



The Arab Gulf States
Institute in Washington
Building bridges of understanding



Petro Diplomacy: The Energy Transition and the Road to COP28

Conference Report



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- Informing a global audience of policymakers, legislators, businesspeople, academics, media, youth, and others as the foundation for strategic decisions regarding this important region.
- Employing multiple avenues to inform public understanding of the importance of the relationship between the United States and the Gulf Arab states.
- Encouraging strong academic coverage by developing scholars who concentrate on the study of the region.

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About This Report

For the ninth consecutive year, the Arab Gulf States Institute in Washington convened its Petro Diplomacy conference, held in a hybrid format over two days. The conference brought together private and public sector stakeholders from the United States, Europe, and the Gulf Arab countries at a pivotal moment for the region and the broader international community as the United Arab Emirates prepares to host the United Nations Climate Change Conference, COP28, in November 2023. The Petro Diplomacy conference explored Gulf energy and climate policies, technological advances, and pressing political, social, and environmental issues ahead of COP28.

Petro Diplomacy offers a unique forum for industry experts to engage with policymakers and analysts to explore the momentous challenges facing Gulf Arab states, oil producing and consuming countries, and the international energy market. This report was compiled by Kate Dourian, a nonresident fellow at AGSIW, contributing editor at MEES, and fellow at the Energy Institute.

Videos of the conference's sessions are available [online](#).

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Executive Summary

The Arab Gulf States Institute in Washington held its ninth annual Petro Diplomacy conference from June 27-28. The event examined how the Gulf Cooperation Council countries are managing the energy transition and expectations for the United Nations Climate Change Conference, COP28, in Dubai beginning in November.

The conference was broken up into four sessions and one keynote address. The first panel discussed the pathways the GCC's oil producers are charting to decarbonize their energy-intensive economies, build resilience to climate change, and prepare for a post-oil era. The discussion was framed with COP28 in mind, with speakers expressing their views on what is likely to emerge from the 14-day summit. The second panel covered the shifting geopolitics and alliances in the wake of the Russian invasion of Ukraine and how it is reshaping the Middle East, with China ascendant as an investor and economic partner. In his keynote address, Mike Howard, chair of the World Energy Council, covered the role of digitalization in the energy transition and how new technologies are reshaping the energy landscape. The third session, held on day two, was a virtual presentation by the International Energy Agency on its "Oil 2023" report, a five-year forecast of where the oil market is heading and projections of when oil demand is expected to peak. The final session, held virtually, looked at the changing picture of energy systems across the GCC and the shape of the future energy mix as the energy transition gathers pace.

Decarbonization in the GCC and Preparing for a Post-Oil Future

Even as the debate continues about the amount of oil that will be needed in the coming decades, global energy investment flows are already shifting from fossil fuels to renewables, which has implications for the oil exporting GCC countries.

Climate change and global warming are looming realities, forcing fundamental change even as available evidence indicates shortcomings with the pace of that change to date. The United Nations Intergovernmental Panel on Climate Change warned in a recent report that the nationally determined contribution emission reduction pledges made by signatories to the Paris Agreement make it "likely that warming will exceed 1.5°C during the 21st century and would make it harder to limit warming below 2°C" without additional commitments and actions being taken.¹ At COP28, participants will take stock of what they have achieved since Paris in meeting their nationally determined contributions and what more they need to do to achieve their pledges.

The International Energy Agency, the U.S. Energy Information Administration, and OPEC publish short-, medium-, and long-term forecasts. While estimates by the three organizations diverge slightly, they all project a share for fossil fuels in a redesigned, global-warming-shaped energy architecture. The size of that share varies depending on whether it is calculated based

¹ H. Lee and J. Romero, eds., *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2023), 1-34.

on a business-as-usual scenario or accelerated transition scenarios of different speeds. In the scenarios that take into account the imperatives of climate change, the share of oil and gas would shrink considerably.

In the IEA's status quo outlook for global energy consumption, based on existing laws and regulations, oil demand will likely keep growing over the next several decades, even though renewables are the fastest growing form of energy. Under this scenario, even in 2050, there will still be a lot of natural gas and even coal consumption. By contrast, in its "Net Zero by 2050" report published in 2021, the IEA stated there is no need for new investments in fossil fuel projects if the world is to have a chance of attaining carbon neutrality,² a message that has been challenged by the Gulf Arab states. The Gulf oil exporters insist demand will continue well into the future and declining production has to be topped up with new upstream investment. These states insist there is no easy or cheap way to eliminate fossil fuels, so all technologies should be kept on the table during the decades until the share of renewables is ramped up sufficiently to displace hydrocarbons.

As major oil producers and exporters, Saudi Arabia, the United Arab Emirates, and the other Gulf Cooperation Council states have come under scrutiny about their place in this global energy transition – how much they are doing to accelerate the transition, what role they see themselves playing, and the role of fossil fuels. All GCC states except Qatar have set net-zero carbon emission targets – by 2050 for the UAE, 2050 for Oman, and 2060 for the others. At the same time, they have expansion plans for oil and gas production.

Saudi Arabia is planning to increase its maximum sustainable oil production capacity by more than 1 million barrels per day to 13 mb/d by 2027. The UAE aims to reach a production capacity of 5 mb/d by 2027, with talk of taking that to 6 mb/d. While both oil-producing states have pledged to manage emissions from their operations – classified as scope 1 and 2 emissions – this effort to decarbonize pre-export operations has been largely lost on Western policymakers focused on the carbon impact in oil importing states of burning fossil fuels. From the perspective of Gulf oil producers, their oil will continue to be needed for a considerable amount of time, and they have a comparative advantage in large-scale, low-cost, low-carbon intensity operations.

