

# **RENEWABLE RELATIONS: A STRATEGIC APPROACH TO EUROPEAN ENERGY COOPERATION WITH THE GULF STATES**

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## **SUMMARY**

- Russia's war on Ukraine prompted a frenzy of energy deals between EU member states and countries in the Middle East and North Africa, but their implementation is slow.
- The EU needs a new approach to energy cooperation with states in the Middle East and North Africa that serves both its energy security imperative and its climate goals.
- The Gulf monarchies represent a good test case for such an approach, due to their green ambitions, abundant resources, and significance to the fight against climate change.
- Political and ideological differences are currently the greatest obstacle to long-term, strategic energy cooperation between the regions. But this year's COP28 in Dubai is an opportunity for both sides to focus on practical ways to accelerate the green transition.
- Europeans should emphasise four promising areas of energy cooperation with the GCC states: energy efficiency and electrification, renewable energy, and the circular carbon economy.

# Introduction

Floods in Italy, landslides in Pakistan; ice storms in Texas, wildfires in Canada. The climate devastation of 2023 is a reminder, as if another were needed, that time is running out to address global warming. Yet, the March 2023 report from the United Nations Intergovernmental Panel on Climate Change indicates that current emissions reduction pathways and technologies remain insufficient to limit that warming to below 2°C compared to pre-industrial levels. Instead, it warns of more weather-related disasters to come and the catastrophic degradation of the global ecosystem.

Russia's all-out invasion of Ukraine in February 2022 exacerbated this lack of progress. To meet shortfalls of Russian fossil fuels, Europeans have turned towards countries in the Middle East and North Africa. But this comes with obvious difficulties, not least the continued use of fossil fuels in light of the climate crisis. Europeans are already in a weak geopolitical position vis-à-vis their partners in the region. This could deteriorate further if their status as energy *demandeurs* takes root, thereby diminishing their leverage on issues such as human rights. Europeans are also wary of simply replacing a problematic and geopolitically risky dependency on Russia with problematic and geopolitically risky dependencies on other countries in the world.

It is therefore crucial for Europeans to develop a new approach to energy relations with the Middle East and North Africa that does not entrench their dependence on states in the region. This approach should reinforce shared interests of peace, stability, and prosperity within a sustainable, long-term, and diversified strategy. It needs to serve Europeans' energy security goals, but also its climate goals, and should maintain a strong focus on accelerating the move beyond fossil fuels. This should take place not only through the development of green energy relations, but also – more broadly – through the implementation of industrial decarbonisation and a comprehensive green transition in both regions.

The Gulf Cooperation Council (GCC) monarchies represent a good test case for such an approach. The monarchies – especially Qatar – have become protagonists in European efforts to diversify away from Russian energy. And if Europeans want to achieve their domestic and international climate goals, they will have to engage with the GCC states, which are home to almost one-third of the world's proven crude oil reserves and around one-fifth of its natural gas reserves. Domestic CO<sub>2</sub> emissions in GCC states account for just 2.4 per cent of the global total, but the export of huge quantities of fossil fuels means these countries also export huge volumes of CO<sub>2</sub> emissions.

Yet, the GCC states also harbour green ambitions. They have the financial resources to make

the substantial investments required to enable the energy transition, as well as an abundance of technical expertise in the energy industry and access to the cheapest solar energy in the world.

The monarchies have also recently intensified their efforts to address climate and environmental challenges. Their societies – especially young people – are becoming more vocal about issues such as air quality.

GCC leaders have noted the opportunities linked to the energy transition – including the economic benefits of efficiency, electrification, renewables, and the circular carbon economy – and the political value of embracing climate diplomacy. Later this year the United Arab Emirates (UAE) will host the United Nations climate conference (COP28), while the UN's regional Climate Week for the Middle East and North Africa will take place in Saudi Arabia.

Moreover, Europeans should be partners of choice for the Gulf monarchies. This is due to the competitive edge of Europe's know-how around the energy transition, but also existing industrial and technological ties between the regions and geographic proximity. Some European actors have sought to explore these complementary energy interests through increased engagement with the GCC over the past year. But the reality beyond the media hype is that the European approach has been scattered and short-sighted. The European Union has not devoted enough energy to advancing a coordinated policy; the most ambitious projects from member states, which centre around the energy transition, still face several technical, market, and political obstacles.

This policy brief examines some of these obstacles by analysing existing and potential energy cooperation between EU and GCC states in the context of the run-up to COP28. It also highlights the opportunities for the EU in a new approach to climate relations with the GCC states, especially regarding its climate goals and energy security imperatives. Finally, the paper sets out how Europeans can build partnerships with the Gulf monarchies that could also serve as a launching pad for efforts in industrial decarbonisation and the energy transition farther afield. It focuses on four promising domains of cooperation between Europeans and the Gulf monarchies: energy efficiency and electrification, hydrogen, and the circular carbon economy.

## Welcome to the future of Europe-Gulf state energy relations

As well as being top oil and gas producers, the Gulf monarchies are potential sources of green

energy for the EU and likely frontrunners in the global energy transition. Yet, as I set out in a paper for ECFR in 2021, the EU initially underwhelmed in its engagement with these states as part of the European Green Deal. GCC capitals, in turn, were broadly hostile to a policy that they viewed as revolving around carbon taxation and threatening their economic survival, by focusing on a rapid phase-out of fossil fuels.

