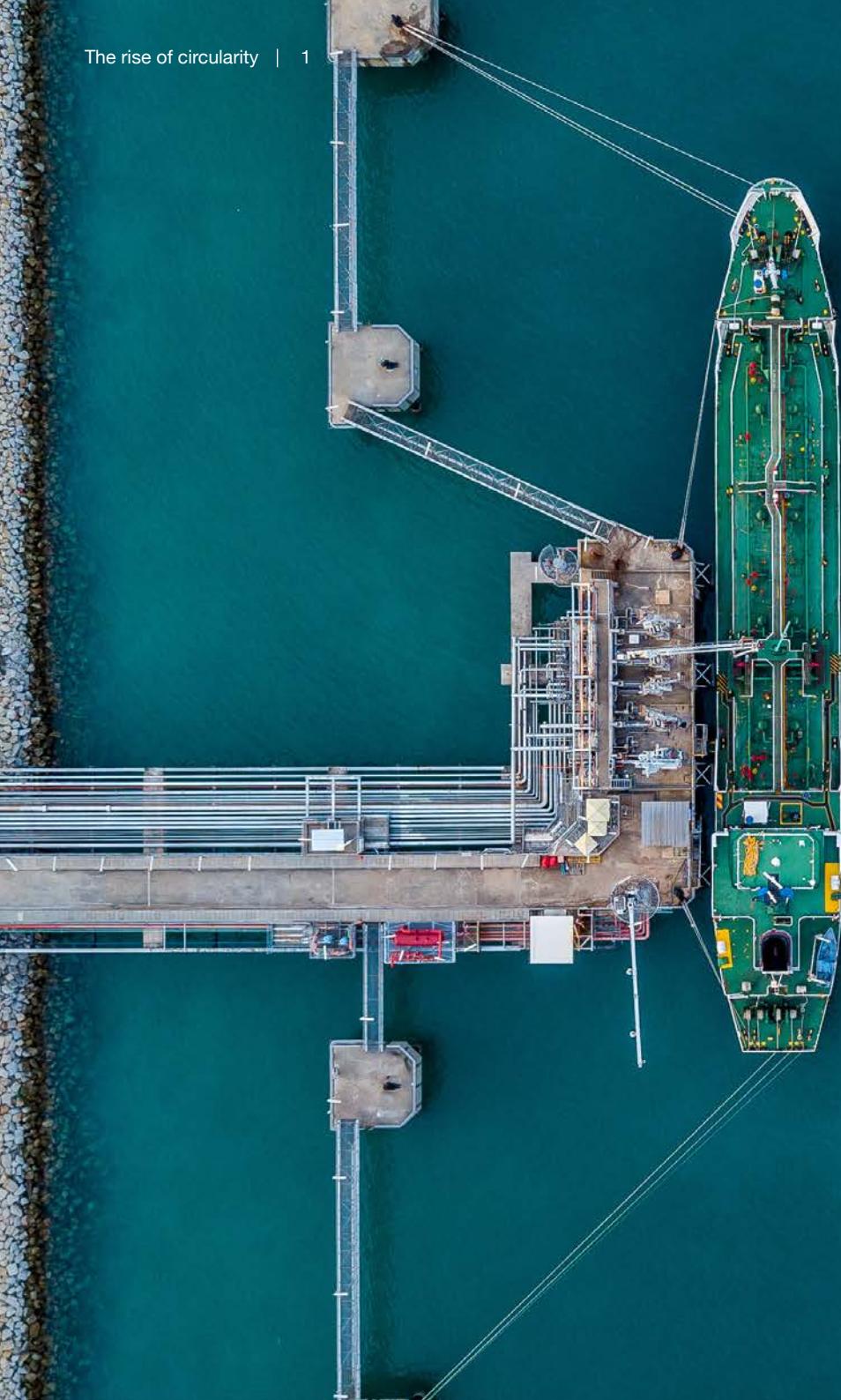


The rise of circularity

**How the GCC is transforming
from the inside for the outside**

Oil and Gas





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Executive summary

As the world attempts to address the causes of climate change before it's too late, the concept of circularity – the decoupling of economic activity from consumption through the creation of closed-loop cycles in which waste is minimised or eliminated and resources are reused – is gathering momentum. As one of the biggest consumers of the planet's resources and a significant emitter, the Energy, Utilities and Resources (EUR) sector should be at the forefront of the debate, exploring ways in which the industry can transform from the inside for the outside.

