

OPEC bulletin

9-10/23



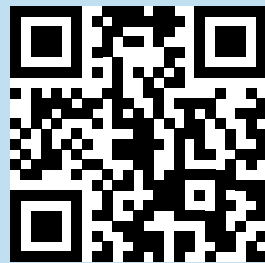
World Oil Outlook 2023

*'All-peoples, all-fuels, all-technologies'
approach to a sustainable energy future*

OPEC

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OPEC launches WOO 2023 amid global shifts in energy policy

Over the past year or so there has been a marked shift in attitudes to energy policies across the world, as many populations and governments increasingly question aspects of some initial net-zero policies and acknowledge the need for reliable and affordable energy access alongside reductions in emissions.

Against this backdrop, at an event of great importance for the Organization, OPEC launched its 17th World Oil Outlook (WOO) – what Secretary General Haitham Al Ghais aptly labelled a “landmark edition” – on 9 October at the King Abdullah Petroleum Studies and Research Center (KAPSARC) in Riyadh, Saudi Arabia.

The result of months of sophisticated modelling, writing, reviewing and production, this year’s WOO contains a wealth of data-driven, expert analysis, ensuring its value as a constructive reference tool for energy stakeholders and policymakers who are serious about prudently planning for the world’s short, medium and long-term energy future.

Recent developments related to energy policy shifts, reassessments of the speed and nature of energy transitions, as well as developments in the economic landscape, have led the OPEC team to reassess exactly what each energy can deliver, with a focus on realistic solutions.

In this respect, the Outlook underscores that if the world is to achieve a sustainable, orderly and just energy future, policymakers need to adopt an ‘all-peoples, all-fuels, and all-technologies’ approach.

Faced with expanding populations and economic and energy demand growth, calls to stop investing in fossil fuels are simply not conducive to maintaining energy security. The global population is expected to grow by around 1.5 billion people, reaching 9.5 billion by 2045. Consequently, demand for all primary fuels (excluding coal) will increase in the long term, with global primary energy demand set to increase by 23 per cent to 2045.

While other renewables (notably wind and solar) see their share in the energy mix increasing from 2.7 per cent to 11.7 per cent in 2045, it is oil that is set to remain the

fuel with the largest share at 29 per cent by 2045. Global oil demand is set to increase by more than 16 mb/d, moving from 99.6 mb/d in 2022 to 116 mb/d in 2045. The 2045 level is 6 mb/d higher than that seen in the WOO 2022, and has the potential to move even higher.

The Outlook clearly demonstrates that energy transition debates should no longer disregard the critical role that commodities like oil will continue to play in fostering energy security. Instead, the world needs to reduce emissions while ensuring access to the energy that people need to live securely and comfortably.

Towards these goals, OPEC Members are investing in upstream and downstream capacities; mobilizing cleaner, innovative technologies; deploying vast expertise to decarbonize the oil industry; making major investments in renewables, hydrogen, carbon capture utilization and storage; and promoting the circular carbon economy. This is all highlighted in this edition of the OPEC Bulletin.

Ahead of this year’s United Nations Climate Change Conference (COP28) in the United Arab Emirates – where the world will evaluate progress on the Paris Agreement – COP28 President-Designate Dr Sultan Ahmed Al Jaber has said that the world needs “maximum energy, minimum emissions”.

The Outlook emphasizes that a healthy degree of realism will be necessary to achieve this goal, especially because, as Al Ghais noted in Riyadh, “there is no credible way to address the challenges before us without utilizing all available energy sources and technologies.”

At COP28, it is hoped that decision makers focus on enabling economic growth and boosting energy access while reducing emissions. The fact that all sectors will have a place at the table represents an excellent start towards meeting these goals and ensuring that COP28 ends as a ‘Cop of Solutions’.

Ultimately, ensuring future energy security in the face of rising population growth and energy demand while reducing emissions necessitates all energy stakeholders and countries working together. Towards this end, the WOO underlines exactly why massive investment in all fuels and technologies is needed now, more than ever. 🌍



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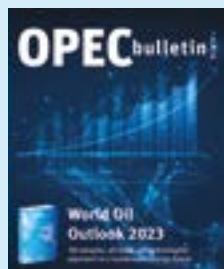


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This month's cover highlights the launch of the World Oil Outlook 2023. (see story on page 4).

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OPEC Membership and aims

OPEC is a permanent, intergovernmental Organization, established in Baghdad, on 10–14 September 1960, by IR Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. Its objective — to coordinate and unify petroleum policies among its Member Countries, in order to secure a steady income to the producing countries; an efficient, economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the petroleum industry. Today, the Organization comprises 13 Members: Libya joined in 1962; United Arab Emirates (Abu Dhabi, 1967); Algeria (1969); Nigeria (1971); Angola (2007); Equatorial Guinea (2017). Ecuador joined OPEC in 1973, suspended its Membership in 1992, rejoined in 2007, and suspended its Membership again on 31 December 2019. Qatar joined in 1961 and left on 31 December 2018. Indonesia joined in 1962, suspended its Membership on 31 December 2008, reactivated it on 1 January 2016, but suspended its Membership again on 31 December 2016. Gabon joined in 1975 and left in 1995; it reactivated its Membership on 1 July 2016. The Republic of the Congo joined the Organization on 22 June 2018.



