management Center (NWMC) whose main mandate is to develop regulations and organise proper enforcement.

SIRC is a wholly-owned subsidiary of the Public Investment Fund (PIF) of Saudi Arabia. Headquartered in Riyadh, the company was founded in 2017 to develop, own, operate, and finance various activities across all waste types to establish recycling capacities in the Kingdom (EU-GCC Dialogue, 2020b).[27] It is currently in the process of completing the first recycling facility for CDW in Riyadh, and companies have expressed interests in using the recycled product. The facility will produce aggregates which are suitable for the construction of new **buildings**.[28] It will turn waste into building material for road and housing construction projects including a 35,000-home scheme

[27] See https://sirc.com.sa/ (last accessed on 19 October 2020).

[28] See https://saudigazette.com.sa/article/573980 (last accessed on 19 October 2020).

(Construction Week Online Middle East, 2019 in Al-Alawi et al., 2020). In this way the project supports the Kingdom's ambition of diverting 60% of CDW from landfills by 2035.[29]

Another aim of the project is to expand the facility in order to cover the recycling of additional kinds of waste such as fertilisers, paper, **plastic** and metals (Construction Week Online Middle East, 2019 in Al-Alawi et al., 2020). It is the first project to be developed under the memorandum of understanding (MoU) signed in July 2019 between SIRC, the NWMC, and the Riyadh Municipality for launching integrated waste management and recycling activities in Riyadh.[30]

Another example is the launch by the Royal Commission for Jubail and Yanbu (RCJY) of an integrated environmental services initiative for the management of clean-up operations in **Jubail Industrial City**. The main aim of the initiative is to make the city free from waste through smart transformation in waste management and disposal in a safe and sustainable way. Another aim is to raise the level of environmental conservation, extend the lifespan of landfills, and activate programmes for recycling and waste conversion into energy. Within this context, RCJY has promoted the use of modern technologies in waste management with a view of increasing the efficiency of operations (Saudi Arabia, 2018). RCJY's initiative has been closely aligned with a smart cities programme led by the government. The Ministry of Municipal and Rural Affairs (MoMRA) launched **a smart cities programme** for 17 selected cities[31] including Yanbu, the first smart city in Saudi Arabia.[32] The main objective is effective management of services for efficient resource utilisation and improved urban service delivery. The programme includes goals related to real estate, industrial manufacturing, utilities, waste management, and mobility.[33]

This study identified two examples of initiatives for **food** recovery and recycling at a provincial or city level. Jeddah is one of the major commercial hubs in the Middle East and Saudi Arabia's second largest city. This city has been proactive in food recovery, placing containers for food left-overs and requiring restaurants and ceremony services to contract with charities to redistribute the left-overs to those in need, and signing contracts with companies to deliver the food to those in need (Saudi Gazette, 2015 in Baig et al., 2019a). Jeddah joined cities across the world attempting to measure food loss and waste (Hanson and Mitchell, 2017). The Eastern Province launched in cooperation with the food donation society and a specialised recycling company, an initiative to use food waste for conversion into organic fertilisers. The project aims at both exploitation of wasted resources and conservation of the environment (Saudi Arabia, 2018).

According to the interview consultation for this study, while **wastewater** systems in Saudi Arabia mainly work either through underground pipes or septic tanks, there is still a percentage of wastewater which is illegally dumped in the desert due to a lack of monitoring and regulation enforcement. Some of the water is treated and used for irrigation or other purposes, but the larger part is just released. In addition, sewage sludge is still a big issue. Against this background, the

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[29] See https://www.mewa.gov.sa/en/MediaCenter/News/Pages/News793.aspx; https://www.zawya.com/mena/en/story/Circular_economy_Saudi_Arabias_first_construction_waste_recycling_project_on_track_for_Q3_opening-ZAWYA20200603074952/; also see https://www.arabnews.com/node/1525696/business-economy (last accessed on 19 October 2020)

[30] Ibid.

[31] See http://www.ksclg.org/en/publication-project/saudi-arabias-smart-cities-program-why-local-government-is-imperative-to-digital-transformation-in-saudi-cities/ (last accessed on 19 October 2020).

[32] See https://www.arabnews.com/node/1089466/corporate-news (last accessed on 29 January 2021).

[33] See http://www.ksclg.org/en/publication-project/saudi-arabias-smart-cities-program-why-local-government-is-imperative-to-digital-transformation-in-saudi-cities/ (last accessed on 19 October 2020).

National Water Company (NWC), the entity responsible for wastewater treatment services, has created the Treated Sewage Effluent Business Unit (TSE BU) in order to educate consumers as well as commercially market the Treated Sewage Effluent (TSE). Efforts are also put in increasing wastewater collection. Additionally, the NWC made progress with its first privatisation project by awarding a contract to a consortium to develop three wastewater schemes, one each in Jeddah, and Dammam (in the Eastern Province) and one in the Northern Border region (Aqua Fluency Limited, 2017 in MoMRA, 2020). On the water recycling front, **Green Riyadh** is an urban forestation project to increase the amount of green space. The project uses recycled water from a connected irrigation network with the aim of improving air quality and reducing city temperature.[34]

One of the major issues raised in the consultation was that key challenges to business are centered on lack of financial viability for investment. The key challenge ahead is the development of markets. Some companies are currently operating in the market only in areas with a viable commercial model, i.e. paper, metals, **plastics** and other minor waste streams. Still, these activities are limited as the market for recycling plastics, paper and metal is underdeveloped and there are not many fully viable business opportunities. In other areas, like MSW and CDW, there is very little private activity.

There are some examples of ongoing business or industry initiatives in Saudi Arabia in the field of circular/green economy, mainly associated with **plastic**. Saudi Aramco, a Saudi multi-national oil and gas company, operates innovative industrial recycling projects including recycling of deteriorated high-density polyethylene from a **wastewater** evaporation pond into plastic products, and using recycled **plastics** in road construction and recycled airport landing strip.[35] Saudi Basic Industries Corporation (SABIC) is a Saudi multinational chemical manufacturing company established as a subsidiary of Saudi Aramco. The company regards the CE as a business opportunity that can strengthen its own sustainability commitments. Their commitments include an investment decision on a chemical recycling mega-project for mixed **plastic** waste (SABIC, 2019). PepsiCo and the Saudi Waste Management Center (SWMC) signed an MoU to reduce waste. The strategic partnership will support CE through different projects. The aim of the first project under this partnership is to provide smart bins to segregate and crush **plastic bottles** delivered by the SME Cycled. The SWMC has stated that it will be the first of many such partnerships focusing on waste reduction and educational campaigns.[36]

5 Circular economy policy developments in the United Arab Emirates (UAE)

The UAE is a federal state which consists of seven emirates. This section focuses on the UAE at the federal level and presents information collected from literature review as well as expert interviews and analysis of this information.

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[34] See https://www.riyadhgreen.sa/en/ (last accessed on 19 October 2020).

[35] See https://www.saudiaramco.com/en/magazine/elements/2020/innovative-industrial-recycling (last accessed on 19 October 2020).

[36] See https://saudigazette.com.sa/article/596132/BUSINESS/SWMC-PepsiCo-sign-MoU-to-enhance-environmental-sustainability-in-Saudi-Arabia (last accessed on 19 October 2020); https://www.mewa.gov.sa/en/MediaCenter/News/Pages/News182.aspx (last accessed on 29 January 2021).

5.1 Policy framework in the country

UAE Vision 2021 is a national agenda programme launched in 2010 covering six focus areas. One of the priorities set in the Vision is to ensure sustainable environment and infrastructure. The Vision 2021 strategy sets five targets within clean energy, **water** availability and productivity, carbon emissions, and energy intensity. It also sets Key Performance Indicators including **water** scarcity index, percentage of treated waste of total waste generated, and air quality index.[37] The UAE's National Committee on SDGs guides and monitors progress towards achieving the SDGs and the National Agenda goals towards the Vision 2021. The National Committee on SDGs monitors relevant KPIs for the different Emirates, oversees which targets are on track for both the UAE Vision 2021 and the SDGs, and identifies areas for improvement.