In this paper, we examine the potential for circularity in the EUR sector – specifically in Oil and Gas – in GCC nations, the benefits circularity could bring to EUR companies and outline the six steps that organisations can take to set themselves on the road to a circular economy strategy.

Circularity is about much more than reducing environmental impact; it offers significant opportunities for organisations and for the region:

- A circular business model is a source of competitive advantage
- Investors and stakeholders are increasingly demanding strong environmental, social and governance (ESG) and sustainability credentials, and punishing companies that fall short
- Circular economy creates jobs and a new ecosystem of service providers.

The region is steadily moving towards a circular economy approach. But much more work is needed from governments and policymakers, and from businesses in the EUR sector.

Circularity is the future – and the EUR sector needs to be prepared

We recommend the following six steps that companies can take for a strategy led action plan:



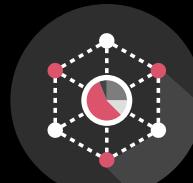
Understand your circular opportunities



Be clear about your strategy and vision



Plan your circular transformation journey



Develop circular collaborations and frameworks



Measure, review and communicate your progress



Move before your competitors, customers and regulators do

A planet, and region, in crisis

Since the 1970s human activity and the linear ‘take-make-dispose’ industrial model have pushed the earth close to the point of no return. In the past 30 years alone we have used up a third of the earth’s resources and at our current rate of consumption, by 2030 we will need not just one earth, but two to meet our demand for resources.¹

The Energy, Utilities and Resources sector is a significant consumer of the planet’s resources and is responsible for a significant proportion of greenhouse gas (GHG) emissions. The chemicals & petrochemicals and iron & steel industries account for 3.6% and 7.2% of global GHG emissions respectively, while fugitive emissions of methane in the Oil and Gas sector account for a further 3.9%.²

The low cost of energy, government subsidies and an abundance of fossil fuel sources have encouraged huge growth in energy consumption in the GCC region; Qatar, Kuwait, UAE, Bahrain and KSA all rank among the worst 10 countries globally in terms of emissions per capita.³

We are already seeing the consequences of our actions through climate change, depletion of the ozone layer and rising sea levels. This puts countries in the region at direct risk through higher temperatures, declining rainfall and other effects of climate change; the Bahrain Supreme Council for the Environment predicted that even the most conservative sea level rise scenario would put 5% of Bahrain underwater within 80 years.⁴

Both population and energy demand in GCC nations are forecast to increase in the coming years. With all six GCC nations falling well under the UN benchmark for ‘absolute water scarcity’,⁵ reliance on desalination plants will inevitably increase; the desalination capacity of GCC countries is expected to grow by 37% by 2025.⁶ This has a knock-on effect on electricity consumption in a region that is already one of the highest per capita consumers of electricity in the world.⁷ Meeting forecasted electricity demand in the future has economic as well as environmental consequences, as extra demand will put a strain on oil supplies, forcing a fall in exports.

1 Number of planet Earths we need, The World Counts, accessed 9 August 2021, <https://www.theworldcounts.com/challenges/planet-earth/state-of-the-planet/overuse-of-resources-on-earth/story>

2 Emissions by sector, Our World in Data, accessed 9 August 2021, <https://ourworldindata.org/emissions-by-sector#energy-electricity-heat-and-transport-73-2>

3 Greenhouse gases emissions by country, WorldData.info, accessed 9 August 2021, <https://www.worlddata.info/greenhouse-gas-by-country.php>

4 Climate Change Impacts in the GCC, Eco MENA, 25 May 2021, <https://www.ecomena.org/climate-change-gcc/>

5 Water Scarcity, UN Water, accessed 9 August 2021, <http://www.unwater.org/water-facts/scarcity/>

6 GCC desalination projects’ investment to reach US\$100bn by 2020, Technical Review Middle East, 25 February 2020, <https://www.technicalreviewmiddleeast.com/power-a-water/water-a-environment/gcc-desalination-projects-investment-to-reach-us-100bn-by-2020>

7 Growing energy demand in the GCC countries, Abdullah Al-Badi & Imtenan AlMubarak, Arab Journal of Basic and Applied Sciences, 12 November 2019, <https://doi.org/10.1080/25765299.2019.1687396>