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The *OPEC Bulletin* welcomes original contributions on the technical, financial and environmental aspects of all stages of the energy industry, as well as research reports and project descriptions with supporting illustrations and photographs.

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OPEC launches World Oil Outlook 2023

Global oil demand at 116 mb/d in 2045

*Among OPEC's various objectives is the continuous focus on providing transparent and comprehensive analysis and oil market data to both energy stakeholders and the general public. Over the years, this has been exemplified through OPEC's annual **World Oil Outlook** (WOO), with the 17th edition most recently launched at a distinguished gathering at the King Abdullah Petroleum Studies and Research Center (KAPSARC) in Riyadh, Saudi Arabia.*



HRH Prince Abdul Aziz Bin Salman, Minister of Energy of the Kingdom of Saudi Arabia.



OPEC Secretary General Haitham Al Ghais presenting the World Oil Outlook 2023.

This year's WOO launch saw special guest of honour, HRH Prince Abdul Aziz Bin Salman, Minister of Energy of the Kingdom of Saudi Arabia and Chairman of the Board of Trustees at KAPSARC, open proceedings. In his remarks, he welcomed all attendees, specifically mentioning Hayan Abdulghani Abdulzahra Alsawad, Iraq's Deputy Prime Minister for Energy Affairs and Minister of Oil.

Prince Abdul Aziz also thanked all those who have been participating in MENA Climate Week 2023, taking place at the same time as the WOO launch, and stated that he hoped the climate change event displayed how all countries in the region were committed to attending to such matters. He added, "Our aspirations in Saudi Arabia are to take a lead in these issues."

OPEC SG remarks

OPEC Secretary General, Haitham Al Ghais, said it was a great privilege to launch the publication in the presence of Prince Abdul Aziz, who has played a leading role in the history of OPEC and been a driving force in the success of the Declaration of Cooperation (DoC). He also thanked Fahad Alajlan, President of KAPSARC, and his dedicated staff, for supporting with preparations for such an important OPEC event.

Al Ghais said this year's Outlook was the 17th and "I truly believe it is a landmark edition" that examines the intertwined challenges related to energy security, energy availability and reducing emissions.

"It asks the questions of how we can deliver a sustainable energy and economic future for all, with world population increasing to 9.5 billion by 2045, the global economy almost doubling over the same period, and given the critical need to bring modern energy services to those billions that continue to go without," he added.

In talking about the research undertaken by analysts at the OPEC Secretariat, he noted that they had "taken on board all the shifting realities on the ground, what each energy source can actually deliver, what technological options are relevant and available, and most recently the changing policy dynamic and challenges around experimental net-zero policies."

He added that "we firmly believe that climate action should not come at the cost of global energy security. In fact, we go further: energy security, accessibility and sustainability are essential for the world to combat climate change."

Increased demand

Al Ghais said that this all led in one direction — "there is no credible way to address all the challenges before us without utilizing all available energy sources, all relevant technologies, with energy market stability as a cornerstone for the huge investments required."

He stated that OPEC did not dismiss any energy sources or technologies, and believed that all stakeholders should do the same and recognize short- and long-term energy realities.

Accordingly, he added, "this year's Outlook sees oil demand in 2045 at 116 million barrels a day (mb/d), more than 6 mb/d higher than our forecast last year, and with the potential to be even higher.

"For this to be achieved, oil sector investment requirements out to 2045 now total \$14 trillion, or around \$610 billion per year."

He stressed there were some who unfortunately continue to push the extremely risky narrative of dismissing oil "with talk of oil demand dropping by almost 25 mb/d by 2030, only just over six years from now, and with dangerous calls to stop investments in new oil projects.

"This can only lead to heightened volatility, hindering economic development and exacerbating energy poverty."

In concluding, he said, the WOO took a holistic view of the core energy challenges before us. "We need to reduce emissions, and remember that the Paris Agreement itself is about reducing emissions, not about choosing energy sources. We need to guarantee energy security. We need to ensure everyone has access to modern energy services."

Other main takeaways

Dr Ayed S Al-Qahtani, Director, OPEC's Research Division (DRD), drilled down further into the key findings of the WOO, emphasizing that all "critical parameters" had been examined in formulating the outlook. He added the WOO highlighted the Organization's "commitment on knowledge sharing and data transparency", and praised the valuable input from OPEC's governing bodies.





Dr Ayed S Al-Qahtani, Director of OPEC's Research Division.