In 2012, the UAE developed in partnership with the Global Green Growth Institute (GGGI) **an inter-ministerial green growth strategy**[38] encompassing a variety of policy areas such as integrated power and **water** management, sustainable resource use incorporating **water** and energy efficiency, municipal waste-to-resources and a green data platform (Howarth et al., 2020). **UAE Green Agenda 2030** was also developed in collaboration with the GGGI and approved by the cabinet in January 2015 as an implementation framework of the UAE Green Growth Strategy. The agenda consists of 5 strategic objectives and 12 programmes including a national waste-to-resource programme. [39]

While developing the vision, strategy and agenda for green growth, the UAE made a series of strategic moves towards technology research and innovation involving industries. One of the main areas of focus was water and food security, which are highly relevant to CE. In September 2017, the UAE Government launched the **UAE Strategy for the Fourth Industrial Revolution (4IR)** with an aim to increasing 4IR's contribution to the national economy by advancing innovation and future technologies. One of the goals is to achieve future security of **water** and **food** supply by using bioengineering sciences and advanced renewable energy technologies. This was followed by the **National Advanced Sciences Agenda 2031** (2018) which also sets out scientific priorities to leverage natural resources through enhancing **water** security and developing advanced scientific **food** security system (EU-GCC Dialogue, 2020a). Two sectoral strategies developed in parallel are the UAE **Water** Security Strategy 2036 (2017) and the National **Food** Security Strategy 2051 (2018). Lastly, in December 2019, the government (Ministry of Energy and Industry) launched the **UAE Policy for Advanced Industries** to promote industrialisation and the application of the 4IR across all sectors (EU-GCC Dialogue, 2020a).

At the federal level, the Ministry of Climate Change and Environment (MoCCAE) sets the environmental agenda for the whole of UAE. MoCCAE developed the **UAE National Sustainable Consumption and Production Plan** (2019-2030) to support the transition to a CE. The main objectives of the plan are: to achieve sustainable management and efficient use of natural resources by supporting the transition to a CE; to support the private sector in shifting to cleaner

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[37] See https://www.vision2021.ae/en/national-agenda-2021/list/environment-circle (last accessed on 18 October 2020)

[38] See https://uaecabinet.ae/en/details/prime-ministers-initiatives/uae-green-growth-strategy (last accessed on 18 October 2020).

[39] See https://www.moccae.gov.ae/assets/download/f7af9918/UAE%20Green%20Key%20Performance%20Indicators.pdf.aspx?view=true (last accessed on 26 January 2021).

production methods and use cleaner production techniques; and to promote sustainable production and consumption patterns that reduce environmental stress and meet basic needs.[40]

To meet these objectives, the plan addresses 4 priority areas: green infrastructure and development; sustainable food production and consumption; sustainable public procurement; and sustainable manufacturing. It establishes a framework to address the most relevant sectors for green growth, which account for a high percentage of UAE's gross domestic product (GDP) and the impact on natural resources, water, energy, waste, air and climate. The selected sectors are production (manufacturing, **construction,** mining (gas and oil), wholesale and retail, transport) and consumption (housing, **food,** transport, **textile** and clothing).

In January 2021, the UAE government has made a high-level commitment to CE by establishing the **Circular Economy Council** and announcing the **UAE Circular Economy Policy**. The CE Council sets several objectives: to oversee the drafting of a mechanism to implement the strategy in coordination with relevant authorities; to approve performance indicators related to the adoption of the strategy; to harmonise federal and local strategies within the policy's requirements; to suggest the general foundations of sectoral plans and project; to encourage the participation of the private sector in projects and initiatives related to the CE; and to promote partnership between the public and private sectors, and advance scientific research in related areas.[41] Led by Minister of Climate Change and Environment, the UAE's Circular Economy Council membership includes the CEO at the Alliances for Global Sustainability, the Minister of State for Artificial Intelligence, the Secretary General of the UAE Cabinet, and senior executives from the public and private sectors.[42] At the same time, the UAE has recently adopted the **Circular Economy Policy** to promote environmental health, support the private sector in adopting clean production methods, and reduce environmental impacts, in order to achieve the country's Vision to be a global pioneer of green development. It consists of a framework that identifies priority activities associated with CE including infrastructure, sustainable transportation, sustainable manufacturing, and sustainable **food** production and consumption.[43]

5.2 National and regional programmes in support of circular/green projects and initiatives

GCC countries produce significant quantities of municipal waste and therefore there is potential for investment on processing and waste management facilities. During the interview consultations for this study it was raised that in the UAE funds for circular or green projects should be raised from both public and private sources; however, it was not possible to identify such specific federal

[40] See https://www.moccae.gov.ae/assets/download/3492c277/SCP_framework_EN.pdf.aspx?view=true (last accessed on 18 October 2020).

[41] See https://u.ae/en/about-the-uae/economy/circular-economy (last accessed on 2 February 2021).

[42] These executives come from MoCCAE, Environment Agency Abu Dhabi (EAD), Abu Dhabi Waste Management Center (Tadweer), Dubai Municipality, Municipality and Planning Department in Ajman, Emirates Nature-WWF, World Economic Forum, Bee'ah, Majid Al Futtaim-Holding, and Chalhoub Group. Some of the municipalities and companies participating in the Circular Economy Council are actively involved in policy implementation and business development (emphasis added in italic, see section 5.3 and 6.3). https://uaecabinet.ae/en/details/news/uaes-circular-economy-council-holds-inaugural-meeting-on-scale-360-initiative (last accessed on 26 January 2021).

[43] See https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-circular-economy-policy (last accessed on 2 February 2021); https://wam.ae/en/details/1395302903978 (last accessed on 7 February 2021).

funding programmes to support circular or green projects through the interviews or desk-based research.

The following example of a coalition of stakeholders interested in CE highlights opportunities for membership expansion and difficulties with obtaining project funding. In 2019, Coalition of Innovation in Recycling towards a Closed-Loop Economy (**CIRCLE Coalition**) was formed in collaboration with several government bodies such as MoCCAE and the Environment Agency Abu Dhabi (EAD), global and local private companies and NGOs in order to tackle plastic and packaging waste pollution and to ensure plastic recovery from waste. The coalition signed a pledge with EAD and MoCCAE to develop a CE model to combat plastic and packaging waste pollution.[44] Most of food and beverage (F&B) companies in the coalition have made commitments to achieve 100% recyclability of packaging material by 2025, and 100% collection and recovery of packaging material. One of the issues raised in a stakeholder conference was that it is important to work with like-minded companies, especially to collaborate with companies that have the infrastructure for the collection and segregation such as Bee'ah (see below) and to have access to the facilities that can convert the waste into post-consumer recycled materials (PCR). Although initial members were big companies, they are looking for companies of all sizes, including small local businesses.[45] Another related issue emerging from the consultation was the intention of the coalition to look at the different participants in the waste management chain, and to test assumptions of technical feasibility (e.g., infrastructure availability, where the key players are). Based on initial efforts, in 2020 the CIRCLE Coalition attempted to raise funding from public/private partnerships to undertake the design of an EPR framework for the UAE but were unsuccessful. It is possible that because the Gulf States are high income countries and because the UAE is a much smaller market than Saudi Arabia or Egypt, such an initiative was considered less important from a funding perspective.