But Russia's all-out invasion of Ukraine changed the dynamics of energy geopolitics. The pressures of an imminent energy security crisis forced Europeans to become more attuned to GCC arguments that the energy transition should take place without major socio-economic instability. At the same time, while the GCC states intensified energy cooperation with Russia following the invasion, they also started to see more clearly that strategic energy relations with the EU presented opportunities – since it would be the only major market able and willing to absorb meaningful quantities of green energy in the short term. [1] Trade with the EU in the energy sector also serves the purpose of reducing GCC dependence on the Chinese market, which Russia has aggressively targeted.

Unsurprisingly, energy engagement between EU member states and the Gulf monarchies has intensified since February 2022. ECFR's Energy Deals Tracker found that Austria, France, Germany, Greece, Hungary, Italy, the Netherlands, and Poland have signed deals with Bahrain, Oman, Qatar, Saudi Arabia, and the UAE. Most of these agreements are short term and simply focus on diversifying supplies of fossil fuels to Europe. But some of them stand out for their ambition and their efforts to combine key EU member states' short-term energy security with long-term goals linked to the green transition and decarbonisation.

In September 2022, the German chancellor, Olaf Scholz, visited Qatar, the UAE, and Saudi Arabia. Two months later, Berlin signed a 15-year deal to buy 2m tonnes of liquefied natural gas (LNG) from Qatar, with deliveries starting from 2026. That same year, Qatar and Germany signed an energy partnership with working groups on hydrogen, LNG, and energy efficiency. Berlin and Abu Dhabi have had an energy partnership since 2017. To build on that, they signed the Energy Security and Industry Accelerator Agreement that aims to, as Scholz put it, “enable the rapid implementation of lighthouse projects [small-scale but big-picture initiatives] in the priority areas of renewable energy, hydrogen, LNG and climate protection”. Germany's largest power company RWE, signed an initial agreement with Abu Dhabi National Oil Company (ADNOC) for a delivery of 137,000 cubic metres of LNG. But another deal followed for, initially, “blue hydrogen” – hydrogen produced using natural gas and storing carbon emissions – and its derivative “blue ammonia”. This deal includes an aim of quickly replacing this with the cleaner “green hydrogen”. In Saudi Arabia, the German foreign office has opened a Riyadh-based hydrogen diplomacy office. Its aim is to implement a 2021 memorandum of understanding that foresaw Germany providing electrolysis systems for the

production of hydrogen at the Saudi flagship hydrogen project, NEOM Green Hydrogen Company, in exchange for green hydrogen exports to Germany. Finally, during the historic first visit of Sultan Haitham bin Tariq to Berlin in the summer of 2022, Germany signed a declaration of intent with Oman for closer cooperation in green hydrogen and its derivatives; smart grids and energy efficiency in industry, buildings, and transport; and regulatory frameworks.

France has also been active. In July 2022, the UAE and France inked a comprehensive strategic energy partnership, reinforced by a 2023 UAE-France-India tripartite cooperation initiative focused on the energy transition. Moreover, Paris signed a memorandum of understanding with Riyadh to work together on nuclear energy; hydrogen; electricity interconnection; energy efficiency, storage, and smart grids; and oil and gas and their derivatives. The last of these focuses especially on carbon capture, utilisation, and storage (CCUS) technologies, which capture carbon emissions at source to sequester them underground or to transform and use them as alternative marketable products. The memorandum also promotes cooperation on cross-cutting issues such as the localisation of materials, products, and services in the energy supply chain, and joint scientific research and training.

Italy has emerged as the third active member state. Alongside LNG cooperation, Italian energy multinational Eni signed a memorandum of understanding with Saudi Arabia's minister of investment in September 2022 that covers sustainable mobility, the circular economy, and the chemical industry. The Italian government promoted the first pre-COP28 event in Abu Dhabi, which followed a declaration of intent between the two governments to enhance cooperation in the COP28 framework. The intention is to build upon longstanding connections between Eni and ADNOC by increasing efforts in the areas of renewable energy, blue and green hydrogen, energy efficiency, carbon capture and storage (CCS), greenhouse gas reduction, methane gas emissions, and routine gas flaring. Eni is principally involved in enhanced oil recovery and gas extraction in the multi-billion-dollar Ghasha natural gas field, and has signed a memorandum of understanding with the state-owned Mubadala Petroleum to work on joint energy transition projects in the Middle East and North Africa, south-east Asia, and Europe. A 2021 memorandum of understanding between Italian firm Snam and Mubadala had agreed to assess the feasibility of piping green hydrogen to Europe.

Deals such as these have substantial potential to advance the energy transition in the GCC states. However, to move from paper to practice, the sides will have to confront and overcome some key obstacles including: the resilience and sustainability of the green supply chain; the development of necessary infrastructure; technological and scientific problems related to green energy production; and challenges linked to market development and financing. The

later sections of this paper cover how they can begin to do so.