Alongside the points on long-term oil demand and investments emphasized by the Secretary General, other main takeaways noted by Dr Al-Qahtani, included:

- The world economy is expected to almost double in size, and the global population to rise by 1.5 billion between now and 2045.
- Global primary energy demand is set to expand by a significant 23 per cent in the period to 2045, adding annually on average 3 million barrels of oil equivalent a day.
- All major fuel types witness growth, with the exception of coal.
- Oil is set to retain the largest share in the energy mix in 2045 at almost 30 per cent.
- Other Renewables — combining mainly solar, wind and geothermal energy — expand by 7.5 per cent per annum on average, significantly faster than any other source of energy.
- Non-OECD countries drive oil demand growth, expanding by 25.7 mb/d over the entire forecast period.
- The largest contributor to incremental demand is India, adding around 6.6 mb/d to 2045, followed by Other Asia, China, the Middle East and Africa.
- Oil demand in road transportation returns to the top spot in the sectoral breakdown with growth of 4.6 mb/d through 2045, followed closely by petrochemicals and aviation.
- Non-OPEC liquids supply expands to over 73 mb/d by the early 2030s, with the US making up nearly half the expansion, before declining to 69.9 mb/d in 2045.
- The share of OPEC liquids in the overall global liquids base increases by 6 percentage points to 40 per cent in 2045.
- Global refining capacity additions are projected at 19.2 mb/d through 2045.
- Significant refinery capacity expansions in the Asia-Pacific, Middle East and Africa in both the medium and long term, are partly offset by closures in developed regions.
- Global interregional crude and condensate trade is set to increase from 36 mb/d in 2022 to 45.3 mb/d by 2045, driven by rising oil demand and falling supply in importing regions.
- The major export growth contributors are the Middle East and Latin America, while Asia-Pacific remains the major import destination.
- Energy access and per capita consumption in developing countries improves, but energy poverty remains an issue throughout the forecast period.
- Given the need to continually reduce emissions, it is vital to evolve global best practices and cutting edge, best-in-class technologies. For example, carbon capture utilization and storage, clean hydrogen technologies, carbon dioxide removal, direct air capture and others, all within the concept of the circular carbon economy.

Panel session

What followed was a panel session with moderator, Dan Murphy, CNBC Anchor and Correspondent, who was joined on stage by panelists from OPEC's RD: Dr Al-Qahtani; Dr Abderrezak Benyoucef, Head of the Energy Studies Department (ESD); Dr Jan Ban, Senior Research Analyst, ESD; Dr Haris Aliefendic, Senior

OPEC experts discuss the WOO 2023 with moderator Dan Murphy of CNBC.



Research Analyst, ESD; and, Julius Walker, Senior Research Analyst, ESD.

When asked about the WOO in relation to the upcoming COP28, Dr Al-Qahtani reiterated that the outlook was data-driven, with sophisticated modelling, backed up by expert opinions from the Secretariat. He said he hoped it could provide input to upcoming meetings, including COP28.

One specific area he mentioned was “technology as a major facilitator for decarbonization”. This is referenced in the WOO and Al-Qahtani also took note of the many technologies on display at MENA Climate Week, emphasizing an all-technologies, and all-fuels approach as the way forward.

Dr Benyoucef was asked about the reasons behind the higher oil demand forecasts. He stated that all energies had in fact been revised up, but in terms of oil demand he highlighted the shift in energy policies, with populations pushing back on some net-zero policies; the need for more energy access; and, a higher number of internal combustion engine vehicles, specifically in the commercial sector.

Another interesting development in the WOO 2023 was the return of road transportation to the top spot for sectoral oil demand growth out to 2045. Dr Ban said there were two main reasons for this. “The first was expectations for faster economic growth in developing nations, leading to more vehicles on the road, and the second was OECD developments, such as postponed phasing out of ICES, with spillover effects for other regions.”

On the supply side, Walker was invited to reflect on the differing medium- and long-term expectations. He said, “Yes, there is a distinct difference, with non-OPEC

expected to lead medium-term growth, with the US contributing around half of the expected 7 mb/d from non-OPEC. In the long-term, however, demand for OPEC liquids rises to over 46 mb/d, with its share increasing to 40 per cent in 2045, from 34 per cent in 2045.”

From the perspective of refining and trade, Dr Aliefendic underscored the expected significant refinery capacity expansions in the Asia-Pacific, Middle East and Africa, as well as the almost 10 mb/d increase in global interregional crude and condensate trade to just over 45 mb/d by 2045. He stated that the oil trade link between the Middle East and the Asia-Pacific becomes ever more important over time.

Teamwork

The Secretary General again thanked Prince Abdul Aziz and KAPSARC and the extremely warm welcome the team had received while in Riyadh.

In terms of teamwork, he also emphasized that the platform for building a sustainable energy future for all came from stability in energy markets, which remained the core focus of OPEC and its partners in the DoC. He added that the proactive, pre-emptive and multilateral approach to balanced and stable markets would continue to be a guiding principle in the years to come.

Al Ghais also thanked all those involved in putting together the WOO, management, analysts, editors, designers and all others that played a role. In his foreword to the publication, he said, “The OPEC team should be proud of this achievement, which is central to the Organization’s embrace of transparency through dialogue and cooperation.”