Another example is **SCALE 360** which has gained high-level political commitments and financial support from the UAE government. It is an initiative in collaboration with the World Economic Forum (WEF) as part of the Platform for Accelerating the CE**.** In April 2019 the UAE became the first signatory to adopt the WEF's SCALE 360 initiative to fast-track the CE through nationally-led innovation challenges. This initiative provides a model for a CE, based on using fewer natural resources and reducing pollution to tackle climate change. The aim is to help stakeholders scale up solutions in partnership with government entities, investors, and companies to create new markets for circular goods and services. Scale 360 explores the potential for the 4IR technologies such as the Internet of Things (IoT) and Artificial Intelligence (AI) to accelerate the CE transition for **plastics** and **electronics**, building on research developed by the WEF in collaboration with Accenture.[46] The WEF will host the partnership with UAE, which as announced in November 2019, will involve an initial investment of CHF 1 million from the UAE government to tap into the Forum's networks of experts, civil society, government and industry leaders.[47] The UAE Circular Economy

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[44] The cooperating companies and entities include BASF, Borouge, Tetra Pak, Carrefour, Coca-Cola, Dow Chemicals, Environment Agency Abu Dhabi, Gulf Petrochemicals and Chemicals Association (GPCA), McDonald's UAE, Nestlé, Procter &Gamble, PepsiCo, Unilever and Emirates Nature – WWF. https://www.arabianindustry.com/construction/news/2019/apr/28/abu-dhabi-bodies-commit-towards-circular-economy-6076265/#close (last accessed on 18 October 2020).

[45] Webinar, "EcoWASTE Exhibition & Forum: Restoring Focus on a Circular Economy in the Aftermath of Global Developments", 19 January 2021.

[46] See https://uaecabinet.ae/en/details/news/uaes-circular-economy-council-holds-inaugural-meeting-on-scale-360-initiative (last accessed on 18 October 2020).

[47] See https://www.weforum.org/press/2019/11/new-partnership-aims-to-accelerate-technology-innovations-and-scale-up-the-circular-economy/ (last accessed on 6 February 2021).

Council also serves as the highest steering body of the UAE Scale 360 initiative and discusses the main priorities and commitments that outline UAE's engagement in the Scale 360 initiative.[48]

5.3 Key challenges and areas with potential for implementing circular economy projects and initiatives

This section first discusses key challenges, then looks at implementation of CE projects and initiatives at a provincial or city level, and lastly explores business opportunities.

Major barriers for businesses in developing processing facilities for waste, which were addressed in the consultation, are i) high initial investment costs and at times operating costs; ii) lack of market or market size for recycled materials; and iii) handling waste movement across the emirates. On the second barrier, as the UAE is a small country, some initiatives such as a by-product exchange network will only make sense if they can be implemented at the national level. The third barrier on waste movement will be discussed in section 6 on CE policy development in the Emirates of Abu Dhabi and Dubai.

In addition, fragmentation of standards across the jurisdictions of the UAE is considered a barrier to the industry. The UAE Construction Industry Think Tank recommends to the government to consolidate federal and local sustainability requirements, i.e., the government could create a federal sustainability mandate by combining **building** codes such as Abu Dhabi's Estidama Pearl Rating system and Dubai's Green Building Code (see Section 6.1) (UAE Construction Industry Think Tank, 2020). Closely related is the lack of common **construction** measurement standards in the UAE, exacerbated by the use of a mix of local or regional standards, leading to lack of quantification and stakeholders' understanding about the exact amount of waste. The industry think tank suggests that a common construction measurement standard can be mandated (UAE Construction Industry Think Tank, 2020).

There are a number of ongoing business or industry initiatives in the UAE in the field of circular/green economy. Bee'ah is currently making progress towards enabling Sharjah to become the first zero-waste-to-landfill city in the GCC region and the Middle East by adopting cutting-edge waste-to-energy conversion facilities (Bee'ah, 2017 in Al-Alawi et al., 2020). The Emirate of Sharjah already reached 76% waste diversion rate, exceeding the federal target, through integrated waste management solutions (collection, landfill management, treatment, disposal and now waste-to-energy). The remaining 24% is soon to be diverted from landfills to Sharjah's first waste-to-energy plant developed by Bee'ah, which aims to enable the emirate to reach a 100% waste diversion rate. Crescent Petroleum, an oil and gas company headquartered in Sharjah, UAE, recycles hazardous waste. Falcon Pack, a manufacturer and distributor of disposable food packaging, and Nabeel Perfumes Group, both headquartered in Sharjah, UAE, use biodegradable and recycled materials.[49]

On recovery and recycling, Bee'ah aims to provide waste management solutions to tackle a growing number of landfill sites in the country by setting up facilities to recycle material and divert

[48] See https://uaecabinet.ae/en/details/news/uaes-circular-economy-council-holds-inaugural-meeting-on-scale-360-initiative (last accessed on 18 October 2020).

[49] See https://www.weforum.org/agenda/2020/06/6-ways-that-gulf-cities-can-turn-waste-into-wealth/ (last accessed on 25 January 2021).

around 70% of all waste away from landfill (Bee'ah Tadweer, 2020 in Al-Alawi et al., 2020). The company's waste management centre established in the emirate of Sharjah has made investments on waste sorting, processing, treatment, and recycling facilities to maximise efficiency in the use of resources and to attain sustainability goals (Bee'ah Tadweer, 2020 in Al-Alawi et al., 2020). The aim is to process waste in such a way that products can be recycled, recovered, regenerated, and brought back into the economy, to support a sustainable and environmentally friendly cycle (Al-Alawi et al., 2020). Waste diverted from landfills is collected and sent to Bee'ah's material recovery facility where it is either recycled or re-sold to the market with recycling facilities for specific waste streams, for example, for used tires. In the UAE, Bee'ah has led the reuse and recycling of materials for the construction of roads and cycle tracks (Al-Alawi et al., 2020). CDW is being recycled and reused as aggregates for roads and sidewalks, while steel is also being reused.

An important issue raised in stakeholder discussion is the need to seek out partnerships between waste management companies and private companies to complement existing efforts. A good example in this respect is the joint venture between Bee'ah and Masdar, Emirates Waste to Energy Company, which aims to establish waste-to-energy projects across the region under the UAE initiatives [50]. Another example is the MoU signed by Bee'ah and Unilever to collaborate on an end-to-end integrated **plastic** management system.[51]

Plastic packaging is an important and valuable material that is easy to attract interest and investment from private sector. Although there are various ongoing developments in the field of plastics, interviewees suggest possibilities for starting initiatives for other industrial materials. According to the consultation, other companies in the region are developing facilities for cardboard processing and a cellulose plant producing industry fuel.

6 Circular economy policy developments in the Emirates of Abu Dhabi and Dubai

This section focuses mainly on the Emirate of Abu Dhabi and to a lesser extent on the Emirate of Dubai. It provides information collected from literature review as well as expert interviews and analysis of this information.

6.1 Policy framework in the emirates

According to the UAE regulatory framework, as outlined in the consultation, the federal government sets general guidelines and standards while competent authorities at the emirate level define the details of their implementation and regulate different sectors within the administrative borders. For example, in the UAE waste management is implemented within each emirate's boundaries. This configuration raises some challenges, for example, in terms of waste transport across emirates or hazardous waste treatment, which limit recycling possibilities and the implementation of a CE model across full value chains. Interviews indicate that some emirates such as Dubai are more decentralised with a number of separate entities in charge of waste management while some other emirates have a more centralised structure with one central authority. In **Abu Dhabi** the

[50] See https://masdar.ae/en/masdar-clean-energy/projects/sharjah-waste-to-energy-project (last accessed on 25 January 2021).

[51] Webinar, "EcoWASTE Exhibition & Forum: Restoring Focus on a Circular Economy in the Aftermath of Global Developments", 19 January 2021.

Environment Agency Abu Dhabi (EAD) is the entity responsible for environmental policies including waste management. This section first looks at policy framework in Abu Dhabi and then in Dubai.