Yet, the greatest barrier to realising the potential of energy relations between European and GCC states is not technical, but political. This becomes most apparent at the EU level. In the months after the publication of my 2021 research, and in line with the paper's recommendations, the EU elaborated a roadmap for its energy relations around the world to accompany the transition from fossil fuels to green energy. Importantly, this "REPowerEU" decarbonisation strategy clearly indicates the scale of the opportunity for exporters such as the GCC states. The EU's External Action Service also included energy as a domain of its proposal in May 2022 for "A strategic partnership with the Gulf", which the Council of the European Union strongly endorsed in June that year. In the framework of COP28, some EU-UAE engagement has taken place at the level of meetings between senior officials. And European Commission vice-president Frans Timmermans, who leads on the European Green Deal, and Kadri Simson, the energy commissioner, took much-anticipated trips to the UAE in January 2023 and Saudi Arabia in March 2023.

However, the EU appears to be actively de-prioritising the Gulf monarchies regarding the energy transition. The REPowerEU document only mentions the GCC explicitly in one sentence. The EU-GCC Clean Energy Technology Network, which brought together stakeholders and experts from the two regions to foster clean energy partnerships, reached the end of its mandate in June 2022; its replacement – the EU-GCC Cooperation on the Green Transition and De-Carbonisation – has not yet come to fruition, leaving a most untimely vacuum. NEOM is one of the few fully financed hydrogen projects in the Middle East and North Africa, and a rare realistic source for the EU to fulfil its ambitious objective of importing 10m tonnes of green hydrogen by 2030. But a hydrogen partnership between the EU and Saudi Arabia remains embryonic, while the EU's directorate-general for energy has signed hydrogen partnerships with countries that are far behind Saudi Arabia's production schedule with NEOM. It is unclear whether the EU has even begun conversations about hydrogen with Oman and the UAE, which are two other promising producers.

At the core of the EU's reluctance seems to be uncertainty about how to deal with entrenched views – on all sides – over how to undertake the green transition. COP28 will therefore be a crucial catalyst to explore opportunities to bridge some of those gaps. As such, Europeans should ensure that they arrive in Dubai with a clear awareness of their host's priorities.

## Horizon COP28: What Europeans should know

Climate change has a significant impact on GCC countries, but hydrocarbon revenues contribute between 60 per cent (UAE) and 90 per cent (Kuwait and Qatar) of government

budgets. GCC governments previously viewed climate policies as a bigger threat than climate change, as these policies posed a direct threat to their economic wellbeing. [2] In this sense, they historically aligned with other emerging economies – such as China, their indispensable client in international negotiations. Moreover, GCC countries have long focused on adaptation rather than mitigation in relation to climate change, since their high-income status allows them to invest in high-tech resilience.

However, climate change is slowly becoming more relevant for policymakers in the region. All GCC states except Qatar have now introduced net-zero targets. As discussed, GCC governments also increasingly see green energy as an economic opportunity. According to a report from the International Renewable Energy Agency, an increase in the use of renewable energy in the GCC region of 80GW by 2030 would allow the monarchies to conserve about 11 trillion litres of water, as well as 400m barrels of oil, per year. This would also create more than 200,000 jobs.

The green transition will be a given in the region, but the GCC states want that transition to be slow and gradual.[3] They would first scale up their renewable energy capacity to deploy it domestically, freeing up more fossil fuels for export. (All the GCC countries are currently investing in more fossil fuel production capacity.) Later, they would diversify their exports by adding green energy. This would allow them to preserve their political-economic systems based on the redistribution of externally derived rents a little longer, guarding against potential economic and political instability. This is the fundamental context to the green transition thinking in the UAE and other Gulf monarchies.

Like its predecessor in Egypt, COP28 is thus unlikely to result in commitments to phase out fossil fuel production. The UAE is designing COP28 around the approach of accelerating the energy transition without fossil fuel producers having to compromise their hydrocarbons-funded economic growth. This thinking very much reflects the contradictions of having a major fossil fuel producer host the conference – and choosing as the president of that conference Sultan al-Jaber, who runs ADNOC as well as Masdar, one of the country's largest and most active renewable energy investment funds. This point has been the source of much controversy over the UAE presidency in Europe and the United States, and will complicate the signing of an agreement at the meeting.

The UAE and other fossil fuel producers saw the scramble for energy security after the Russian invasion of Ukraine as an opportunity to argue, as Jaber has, that fossil fuels are still necessary: “[we] cannot unplug the current energy system before we have built the new one,” he said at India Energy Week in February 2023. At this year's CERAWEEK energy conference, Jaber added, “Let's scale up best practices and aim to reach net-zero methane emissions by

2030. We must electrify operations, equip facilities with carbon capture and storage, and use all available technologies to increase efficiency across the board.” He also advocates investing in only the least carbon-intensive oil barrels which, incidentally, are to be found in the GCC.

Indeed, with some of the lowest carbon footprints and production costs for oil in the world, the Gulf monarchies might even increase their market shares in the medium term; they could be subject to up to 50 per cent less in EU carbon tariffs than most competitors, making them the last men standing in fossil fuels. ADNOC and the Saudi Arabian Oil Group (ARAMCO) both plan to have expanded their oil production by 2027, by when Qatar also aims to have increased its gas production by 64 per cent. Doha considers gas the transition fuel *par excellence*.

The UAE will direct COP28 to move from fighting the hydrocarbons industry to working with it to promote technological solutions to limit emissions, such as CCUS. The UAE already deploys CCS technologies at a commercial scale, in part thanks to strategic cooperation with European energy industry operators. But the percentage of CO<sub>2</sub> the GCC states capture is still critically insufficient. As of August 2022, there were only three large and active carbon capture plants in the GCC region, capturing 3.7m tonnes a year of CO<sub>2</sub> – which is 10 per cent of global capture capacity: Uthmaniyah in Saudi Arabia, Al-Reyadah in the UAE, Ras Laffan in Qatar.