That is why the IEA's net-zero scenario angered the Gulf states, souring the relationship between OPEC and the IEA, which has been dropped as a secondary source for OPEC production data. Saudi Energy Minister Prince Abdulaziz bin Salman often criticizes the IEA, but the tensions come down to a fundamental debate about the role of the Gulf states and fossil fuels.

Even as the debate continues about the amount of oil that will be needed in the coming decades, global energy investment flows are already shifting from fossil fuels to renewables, which has implications for the oil exporting GCC countries. In 2022, investment in renewables, such as wind and solar energy, exceeded investment in traditional hydrocarbons, a trend that has continued into 2023.

This changing dynamic is due to environmental activism and growing concern about the impact of global warming. Government action, such as the United States' Inflation Reduction

² International Energy Agency, *Net Zero by 2050* (Paris: IEA, 2021).

Act, is also shaping this dynamic. Despite the increase in clean energy investment, greenhouse gas emissions rose in 2022, as the Russian invasion of Ukraine disrupted energy flows and sent consumers scrambling for alternatives to Russian supplies. Some countries turned to coal to generate electricity as gas prices rose to a record high.

The Ukraine crisis, which also sent oil prices soaring, put pressure on governments' efforts worldwide to adopt stricter climate policies to reduce reliance on fossil fuels. For example, the United States' Inflation Reduction Act and the European Union's "Fit for 55" emission reduction program were both designed to encourage renewable energy investments.

The Gulf Arab states are also moving ahead with their own economic and energy diversification policies. The United Arab Emirates and Saudi Arabia have set ambitious carbon neutrality targets but are also expanding their oil production capacity.

The UAE, Saudi Arabia, and Oman are investing heavily in green and blue hydrogen production in the expectation that a global hydrogen market will emerge and provide a new revenue source. The challenge for the petrostates is timing – whether they can transition fast enough to ensure they remain relevant in a carbon-constrained world, avoid stranded assets, and deploy technology at a reasonable cost to export lower-carbon oil, gas, and manufactured goods.

The UAE has been a GCC leader as the first to deploy utility-scale solar farms and operating the Arab world's only nuclear power plant. Saudi Arabia is building the first carbon-neutral city, Neom, and the largest solar-powered green hydrogen plant. Yet the Middle East as a whole, excluding Egypt and Morocco, has just 1% of total global renewable energy capacity, according to the International Renewable Energy Agency, underscoring how much more needs to be done if Middle Eastern states are to be in line with commitments made at the 2015 Paris climate summit.

As COP28 host, the UAE will have to show that it can be both an oil producer and a renewable energy leader driving the transition forward. It is already leading the way in demand management. The UAE has adopted creative methods of looking at how much demand is produced in the country in which sectors and how to efficiently reduce and manage that demand by setting building codes and water efficiency standards. Demand-side management has often been ignored, as the focus has been on supply and clean energy production.

The critical question is how quickly the Gulf states can increase the share of renewable energy in the power sector, which relies heavily on natural gas and in some instances liquid fuels. During summers in Saudi Arabia, an estimated 1 mb/d of crude oil, diesel, and other liquid fuels are burned to generate electricity when demand for cooling soars. This is wasteful from an economic perspective and uses oil that could be exported for much higher revenue. It is also environmentally harmful.

Some of the Gulf Arab states, such as Oman, have significant wind resources, and there is an abundance of investment capital in the region. The Gulf has an array of state and quasi-state investment funds with expertise in building major projects. As a result, there is huge potential for the Gulf states to develop renewable energy systems in sub-Saharan Africa and Southeast Asia.

The role of renewables in the power sector is directly related to the bigger question about the role of natural gas in the Gulf and, in the long term, globally. A rapid increase in the share of renewable energy in the power sector would free up natural gas for multiple uses in the Gulf states, and more of that gas could be reserved for industrialization, domestic petrochemical industries, or blue hydrogen production.

Until recently, the Gulf states, aside from Qatar, were gas short, leading to a struggle for gas self-sufficiency. Kuwait and the UAE are gas importers, but in the last 10 years, there's been a major focus on domestic gas exploration and development, mostly of sour gas and unconventional gas, which is more expensive and more difficult to develop. Saudi Arabia aims to generate half its electricity from gas and half from renewables by 2030. While Saudi Arabia's target may be overly ambitious, some progress is being made, with new wind and solar projects under construction.

The GCC countries have energy-inefficient economies, and the decarbonization journey has a long way to go. To decarbonize, Gulf states must focus on the power sector and on reforming electricity and fuel subsidies. The region made significant progress on easing subsidies from 2014-15, but some Gulf states have taken their foot off the pedal when it comes to subsidy reform.

Hydrogen can be one solution, but there are questions about whether it is best used domestically to produce electricity and clean energy products. Hydrogen makes sense for use in heavy industry, the production of steel, glass, cement, and chemicals, and possibly, aviation and shipping. However, it is too energy inefficient for applications such as fuel cell vehicles and powering trains and buses – in these cases, it would be better to electrify than use hydrogen because too much energy is wasted in its production and transformation into usable energy.

That has not deterred the UAE and Saudi Arabia from investing in the development of hydrogen hubs. Both countries have solid plans for carbon capture hubs that would likely include hydrogen as part of the mix. Saudi Aramco and the Saudi Ministry of Energy plan to establish storage facilities for 9 million tons of hydrogen by 2027, and the UAE has similar plans.

Oman is also making a big bet on hydrogen. The IEA recently issued a special report on Oman's hydrogen potential, stating the sultanate is on track to become one of the world's biggest producers and exporters of green hydrogen.³ Some experts believe there is too much hype surrounding hydrogen, though the EU has made it a key plank of its energy diversification policy and has been a big driver of hydrogen projects in the Middle East as a potential off-taker.