Circularity as a solution

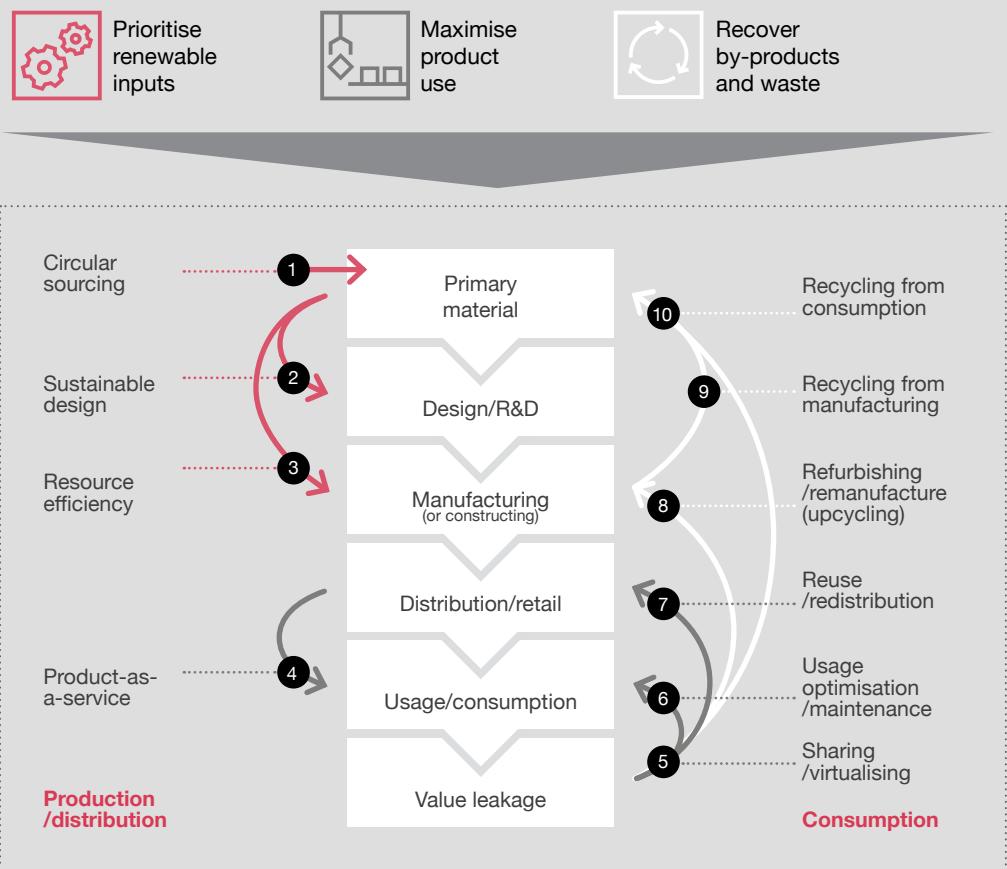
It's clear that something has to change, and quickly. There is a growing consensus worldwide that the answer lies in circularity. Circular thinking decouples economic activity from the consumption of materials and energy by creating closed-loop cycles in which waste is minimised or eliminated and resources are reused.

Three principles underpin circularity:

- **Renewable inputs are prioritised.** This is achieved through circular sourcing, sustainable design of the product and production line, and by optimising resource efficiency (for example through the use of renewable energy and sustainable sources for raw materials)
- **The lifespan and usage of products is maximised in order to extract the highest possible value.** In production, this involves switching to a products-as-a-service strategy (for example chemical leasing where product is turned into a service that can be leased, reused, sold back or shared) where possible. While during consumption, this means that products are reused, product uses and functions are optimised, and sharing is encouraged
- **By-products and waste are recovered and reused.** This includes refurbishing or remanufacturing the product at the end of its life, recycling it back into the production line and reusing the by-products of manufacturing.

The good news is that even companies with business models that are inherently linear, such as those in the EUR sector, can introduce elements of circularity into their operations.

Figure 1



Circularity can be centred on three overarching principles, which define ten corresponding strategies. The diagram above illustrates the continual flow of resources in both the production/distribution phase and the consumption phase.

- Circularity in production/distribution is anchored in four strategies (1–4) that aim to maximise the use of renewables and minimise value leakage across the value chain.
- Circularity in consumption has six strategies (5–10) that reduce value leakage by circulating products and materials at their highest utility through sharing, reusing, repairing, remanufacturing and recycling.
- The end of a product's life represents value leakage when important by-products are not collected for productive use. The circular economy stops value leakage due to discarding products and materials after use.