HRH Prince Abdul Aziz Bin Salman and Haitham Al Ghais with OPEC Secretariat staff at the launch of the WOO 2023.



ADIPEC 2023: Decarbonizing. Faster. Together.

*The Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC), the world's largest energy exhibition and conference, took place in Abu Dhabi from 2–5 October 2023 under the motto, 'Decarbonizing. Faster. Together.' OPEC Secretary General **Haitham Al Ghais** led an OPEC delegation on what was a very fruitful visit.*

The 34th edition of ADIPEC, with the goal of uniting industries and businesses to accelerate collective action to decarbonize quicker and futureproof the energy system, brought together a record 184,000 people from more than 160 countries – including 1,600 ministers – and thousands of CEOs, policymakers, innovators and energy experts.

Participants could visit 16 exhibition halls and 30 country pavilions, attend 350 conference sessions and connect with representatives of 2,200 companies. It was an impressive energy gathering less than two months before the United Arab Emirates (UAE) welcomes global leaders to COP28 to take stock of the Paris Agreement.



Dr Sultan Ahmed Al Jaber, COP28 President-Designate and the UAE's Minister of Industry and Advanced Technology, delivers a keynote address during the ADIPEC 2023 opening ceremony.



OPEC Secretary General Haitham Al Ghais at the opening ceremony.

ADIPEC 2023 succeeded in providing an excellent platform for key stakeholders to discuss their concrete efforts to lower emissions, while providing the energy security the world needs.

ADIPEC opening ceremony

The ADIPEC opening ceremony began with an inspiring video that served as a rallying call to decarbonize better together. This included pledges from ten leading global CEOs from across the energy industry, underlining the industry's unified approach to driving investment, partnerships and innovation to decarbonize.

Aramco CEO and President Amin H Nasser stated: "Aramco believes [that] energy security and sustainability can co-exist. We remain committed to helping supply the world's growing energy needs as we expand our efforts to develop lower-carbon solutions that will provide future generations with cleaner, more sustainable energy."

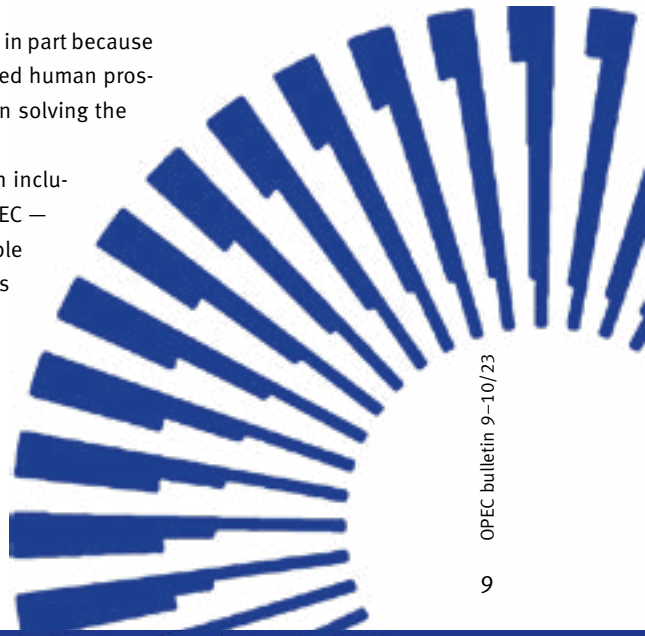
Shell CEO Wael Sawan echoed similar sentiments, stating that: "The world needs fewer emissions and enough reliable, affordable energy for people to power their lives — it cannot be one or the other. At Shell, we

are working to be a net zero emissions energy business by 2050 while we continue to deliver the energy that the world needs."

Following the video, Dr Sultan Ahmed Al Jaber, COP28 President-Designate and UAE Minister of Industry and Advanced Technology, delivered a keynote address that began by noting that ADIPEC 2023 had succeeded in bringing "together the leaders who must shape a future where energy is accessible, secure, affordable, sustainable and decarbonized".

He was optimistic about the future, in part because "just as the energy industry has enabled human prosperity in the past, it will be essential in solving the global challenges we all face today."

Towards this end, he advocated an inclusive approach — also espoused by OPEC — in which "everyone must be at the table to make the transformational progress needed, especially the energy industry... [as] no other industry has the same ability to manage complexity, and possesses the depth of knowledge, engineering knowledge,





أديبك
ADIPEC



Decarbonising. Faster. Together.

Ministerial Panel

Moderator

John Deferios
Professor of Business, NYU
Abu Dhabi



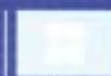
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Minister of Energy and Natural Resources
Turkey



HE Sebastian-Ioan Burduja
Minister of Energy
Romania



HE Haitham Al-Ghais
Secretary General
OPEC



L-r: John Deferios, Professor of Business at NYU Abu Dhabi and former CNN emerging markets editor, was the moderator of the high-level ministerial panel session, with panelists, Suhail Al Mazrouei, UAE's Minister of Energy and Infrastructure; Dr Alparslan Bayraktar, Türkiye's Minister of Energy and Natural Resources; Sebastian-Ioan Burduja, Romania's Minister of Energy; and Haitham Al Ghais, OPEC Secretary General.

capital, technology, and scale that is needed for the task at hand.”