The economics of transporting hydrogen and ammonia over long distances are still uncertain; exporting hydrogen is still relatively costly because it has to be converted to ammonia and regasified at its destination. But the Gulf states have a critical advantage in that they have customer linkages. Gulf national oil companies have been selling to Asian buyers for a long time, allowing them to develop relationships with the big utilities and gas buyers in Japan and South Korea, which have made hydrogen a big part of their decarbonization plans. These

³ International Energy Agency, *Renewable Hydrogen From Oman* (Paris: IEA, 2023).

countries want to use hydrogen to co-fire with natural gas and coal power plants.

The long-term development of a hydrogen economy requires developing both the supply and demand sides simultaneously. This is somewhat similar to how the liquefied natural gas sector developed, with point-to-point sales or one-off transactions growing over time. As more hydrogen supply materializes and demand grows, a liquid market may develop in which not everything is locked into long-term contracts.

Several Gulf states also have gas resources for blue hydrogen production, but some are more advantaged than others. New gas resources being developed in the UAE, Saudi Arabia, and possibly Kuwait are unconventional or sour gas reserves, which are more expensive to develop, complicating the economics of producing blue hydrogen.

There is a strong climate case in favor of natural gas, which typically displaces coal, but the transition has been divisive because of methane emissions. One of the eternal debates at COP meetings is agreeing on language around a phase down of fossil fuels or unabated fossil fuels, including natural gas.

The United States, the EU, and around 20 countries have devised a framework to look at lifecycle emissions associated with natural gas by collating data from satellites and aerial surveys. The basic idea is to measure, report, and verify in order to understand the emissions intensity of the liquefaction and shipping of natural gas.

The UAE is interested in engaging national oil companies and big oil and gas producing states on this question. This is important because the Ukraine war has shown that gas will be needed for a long time and new infrastructure is necessary; the idea that Europe will not need gas after 2030 or 2035 is misguided.

The energy transition is disruptive, and it will take decades to redesign an international energy system no longer dependent on hydrocarbons. Electrification is the main catalyst for decarbonization, but new infrastructure will be needed to support a surge in electricity demand. Some of this electricity will not be produced with clean energy. Even producing components for electric vehicles or wind turbines requires energy, some of which comes from coal. Mining rare minerals for use in batteries and other clean energy applications is also an energy-intensive process, and there are only a few producers, of which Russia is one.

The Ukraine war made energy security a priority for Europe given Russia's pre-war dominance as one of the world's three biggest oil producers and top gas exporter. Russia is also a significant exporter of uranium and supplied 20% of the United States' needs in 2022 despite the raft of sanctions banning imports of Russian oil and gas. The EU's determination that nuclear power is a green energy source, part of its strategy to reduce Russian gas imports, will create a huge market for Russia's uranium. Saudi Arabia and the UAE are considering mining uranium, and more countries need to do the same to curb reliance on Russia.

All this shows that there is no perfect fuel, and each type of fuel has a unique set of issues that needs to be addressed as the energy transition progresses. Hydrocarbons are still the prevalent fuel sources for transportation and heavy industry while also providing the feedstock for a growing petrochemical industry that produces components for manufactured goods, including for renewable energy. The challenge is to reduce greenhouse gas emissions across

the energy value chain if net-zero targets are to be reached by mid-century.

Geopolitical Shift and New Alliances

The GCC states, when considered together, are now a third global power, and they're flexing their muscles.

Relations between the GCC countries and the United States, China, and Russia are changing. This realignment includes a geographic shift in energy trade flows and relations as well as shifts within the OPEC+ alliance of OPEC and non-OPEC oil producers led by Saudi Arabia and Russia. The Ukraine crisis drew these changing relationships into focus as the United States' Gulf Arab security partners have drifted away from Washington over the last decade.

These changing dynamics are due partly to the perception that Washington has disengaged from the region diplomatically. This viewpoint has provided an opening for other powers, as the GCC countries, led by Saudi Arabia and the UAE, have reached out to Russia and China, resulting in a strategic realignment of alliances beyond energy and trade relations.

At the same time, U.S. interests have shifted, and due to increased domestic energy production, U.S. leaders no longer feel that Washington must intervene militarily to protect its energy interests. Indeed, in the wake of the wars in Afghanistan and Iraq, the United States is much less willing to go to war in the region. Perceptions related to great power competition are also affecting U.S.-Gulf dynamics. The United States, for example, identifies its main adversaries as China and Russia, but none of its partners in the Gulf do.

Since its decisive Syria intervention, Russia has been viewed by Gulf states as a reliable partner. However, the Ukraine war has exposed Moscow's vulnerabilities on the battlefield, possibly prompting a reassessment of Russia's reliability. For Saudi Arabia, the hinge is the OPEC+ alliance it co-manages with Russia. Because of the Ukraine war, Saudi Arabia's relationship with Russia and oil production policies have emerged as a periodic irritant between Washington and Riyadh.

After the invasion of Ukraine, the United States' Gulf allies did not stand with it against Russia, adopting a somewhat neutral stance instead. When OPEC+ cut oil production amid high oil prices in late 2022, the perception was that Russia benefited. What is not appreciated in the West is that lower production leaves more spare capacity available, reducing volatility. The perceived absence of a reliable U.S. partner made Russia a desirable friend, though the UAE has placed itself in a somewhat vulnerable position by helping Russia evade sanctions, especially by sending Russia portions of high-tech components that can be used for military purposes.⁴

China, whose influence in the Middle East is growing, has followed a linear progression in the economic and political space since the end of the Cold War that has accelerated since 2000. China has used an array of tools to build robust economic and political relations.