Figure 2

Circular economy initiatives		Definitions
Prioritise renewable inputs	Circular sourcing	Replace finite resources/materials with renewable, bio-based or recycled materials in the production process
	Sustainable design	Design products – and select raw materials – such that they can be effectively disassembled, reused, repaired and up-cycled
	Resource efficiency	Optimise usage of raw materials/resources – minimise waste – in the production process
Maximise product use	Product-as-a-service	Provide a service in areas that were traditionally sold as products; increases the product lifecycle through repurposing at the end of usage
	Sharing/virtualising	Share durable assets such as cars, rooms, appliances and digitise products to increase their lifetime (e.g. vessel pooling amongst operators, technologies to reduce field movements etc.)
	Usage optimisation/maintenance	Increase performance/efficiency of a product and prolong life through maintenance
	Reuse/redistribution	Purchase and sell second-hand and previously owned products to increase product lifecycle
Recover by-products and waste	Refurbishing/remanufacture	Remanufacture products or components for a new usage, instead of down-recycling
	Industrial symbiosis	Waste or by-products from manufacturing become the inputs for another product
	Recycling from manufacturing	Recycle discarded materials after the end of consumption
	Recycling from consumption	Recycle discarded materials after the end of consumption



The benefits of a circular economy in the GCC

Beyond the urgent and obvious benefits of circularity in addressing the pressing environmental challenges we all face, a circular economy offers a number of opportunities for businesses and GCC economies.

01

Greater efficiency, lower costs, maximum value

Circularity provides a useful lens through which to consider strategic options, making sure that resources are used with care and, wherever possible, treated as assets that have cradle-to-grave value. The end result is a more resilient, competitive business.

A circular business model is a powerful potential source of competitive advantage. Businesses around the world are exploring the potential to save raw materials and cut logistical costs by recovering by-products and waste. Circular procurement, for example, treats suppliers as business partners, creating further value beyond one-off transactions and turning products into services that can be leased, reused, sold back or shared.

02

Brand reputation

As awareness of the risks of climate change grows, so has the focus on sustainability and ESG. EUR shareholders, investors and international bodies are putting pressure on companies to demonstrate their ESG credentials;⁸ Exxon, Chevron⁹ and Shell¹⁰ have all faced shareholder action intended to bring the companies closer in line with the goals of the Paris Agreement on Climate Change.

Business leaders are taking notice: 46% of CEOs in the Middle East say that they plan to increase their long-term investment in sustainability and ESG.¹¹ Commitment to ESG is rapidly becoming a ‘must have’, rather than a ‘nice to have’ – and circularity is the next logical step.

03

Localisation and job creation

Circular business models encourage business-to-business trade of process by-products, opening the door to a new ecosystem of service providers, and creating jobs and localisation opportunities. On a national level, circularity can reduce reliance on imports and reinforce localisation policies.

04

Attracting foreign direct investment (FDI)

Interest in green investment is a growing trend worldwide¹² – a recent survey found that 70% of institutional investors expect that investing in line with ESG factors will be standard practice within five years.¹³

FDI managers are already developing assessment criteria and methodologies that rank countries and companies against sustainability maturity and advancement. A commitment to circularity, on a company and country level, is rapidly becoming an essential criteria for attracting foreign investment.

⁸ Investors pile pressure on companies over ESG at annual meetings, Financial Times, accessed 9 August 2021, <https://www.ft.com/content/844783f8-c9c4-4cda-960f-bec2543a5e12>

⁹ Chevron shareholders pass one ESG proposal; Exxon votes down resolutions, S&P Global, 28 May 2020, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/chevron-shareholders-pass-one-esg-proposal-exxon-votes-down-resolutions-58808569>

¹⁰ Dutch court rules Shell must reduce CO2 emissions, Argus Media, 26 May 2021, <https://www.argusmedia.com/en/news/2218742-dutch-court-rules-shell-must-reduce-co2-emissions>

¹¹ 24th CEO Survey – Middle East findings, PwC Middle East, accessed 9 August 2021, <https://www.pwc.com/m1/en/ceosurvey/2021/ceo-survey-24th-web-ver.pdf>

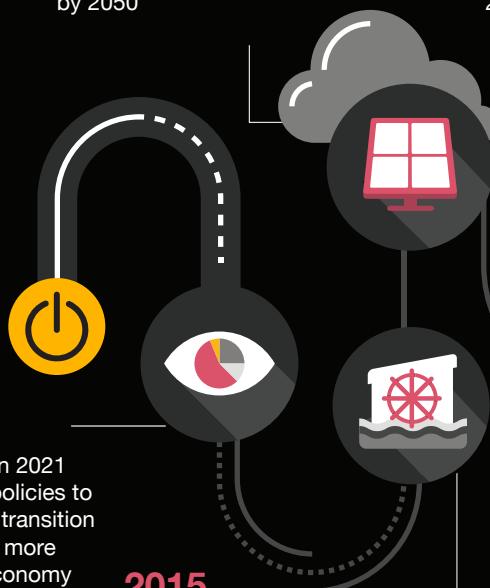
¹² How the World’s Largest Asset Managers Are Finally Taking ESG Seriously, Institutional Investor, 1 March 2021, <https://www.institutionalinvestor.com/article/b1qs5j405m2qtf/How-the-World-s-Largest-Asset-Managers-Are-Finally-Taking-ESG-Seriously>