The UAE will also use COP28 as a platform to boost investments in green energy production globally as it works to become a key actor in this space. The UAE already has the world’s most cost-effective solar energy production system and the Middle East and North Africa’s highest percentage of renewable energy in its mix, with 3.058 megawatts of capacity. Accelerating green energy industrial development is central to the UAE’s Net Zero by 2050 strategy, and the country has to date invested over \$16.8 billion in 70 green energy projects worldwide.

Yet, neither the UAE nor any other GCC country, despite some sizable pledges and large-scale projects, are yet on track to meet their self-declared green energy targets. Saudi Arabia, the UAE, and Oman aim to generate between 20 per cent and 50 per cent of their domestic energy needs from renewable sources by 2030, and have significant ambitions to produce and export green hydrogen. This would require almost 40-60GW of renewable energy capacity by 2030, compared to a current installed capacity of around 4,000MW. Qatar, Kuwait, and Bahrain do not have comparable or noteworthy renewable energy targets.

Finally, the UAE is setting high expectations on progress over climate finance at COP28. Jaber has criticised the availability and affordability of this finance, advocating an increase from “billions into trillions” in such a way that would not exacerbate the debt crisis in poorer



countries. He has also argued for improved accessibility to climate finance by removing some bureaucratic obstacles that hinder access to funds. Abu Dhabi has pledged to complete negotiations at COP28 on the compensation fund for climate change-related loss and damage in developing countries, agreed after some discord at COP27.

Indeed, there is a global shortage of dedicated climate finance frameworks, including in the GCC monarchies. Some promising initial projects include the 2021 Sustainable Finance Framework in the UAE, which has pushed dozens of financial institutions to lend and invest in environmentally sound activities; a 2019 scheme from Oman's Bank Muscat to encourage renewable energy installation; and Saudi Arabia's 2022 Green Finance Framework through its Public Investment Fund – the country's sovereign wealth fund – which has released two tranches of green bonds aimed at supporting the local green agenda. The EU, for its part, has a diversified portfolio of climate finance instruments and frameworks (such as the European Hydrogen Bank and several environmental, social, and governance investment models) which could serve as inspiration for the UAE's goals on climate finance at COP28.

In fact, the EU could even encourage the GCC states to see its forthcoming carbon border adjustment mechanism (CBAM) as a financial product and – as with its emissions trading system (ETS) – a new source of climate financing. Europeans could discuss this with their GCC counterparts at COP28 while offering technical assistance to draw up a carbon-pricing framework, which is currently absent in the GCC. Given the relatively low-carbon content of GCC industry, detailed carbon pricing could be more convenient than standard emissions metrics and increase acceptance of the CBAM in the region.

## Make it happen: Pathways to decarbonisation

All of this suggests that there will likely continue to be significant divergences in the parties' perspectives at COP28. However, there is also a substantial convergence of interests in several domains that could advance the green transition. The most effective way to address this challenge is to look beyond the ideological divide and focus on technical barriers to progress in the following areas: energy efficiency and electrification, the circular carbon economy, and hydrogen.

### Energy efficiency and electrification

Energy efficiency and electrification have been part of GCC policymakers' discourse for decades. Per capita energy consumption rates in the GCC are among the highest in the world, exacerbated by economic growth based on energy-intensive industries, a development and

construction boom, and growing populations. GCC countries score low on energy efficiency, both in absolute terms and compared to other oil producers and high-income countries; they fare better on electrification. Over the past ten years, GCC policymakers have started pushing more vigorously to improve both, including in cooperation with the EU, which they recognise as having significant expertise to share on both topics.

Energy efficiency and electrification, alongside the development of renewable energy sources and emissions reduction, have been at the core of several EU-GCC projects. These include: the 2010 joint action programme for the implementation of the GCC-EU Cooperation Agreement; a policy document covering 2010-2012 followed by scientific diplomacy project INCONET-GCC from 2014-2017; and the EU-GCC Clean Energy Technology Network, which ended last year. These frameworks encouraged and facilitated the participation of Europe's private sector in energy transition projects across the GCC, including in electricity interconnections – the core infrastructure that enables efficiency and electrification.

European and GCC producers, transmission system operators, and distributors need new frameworks for dialogue on interconnections. This needs especially to address the prospect of linking the GCC-wide transmission grid to, for example, its European counterpart ENTSO-E. Plans for such an interconnection have gained momentum since a 2021 deal between Egypt and Saudi Arabia to link their grids, and another signed in 2023 between the GCC and Swiss company, Hitachi Energy, to boost the existing exchange capacity of the GCC grid by upgrading the Al-Fadhili high-voltage direct current converter station. The latter is a necessary preliminary step to further extending connectivity towards the Mediterranean.

Alongside changes in consumer behaviour, electrification is fundamental to improving energy efficiency in high-emissions sectors such as construction, transport, and cooling (air conditioning and refrigeration, for example). The UAE, Qatar, Kuwait, and Saudi Arabia are starting to put in place guidelines for the construction industry on building codes, insulation, and glazing; efficiency criteria are often included in urban development planning. But there is still considerable scope for improvement. EU directives represent the highest standards in this sense. The EU has previously organised a webinar to engage its GCC counterparts on energy efficiency in construction and urban development. This brought together policymakers and representatives from the private sector – including industrial and building operators, architects, engineers, and smart technology providers – to discuss solutions in “green buildings”, a core theme of the European Green Deal. EU leaders should ensure that that was not a one-off exercise.