China's rise in the region has been accompanied by a more public role, with Chinese President

⁴ Eric Tucker and Fatima Hussein, "U.S. Busts Network Providing Technology to Russian Military," *AP*, October 19, 2022.

Xi Jinping visiting Saudi Arabia in December 2022 for a state visit, convening the China-Arab States Cooperation Forum, and a GCC-China summit. China has also taken on a mediating role, notably in negotiating the March agreement between Saudi Arabia and Iran to restore diplomatic ties.

Resources and markets have been the primary drivers for China's Gulf relations for over 20 years. Since the start of the 2011 Arab Spring uprisings, China has viewed the Gulf as more stable than North Africa, making it an attractive market. And the Gulf states see ties with China as an opportunity to sell goods and services but also for cooperation in health care, artificial intelligence, and green technology.

China has been very responsive to the interests of the GCC countries and their economic reform programs. But China also wants to garner support from the Gulf, as well as the broader Middle East and the Global South, in international organizations. And as China's relations with the United States and Western Europe have soured, the Global South and the Gulf are becoming more important for trade and political cooperation.

No longer seeing themselves as clients of great powers, Gulf leaders are making their own decisions at all levels. The leaders in the region – Turkish President Recep Tayyip Erdogan, Saudi Crown Prince Mohammed bin Salman, and Emirati President Mohammed bin Zayed al-Nahyan – see themselves as leaders on the global stage and are charting their own course.

Gulf leaders also consider themselves shapers of a semi-hydrocarbon future and drivers of the energy transition. It's not lost on them that they have the biggest amounts of capital to spend in the world, rivaling that of China and certainly the West. The UAE views itself as a "hub nation" in the model of Singapore and wants to be the hub of many networks.

While the Gulf countries sell energy to and purchase goods from China, the country isn't a welcoming environment for Gulf investors (the same is true for Russia). With their trillions of dollars in assets, Gulf sovereign wealth funds are investing mostly in Europe and the United States because they are reliable and transparent markets. Nevertheless, Gulf states still want to hedge between the United States and Russia and China.

China has strategic partnerships with almost every GCC country, Iran, and Turkey and has robust relations with Israel. While China values its relationships across the Middle East, it will likely place more emphasis on the Gulf, which it sees as a critical region, particularly as its relations elsewhere become increasingly frayed.

Beijing is also trying to pull the Gulf states into other regional configurations, such as the Shanghai Cooperation Organization. All GCC states except for Oman are either SCO dialogue partners or are in the process. China is also pulling the GCC countries into the BRICS grouping (comprised of Brazil, Russia, India, China, and South Africa), and part of the effort is being driven by the GCC countries themselves.

The GCC states, when considered together, are now a third global power, and they're flexing their muscles.

Keynote Discussion With Mike Howard, Chair, World Energy Council

The important question is how to use energy resources and technology to ensure no one is left behind.

Eliminating fossil fuels by 2030 or 2050 is not possible because they are used in the production of so many essential materials. While reducing Earth's carbon footprint is necessary, it must be done as humanely as possible given the harmful consequences of pursuing the wrong policies.

Energy transitions can take over a century and are messy processes. The important question is how to use energy resources and technology to ensure no one is left behind. More than 1 billion people lack access to electricity, much less reliable electricity, even with all the technology available today. In Africa, for example, a 400-year-old village just got electricity. Without electricity, the villagers could not pump water or refrigerate their food and medicines.

The wealthier countries have a social obligation to manage and move forward with the energy transition while understanding the technical and social implications of the shift on the developing world. There is a need to understand the circular economy and how it can be applied in the decarbonization process. Then there are new applications, such as artificial intelligence, which consumes a massive amount of energy. The amount of energy used to train the ChatGPT3 data application was the equivalent of the energy use of 138 U.S. homes in one year. The amount of energy that is going to be used in electrifying the global economy will be of a much larger magnitude than imagined.

Meanwhile, coal plants are being used to produce steam and electricity. Between now and 2030, the world needs to move aggressively to ensure as many people as possible have access to reliable electricity. Fossil fuels will be needed, but moving to natural gas and away from coal is the next step in the evolution.

Energy-intensive industries must be electrified to reduce greenhouse gas emissions. Just 6% of the cement industry's carbon emissions come from processing and making cement; converting the heat needed to produce cement into electricity is a complex process. Some experimental technologies exist, but they are still a long way from solving the problem.

More electrification is needed, particularly in the transportation sector, requiring further improvements to the energy density of lithium-ion batteries to enhance performance and enable their use in trucks and other modes of transportation. To deliver electricity, transmission and distribution systems must be upgraded and expanded.

Electricity accounts for 20% of the world's total energy use, with the rest coming from hydrocarbons, oil, gas, and biomass. As forecasts indicate that electricity will account for around 50% of overall energy use by 2050, much more electricity will be needed for transportation, artificial intelligence, and cooling. Electricity provides more energy options than hydrocarbons, but fossil fuels will still be needed to produce electricity – that's potentially where carbon capture and storage has a role. At the same time, there will be more wind and solar energy and many more batteries in use.

Hydrogen is best applied in sectors that cannot be electrified, but only as a last resort. Shipping ammonia around the world does not make much sense if electrification is an option. Green hydrogen production is currently cost prohibitive; although new catalysts are being developed to lower the amount of energy required, there are physical limitations. A certain amount of realism is needed regarding hydrogen.

Nuclear power should be part of the transition, possibly after 2030, because it has by far the highest energy density and efficiency of any fuel source. Small modular units are one solution, but it would be pointless to introduce nuclear power in developing countries without nuclear engineering programs. A more logical solution would be the development of microgrids rather than the central stations common in developed countries.