¹³ ESG will be industry standard within five years, say institutional investors, Institutional Asset Manager, 19 May 2020, <https://www.institutionalassetmanager.co.uk/2020/05/19/285756/esg-will-be-industry-standard-within-five-years-say-institutional-investors>

The circularity journey in the GCC

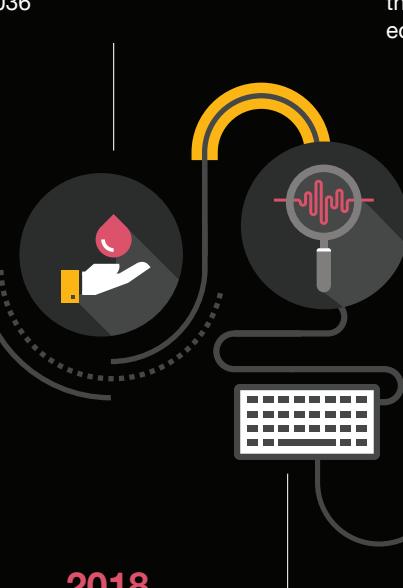
2017

The UAE National Energy Plan 2050¹⁵ sets out plans to cut CO2 emissions by 70%, and increase renewable energy and nuclear capacity by 50% by 2050



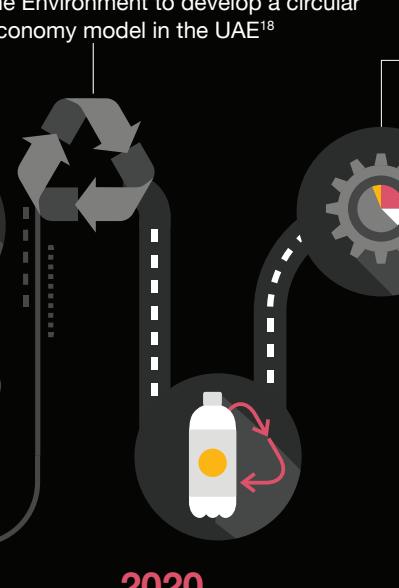
2017

The UAE's Water Security Strategy 2036¹⁶ aims to reduce potable water consumption by 20% and increase reuse of treated water to 95% by 2036



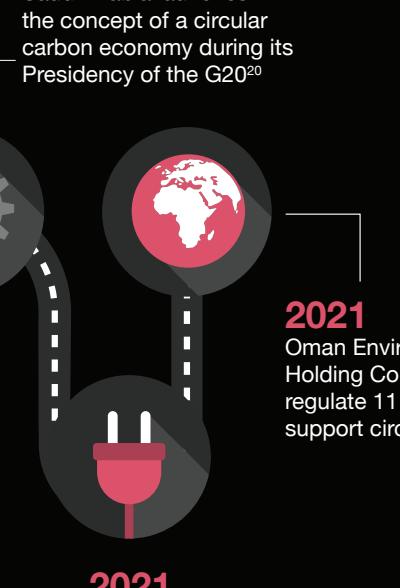
2019

The Coalition of Innovation in Recycling towards a Closed Loop Economy (the Coalition Circle) signs a pledge with the Ministry of Climate Change and the Environment to develop a circular economy model in the UAE¹⁸



2020

Saudi Arabia launches the concept of a circular carbon economy during its Presidency of the G20²⁰



2010

UAE Vision 2021 includes policies to support a transition towards a more circular economy

2015

UAE's National Sustainable Production & Consumption plan (2019-2030)¹⁴ sets out a framework for supporting transition to a circular economy and identifies Oil and Gas as a priority sector

2018

Qatar National Vision 2030 integrates the goals and objectives of the UN 2030 Agenda for Sustainable Development into sections of the National Development Strategy (2018-2022)¹⁷

2020

Abu Dhabi's Environment Agency publishes a Single Use Plastic Policy,¹⁹ which articulates a long term ambition to transition towards circularity practices