Furthermore, he was fully confident that the energy industry “can and must help drive solutions”, and called on the industry “to show the world that, in fact, you are central to the solution.”

Ministerial panel

Immediately following the keynote address, a ministerial panel on the topic of ‘Fast Tracking the Energy Transition’ brought together Suhail Al Mazrouei, UAE’s Minister of Energy and Infrastructure; Dr Alparslan Bayraktar, Türkiye’s Minister of Energy and Natural Resources; Sebastian-Ioan Burduja, Romania’s Minister of Energy; and OPEC Secretary General Al Ghais.

John Deferios, Professor of Business at NYU Abu Dhabi and former CNN emerging markets editor, moderated the panel, which discussed, *inter alia*, how to accelerate energy transitions across the globe.

Towards this end, Al Mazrouei underlined that the UAE was working on two parallel tracks to hit its renewable energy goals — planning to triple its renewable energy contribution by 2030 — while also investing to meet the country’s responsibility to supply global consumers with oil, which would remain a reliable source of energy for years to come.

In this respect, he noted that ADNOC had brought forward its goal to achieve production of 5 million barrels a day (mb/d) from 2030 to 2027 in order to address underinvestment across the oil industry that could otherwise jeopardize energy security if not swiftly remedied.

In addition, he praised the ability of OPEC and OPEC+ to work as a technical group, stating that: “We care about



Participants of the leadership roundtable titled ‘Ministerial roundtable: Accelerating the pace of policy innovation to a secure, affordable, lower carbon energy future’.

the market, and we have a responsibility towards the consumers of the world — that is the right thing to do.”

Upon taking the floor, Al Ghais noted that: “Calls to stop investing in oil are counterproductive... and put countries at risk, because the cornerstone of global economic prosperity today is energy security.”

Underlining the scale of investment needed, he noted that the oil industry alone required investment of \$14 trillion, or \$600 billion a year, from now until 2045, if energy security was to be ensured.

In addition, he noted that: “Energy transitions have to be just, orderly, and inclusive; we have to have a clear

roadmap of where we are heading and how we are going to get there.”

In closing, the OPEC Secretary General noted that the Organization was optimistic regarding future oil demand, believing that it would “remain resilient this year, as it did last year... with north of 2.3 mb/d year-on-year growth forecast.”

Leadership roundtable

ADIPEC 2023 also saw Al Ghais host a leadership roundtable discussion, entitled, ‘How national oil

Participants of the leadership roundtable hosted by Haitham Al Ghais to discuss the role that national oil companies (NOCs) can play to contribute to a lower-carbon future.





Haitham Al Ghais, OPEC Secretary General, took part in a leadership roundtable discussion, during which he praised the UAE for its firm commitment to supporting energy security and reducing emissions.

companies can contribute to a lower carbon global energy system.’

The goal of the session was to share perspectives on how national oil companies (NOCs) can — and are — contributing to a lower emissions global energy system.

Pattabi Seshadri, Managing Director & Senior Partner at Boston Consulting Group, moderated the event, along with Jamie Webster, Partner and Associate Director at Boston Consulting Group, while Arthur Hanna, Strategic Advisor at the World Energy Council, chaired the session.

In his remarks, the Secretary General focused on four areas that have been key in driving NOCs’ success to date, namely developing advanced technologies; ensuring adequate investment in all energies; improving operational efficiency; and facilitating cooperation within the industry.

He stated that “technological advancements and innovations can and do improve performance across the entire oil industry value chain. OPEC Member Countries and NOCs are fully aware of this and are developing advanced technology and driving technological innovation

The strategic conference session, ‘Actions for a net-zero world: solving the current energy trilemma’.





As part of OPEC's participation at ADIPEC, Dr Ayed S Al-Qahtani (r), the Director of the Organization's Research Division participated in a leadership perspectives session, entitled, 'How upstream producers are rapidly decarbonizing operations'. Also attending the session (l-r): moderator John Defterios, Professor of Business at NYU Abu Dhabi and former CNN emerging markets editor, with other panelists, Montri Rawanchaikul, CEO of PTTEP; and Arun Kumar Singh, Chairman and CEO, ONGC.

accordingly ... including, but not limited to, scaling up carbon capture utilization and storage, clean hydrogen technologies, direct air capture, and carbon dioxide removal, all within the concept of the circular carbon economy.”

On investment, Al Ghais opined that “OPEC Member Countries and NOCs firmly believe that if the world is to avoid volatility and meet future energy demand, we need to ensure the availability of adequate investment in all energies today. Backing up their words with actions, OPEC Member Countries and their NOCs are proving that it is possible to invest simultaneously, among other areas, in upstream and downstream capacity, hydrogen, new decarbonization technologies and hydrocarbons.”