IEA Oil 2023 Report: Analysis and Forecast to 2028

A Presentation by Toril Bosoni, Head of the Oil Industry and Markets Division, IEA

Despite the very significant increase in clean energy investments, which have overtaken fossil fuel investments, it is not enough to get the world on the net-zero trajectory.

After delaying publication of its medium-term oil outlook due to the Russian invasion of Ukraine disrupting the market, the IEA's "Oil 2023" outlook, a five-year forecast, was issued in June. The report shows that the global energy crisis, which started before Russia's invasion of Ukraine but hit a high point in 2022, has accelerated the transition away from oil.⁵

This scaling up of renewable energy is driven not only by climate ambitions but also energy security concerns and high oil prices. Energy efficiency measures and electric vehicle sales are projected to result in a slowdown in oil demand growth expectations from 2.4 mb/d in 2023 to 400,000 b/d in 2028, the last year of the forecast. While the IEA sees the peak in oil demand on the horizon, continued growth from the petrochemical and aviation sectors means that demand will continue to grow each year until 2028.

Other fuels, such as liquefied natural gas, ethane, and naphtha, provide the biggest source of energy demand growth over the medium term, accounting for 3.2 mb/d of projected total demand growth of 5.9 mb/d. Much of this growth will be concentrated in China as it expands its petrochemical industry. Jet kerosene will be the second-biggest source of growth, adding 2 mb/d.

Asia accounts for the majority of the demand increase to 2028. Asian countries that are not members of the OECD will account for 5 mb/d of total projected growth of 5.9 mb/d.

Demand in the OECD countries is expected to decline starting in 2024, as the post-coronavirus recovery has largely run its course in the advanced economies and, increasingly, in the emerging world. But the projected gross domestic product outlook remains quite weak for the OECD countries going forward due to high interest rates and tighter monetary policies. The consensus forecast is weaker GDP growth in the next five years than seen recently.

⁵ International Energy Agency, *Oil 2023* (Paris: IEA, 2023).

China dominates growth in at least the early parts of the forecast, accounting for more than 60% of global oil demand growth. However, this is coming from very low demand growth in 2022, when much of the economy was closed due to coronavirus pandemic restrictions. There has been concern about the economic recovery in China, but apparent oil demand numbers for China have been growing monthly, reaching an all-time high in April, when demand rose by 2 mb/d year-on-year. This growth is expected to taper off through the rest of the year, but even if it holds steady, it will result in more than 1 mb/d of growth in China in 2023. The pace of growth will slow markedly over the forecast period because of Chinese policy measures and a shift from manufacturing to a more service-oriented economy. China has the highest number of electric vehicle sales globally, and the government has introduced energy-efficiency measures that will impact oil demand.

India will experience more robust growth as energy transition policies are paused in the near term. In India, the world's most populous country, steady population growth is expected, while China's population will shrink during the forecast period. As a result, India becomes the strongest driver in oil demand growth toward the end of the forecast period, and the trend will continue in the longer term.

Steady demand growth is expected in the Middle East due to GDP increases and a dynamic population. There's quite robust demand now. However, based on the GDP forecasts, the IEA is expecting a significant slowdown in overall demand growth in the coming year, going from 2.4 mb/d in 2023 to less than 1 mb/d of growth in 2024. Demand will continue to increase but at a slower pace.

This is partly because higher interest rates are slowing economic growth. Additionally, some of the measures that were put in place by governments on energy savings, conservation, and energy efficiency are reducing demand. Going forward, this will be driven by electric vehicle sales, which went from 2% to 30% of sales in just the past two years. China is the biggest market and Europe is the second biggest. But sales are also increasing in the United States. The Inflation Reduction Act is pushing some of these policies. It will take some time, but toward the end of the forecast period, the efficiencies from all of these policy measures, taken together, will start to have a larger effect on demand. For example, there have been efficiency improvements in aviation over the last two years. The IEA outlook estimates around 7 mb/d of oil demand will be saved due to efficiency measures over the period.

The energy crisis that followed Russia's invasion of Ukraine has also led to an increase in upstream oil and gas investment. The report estimates that global upstream oil and gas investment will increase by 11% to \$528 billion in 2023, from \$475 billion in 2022. The impact of higher spending will be somewhat offset by cost inflation, as supply chain constraints have raised the costs of materials and labor, eating into the investment. If these investment levels are sustained, and based on demand expectations they should be, the markets should be adequately supplied through the medium term.

Expansion in upstream production capacity for oil is expected to slow over the medium term. The United States as well as Brazil, Guyana, and other Latin American countries will drive growth in the initial period, but this will slow over the medium term.

And while capacity growth is expected to slow, it will still keep pace with demand with a net

increase of about 6 mb/d, up to 111 mb/d by 2028.

The broad deceleration in production capacity building reflects the global pivot toward cleaner energy, which will slow oil demand growth. But even with total investments adjusting to this picture, there will still be a spare oil capacity cushion of about 4 mb/d over the forecast period. This spare capacity will continue to be concentrated in Saudi Arabia and the UAE.

These Middle Eastern heavyweights are boosting capacity today to meet demand in the medium and longer terms, and markets are expected to remain adequately supplied. Iran and Russia, which are both under sanctions, were not included, but the report estimates that they are holding about 1.5 mb/d of unused capacity that could be brought online relatively quickly if sanctions are eased.

To meet projected demand to 2028, world oil supply is expected to increase by about 5.8 mb/d, with the United States the biggest source of growth, adding 2.6 mb/d, or 45%, of the total. In the United States, light tight oil, particularly in the Permian Basin, will drive growth, but there will also be strong growth in gas liquids production. Natural gas liquids production in the United States is higher than almost any other country's total oil production and will be a significant source of supply and supply growth over the medium term. Natural gas liquids production is expected to increase by almost 1 mb/d, while crude oil is expected to grow by 1.7 mb/d.