2021

Oman Environmental Service Holding Company will regulate 11 waste streams to support circular economy²²

¹⁴ UAE National Sustainable Production & Consumption Plan (2019-2030), United Arab Emirates Ministry of Climate Change & Environment, accessed 9 August 2021, <https://www.moccae.gov.ae/assets/bb4a98d4/uae-national-sustainable-production-and-consumption-plan-2030-2019-framework.aspx>

¹⁵ The UAE National Energy Plan 2050, United Arab Emirates Ministry of Energy & Infrastructure, accessed 9 August 2021, <https://www.moei.gov.ae/>

¹⁶ The UAE Water Security Strategy 2036, United Arab Emirates Ministry of Energy & Infrastructure, 6 June 2021, <https://www.moei.gov.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/the-uae-water-security-strategy-2036>

¹⁷ Qatar Affirms National Vision 2030 is Solid Framework For Achieving Sustainable Development, Qatar Ministry of Foreign Affairs, accessed 15 September 2021, <https://www.mofa.gov.qa/en/all-mofa-news/details/1441/11/24/qatar-affirms-national-vision-2030-is-solid-framework-for-achieving-sustainable-development>

¹⁸ Newly Launched Coalition Signs Pledge with UAE Ministry of Climate Change and Environment, Gulf Petrochemicals & Chemical Association, 22 April 2021, <https://www.gpca.org.ae/2019/04/24/newly-launched-coalition-signs-pledge-with-uae-ministry-of-climate-change-and-environment/>

¹⁹ Single Use Plastic, Environment Agency - Abu Dhabi, accessed 9 August 2021, <https://www.ead.gov.ae/en/join-the-movement/citizens-and-residents/campaigns-and-programmes/single-use-plastic>

²⁰ Energy & Sustainability, Kingdom of Saudi Arabia Vision 2030, accessed 9 August 2021, <https://www.vision2030.gov.sa/thekingdom/explore/energy/>

²¹ Abu Dhabi Department of Energy Launches Policy for Energy Production from Waste (EFW), Department of Energy, 20 January 2021, <https://www.doe.gov.ae/Media-Centre/News/Abu-Dhabi-Department-of-Energy-Launches-Policy-for-Energy-Production-from-Waste>

²² Oman to regulate 11 waste streams to support circular economy, Conrad Prabhu, Oman Daily Observer, 16 August 2021, <https://www.omanobserver.om/article/1105427/business/economy/oman-to-regulate-11-waste-streams-to-support-circular-economy>

Circularity in the EUR sector

Companies across the EUR sector have moved closer to a circular economy approach in recent years. On the following pages, you will find examples of circular economy initiatives and case studies from the Oil and Gas sector.

Looking for other case studies from the EUR sector?

Scan the QR codes to view and download.



Power and Utilities



Metals and Mining



Oil and Gas

Oil and Gas companies around the world are introducing elements of circularity into their operations and pioneering technologies that contribute to decarbonisation in the sector. These solutions range from carbon capture and utilisation and storage, to negative emissions technologies, such as bioenergy with carbon capture and storage, and direct air carbon capture and storage. The GCC has been the base for many of these initiatives.

The sector can further reduce the waste produced across its value chain, primarily gas and water, by designing interoperable systems between its upstream, midstream and downstream systems that promote the concept of industrial symbiosis. Emissions can also be reduced significantly through the reduction of methane venting, fugitives and flaring in addition to applying advanced technology to control and delay gas and water influx in oil wells.

Circular economy initiatives	Potential	Technology and application examples	
Prioritise renewable inputs	Resource efficiency	Very high	<ul style="list-style-type: none"> Predictive maintenance Enhanced oil recovery Advanced methane monitoring and detection Flare optimisation and avoidance Smart energy management with artificial intelligence (AI) Remote operations Digital twins
	Circular sourcing	High	<ul style="list-style-type: none"> Transition to renewable energy sources
Recover by-products and waste	Industrial symbiosis Recycling from manufacturing	Very high	<ul style="list-style-type: none"> CCUS and DACS Carbon compression technology
	Refurbishing/ remanufacture	High	<ul style="list-style-type: none"> Repurposing of discontinued offshore rigs and assets



Case study: Aramco

Aramco, the largest Oil and Gas company in the world, uses the 4R principles (Reduce, Reuse, Recycle and Remove), and Fourth Industrial Revolution technology such as AI and big data, to reduce emissions through active monitoring of its energy consumption, continuously optimise crude oil recovery methods, enhance oil well productivity and improve efficiency of its operations across the value chain. Aramco has undertaken one of the largest carbon Enhanced Oil Recovery (EOR) initiatives in the Middle East, where CO2 captured at its Hawiyah Gas Plant is injected into an oil reservoir at the Uthmaniayah field to increase its productivity.²³

Case study: ADNOC

In 2020, Abu Dhabi National Oil Company (ADNOC), UAE's largest Oil and Gas producer, announced plans to decrease its GHG emissions intensity by 25% by 2030. This target is supported by a set of comprehensive sustainability goals, including resource efficiency, zero-flaring policy, and carbon capture, utilisation and storage.