Regarding enhanced efficiency, the Secretary General said that: “NOCs are constantly improving their operational efficiency by optimizing extraction and refining processes — including excellent reservoir management practices — flare minimization and reducing methane leaks, greenhouse gas emissions management, energy efficiency and improving transportation and logistics to minimize energy waste and emissions.”

On fostering cooperation among NOCs towards improving their operational efficiency standards further, he used the example of the OPEC International Seminar in July, stating that: “It brought together 1,000 delegates, including 18 CEOs of energy firms and 17 ministers from producing and consuming countries, and





On the sidelines of ADIPEC 2023, OPEC Secretary General Haitham Al Ghais, met with Dr Ruth Nankabirwa Ssentamu, Uganda's Minister of Energy and Mineral Development. The two discussed energy market developments and explored ways to enhance cooperation between Uganda and the Organization.

provided an excellent forum to share ideas and best practices.” Towards the same end, he added that OPEC would again gather industry stakeholders together for a workshop in October.

He concluded by noting that “NOCs should be proud of what they have been doing to date to foster global energy security, deliver energy affordability and reduce emissions — all integral components of the energy sustainability trilemma.”

Bilateral meetings on the margins of ADIPEC

OPEC places great credence in cooperating and fostering dialogue with a wide variety of stakeholders to ensure inclusive and effective dialogues on energy, and contribute to overall global energy stability.

In accordance with this approach, Al Ghais utilized the excellent convening power of ADIPEC 2023 to hold a number of bilateral meetings on the sidelines of the event.

During a meeting with Hardeep Singh Puri, India's Minister of Petroleum and Natural Gas and Minister of

Housing and Urban Affairs, developments in oil and energy markets, the investment challenge facing the industry and the forthcoming High-level Meeting of the OPEC-India Energy Dialogue later this year were discussed.

In a meeting with Senator Heineken Lokpobiri, Nigeria's Minister of State for Petroleum Resources, market developments, energy security and possible means of strengthening ties between Nigeria and OPEC were discussed. The Secretary General also thanked Nigeria for its significant contributions to OPEC and the Declaration of Cooperation process, noting that Nigeria remained a strong advocate of oil market stability.

The OPEC Secretary General also met with Mohammed Jalal Alraysi, Director-General of the Emirates News Agency (WAM), at the WAM Headquarters, discussing a number of key issues related to the industry and cooperation between WAM and OPEC.

During a meeting with Eng Ahmed Mohammed Al Rumaithi, Undersecretary of the Abu Dhabi Department of Energy — held at the department's Headquarters — Al Rumaithi outlined the key projects carried out



Haitham Al Ghais, OPEC Secretary General, met with Hardeep S Puri, India's Minister of Petroleum and Natural Gas and Minister of Housing and Urban Affairs.



Haitham Al Ghais, OPEC Secretary General, met with Senator Heineken Lokpobiri, Nigeria's Minister of State for Petroleum Resources, where they discussed market developments, energy security and possible avenues to strengthen the ties between Nigeria and the Organization.

OPEC Secretary General Haitham Al Ghais met with Mohammed Jalal Alraysi, Director-General of the Emirates News Agency (WAM), at the Agency's Headquarters.




by the department, with a focus on improving energy efficiency.

Al Ghais praised the department's efforts and highlighted the importance of reliability in the energy sector. They also agreed on possible ways to strengthen cooperation between the Agency and the Organization.

Al Ghais also held a meeting with Sheikh Mansoor Mohamed Al Hamed, CEO of Mubadala Energy, which focused on key issues related to the energy industry, including energy security and technological innovation.

Ultimately, the 34th edition of ADIPEC saw an impressive convergence of people, policy, technology and capital. Indeed, its ability to bring together global energy leaders and stakeholders from adjacent industries and sectors like finance and technology represents a great comparative advantage that — moving forward — will continue to serve the world well in reducing emissions while providing energy security.

In this respect, OPEC is already looking forward to the 35th edition of ADIPEC, due to take place next year from 11–14 November in Abu Dhabi. 

OPEC Secretary General Haitham Al Ghais met with Eng Ahmed Mohammed Al Rumaithi, Undersecretary of the Abu Dhabi Department of Energy, at the Department's Headquarters.





OPEC Secretary General Haitham Al Ghais (r) held a meeting with Sheikh Mansoor Mohamed Al Hamed (c), CEO of Mubadala Energy. The meeting focused on key issues related to the energy industry, such as energy security and technological innovation.