The expected slowdown in U.S. oil supply growth is due to a number of factors, including the increased focus on climate action and a return to capital discipline by operators. As U.S. growth slows, it will allow Middle Eastern producers, primarily Saudi Arabia and the UAE, to add barrels to meet demand. As a result, their market share will increase in 2023 and 2024. Current investment trends point to an increase in the Middle East's share of world oil production in the longer term from around 30% now as output growth slows in other producing regions.

The oil refining sector was also impacted by the coronavirus pandemic and the Ukraine crisis but has since recovered strongly. The refining industry posted larger-than-expected profits in 2022, due mainly to the sudden and strong recovery in oil demand following the coronavirus-induced slowdown in 2020-21. The refining industry was unable to keep up with the demand increases for certain products because 4 mb/d of refining capacity was shut down from 2020-22. Records show that 2021 was the first year in the past three decades when more refining capacity was shut than added, leading to tightness in refined products. The reduction in Russian product flows because of sanctions also contributed to this tightness and boosted prices.

As most announced refinery capacity closures have been completed, some 6 mb/d of new refineries will come online in the next five to six years, generating 4.4 mb/d of net added capacity. That should help keep the product markets relatively well supplied. Most of the additions will come from the Middle East and East of Suez, or Asian market.

China is the biggest source of growth in the medium term, adding 1.8 mb/d of refining capacity. India will add 1.2 mb/d and the Middle East 1.2 mb/d. The expansions in Middle Eastern refining capacity along with additions in Nigeria, Mexico, and other oil-producing countries will reduce the crude oil that is available for trade, significantly impacting both products and crude trade flows going forward.

As the driver of future oil demand growth, East of Suez will also shape the global crude balance going forward. The baseload supply for Asian refiners has shifted, so it is not just Middle Eastern oil that dominates. Asia is taking all the Russian crude oil that previously went into Europe and other countries, and this is expected to continue. Yet still more volumes will be needed by China, India, and other regional refiners. Atlantic Basin producers will supply some of this demand as the Middle Eastern exporters will need to meet increased demand for their refineries.

The gasoline market is expected to remain relatively balanced in the medium term, based on current configurations of the refining industry but is expected to flip to a surplus over the medium term. The main challenge for refiners will be balancing their product supply with uneven growth in demand for different products.

The momentum for clean energy investments is picking up. This was sparked largely by the energy crisis and Europe's need to reduce reliance on Russian gas and oil. But clean energy technologies have also started becoming competitive on their own without government support. Solar, for instance, has become the cheapest source of electricity.

However, the report shows that, despite the very significant increase in clean energy investments, which have overtaken fossil fuel investments, it is not enough to get the world on the net-zero trajectory. It has to double, or triple, again. The majority of clean energy investments are in advanced economies, in Europe, North America, and also China. More is needed in emerging and developing countries. Without that, there is still going to be a need for investing in oil and gas. For now, these investments and changes in behavior and patterns are reducing the growth in demand for oil but are not taking demand from oil away.

The Future Energy Mix in the Gulf

The future energy mix in the Gulf depends on each country's domestic position and plans to power its economy.

The Gulf Arab states are major consumers of hydrocarbons, particularly for power generation and transportation, with high per capita consumption and greenhouse gas emissions. Renewable energy has been introduced in several GCC countries, but the overall share of clean energy in power generation in the Gulf remains low. As a region that is vulnerable to climate change and severe weather events, the Gulf urgently needs to step up investment in clean energy and a redesigned energy mix.

Solar energy is abundant in the Gulf and cheap to produce, but much more capacity is needed if net-zero targets are to be achieved. In the Middle East and elsewhere, energy transition policies have caused a surge in demand for solar energy components that suppliers have been unable to keep up with. This demand growth is encouraging countries in the Middle East to develop local content and technology to support their energy transition needs rather than rely on a handful of countries, mainly China, which produces 90% of the world's solar panels. The coronavirus pandemic and the Ukraine crisis brought to the fore not only the issue of energy security but also the risk of supply chain disruptions. Saudi Arabia produces renewable energy components, including silica, aluminum, and glass, so it makes sense for the kingdom to develop its own industry.

As demand for fossil fuels declines and solar and wind capacity is developed further, hydrogen can fill the supply gap. In the Middle East, where wind is not an option for many countries, green hydrogen produced from solar energy is being developed, but much more solar power will be required considering that a 1-megawatt hydrogen electrolyzer needs 1.5 megawatts of solar power.

Gulf states are betting on becoming hydrogen exporters to replace some of their fossil fuel export revenue, though hydrogen is unlikely to generate as much rent as oil and gas. There is an argument that, given the cost of transporting hydrogen, it might be better used to power sectors that cannot be electrified or to domestically produce low-carbon products for exportation.

While COP28 will provide an opportunity to address all these issues, there has been a tendency at previous climate summits to make big announcements and sign agreements that are not implemented. To drive the energy transition forward, COP28 participants must take a pragmatic and realistic approach to the future role of fossil fuels.

The selection of the UAE as COP28 host and Sultan Ahmed Al Jaber, head of the Abu Dhabi National Oil Company, as president-designate, has drawn criticism in the West and made the summit contentious. But Jaber has a strong background as both the founding CEO of Masdar, the UAE's renewable investment firm, and a leading advocate for a large oil and gas producer.

The UAE wants to make COP28 the climate summit that stands out with its focus on implementation. And Abu Dhabi is starting to prepare its pitch rather than waiting for the start of the summit, rolling out new projects over the past year.