ADNOC's Al Reyadah facility in Abu Dhabi has the capacity to capture 800,000 tonnes of CO2 annually. ADNOC plans to expand capacity by over 500%, capturing CO2 from its own gas plants, with the aim of reaching five million tonnes of CO2 every year by 2030 – the equivalent of the annual carbon capture capacity of over five million acres of forest.²⁴



23 The Circular Carbon Economy, Aramco, accessed 9 August 2021, <https://www.aramco.com/en/making-a-difference/planet/the-circular-carbon-economy>

24 ADNOC Announces Expansion of Carbon Capture Program, Hydrocarbon Processing, 26 February 2021, <https://www.hydrocarbonprocessing.com/news/2020/02/adnoc-announces-expansion-of-carbon-capture-program>

Chemicals

Among its peers in EUR, the Chemicals sector is often seen to be taking the lead in the circular economy. Advanced chemical recycling, a process where plastic is recycled into fuel or stripped down to its fundamental building blocks (monomers) and then refashioned into polymers, is one example of its advanced capabilities.

Circular economy initiatives		Potential	Technology and application examples
Prioritise renewable inputs	Sustainable design	Very high	<ul style="list-style-type: none"> Integrating sustainability into the design process Development of biomaterials Development of product sustainability indices
	Circular sourcing	High	<ul style="list-style-type: none"> Transition to renewable energy Procurement of second-hand recycled material Life Cycle Assessments (LCA)
	Resource efficiency	High	<ul style="list-style-type: none"> Smart facility energy management
Maximise product use	Usage optimisation/maintenance	Very high	<ul style="list-style-type: none"> Material innovation to increase product durability and life
	Products-as-a-service	High	<ul style="list-style-type: none"> Chemicals leasing and long-term management contracts Value chain integration
	Reuse/redistribution	High	<ul style="list-style-type: none"> Reuse of plastic waste in asphalt mixtures
Recover by-products and waste	Recycling from consumption	Very high	<ul style="list-style-type: none"> Recycle of plastic waste to make liquid feedstock
	Refurbishing/remanufacture	High	<ul style="list-style-type: none"> Repurposing of chemicals and plastic products
	Industrial symbiosis Recycling from manufacturing	High	<ul style="list-style-type: none"> Cross-industry symbiosis with the pharmaceutical industry and others



Case study: SABIC

SABIC's Trucircle programme manages a portfolio of products and services that are based on circularity principles, including certified circular polyethylene (PE) and polypropylene (PP) materials produced from feedstock recycling of used plastics. The company's Design for Recyclability initiative aims to minimise waste in packaging products, with the aim of enabling 100% recyclability.²⁵

In January 2021, SABIC announced that it would partner with Plastic Energy, a pioneer in chemical plastics recycling, to build the world's first commercial unit to produce its flagship certified circular polymers.²⁶ The project is expected to become operational in the second half of 2022.

Case Study: ADNOC Borouge

Borouge, a joint venture between Abu Dhabi National Oil Company (ADNOC) and Borealis, a leading petrochemical company in the region, is a strong supporter of the circular economy and a leader in the movement to achieve a zero waste plastics circular economy. Borouge is investing in a new Packaging Centre of Excellence in Abu Dhabi to develop and commercialise circular packaging solutions.

Among its new 2030 corporate strategy objectives is a commitment to reduce flaring by 60% per tonne produced, decrease hazardous waste by 40%, reduce energy consumption by 14% per tonne produced and reduce consumption of industrial water by 6% per tonne produced.