A key sub-theme in the green buildings domain is cooling. In most GCC cities, cooling can account for up to 60 per cent of local energy consumption. Over the past few years, GCC

countries have increased their use of “district cooling”, which improves efficiency by consolidating supplies of cold air to distribute across densely populated areas. But governments need to do more to encourage this through specific regulatory frameworks and urban planning. At the same time, GCC markets are still overflowing with cheap and energy-inefficient air conditioning units. The race is now on to replace fixed air conditioning units with more efficient inverter units, which consume 40 to 50 per cent less energy.

The GCC states could now encourage the replacement of other cheap and energy-inefficient “Made in China” appliances, that have flooded the local markets. Energy subsidies have for decades been at the core of the government-society ruling contract in the monarchies. It would therefore be easier for them politically to promote more efficient alternative goods than try to influence consumer behaviour by reducing subsidies. At the same time, lowering subsidies and raising tariffs – both for water and for electricity – are tools that some GCC governments have gradually introduced, and seem necessary given the amount of wasted energy in the region.

## The circular carbon economy and decarbonisation

Gulf states have long treated CCUS as a silver bullet solution. The EU cautions against the GCC countries’ overreliance on technology, and continues to stress the need for behavioural change.[4] However, the European Green Deal also recognises CCUS as a key tool to aid decarbonisation.

Saudi Arabia centred its 2020 presidency of the G20 around CCUS and other measures to create a “circular carbon economy” based on the reduction, reuse, recycling, and removal of CO<sub>2</sub>. Over the past 12 months, Saudi Arabia has pledged to only build power generation plants that incorporate carbon capture technology and to work through its Middle East Green Initiative to cut emissions by 60 per cent by 2030 – by when the country aims to be capturing 44m tonnes of CO<sub>2</sub> a year. ARAMCO is currently building a new plant in Jubail with the capacity to capture 9m tonnes per annum by 2027. Qatar and the UAE target, respectively, a total capacity of 7m tonnes per annum and 5m tonnes per annum by the same year.

However, as discussed, the share of CO<sub>2</sub> captured in the GCC countries is still critically insufficient. The GCC's three carbon capture and storage facilities in Saudi Arabia, Qatar, and the UAE sequester just 3.7m tonnes per annum. The three other GCC fossil fuel producers – Oman, Bahrain, and Kuwait – lag even farther behind. In the International Energy Agency's global scenario for net zero by 2050, the world needs to be capturing 1,200m tonnes per annum by 2030, with CO<sub>2</sub> transport infrastructure and storage capacity increasing at the same rate.

As part of their CO<sub>2</sub> strategy, the Gulf monarchies have also bet on nature-based solutions, such as: restoring wetlands, conserving mangrove forests, protecting salt marshes, restoring forest habitats, and planting trees. In March 2021, as part of its Green Initiatives, Riyadh announced that it aimed to plant 50 billion trees across the Middle East over the coming decades, including 10 billion trees in Saudi Arabia.

All the other monarchies have launched similar, albeit smaller, tree-planting campaigns. However, environmental experts cast doubt on the feasibility of planting so many trees in such a water-stressed region. They point instead to other promising nature-based solutions such as “mineralisation” – a process that permanently captures (that is, mineralises) CO<sub>2</sub> within peridotite rock formations. The UAE and Oman have already studied the potential of this solution in a pilot project, which found it could be cost-competitive and compatible with the GCC environment, where peridotite is abundant. The EU recognises mineralisation as a permanent sequestration method, which can be excluded from the obligation to report emissions under the ETS.

Going one step further, EU member states are undertaking several projects to permanently lock CO<sub>2</sub> into building materials. These projects include some that have even reached the commercialisation stage: for example, the first pavement made out of CO<sub>2</sub>-based bricks was installed in Belgium in 2020. To date, concrete products containing reused CO<sub>2</sub> are only available in the form of blocks and bricks, which cannot be used as building foundations due to their higher than normal acidity. But in the future, these CO<sub>2</sub>-based materials could potentially replace carbon-intensive products such as cement, significantly reducing the carbon footprint of building materials globally.

Incorporating CO<sub>2</sub> into building materials could become one way to make CCUS commercially viable. And commercial viability is how CCUS can become a credible tool in fighting climate change. The main obstacles to achieving this viability are the cost of the equipment needed to capture and pressurise CO<sub>2</sub>, as well as to transport and store it. The bulk of CCUS technology currently in use remains substandard, with the least efficient plants capturing

only around 60 per cent of emissions. There is also a high risk of CO2 leaks contaminating aquifers.

Today, the only form of large-scale, permanent, and profitable carbon sequestration is enhanced oil recovery (EOR), whereby the captured carbon is reinjected to extract more oil or gas. In fact, nearly 70 per cent of CO2 captured globally is currently used for EOR. This is clearly not sustainable, and the global focus should be on more innovative solutions.