One ambitious project involves connecting ADNOC's onshore operations to renewable and nuclear power plants, a major development. The UAE also plans to produce 1 million metric tons per year of blue ammonia at the Abu Dhabi Chemical Derivatives Company, or Ta'ziz, plant in Abu Dhabi and is looking to decarbonize the aluminum sector. Much of the UAE's climate efforts are focused on decarbonizing existing facilities, and there has been massive progress on this front.

Around 25% of Abu Dhabi's electricity in 2022 came from nuclear and solar facilities. That figure will be significantly higher in 2023 because Abu Dhabi brought on another unit at the Barakah nuclear power plant. Test operations on the fourth and final unit are likely to start before COP28 begins. Around 8% of Dubai's electricity comes from solar power. Dubai's 1.8-gigawatt Mohammed bin Rashid Al Maktoum Solar Park is the world's largest single-site solar facility.

Yet this recent progress does not put the UAE and other GCC countries on track to meet their climate ambitions. To reduce greenhouse gas emissions, more investment is needed in larger-scale carbon capture and storage technology, especially if the GCC countries are to continue exporting large amounts of oil and gas.

The future energy mix in the Gulf depends on each country's domestic position and plans to power its economy. The GCC countries have taken varying positions and steps in the energy transition. The UAE has moved heavily to nuclear, and Saudi Arabia may also do so. Saudi Arabia, the UAE, Oman, and, to some extent, Qatar have actively pursued solar power. Qatar has huge gas resources, but the others have smaller reserves and primarily use their gas

domestically rather than export it.

The IEA's net-zero scenario forecasts a relatively significant amount of oil use and even more gas use in 2050. Before investing in production infrastructure, the Gulf states must assess whether there will be sufficient demand for their oil and gas in the long term.

The question of carbon capture and storage relates to the use of hydrocarbons in general, which is a big part of the COP28 debate: Should COP28's resolution commit to phasing out fossil fuels or just unabated fossil fuels that cause emissions? The position of the UAE, other oil-producing countries, and coal-dependent countries, such as India and China, is that the problem is emissions, not fossil fuels themselves. In this regard, carbon capture and storage is essential, particularly for gas.

Carbon capture and storage has a very important part to play in the transition, and the Gulf will be critical in scaling up capacity. Gulf states have some reasonably ambitious capacity targets, but much more ambition is needed for a sufficient number of projects to be completed by 2030. For now, as oil and gas are still the dominant fuels in the Middle East, carbon capture and storage must be scaled up rapidly. The technology has not advanced globally over the past 20 years because there was no price on carbon or it wasn't high enough. However, countries in Europe and North America now have a good price on carbon tax credits that encourage carbon capture and storage. These approaches should be pursued in the Gulf to encourage carbon capture and storage projects and draw investors as new regulations on the carbon content of products start to be applied in some parts of the world. Additionally, the EU is rolling out the Carbon Border Adjustment Mechanism, which will require carbon-intensive producers exporting energy-intensive materials, such as steel or aluminum, to pay a carbon price or lower the carbon footprint of their products. This might prompt the GCC countries to impose a domestic carbon price.

There is an export opportunity for hydrogen that should be pursued, but the true prize is to use hydrogen domestically and become a center of low carbon in industries such as steel and aluminum chemicals in a naturally advantaged region.

Despite the rise in the share of renewables capacity globally, emissions rose in 2022 as coal made a comeback and oil was increasingly used for power generation due to record-high LNG prices. However, coal's share in the mix may decline as new LNG capacity comes online and prices drop. Given that renewables have such low representation in the global power generation sector, natural gas is critical as a transition fuel, as it has far lower emissions and fewer pollutants. Gas also has higher energy content and can deliver much more power for the same amount of energy. Qatar, with 77 million mt/y of LNG capacity now, is in the process of increasing capacity by 60% by 2027.

At the same time, energy poverty must be addressed and cannot be overlooked in sub-Saharan Africa and other developing countries. Wealthier countries, including Qatar and the UAE, are making significant investments to address energy poverty while achieving climate objectives. But these funds aren't necessarily going to those who need them. Often the choice comes down to addressing energy hunger in the near term or investing in renewable power generation facilities with long-term benefits. Despite the challenges, addressing energy poverty isn't at odds with economic development or a net-zero future. African countries with

renewable energy resources could offer economic investment opportunities for Gulf sovereign wealth funds.

In discussions about renewables, an issue that often comes up is storage, which is needed to counteract intermittency. However, less attention is paid to the impact on national grids of more solar and wind power being added and thermal power plants being taken offline. It will cost billions of dollars to upgrade grids to handle this shift.

The UAE is not just looking at irradiation levels but specifically at the grid in its totality and how to ensure it remains stable. One way of managing grid stability is interconnections. Saudi Arabia and Egypt will have a high-voltage link by the end of the decade, which will help manage demand across the two countries with different time zones and peak demand at various times and seasons. These links could be extended to Europe, creating North-South and East-West linkages. Grid connections are crucial and extremely helpful for integrating renewable electricity, but countries are unwilling to depend on them, leading to almost no electricity trade outside Europe.

There is potential to bring some of the Middle East's renewable energy resources to the wider market as an alternative or complement to hydrogen for interconnecting continents and making use of the Gulf's very attractive solar power.

Storage is a solution for grid stability, but so are microgrids and decentralized grids. Dubai has opted for a decentralized grid system with the Shams Dubai initiative, whereby rooftop solar panels on private and public buildings are connected so as not to put pressure on the grid. This model is more efficient because it has less transmission loss and can be replicated. Many countries are looking at this decentralized model. Using microgrids rather than utility-scale installations would improve energy access in remote areas of Africa currently lacking access to grids.

Intermittent renewable energy requires storage when the sun goes down and the wind stops, but lithium battery storage is still expensive. However, it is well suited for the Middle East because it is only needed to bridge a few hours, such as during peak demand in the evenings.