The two main policy frameworks developed by EAD are the Abu Dhabi Environment Vision 2030 and Single Use Plastic Policy. Abu Dhabi has also developed its own waste management policy. In 2010 - 2011, the **Abu Dhabi Environment Vision 2030** was developed to set the overall policy direction in order to ensure integration of environmental, economic, and social vision towards sustainability and to enhance Abu Dhabi's efficient use of resources. Five priority areas are climate change, clean air and noise pollution, **water** resources, biodiversity and waste management.[52] From the consultation it emerges that the Vison 2030 did not explicitly include CE principles when it was developed ten years ago, but it touched upon the concept of material flow especially in regard to waste management.

It has been observed from the consultation that the UAE and the Emirate of Abu Dhabi are still at an early stage of CE planning. While key progress has been achieved in creating an enabling environment at national and local levels, there is a need for a more comprehensive framework bringing together different policy actions. It is noted that sustainable procurement and eco-design have not been properly integrated in the environmental policy framework in Abu Dhabi. A further emerging outlook is that the next 4-5 years will be important for shaping a CE type of management for material flows, and that the single use plastic policy would be a key enabler in this direction.

In this context, in line with the recently adopted UAE **Circular Economy Policy** there will be a shift of focus on Abu Dhabi from reducing waste generation to reducing resource consumption, according to the interviewees. Specifically, there will be new regulations and incentives for less resource-intensive products and services with the objective of addressing the need to reduce consumption of resources. At the federal level, among key initiatives on the CE by the MoCCAE is the establishment of common KPIs for local entities.

Abu Dhabi has a high rate of waste generation per capita (1.8 kg/capita/day for MSW) resulting in about 6.5 to 7 million metric tonnes of MSW per year, 90% of which goes to landfill. At the same time, Abu Dhabi has a low rate of waste diversion from landfills (34.6% diversion – 2018 baseline). Abu Dhabi sets guidelines for waste management to ensure maximising potential for recovery and sets objectives for new waste facilities and introduction of tariffs to implement the principles of the waste hierarchy.[53] EAD is planning to develop an integrated waste management policy and a Circular Economy Policy as stated in EAD's Strategic Plan 2021-2025. Currently there are no incentives for recovery of waste streams other than **plastic**. **Food** waste was raised as a waste stream that could be addressed further, especially in terms of ensuring cleaner waste streams as waste is often contaminated and unsuitable for compost or other treatment.

Abu Dhabi Waste Management Center (Tadweer), which was established by the government, introduced a waste classification policy with the following objectives: to ensure that waste is treated and handled correctly; to divert waste from landfills to promote reuse, recycling and recovery; and to impose tariffs to encourage reuse, recycling and recovery (Environmental Agency Abu Dhabi, 2016 in Al-Alawi et al., 2020). On the second objective, Tadweer promoted several initiatives to

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[52] See https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/local-governments-strategies-and-plans/environment-vision-2030-abu-dhabi (last accessed on 18 October 2020).

[53] See https://www.ead.gov.ae/storage/Post/files/8f67dc118248f26001af379cfea26c21.pdf; https://www.ead.gov.ae/storage/Post/files/2af8f981e53f99e7fc041aae7d81612f.pdf (last accessed on 18 October 2020).

achieve waste diversion targets, for example, waste-to-energy, refuse-derived fuel (RDF), waste-to-fuel, and others. In addition to targeting diversion and proper treatment,[54] Tadweer also started an online recycling auction of waste materials.[55] They furthermore established wood, paper and **plastic** recycling facilities and incineration facilities in Abu Dhabi. It is observed in the consultation that Abu Dhabi has reached a good level of CDW recycling, tires recycling, green waste conversion to compost and lubricant oil recycling. Tadweer is also planning to establish a landfill gas collection cleanup system at the Abu Dhabi Eco Park developed by EAD[56] in collaboration with the Department of Economic Development (DED) to provide facilities for new companies operating in the innovation and recycling sector in Abu Dhabi. It is the first integrated area where different recycling and treatment facilities are put together in one place. They will utilise the waste of the largest landfill in Abu Dhabi, which is close to the Eco Park, in order to produce power from landfill gas. They also plan to initiate the treatment of organic waste for the production of fertilisers. Tadweer signed an MoU[57] with the Emirates Water and Electricity Company (EWEC) to build two waste-to-energy plants in Abu Dhabi and Al Ain.[58]

In terms of monitoring systems, a return scheme for bottles has been introduced which is self-monitoring and can report how much is recovered, using the baseline of consumption of bottles per capita. In addition, Tadweer plans to monitor the diversion of waste from landfills. There is only one landfill in Abu Dhabi, which makes it easier to monitor the quantities of waste. Tadweer has also implemented a waste tariff, entitled the **Nadafa Programme**, which helps financing an integrated waste-management system that tracks and monitors all vehicles carrying all waste types.[59]

One of the main policy developments in waste management is **the Abu Dhabi Single Use Plastic Policy**. As a major producer of plastic and a big consumer at the same time, Abu Dhabi exhibits high levels of single use plastic consumption. According to the consultation, Abu Dhabi has a high consumption rate of plastic bags per capita per year, about 4 times more than the global average (1180 bags vs 300 bags), and a high consumption rate of plastic bottles per capita per year (500-600 bottles). In response, EAD developed the Single Use Plastic Policy to promote transition towards CE through innovation, product specifications and a higher rate of product recovery. The policy has three goals: on single-use plastic items and finding sustainable alternatives in the short term; on establishing a closed-loop circular system to recycle plastic in the medium term; and on fostering and embedding a culture of reuse and recycling throughout society in the long term (Environmental Agency Abu Dhabi, 2020 in Al-Alawi et al., 2020). Towards these goals, Abu Dhabi

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[54] Webinar, “EcoWASTE Exhibition & Forum: Restoring Focus on a Circular Economy in the Aftermath of Global Developments”, 19 January 2021.

[55] See https://www.weforum.org/agenda/2020/06/6-ways-that-gulf-cities-can-turn-waste-into-wealth/ (last accessed on 25 January 2021).

[56] See https://www.technicalreviewmiddleeast.com/power-a-water/water-a-environment/tadweer-holds-opening-ceremony-for-eco-park-complex-in-abu-dhabi.

[57] See http://www.ewec.ae/en/media/press-release/abu-dhabi-power-corporation-signs-memorandum-understanding-tadweer-two-waste.

[58] Webinar, “EcoWASTE Exhibition & Forum: Restoring Focus on a Circular Economy in the Aftermath of Global Developments”, 19 January,2021.

[59] See https://www.weforum.org/agenda/2020/06/6-ways-that-gulf-cities-can-turn-waste-into-wealth/ (last accessed on 25 January 2021); https://dmat.abudhabi.ae/ar/ADM/ELibrary/Document%20library/نظافة20%برنامج.pdf.

Single Use Plastic Policy establishes a policy framework for reducing and eliminating single use plastics and provides a roadmap for action with a timeline from 2020 to 2022.[60]

For the development of the roadmap EAD worked with local and federal levels as well as the private sector to define issues related to recovery of single use plastics. The policy aims at banning single use plastic bags at the beginning of 2020 and sets a target of 50% recovery of PolyEthylene Terephthalate (PET) bottles by 2022. EAD drafted a law for single use plastics that highlighted EPR, which will be the first of its kind in the Emirate and set the legal foundation for its local implementation. In the future this could be applied to other packaging items and non-plastic items. In 2020 the Abu Dhabi Single Use Plastic Policy was scheduled for implementation as law but was put on hold due to the COVID-19 pandemic.