Another example of commercially viable use of CCUS is CO2-based synthetic fuels, such as “electrofuels” or “e-fuels”. These use captured CO2 and electricity to produce “drop-in” diesel or gasoline, methanol, and similar fuels that can power vehicles, aeroplanes, and ships. EU policies have incentivised CO2-based synthetic fuels, in particular through the recast Renewable Energy Directive to 2030. Although the EU should still phase out emissions-producing cars and vans by 2035, it should also continue to support e-fuels – especially to help decarbonise aviation. Some European companies have committed to net-zero flights by 2050, and the Dutch airline KLM operated its first e-fuel powered flight in 2021. E-fuels are considerably more expensive than conventional fuels, but the technology is progressing fast and some companies have already pledged to match and beat the price of conventional fuels within a decade.

The Gulf monarchies – where aviation is a major business – have also shown interest in e-fuels. In 2021, the UAE’s Ministry of Energy and Infrastructure and the World Economic Forum, along with the Clean Skies for Tomorrow coalition, collaborated on a white paper called “Power-to-Liquids Roadmap: Fuelling the Aviation Energy Transition in the UAE”. In this, they announced the launch of a roadmap to produce 11m tonnes of sustainable aviation e-fuel by 2050 and clearly identified aviation e-fuels as an opportunity for decarbonisation, job creation, and GDP growth.

One highly innovative idea to commercialise the use of CO2 is using it to power batteries. The Italian start-up Energy Dome has already launched its first CO2 battery facility and entered the commercial scaling phase, including through projects in the Middle East and North Africa. The company uses liquefied CO2 in a process that allows storage of power generated from the sun and wind in a closed-loop system that generates no emissions. The project obtained EU funding via the European Innovation Council, due to its potential to make cost-effective renewable energy that can be dispatched around the clock and the fact that the technology neither relies on lithium-ion batteries nor on any rare earth minerals such as cobalt.

The potential for a viable commercial reuse of captured CO2 for major fossil fuels producers

is substantial. GCC states would have a very strong strategic interest in funding similar innovative research in pursuit of the necessary technological breakthroughs. A partnership with the EU and member states would act as a much-needed accelerator.

## Hydrogen beyond the hype: Storage, transport, and uses

Hydrogen has emerged as a shared interest between European countries and the Gulf monarchies. European policymakers believe that hydrogen could be a solution to decarbonise hard-to-electrify sectors, including heavy industries, shipping, and aviation; or for long-term energy storage for electricity production. The booming availability of cheap renewable energy – particularly in places such as the Gulf monarchies – could make even the most expensive green hydrogen cost-competitive. Other hydrogen types – such as blue or pink (produced using nuclear energy) – are also appealing and feasible options for the Gulf monarchies. Additionally, the GCC states could redeploy, to some extent, existing infrastructure for the hydrogen business, such as port facilities, LNG export and import terminals and gas pipelines, and salt domes for storage. This could enable the long-term economic survival of oil and gas firms after the energy transition is complete.

Indeed, some GCC countries (for example, Saudi Arabia, the UAE, and Oman) have accelerated their hydrogen plans over the past year, in order to be early movers. The EU would be their most important market, as the bloc – alongside key European countries such as Germany, Italy, Spain, the United Kingdom, and France – has officially identified hydrogen as key to the energy transition. In the REPowerEU initiative and External Energy Strategy, the EU reiterated its strategic interest in hydrogen: its preference is for green hydrogen but it also has a pragmatic approach to other types. The EU has proposed comprehensive energy partnerships that begin with fossil fuels and accompany the transition towards hydrogen, clearly laying out an intention to import 10m tonnes of hydrogen by 2030 from a number of sources, including the Gulf monarchies. The GCC states also cooperate closely with European energy giants, medium-sized companies, and even start-ups in the hydrogen production process.

Among the GCC capitals, Muscat, Abu Dhabi, and Riyadh are particularly active on hydrogen. In 2022, Oman published its Hydrogen Strategy, seeking \$140 billion in investment to target an annual production of 1-1.25 megatonnes of green hydrogen by 2030 – mainly at HYPOR Duqm, led by the Belgian company DEME. This would rise to 3.25-3.75 megatonnes by 2040 and 7.5-8.5 megatonnes by 2050. The UAE has also taken significant steps to develop green hydrogen, within its borders and abroad. In 2021 the UAE inaugurated the largest hydrogen plant in the Middle East and North Africa, a joint initiative between Siemens Energy and Dubai Electricity and Water Authority, and started building the region's first dedicated export

terminal in Fujairah. ADNOC targets 1 megatonne of green hydrogen output by 2030. Saudi-based firm ACWA Power is building the world's largest utility-scale, commercially based hydrogen facility powered entirely by renewable energy at NEOM. By 2025, this will produce up to 650 tonnes per day of green hydrogen and 1.2 megatonnes of green ammonia for export. ACWA Power announced this year a plan to build two more hydrogen facilities in the area adjacent to NEOM. In addition, Saudi Arabia and the UAE have unveiled several blue hydrogen projects, including a facility near the Saudi Jafurah gas field, which will go online in 2024; and an Emirati large-scale blue ammonia plant at Ruwais, starting production in 2025. Qatar has been slower to embrace green hydrogen, but it has launched a project for the world's largest blue ammonia facility. This will produce 1.2 megatonnes of blue ammonia by 2026, with electrolyzers contracted to German manufacturer ThyssenKrupp Uhde. Qatar's sovereign wealth fund is also evaluating green ammonia projects elsewhere in the region, such as in Egypt.