²⁵ Thriving Responsibly - Executive Summary 2020, accessed 9 August 2021, https://www.sabic.com/assets/en/Images/Executive-Summary-SR2020-EN_tcm1010-28829.pdf

²⁶ SABIC and Plastic Energy set to start construction of pioneering advanced recycling unit to increase production of certified circular polymers, SABIC, 21 January 2021, <https://www.sabic.com/en/news/26247-sabic-and-plastic-energy-set-to-start-construction-of-pioneering-advanced-recycling-unit>

The next steps

While efforts taken by GCC nations and EUR companies to date have been mainly steered by a sustainability agenda, they do contain elements of circularity. There is much work to be done if true circularity is to be achieved.

Moving towards circularity will require a level of partnership and collaboration from government regulators and legislators, industry sector leaders and consumers that has not been seen before. Action is needed at GCC level because of the complexity of value chains, the systemic and multi-disciplinary nature of the technologies and their high development costs, and the cross-sectoral nature of the problems to be addressed.

In particular, governments and policy makers should:

01

Develop regulatory frameworks based on circularity principles to steer regulation and policy

02

Incentivise investments in circular economy related/green companies through tax or fiscal incentives

03

Invest in infrastructure that will enable effective renewable energy integration, waste management and backward logistics

04

Create independent circularity councils to advise industries and advance the development of standards and specifications

05

Increase cross country collaboration to explore optimisation possibilities such as jointly developing desalination plants in favourable locations

06

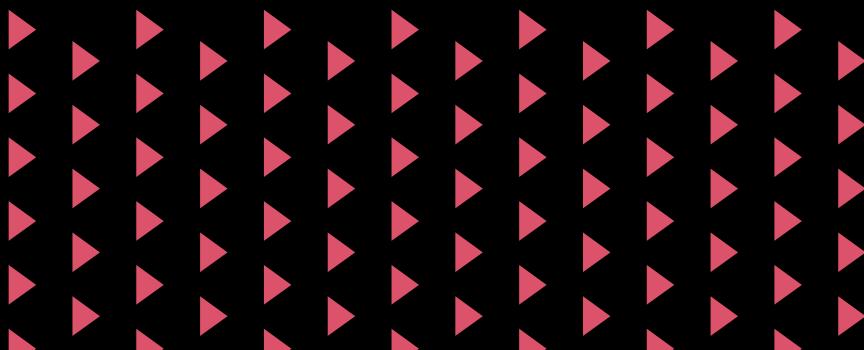
Increase public awareness of the circular economy and its benefits

The GCC has clear advantages as we transition to a circular economy: it has the leadership and financing capability needed to support investment, EUR companies in the region are already pioneering sustainability innovation and greenfield developments, such as NEOM, offer the opportunity for a radical blueprint approach. Furthermore, many of the EUR companies in the region are publicly owned. This gives GCC nations more sovereignty and ability to pass through recommendations that lead to real transformation.

For companies, transitioning to a circular economy will require a mindset change towards long term thinking and a wider approach to value. Function and product-based sustainability will need to be replaced with a more holistic approach, with organisations thinking (and measuring) across their entire value chain and considering all stages of the product life cycle.

As circularity becomes the new normal, businesses that radically innovate to create new business models – investing in new product technology, value chain partnerships, and waste management infrastructure – will be the winners.

EUR companies adopting circularity principles will stay ahead of the curve – not reacting to regulation or public pressure, but proactively planning for a different future.



Six recommendations for EUR companies



Understand your circular opportunities

Examine where your current operational footprint and direction are taking you, and assess your opportunities to deliver circularity – both within your own operations and in your surrounding community of suppliers, customers and stakeholders.



Be clear about your strategy and vision

Set out your circularity ambition and the strategy that underpins it. Make sure it is understood by those who will deliver it and clearly communicated.



Plan your circular transformation journey

Some companies may only need small steps; others will require transformation of the entire business model. Wherever you are on the spectrum, identify the capabilities that will enable the transition.



Develop circular collaborations and frameworks

Forge the relationships and alliances that will help you develop an effective circular ecosystem – one that has clear rules, a dedicated infrastructure and a logistical network.



Measure, review and communicate your progress

Management and reporting processes should be put in place to monitor circularity steps and support ongoing refinement of your circular strategy. Maximum transparency and building trust are key.



Move before your competitors, customers and regulators do

Stay one step ahead to keep control of your own transformation.

Success is no longer measured by finances alone, but how businesses adapt to the changing world, taking bold steps forward to tackle the biggest challenges of today and capture the opportunities of tomorrow.

By taking the above steps and putting the circular economy at the heart of business strategy, the industry can make the operational, cultural and financial changes needed to deliver sustainable business advantage and long term value: transforming from the inside for the outside.



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To find out more about how we can help your business, please visit us at www.pwc.com/me or get in touch.

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