EAD has introduced necessary measures to reach the targets for 2022, which were well explained in the consultation. Firstly, EAD has recently engaged with the Department of Government Support to ensure that 100% of Abu Dhabi Government entities are free from single use plastic and non-plastic products through centralised government procurement. They have reviewed the procurement contracts to ensure that they are more sustainable. Secondly, EAD is putting in place an incentive-based return scheme to recover 50 % of plastic bottles and is also introducing levies on cutlery, cups, plates and stirrers to reduce their consumption. The incentive scheme has been developed in collaboration with companies based on Corporate Social Responsibility (CSR) initiatives and private sector experiences. The model is composed of incentives in the form of discounts for brands based on the return of certain numbers of bottles.

An opinion expressed in the consultation is that while the private sector has preference over voluntary programmes, there needs to be some legal push through top-down policies in order to achieve a big impact on plastic waste, although this is an area where public awareness has grown. Another opinion raised is that a careful consideration should be made about whether from a life cycle perspective it would be better to import alternative products from outside the GCC region instead of relying on plastic products locally produced in the region. In terms of recycled content, interviewees indicate that companies might like to use recycled content in their PET bottles but they might not be able to do so because policies supporting recycled content are not set in place, which makes virgin plastic cheaper than recycled one .

Estidama Pearl Rating System, established in 2010, introduces a mandatory rating system for all new buildings in the Abu Dhabi Emirate and represents the first such mandatory rating system in the Arab region.[61] The Estidama rating system in Abu Dhabi is intended to divert a minimum of 30% of CDW through recycling or salvaging. The aims are to encourage the reuse of existing building stock and to reduce waste and associated environmental impacts (Swain, 2018 in Al-Alawi et al., 2020).

Dubai has developed a plan and a strategy both setting policy directions by 2021, which may be relevant to transition towards CE. **Dubai Plan 2021** encompasses a holistic and complementary perspective on the future of Dubai, addressing the urban environment including both natural and

[60] See https://www.ead.gov.ae/storage/SINGLE%20USE%20PLASTIC%20POLICY%20FINAL%20ENGLISH%20313.pdf (last accessed on 18 October 2020).

[61] See https://www.prometric.com/EPRS (last accessed on 18 October 2020).

built assets.[62] **Smart Dubai 2021** is a city strategy on resource optimisation through digital transformation with six strategic objectives including smart liveable and resilient city as well as environment. The targeted measures include introduction of new **building** regulations, adjustment of power and **water** tariffs, and introduction of hybrid and EVs. Smart technology for **water**, waste and electricity monitoring for consumers, increased public transport and overall reduction of traffic also fall within the scope of the strategy.[63] **Dubai Industrial Strategy 2030** sets objectives including promotion of environmentally-friendly and energy-efficient manufacturing. Six priority sub-sectors are aerospace, maritime, aluminium and fabricated metals, pharmaceuticals and medical equipment, **food and beverages,** and machinery and equipment.[64]

On a sectoral level the **Dubai Green Buildings Regulations and Specifications** issued in 2010 support Dubai's strategic plan of a sustainable urban environment, addressing resource use and reducing environmental impacts among others. On waste, all new buildings must account for at least 5% of recycled materials, and 5% of materials used must be from regional sources. At least 50% of CDW by weight or volume must be diverted from landfills.[65] The regulations and specifications set a mandatory requirement for all new government buildings to obtain a permit in the first phase and for all types of buildings in the second phase. In 2016, the Dubai Municipality updated the existing green building code and upgraded it to a rating system classifying green buildings into different categories depending on their sustainability performance. Since October 2020, **Al Sa'fat – Dubai Green Building System** has replaced Dubai Green Building Regulations and Specifications. Al Sa'fat includes a set of mandatory requirements for all new buildings.[66] **Trakhees** is the rating system of the Environmental, Health and Safety Department in Dubai which aims to reward projects that divert 50–75% of all CDW from landfill (Al-Alawi et al., 2020). In 2018, Trakhees issued guidelines for cleaner production, waste minimisation, and RRR (Reduce, Reuse, and Recycle) options.[67] In addition, in 2016, Dubai established the first 3D-printed office and launched a dedicated **3D printing strategy**. The strategy enables the printing of **building** components or structures in a reduced timeframe, thereby saving associated costs and construction material. (Bejjani et al., 2019).[68]

6.2 Emirate-level programmes in support of circular/green projects and initiatives

There are several funding programmes for investments in the field of green/circular economy in **Abu Dhabi**. In order to raise public funding, EAD is developing the **Abu Dhabi Environment Fund** as part of the implementation of the Abu Dhabi Single Use Plastic Policy. It will provide a platform

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62 See https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/local-governments-strategies-and-plans/dubai-plan-2021 (last accessed on 25 January 2021).

63 See https://2021.smartdubai.ae (last accessed on 29 January 2021).

64 See https://www.emirates247.com/news/government/mohammed-launches-2030-dubai-industrial-strategy-2016-06-26-1.633991 (last accessed on 18 October 2020).

65 See https://www.dewa.gov.ae/~/media/Files/Consultants%20and%20Contractors/Green%20Building/Greenbuilding_Eng.ashx (last accessed on 18 October 2020).

66 See https://www.dm.gov.ae/municipality-business/planning-and-construction/al-safat-dubai-green-building-system/ (last accessed on 25 January 2021).

67 See https://www.trakhees.ae/en/ehs/env/Documents/Guidelines/Guideline%20ID-EN-G23,%20Cleaner%20Production,%20Waste%20Minimization%20and%20RRR,%20Rev.%2000,%20Jan18.pdf (last accessed on 25 January 2021).

68 "Dubai 3D Printing Strategy," last updated on 7 March 2017 (https://government.ae/en/about-the-uae/strategies-initiatives-and-awards/local-governments-strategies-and-plans/dubai-3d-printing-strategy) quoted in Bejjani et al. 2019.

for funding such investments. The development of infrastructure for recovery and recycling is driven by both the private sector and the government, for example, through a local portfolio investment management company called Abu Dhabi Holding, which has been entrusted by the government to attract international investment in waste management, product recovery and recycling. A plan is under development now, and some funds have been allocated into these venues.

The private sector has been also working on sustainable finance from a CE perspective. Initiated by Abu Dhabi Global Market (ADGM), 25 entities signed in January 2019 the **Abu Dhabi Declaration** to establish a healthy sustainable finance industry that supports the country in attaining the UN SDGs. The Abu Dhabi Sustainable Finance Declaration[69] led by the Abu Dhabi Global Market, promotes Environmental, Social and Governance (ESG) criteria throughout the UAE. The declaration has a broad range of signatories, e.g., financial sector, oil and gas, governmental agencies, and WWF. In addition, Borouge, a joint venture the Abu Dhabi National Oil company (ADNOC) and Borealis based in Austria providing chemical and innovative plastic solutions, has introduced a sustainability index that requires a certain level of sustainability performance in all their products. ADNOC has invested in the expansion of the work done by Borouge within plastics innovation which increases the share of multiple use plastics against single use plastics.

There are several supporting programmes (e.g., funding programmes) for investments in the field of green/circular economy in **Dubai** based on information collected from the consultation. In 2016, over 30 lenders have signed up the **Dubai Declaration on Sustainable Finance**, under which leading UAE banks agreed to provide finance to projects, businesses, and customers with sustainable purposes. The First Abu Dhabi Bank, the UAE's largest bank headquartered in Abu Dhabi, has committed $10 billion to sustainable financing over 10 years. Emirates NBD, a government owned bank established in Dubai, has launched a financing programme to support the purchase of electric and hybrid cars. **Dubai Green Fund Initiative** aims at stimulating the growth of a green and sustainable economy and strengthening Dubai's shift towards a green economy. It aims to attract AED 100 billion investment by 2030.