But risks and challenges remain. For starters, a surge in demand for hydrogen, solar panels, electric vehicles, batteries, and other components critical to the EU's green transition will increase competition over the raw materials needed to scale up production, such as nickel and platinum. Global suppliers of these raw materials are located mostly in countries such as China, Russia, Indonesia, and the Philippines, as well as in Africa (especially South Africa but also Zimbabwe). In its 2023 Critical Raw Materials Act, the EU proposed a number of solutions to address this, most notably a diversification of supply sources. Given the abundance of hydrocarbons in the GCC monarchies, it is conceivable that there are also some reserves of critical raw materials in the region. Saudi authorities, for example, have suggested that substantial mineral reserves exist in the kingdom, including bauxite, aluminium, coal, copper, zinc, phosphates, uranium, and gold.

The production of green hydrogen also demands huge quantities of water. GCC countries rely heavily on desalination for their water needs, including for renewable energy production. Desalination plants are usually energy-intensive and often powered by fossil fuels. In most cases, a by-product of desalination is brine, which increases the salinity of the coastal waters into which it is discharged. This disrupts the marine environment, leading to a proliferation of toxic algae that, in turn, threatens to disrupt desalination processes. In fact, if water in the Gulf reaches what experts call “peak salt”, desalination may become unfeasible. In this sense, NEOM’s desalination plant, which is designed to dispose of brine sustainably using technology from French company Veolia, could be particularly valuable. In fact, GCC states are showing increasing interest in the latest desalination technologies that, in the near future, could enable “brine-mining” – or the extraction of chemical components from brine for use in industrial processes.[5]

Finally, new types of hydrogen infrastructure – including fuelling systems, pipelines, port upgrades, and ammonia synthesis and shipping systems – will ultimately have to be developed to scale up hydrogen use globally. Without pipelines, hydrogen needs to be converted into derivatives such as ammonia or synthetic fuel, or could be used to produce materials such as zero-carbon steel on site, but every conversion comes with significant added cost and a further efficiency loss. The scale of the required investment and development is so large that – notwithstanding the EU’s preference for southern Mediterranean countries, where the hydrogen business can spur growth and curb migration – the Gulf monarchies are the realistic interlocutors for Europeans in the Middle East and North Africa in the short term. The Gulf states offer strong financing capacities, pre-existing (export) infrastructure, short construction times, and advanced know-how in the hydrogen sector, thereby allowing them to implement pilot projects quickly. Their location, in the centre of the heavily travelled EU-China transport corridor, is ideal for the production of hydrogen derivatives, especially those that can be used as maritime fuel. If this enables them to benefit directly from clean energy trade with the EU, Gulf monarchies would likely also contribute to Global Gateway investments in infrastructure to turn Mediterranean countries into transit hubs. Transit infrastructure can then be used in the longer term too, once Mediterranean countries are also ready to become producers and exporters.

## Recommendations

Energy engagement between Europe and the Gulf monarchies accelerated after the energy security crisis triggered by Russia’s invasion of Ukraine. It now needs to move from conversations about tactical needs to strategic cooperation, which factors in climate



imperatives. With its self-perceived position of strength, the UAE is clearly intent on delivering a successful COP28 that includes ambitious achievements and leadership. [6] Therefore, if Europeans overcome their uncompromising approach and focus on coalition-building, they could help secure meaningful outcomes. Decision-makers in the EU have several policy options to consider.

## Promote energy efficiency and electrification

The EU should intensify its diplomatic efforts to promote energy efficiency in the GCC. It should focus specifically on: decarbonising transport networks; encouraging the introduction of enforceable norms in green buildings, especially on insulation and cooling; and sensitising consumers to the importance of energy efficiency.

Here, the EU-GCC Cooperation on Green Transition and De-carbonisation could become a particularly useful platform – once it is fully defined. The objective of this new action is to facilitate cooperation in research and business, and promote the uptake of green transition policies and technologies in GCC countries, by exchanging best practices and customised options for policy and practice. As a way to compensate for its delayed set-up, the EU’s engagement under this framework should focus on rapid delivery. It could start by arranging dialogue on electrification between transmission system operators and distributors, as well as regulators. The EU could also use the initiative as a vehicle to offer specialised technical and policy assistance on green buildings to the relevant authorities in the GCC. On consumer behaviour, European and EU diplomats in GCC capitals should continue to invest in communication and awareness campaigns.

## Focus on the circular in the circular carbon economy

Boosting the carbon economy’s circularity is dependent on developing the ‘remove, reuse, and recycle’ pillars of the concept. In the GCC states, carbon capture storage and transport infrastructure is significantly underdeveloped, and laws and regulations on CCUS frameworks often have gaps. Linkages already exist between GCC countries, so multi-user CO2 infrastructure could fit well in the region. The EU should offer a blueprint on how to approach this, and Denmark, Belgium, the Netherlands, and Norway are already actively working on transnational transport and storage. More importantly, to harness the necessary investment and to give credibility to the concept of a circular carbon economy, the EU and GCC states could contribute to addressing the global need to develop commercial viability for captured or recycled CO2. This is very much in line with the “business mind-set” which Jaber has been advocating in the run-up to COP28. Yet, public sector involvement will be necessary

to fund industrial research and development, especially in the GCC states – where this kind of investment is the lowest among OECD economies.