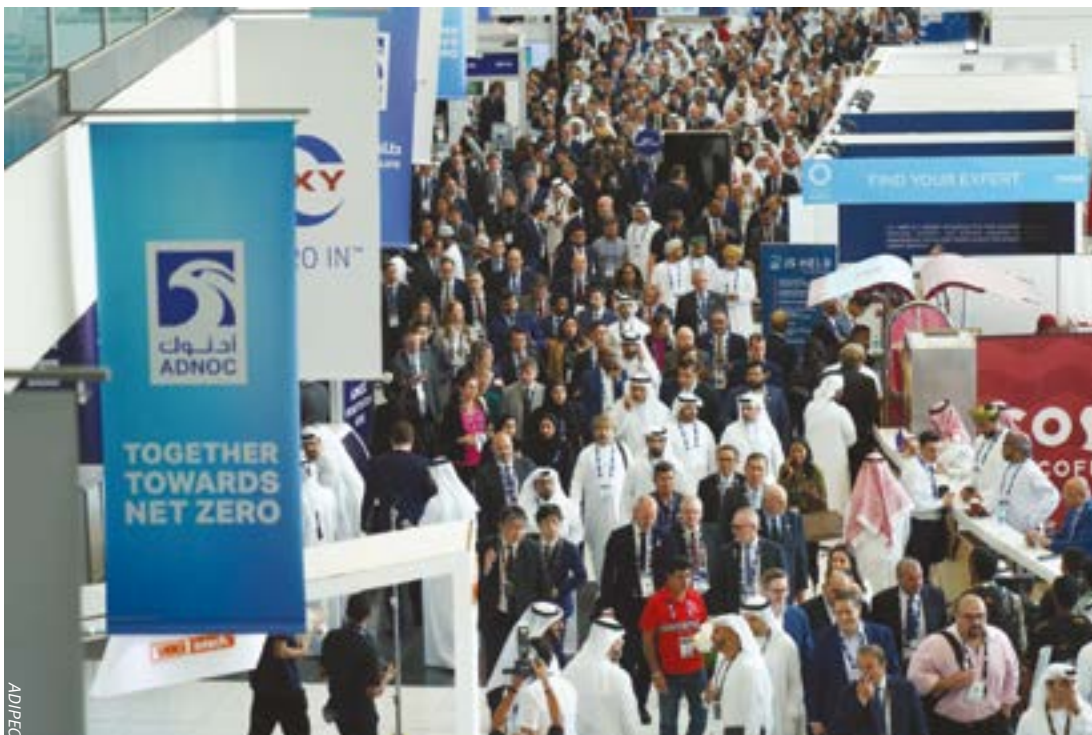
In an interview with CNBC's Dan Murphy, OPEC Secretary General Haitham Al Ghais underlined the critical importance of investing in oil and gas now to ensure future energy security.



United Arab Emirates volunteers helping at the OPEC stand.

Impressions of ADIPEC 2023





ADNOC

COP28 on the

With COP28 set to take place in Dubai, in the United Arab Emirates (UAE), from 30 November to 12 December, the OPEC Bulletin provides a brief overview of some of its key priorities.

Under the leadership of the COP28 Presidency, the UAE, the world is set to convene in Dubai to chart the way forward on climate action.

To achieve its ambitious agenda, COP28 will seek to build upon the progress achieved at previous COPs to advance climate action through cooperation and dialogue and an inclusive, transparent, pragmatic and results-oriented approach.

Thematic programme

The two-week conference will feature a thematic programme designed to bring together a wide range of stakeholders for the discussion of realistic, achievable solutions that are intended to limit warming to 1.5°C. These solutions will require enhanced resilience and the mobilization of finance at scale.

The official COP28 website summarizes these solutions as follows: “This set of solutions constitutes the

response to the Global Stocktake, looking where the world stands on climate action and support, identifying the gaps, and working together to agree on solution pathways to 2030 and beyond.”

The UAE Presidency has developed this integrated thematic programme together with the High-level Champions and through the support of the Marrakech Partnership and the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat.

The programme will also take into account the Climate Action Pathways, the Breakthrough Agenda, and the Sharm El Sheikh Adaptation Agenda with the goal of achieving the systemic transformations needed in every thematic area to fulfill the Paris Agreement.

The COP28 Presidency describes its plan of action as “focused on matching the highest ambition for negotiated outcomes, with a robust action agenda to implement those ambitions in the real world”.

Dubai
coastline.

horizon

It has called on governments and key climate stakeholders to take action in four areas centered around: fast-tracking the energy transition and keeping 1.5°C within reach; fixing climate finance; focusing on nature, people, lives and livelihoods; and ensuring full inclusivity.

The wide array of issues to be discussed at COP28 will be considered within a framework of cross-cutting themes, which are technology and innovation, inclusion, frontline communities and finance.

OPEC pavilion

OPEC will have a significant presence at this year's COP, hosting a pavilion at the event for the first time. A daily program of events will be organized, and information on OPEC, its role in the global energy industry, the role of oil in the world and key technologies for the future, will be highlighted.

"The oil industry will be there at COP and we will be there," OPEC Secretary General Haitham Al Ghais said while addressing the Gulf Intelligence Forum in Fujairah. "I hope all voices will be at the table at COP28."