6.3 Key challenges and areas with potential for implementing circular economy projects and initiatives

According to the consultation, initiatives such as the CIRCLE coalition and the Abu Dhabi Single Use Plastic Policy show that there is action at the high policy level, but CE would need more push at the implementation phase where a sectoral-focused approach could be useful. Implementation depends on each emirate, which could be an opportunity but also a challenge at times. In this regard, the key challenges for the government of Abu Dhabi would be to ensure that Abu Dhabi produces and consumes **plastic** in a more sustainable manner and has an enhanced recycling sector with the right legal framework and physical infrastructure in place. EAD's Strategic Plan for 2021-2025 presents some annual initiatives to encourage the adoption of a CE approach in the industrial sector: to assess the potential to develop an eco-industrial park (EIP), a by-product exchange (BPE), and an eco-industrial network (EIN).

[69] See https://www.adgm.com/documents/fsra/sustainable-finance/abu-dhabi-sustainable-finance-declaration-2-20200115.pdf (last accessed on 15 March 2021).

However, several barriers to policy implementation in Abu Dhabi were identified through the interviews. On policy and regulation, there is no provision regarding the standards for the use of PCR in **food** grade **packaging**, or policy instruments to incentivise use of PCR in procurement policies. In addition, fines and penalties for dumping and littering, or incentives to residents for recycling have not yet been introduced. On infrastructure, there is a lack of investment in material sorting facilities. While there are recycling and conversion capacities in the UAE, in many instances they do not have access to the right technologies, as well as sufficient feedstock or market demand for their products. The infrastructure for recovery and recycling is developing but it is still in the early stages. Currently, 34-35% (2018 figures) of high value waste streams such as **electronics**, used tires, used oil and some **construction** waste materials are recovered and recycled. On awareness and prevention, there is a good majority of the population who are aware and willing to recycle, provided that they are offered convenience, reliability and trust. However, there is often lack of consumer understanding of how and what to recycle. In this regard it may be relevant that Bee'ah, a public-private partnership established in the city of Sharjah aims to contribute to consumer understanding through information programmes to improve waste utilisation. On assessment and monitoring, the implementation of a federal waste database and tracking system was introduced in 2020. Previously, it was difficult to monitor and assess progress, given the different tracking, data collection and monitoring systems used by the different Emirates.

In an effort to overcome barriers to policy implementation, the CIRCLE Coalition recently launched a pilot project to adopt a closed-loop recycling model (CE model) for **plastic** bottles**, beverage cartons,** and other **packaging** in Abu Dhabi. Consultations suggest that with additional regulations and soft power efforts, a return scheme could be introduced and expanded to other items in the future while the pilot study can guide the discussion and help identify policy opportunities and barriers. As potential barriers to policy implementation, the study identified the different waste management systems throughout the Emirates, gaps in the infrastructural network (e.g., availability of segregating facilities), and lack of consumer awareness. Another project by the CIRCLE Coalition in 2020 was the establishment of a Sustainability Association to look at CE across the value chain. The coalition also started to work on projects to begin the collection of segregated material at source, partnering with UAE environmental service providers. They worked on the regulations and standards on PCR, providing recommendations to both the Saudi Arabian Standard Organization and the Emirates Authority for Standardization and Metrology (ESMA).[70] They reviewed a number of standards by the GCC Standardization Organisation (GSO)[71] as well as EU and US Food and Drug Administration (FDA) standards for the use of PCR, specifically in **food** grade **packaging** because there are currently no regulations in the GCC region.

Consultation suggests that the CIRCLE Coalition has potential to evolve into an industrial association. So far it has been acting as a consultant for the UAE government which is a member of the coalition. The consistent group of companies demonstrate a significant body of expertise and share a strong commitment towards CE. While the coalition is still an informal group, it aims to evolve into an industry association so that they can better inform policies, finance studies or promote awareness campaigns.

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[70] See https://www.esma.gov.ae/en-us (last accessed on 15 March 2021).

[71] See https://www.gso.org.sa/en/ (last accessed on 15 March 2021).

On a company level, a variety of circular or green projects have been carried out, ranging from waste-to-energy generation to plastic recycling. Masdar, Abu Dhabi's leading renewable energy company, has partnered with Bee'ah to establish the UAE's waste-to-energy sector and help the government achieve the targets set out by UAE Vision 2021 strategy (UAE official portal, 2020 in Al-Alawi et al., 2020).[72] The Abu Dhabi National Energy Company PJSC (TAQA) and Tadweer proposed to set up a 100-MW facility in Abu Dhabi to provide power to almost 20,000 households and reduce carbon dioxide emissions (UAE official portal, 2020 in Al-Alawi et al., 2020). In Abu Dhabi the private sector has expressed an interest in developing the recovery and recycling sector mainly for PET products. According to the consultation, given that PET bottles are currently bundled and exported to countries like China and India, there is potential for developing recycling facilities for PET bottles and cardboard (old corrugated containers OCC). A broader business landscape emerging from interviews and desk research shows that a partnership between Alliance for Global Sustainability, an international group established in Abu Dhabi, and Veolia announced plans for launching a new facility for recycling PET bottles; DGrade based in Dubai is actively involved in the recovery and recycling of PET bottles by turning recycled **plastic** into quick-drying T-shirts and cloth bags[73] and is also establishing a factory in Abu Dhabi; West Coast Group based in Abu Dhabi also recycles plastic bottles.

Dubai has also developed green or circular projects in both public and private sectors. As the UAE federal government promotes greater **electric vehicle (EV)** use, the Electricity and **Water** Authority and the Roads and Transport Authority have introduced in Dubai incentives such as free public parking, toll-fee exemptions, and discounts on registration to encourage adoption of EVs (Bejjani et al., 2019).[74] Dubai municipality promotes a recycling project called **Smart Sustainability Oasis** to segregate different types of household wastes.[75] The municipality aims at reducing waste generated in the city by providing an electronic platform to exchange recyclable or reusable materials.[76] Several projects are also currently being developed on waste-to-energy plants in Dubai. At a company level, EnviroServe based in Dubai is recycling electronic waste while Lootah founded in Dubai is producing biofuel from used cooking oil.

Majid Al Futtaim, a company headquartered in Dubai developing and operating shopping malls, communities, retail and leisure spaces across the Middle East, Asia and Africa, has become the first Middle Eastern company to adopt a **Net Positive Sustainability Strategy**. The strategy aims to significantly reduce the company's **water** consumption and carbon emissions, resulting in a positive corporate footprint on water and carbon by 2040. The company will implement methods to reduce water and carbon footprint through projects at all the assets across the MENA region, including on-site rainwater harvesting and grey water recycling.[77] On **water**, consultation also informed about a case study, looking into the environmental impact of the brine and the chemicals

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[72] See https://masdar.ae/en/masdar-clean-energy/projects/sharjah-waste-to-energy-project (last accessed on 25 January 2021).

[73] See https://www.weforum.org/agenda/2020/06/6-ways-that-gulf-cities-can-turn-waste-into-wealth/ (last accessed on 25 January 2021).

[74] Source: LeAnne Graves, "Dubai announces new electric vehicle incentives," *The National*, Sep. 24, 2017 (https://www.thenational.ae/business/energy/ dubai-announces-new-electric-vehicle-incentives-1.661286) quoted in Bejjani et al. 2019.

[75] See https://www.weforum.org/agenda/2020/06/6-ways-that-gulf-cities-can-turn-waste-into-wealth/ (last accessed on 25 January 2021).

[76] See https://www.dubairecycles.ae/en/Pages/default.aspx (last accessed on 25 January 2021).

[77] See https://www.worldgbc.org/news-media/majid-al-futtaim-becomes-first-middle-eastern-company-adopt-net-positive-strategy (last accessed on 19 October 2020).

sent back to the sea by desalinisation plants, and assessing whether it is possible to use them for agricultural applications.

7 EU – GCC collaboration opportunities

7.1 Bilateral/regional collaboration

This section focuses on opportunities for EU-GCC bilateral and regional collaboration in the broad field of the circular economy (CE) and identifies specific areas of mutual interest.