Another storage solution that would work well in the Middle East without additional cost is a hydro-dam system. This entails installing floating solar panels on top of dams, which are already electrified and connected to the grid. This system can be used for battery storage during peak hours. A third alternative is to use hydrogen as storage, which would work in the Middle East as production is scaled up but is needed more in Europe, where seasonal storage is necessary.

One common challenge throughout the Middle East is water stress, which is being exacerbated by climate change. Iran is one oil-producing state with significant hydropower capacity, but it has seen a sharp drop in production because of drought. The unreliability of hydropower in Iran has caused gas and electricity shortages domestically and led Tehran to reduce gas and electricity exports to Iraq to satisfy domestic demand. Iraq is also suffering from a drop in water supplies as more dams are being built in Iran and Turkey.

Much of the Gulf's water supply comes from desalination plants, which run mostly on natural gas. More efficiency is needed as demand for desalinated water is expected to surge, making

more efficient reverse osmosis plants the preferred option for many Gulf states. Water is also needed to cool thermal power plants.

Due to the arid conditions and high temperatures that prevail across the Gulf for much of the year, demand for cooling is high and will rise further. There is now a gradual move away from traditional air conditioning units in favor of more climate-friendly technologies, and more efficiency standards are being introduced for appliances.

With natural gas still the main baseload fuel for power generation, a number of countries are putting more effort into reducing methane emissions and halting flaring to comply with stricter environmental requirements. As one of the world's biggest LNG producers, Qatar has taken the lead by pledging to eliminate nearly all methane emissions by 2030. Saudi Aramco has also joined that initiative. For both economic and climate considerations, Qatar began working toward that goal a decade ago to avoid wasting gas that could otherwise be used to produce LNG.

The electrification of transportation is also taking hold in some parts of the Gulf. The number of electric cars in Dubai has grown, while Qatar has been testing electric buses designed to operate in extreme heat conditions. Demand for electric vehicles in the region has spurred some countries, such as Saudi Arabia, to invest in domestic electric vehicle production.

The shift from internal combustion engines to electric vehicles has been visible recently in the UAE, which has updated its nationally determined contribution with a much higher emission reduction target. Whereas the UAE's previous nationally determined contribution aimed to reduce emissions to 300 million tons of carbon dioxide equivalent by 2030, its new target is 200 million tons, which is around its current level, meaning the UAE aims to keep emissions constant despite economic growth.

The aviation sector, a growth industry in nearly all Gulf states, is more difficult to decarbonize. The sector is a huge part of the economies of the UAE and Qatar. Saudi Arabia is also beefing up its airline industry. Most Gulf national airlines operate long-haul flights, which are high emitting. Decarbonization solutions for aviation are costly and in the early stages of development, and there is not yet enough sustainable aviation fuel to make an impact. Converting hydrogen to synthetic kerosene is a perfect replacement for conventional kerosene and is more realistic than developing hydrogen-powered aircraft, which would require replacing entire fleets and fueling systems.

Outside the Gulf, the eastern Mediterranean has garnered significant interest from investors, fast emerging as a gas hub linking Egypt, Israel, and Cyprus. One advantage for eastern Mediterranean producers is their proximity to Europe, which is scrambling to find alternatives to Russian pipeline gas, but delivering the gas poses problems. Part of the problem is that no one can make long-term commitments on fossil fuels, even if they are desperately needed now, making construction of a costly pipeline link from the Mediterranean to Europe unlikely.

There is no such risk regarding electricity interconnections with southern Europe, particularly as renewable energy is scaled up across the Middle East. It would also be feasible and economically competitive to build a gas pipeline to transport hydrogen from Egypt, which is planning to ramp up production.



Mike Howard (right) delivers keynote address with moderator Ambassador Douglas A. Silliman.



Speakers make remarks during the panel "Decarbonization Pathways in the GCC."

Agenda

June 27-28, 2023

Session 1: Decarbonization Pathways in the GCC

Speakers:

Ben Cahill, Senior Fellow, Energy Security and Climate Change Program, Center for Strategic and International Studies

Adam Sieminski, Senior Advisor, Board of Trustees, King Abdullah Petroleum Studies and Research Center

Sara Vakhshouri, Founder and President, SVB Energy International

Moderator:

Kate Dourian, Non-Resident Fellow, AGSIW; Contributing Editor, MEES; Fellow, Energy Institute

Session 2: Geopolitical Shift and New Alliances

Speakers:

Ambassador John E. Herbst, Senior Director, Eurasia Center, Atlantic Council

Dawn Murphy, Associate Professor of National Security Strategy, National War College

Paul Salem, President, Middle East Institute

Moderator:

Hussein Ibish, Senior Resident Scholar, AGSIW

Keynote Discussion With Mike Howard, Chair, World Energy Council

Speaker:

Mike Howard, Chair, World Energy Council

Moderator:

Ambassador Douglas A. Silliman, President, AGSIW

Session 3: Presentation – IEA Oil 2023 Report: Analysis and Forecast to 2028

Speaker:

Toril Bosoni, Head of Oil Industry and Markets Division, International Energy Agency

Moderator:

Ambassador Douglas A. Silliman, President, AGSIW

Session 4: The Future Energy Mix in the Gulf

Speakers:

Joumana Hosri, CEO, Sacotel Znshine

Jamie Ingram, Senior Editor, MEES

Robin Mills, Non-Resident Fellow, AGSIW; CEO, Qamar Energy

Tofol Al-Nasr, Partner, Daleelaq Consulting

Moderator:

Kate Dourian, Non-Resident Fellow, AGSIW; Contributing Editor, MEES; Fellow, Energy Institute

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