The EU should use its forthcoming CCUS strategy, due to be published at the end of 2023, to focus on the commercial viability of the captured or recycled CO<sub>2</sub> by promoting research and development. For example, the EU should encourage the GCC countries to become much more involved in projects such as the Innovation Fund and invest meaningfully in the demonstration of commercial viability of innovative low-carbon technologies. European governments should encourage their GCC counterparts to make substantial investments in and rapidly deploy efficient, new-generation CCUS technology in the Middle East and North Africa. The Innovation Fund has already supported the commercialisation of some creative ways to reuse CO<sub>2</sub> – including mineralisation, CO<sub>2</sub>-based building materials, and CO<sub>2</sub> batteries. Beyond the untapped advantages offered by more established technologies such as e-fuels, the GCC countries would benefit greatly from supporting these other potential applications. Crucially, the EU's CCUS strategy should also aim to overcome inconsistencies and lack of clarity on standards for CCUS certification.

## Accelerate green hydrogen deployment

The key to unlocking hydrogen's potential is to look at the challenges across the entire ecosystem. The EU could address these challenges in the context of hydrogen partnerships with key GCC producers, which the bloc's directorate-general for energy should finalise as soon as possible.

As industrial actors start looking into operationalising existing cooperation agreements on hydrogen, the question of mutually agreed standards – covering safety, product quality, and carbon content, as well as systems of certification and accreditation – has become more prominent. Industry will have to account for carbon emissions across the entire process of producing hydrogen, including in the desalinisation of the water needed for green hydrogen production in the GCC. The EU and member states should lead on developing mutually agreed standards and incentivise the use of renewables-powered desalination plants that employ innovative technology for the sustainable disposal of brine in green hydrogen production.

Another crucial aspect is the provision of adequate opportunities for training and education at various levels. This should start from vocational training for industry operators, targeting the fossil fuels industry too, and extend to formal education that supports scientific advances in energy studies. The EU should focus on these through Erasmus+ and Erasmus Mundus activities with GCC participants, which would be welcome in the GCC as part of their drive to attract know-how.

A longstanding challenge in the hydrogen ecosystem is the required upgrade of existing energy infrastructure and the construction of new infrastructure. These span from hydrogen-ready pipelines and a refuelling network in ports and import terminals, to tank storage systems and salt caverns. GCC hydrogen exports to Europe will likely take place via tankers to start with, given the continent's limited reception capacity and options for use, the absence of pipelines, and the presence of ready-to-use export infrastructure for ammonia and synthetic fuels along the GCC coast. Tanker-based trade also fits with alleviating European concerns about creating new patterns of dependency. In the longer term, the EU's and member states' energy security imperatives would be better served by more durable import infrastructure, including pipelines. The EU should propose co-investment with GCC governments through the Global Gateway initiative to map out a future energy hub in the eastern Mediterranean. This would be especially useful for diversifying import routes to Europe by bypassing bottlenecks in Egypt. Longstanding tensions between GCC states and Turkey are currently de-escalating, which adds (previously lacking) credibility to this proposal.

## Build resilient green supply chains

Last but not least, a core issue that cuts across the green transition and decarbonisation is the sustainability of green supply chains. The past few years have seen frequent supply-chain disruptions, due to covid-19, Russia's war on Ukraine, and Western tensions with China. Strategic energy ties between Europeans and the Gulf monarchies therefore require a certain level of reciprocal trust in the supply and value chain.

The EU should consider launching talks with their GCC counterparts on a preferential trade agreement for decarbonisation and the circular economy. A comprehensive EU-GCC free trade agreement is likely to run into the same obstacles that have plagued these discussions for the past 30 years, further complicated by the CBAM. But a specific agreement to liberalise trade on products and services linked to the green transition would have multiple economic benefits and should face fewer political obstacles. It could increase the advantage of "Made in the EU" technologies for desalination, hydrogen, CCUS, or even energy-efficient household appliances. It could also encourage European investment in mining, which GCC policymakers

and experts have identified as key to economic diversification in the GCC countries, with a view to enhancing access to extracted critical raw materials. [7] The EU should look more specifically at the GCC countries as a potential source of raw materials, while maintaining a critical approach and guarantees to safeguard the rights of the required labour force.

## Conclusion

Europeans should view the summits taking place in Saudi Arabia and the UAE over the coming months – the second Middle East Green Initiative Summit, the UN’s Climate Week, and COP28 – as catalysts to upgrade their energy relations with the GCC monarchies into a more strategic engagement on green transition and decarbonisation. The focus of this should be tangible progress in technical and scientific cooperation related to the development of green energy trade and a circular carbon economy, as well reducing the financial and climate cost of the transition. That way, the EU and member states can go beyond ideological divides and engage these fundamental actors to respond to European imperatives of energy and climate security.

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[1] Author's interviews with officials and experts from all GCC countries, 2023.

[2] Author's interviews with officials and experts from all GCC countries, 2023.

[3] Author's interviews with officials and experts from all GCC countries, 2023.

[4] Author's interviews with EU officials, 2023.

[5] Author's interviews with officials and experts from all GCC countries, 2023.

[6] Author's interviews with officials and experts from the UAE, 2023.

[7] Author's interviews with officials and experts from all GCC countries, 2023.

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