There has been a growing interest in CE in the GCC region. CE business opportunities have been emerging in GCC countries partly driven by an increasing interest among local population. A report published for the World Government Summit estimates that the GCC can save almost 138 billion USD by 2030 with a CE model, corresponding to nearly 1% of the region's cumulative GDP between 2020 and 2030 (Bejjani et al., 2019). In addition to the companies based in Saudi Arabia and the UAE, there are examples of recycling companies operating across the GCC region. For example, Crown Industries[78] based in Bahrain recycles plastics and metals and exports to the UAE and other countries in the world.[79]

Existing initiatives indicate that there are many opportunities for implementing the CE principles in GCC countries. For example, the Gulf Organisation for Research and Development (GORD) has been leading the development and administration of the Global Sustainability Assessment System (GSAS) certification framework for buildings and infrastructure projects in the Middle East and North Africa (MENA) region. The GSAS framework established by GORD in 2009 is the first performance-based rating system and the only integrated sustainability assessment system for green buildings and infrastructure in the MENA region.[80] This system preceded the Abu Dhabi's Estidama rating system introduced in 2010 and Saudi Arabia's Mostadama rating system launched in 2019.

However, for these opportunities to be maximised, there is a need for action at the policy level, which has been confirmed by our literature review and expert interviews. A study for the buildings and construction sector in the GCC region identified several actions in need (Al-Alawi et al., 2020). The first area of action is improving existing policies and regulations with regard to material and waste management practices in the built environment. Although the UAE has been implementing some policies at the building scale, the study indicates that there is room for improvement in this area across the GCC region to include the infrastructure and public realm elements. The second area is implementing policies and regulations that drive urban planning, design, and construction practices to adopt the CE principles. The study suggests that there is a need to revisit some of the existing policies and regulations regarding urban development throughout the GCC region. The third key area is revisiting the approach to water planning and management. The study argues that policy and strategy are needed to minimise the use of potable water, maximise the capture and treatment of stormwater and wastewater, and prioritise the use of treated water over potable water

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78 See https://www.crownbahrain.com/.

79 See https://www.weforum.org/agenda/2020/06/6-ways-that-gulf-cities-can-turn-waste-into-wealth/ (last accessed on 25 January 2021).

80 See https://www.gord.qa/gsas-trust (last accessed on 27 January 2021); https://www.gord.qa/faq (last accessed on 15 March 2021).

where possible. Some countries such as the UAE started to transform their approach to water planning and management to adopt a more sustainable model (Al-Alawi et al., 2020).

Against this background, the EU can provide knowledge, expertise, and facilitation to help the GCC countries further develop CE. The consultations confirm that the EU-GCC cooperation will be important in this regard. Interviews indicate that there is already a strong cooperation at a regional level in the Middle East, especially in the private sector. For instance, companies have been exploring the possibility of setting up a recycling facility for the whole GCC based in Saudi Arabia. Such attempts may be facilitated by collaboration in the field of standards to reduce inconsistencies in the market. Another area would be exchange of expertise on EPR. As countries in the region develop their EPR schemes, lessons can be leant from the implementation of this policy in the EU where EPR schemes exist since the early 1990's.

At the same time, it is cautioned that GCC economies are very different from the European ones in many regards, namely: consistent presence of migrant labor (population swings); extreme climatic conditions; sustainability issues (especially in terms of food waste); and oil dependency (challenges in terms of diversification). These differences would need to be taken into account during any activities seeking to exchange knowledge or technology between the EU and GCC countries.

At present a number of policies are under development in **Saudi Arabia**, potentially creating business opportunities at national and provincial levels, particularly focusing on waste management, plastic recycling, or food recovery and recycling. However, the consultations indicated that in addition to the high-level strategies there is a need for more targeted regulations focusing on specific waste streams or value chains. Given that the EU has developed relevant policy frameworks and regulations for a wide range of sectors this could be an area for collaboration and exchange of knowledge. In terms of business opportunities, SIRC is in the process of building new sites and a large amount of recycling equipment comes from Europe, and therefore there are various connections with European suppliers. However, an observation emerging from the interviewees is that these connections have not led to elaborate cooperation opportunities. This can be attributed to the lack of familiarity of European suppliers with the Middle East region, or to language barriers. Still, this market is attracting interest from potential investors, also thanks to the attention that has been given to sustainability. In this context, it was recommended that European embassies can play an important role in terms of market cooperation. For example, based on cross-country comparison of ELT management (WBCSD, 2018), there could be at least three areas for closer collaboration. Firstly, the EU could organise briefings about ELT producer responsibility to inform Saudi government officials about the EU policy approach in this field. Secondly, the management structure and procedures at both EU and member state levels could provide an interesting case for consideration in Saudi Arabia. In Europe, national organisations are responsible for ELT management on a country basis, e.g., France, Italy, and Spain. The European Tyre and Rubber Manufacturers Association (ETRMA)[81] is responsible for data management, reporting, and coordination at the EU level. Thirdly, the EU manufacturers' expertise and experience could be a valuable asset for bilateral technical collaboration with Saudi Arabia. The EU, Norway, Serbia, Switzerland, and Turkey within the ETRMA scope as a whole have achieved 37% of ELT recovery for cement kilns (WBCSD, 2018).

[81] See https://www.etrma.org (last accessed on 16 March 2021).

Consultations identified a number of specific opportunities for collaboration between the EU and **Abu Dhabi**. On public procurement, there are three areas of action. In the Emirate of Abu Dhabi, approaches such as sustainable procurement and life cycle costs are not yet integrated in public procurement. Interviewed experts suggest that Abu Dhabi could benefit from exchanging knowledge, best practices, and tools such as Procura+, the European Sustainable Procurement Network and other initiatives fostered by the EU and its members to improve resource efficiency. Information exchange on sustainable procurement through the Procura+ network could also be beneficial to understand how tools and approaches from Procura+ could be introduced in Abu Dhabi. In general, the main factor when procuring for a new product or service is the initial cost. According to interviewees, it would be interesting to learn how life-cycle costing has been introduced in Europe and assess how it could be applied to tendering procedures in Abu Dhabi. Lastly, although sustainable procurement has been on the discussion agenda, it has not yet been introduced despite an earlier pilot project and workshops. In addition, although knowledge on sustainable products has grown in recent years, at the moment there is no central system for public purchases. The consultation notes that it would be interesting to learn from others' experience with obstacles in this regard so that it could move forward in Abu Dhabi.

The consultation informs that there can be opportunities for acquiring knowledge and lessons earnt from EU experience in creating the legal and physical infrastructure for product recovery, return schemes and role of government in this action. On reducing consumption in Abu Dhabi there are discussions on what alternatives to single use products exist and how life cycle assessment can be integrated in developing product specifications. To this end, an area of cooperation could be life cycle assessments including the impact of products if they end up in marine or terrestrial environment. From a **plastics** perspective, a key challenge, when developing policy and engaging in public debate, is taking into consideration different alternatives. Thus, the consultation suggests that engaging in a broader discussion around the sustainable alternatives to the existing behavioral and consumption patterns for end-users and customers would be useful. Another area for collaboration emerging from the interviews is environmental impact assessments. There is a need for additional research and exploration into the environmental impact on products that end up in the terrestrial or marine environment because most life-cycle assessments focus on emissions and consider that products end up at end-of-life stage either at waste-to-energy plants or landfills. Another area for cooperation is exchange of expertise and knowledge on return/deposit schemes and on the role of governments in regulating such schemes. Moreover, both CIRCLE initiatives and various business projects for plastic recovery and recycling could be further boosted and scaled up with active engagement of European manufacturers, marketing professionals, researchers, and NGOs.

7.2 Multilateral/global collaboration

Opportunities for collaboration can emerge in the context of the Global Circular Economy Alliance (GCEA) and G20 in order to complement the bilateral/regional collaboration framework outlined in the previous section. The GCEA could support regional partnerships and work with them. At the same time, it is recommended that the alliance should avoid duplication and focus on synergies, while building on existing initiatives that promote government-to-government exchanges. It is also crucial to work with the business sector by creating a forum for this sector also on a sectoral level

such as **plastics**.[82] Consequently, bilateral cooperation between the EU and GCC countries involving both public and private sectors in knowledge sharing or developing insights could contribute to the GCEA's commitments to map, disseminate and exchange available knowledge and insights, particularly those focusing on domestic policies and regulatory frameworks in third countries.

According to the interview consultation, the **UAE** would be interested in partnerships such as GCEA and G20 as the UAE was the first signatory to the Scale 360 initiative of the WEF. There is a willingness and a commitment to play a lead role on the global stage in similar initiatives. While there are several ongoing initiatives, the mechanisms to coordinate actions at the global level are not in place yet. An opinion expressed by interviewees is that the GCEA should avoid duplication and seek to fill existing collaboration gaps while trying to provide visibility to existing initiatives. Another area of action could be the development of a knowledge clearing house to share the growing body of knowledge (practices, tools, and resources) and help translate knowledge into action. The consultation also notes that more sources of finance are required to scale up the circular economy. On sustainable solutions, it was raised that there is a need for accessing better, faster and cheaper solutions that span the entire life cycle from design to production to distribution to use to disposal. Furthermore, more emphasis should be given in the design of products, i.e., a "design for recycling" approach. In order to make the circular model work, there is a need for products that can be properly recycled.

8 Conclusions and key messages

The analysis undertaken and the case studies reviewed on the state of play of CE policy and implementation in Saudi Arabia and the UAE resulted in a number of lessons learned and messages.

There is a broad agreement that CE policy is still in its infancy in the GCC region. While there has been a growing recognition and emerging consensus about the urgency to move from a linear model based on a "take, make and dispose" approach to a closed-loop/life-cycle model (see Introduction), circular economy (CE) is still at early stages of policy development in both Saudi Arabia and the UAE. There have been some advances and a recognition that recycling and reuse need to be further developed. However, lack of well-developed markets for various types of waste and lack of policies aimed at making landfill a less attractive option are two identified barriers. CE policy in the GCC context remains largely limited within the scope of waste management despite recent advancement in technologies, facilities, market regulatory solutions, and infrastructure aimed at reducing waste at the stages of production and consumption/use. One of the first priorities that emerges from the study is the need to improve landfill diversion rates, with a focus on waste reduction and valorization. To tackle this problem, there are three major areas of improvement: proper infrastructure; proper regulations and their enforcement; and proper funding mechanisms. In addition, incentives for producers and measures to increase consumer awareness are required to reduce waste generation levels.

[82] Session "Towards a Global Alliance on Circular Economy and Resource Efficiency", Circular Economy Stakeholder Conference: Together for a cleaner and more competitive Europe, 3 November 2020. https://www.eesc.europa.eu/en/agenda/our-events/events/european-circular-economy-stakeholder-conference/programme (last accessed on 26 January 2021).

Firstly, looking at examples of advancements in this domain, there have been recent infrastructure developments in both UAE and Saudi Arabia with waste-to-energy plants and waste sorting facilities. 4IR technologies such as IoT and AI could help optimise the operation of sophisticated systems for sorting and recovery. Investments in such facilities have been supported by the governments. Still, infrastructure development should be accompanied by assignments of qualified engineers or technicians and by the increasing awareness of consumers about both MSW and CDW. In this regard, the EU technical assistance facility could support a range of activities such as training of engineers or technicians, communication and dissemination campaigns in multiple languages for migrant labour, and education programmes targeting young population.

Secondly, despite high-level political commitments, long-term visions and establishment of councils, there is a variance in the speed and details of policy or regulatory development in both countries. Although governments set in place supporting agencies such as investment corporations and waste management centres, there remains a gap in policy implementation, for example, between the state/federal level and the provincial/city level. It has been observed that there is often a lack of clarity about specific regulations and the state of enforcement in Saudi Arabia. In the UAE, the federal government sets policy directions and regulations while the emirates set guidelines and specifies details about their implementation. While clarity is not an issue, this multi-governance structure could entail risks of having a varied approach policy implementation across borders. In this regard, the EU could share experience gained from European regions and cities involving both public and private sectors in CE models. One interesting form of knowledge exchange would be matching specific EU and GCC regions or cities as partners for long-term collaboration.

Thirdly, the establishment of appropriate funding mechanisms is crucial to promote CE models in the regions as well as encourage the uptake of clear commitments and targets by the private sector. In this context, for specific waste streams, such as MSW and CDW, it may be advisable to rethink the current mechanisms, which rely on the government subsidising collection costs and explore options for self-financing such operations. It is also important to take into account that a large sum of project finance is available for investments in these countries, and therefore the challenge is not necessarily financial in the region. The major challenge is that finance models need the right regulatory environment to support building viable business models. In this regard, greater collaboration can be promoted for the exchange of expertise in diverse fields ranging from municipal government departments in charge of waste management, to European and GCC recycling companies jointly developing sustainable technical solutions and business model mechanisms.

Lastly, given that many of the current challenges are largely characterised and defined by the GCC context, it is recommendable that, the EU and GCC build on the existing CE frameworks with initiatives for regional collaboration and gradually expand interaction, thereby increasing synergy with global collaboration. The engagement can be supported with efforts by commercial offices and national trade promotion organisations in the EU to create awareness and inform EU specialised companies, while promoting contacts between and GCC counterparts. A possible initial focus could be the managing of MSW and CDW. This could improve GCC consumers' awareness and contribute to increasing support for CE policy in a longer term.

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Annex: Interview plan and implementation

This project combines literature review with interviews with circular economy experts from policy, business, academia and NGOs in the two selected countries, the UAE and Saudi Arabia. The main aim of the interviews is to verify, update, and complement the information gathered from the existing literature. These interviews are semi-structured and are based on a template of questions. The interviewers shared the template with interviewees in advance, facilitated discussions with the interviewees based on the key questions while responding to their interviewees' questions and comments. Thus, each interview would develop into an iterative and deliberative process of dialogue. The project team carried out six interviews in total from November 2020 to January 2021. Each interview was organised remotely via online tools and lasted approximately 30 to 60 minutes. The substance of interviews and the relevant information have been integrated as in the relevant parts of the session. Information from the interviews is presented in an anonymous way in the report.

Interview questions:

1) Can you indicate the key strategic policy frameworks, initiatives and actions in the country in the field of the circular economy?
2) How would you assess the country's level of progress in the circular economy? How is the country performing in certain areas such as consumption of resources and waste generation? Could you provide any links or reports with data and figures?
3) What has been the effect of policies adopted in the country so far? Which are in your view the major existing policy gaps? Is there a need for a more comprehensive framework bringing different policy actions together such as the EU Circular Economy Action Plan?
4) Are there any specific supporting programmers (e.g. funding programmes) for investments in the field of green/circular economy that we should be aware of? If yes, has there been any assessment of their impact (in terms of economic or environmental benefits, job creation)?
5) Which are the key areas and sectors that in your view the country has the largest potential for implementing circular economy approaches and why? Can you provide examples and supporting documents? What are major barriers for business to exploiting the potential? (e.g., a market is not developed yet; a market is there but too many red tapes etc.)
6) From your perspective how could the GCC countries and the EU better collaborate in these areas? Which would be the ideal routes for collaboration (e.g., trade agreements, knowledge and expertise exchange)?
7) Can high-level processes such as G20 play a role in this regard? The European Commission has announced the intention to propose a Global Circular Economy Alliance to take forward partnership initiatives, including with major economies. Would participation in such an initiative be of interest to you? What role could such a partnership play in your view?