Al Ghais' comments were echoed by officials from OPEC Member Countries, in addition to leaders of

the world's top energy companies, who continue to emphasize that the oil and gas industry has an important role to play in addressing climate change.

Dr Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology and COP28 President-Designate, delivered a formal address at the opening ceremony for MENA Climate Week held in Riyadh from 8 to 12 October, in which he made an appeal to nations around the world to strengthen "their legacy of climate leadership to drive inclusive progress ahead of COP28."



*Dr Sultan Ahmed Al Jaber,
UAE Minister of Industry and
Advanced Technology and
COP28 President-Designate.*

Shutterstock

Mariam Almheiri, UAE Minister of Climate Change and Environment.

Referring to the Middle East and North Africa region, he said that wind and solar investments have grown fourfold in the past decade and are expected to double again in the next five years. Additionally, he noted that the region is the world's leading producer of clean hydrogen.

He also lauded the success of the Saudi and Middle East Green Initiatives, which are helping advance investments in both mitigation and adaptation measures.

"I am filled with confidence that this region has the leadership, the vision and the capacity to shape a better future, not just for the Middle East and North Africa, but for the entire world," he said. "Over the course of my lifetime, I have seen first-hand the transformative abilities of our region. I have experienced our resilience in the face of global events and climate change. And I can tell you that the track record, actions and political will of the UAE leadership and the COP28 team's determination to build a better future is absolutely unwavering.

"With just 53 days to go before COP28, I am determined to rally the world behind an ambitious and comprehensive climate agenda," he added. "Ladies and Gentlemen, we have had 27 COPs, and you might be surprised to learn that 17 of them have been hosted in

fossil fuel producing nations. The fact is, energy is fundamental to everyone, everywhere. And figuring out a fair, just, equitable and well managed energy transition is essential for economic and climate progress."

United Arab Emirates leadership at COP28

In addition to Dr Al Jaber's key role as COP28 President-Designate, the UAE has many other influential figures taking a lead in the country's efforts to address climate change as hosts of COP28.

Shamma Al Mazrui, UAE Minister of Community Development, is the Youth Climate Champion, a role that was established to help promote the good work being done by youth organizations within the COP process. Al Mazrui is the country's first-ever Youth Climate Champion to be appointed at the ministerial level.

She will be responsible for engaging with youth globally in the lead-up to and during COP28. This will include working with both local and global stakeholders to provide capacity-building opportunities for youth, as well as to promote funding for youth innovation in the field.

Al Mazrui is also the Vice Chair of the Arab Youth Center, the Secretary General of the Education and Human Resources Council, Chairperson for the UAE Special Olympics and President of the National Centre for Education Quality.



Shamma Al Mazrui, UAE Minister of Community Development.



Wikimedia Commons



Razan Al Mubarak is the UN Climate Change High-level Champion, a role that will see her engage in mobilizing the private sector and civil society to bolster their efforts in addressing climate change. This will include government and private sector stakeholders, as well as indigenous peoples and civil society partners.

Al Mubarak is also President of the International Union for Conservation of Nature, Managing Director of the Environment Agency Abu Dhabi and Managing Director of Emirates Nature-WWF.

In addition, Mariam Almheiri, the UAE Minister of Climate Change and Environment, will support the COP28 UAE leadership team and continue to lead national progress on climate change, ensuring that the UAE delivers on its climate targets set out by the Paris Agreement and its Net Zero by 2050 Strategic Initiative.

United Arab Emirates — a climate champion

The UAE is a leading regional player in taking concrete steps to address climate change.

It was the first country in the region to ratify the Paris Agreement, the first to commit to an economy-wide reduction in emissions and the first to announce a Net Zero by 2050 strategic initiative.

The country's 2015 Nationally Determined Contribution (NDC) made it the first country in the region to commit to an economy-wide reduction in emissions by 2030. It also launched its National Net Zero by 2050 Pathway in November of 2022, establishing a timeframe and identifying mechanisms to implement the United Arab Emirates Net Zero by 2050 strategic initiative.

Additionally, the UAE was one of only 29 countries to submit a revised second NDC ahead of COP27 with an enhanced target that is expected to result in an absolute emissions reduction of about 93.2 million metric tons of CO₂ emissions.

These solid credentials will support the efforts of the UAE's leadership as it rallies the world's leaders towards enhanced climate action during COP28.

The OPEC Secretariat supports the UAE in its inclusive and just ambitions for COP28. Al Ghais, speaking at the 30th Annual Middle East Petroleum and Gas conference in Dubai in May, underscored "OPEC's appreciation for the UAE's leadership role in the energy sector, tackling the climate challenge, and bringing stakeholders together at COP28."



Razan Al Mubarak, President of the International Union for Conservation of Nature.

Dubai Expo, the venue for COP28.



Saudi Arabia announces climate initiatives at **MENA Climate Week 2023**



From 8 to 12 October, Saudi Arabia played host to the second-ever Middle East and North Africa (MENA) Climate Week that gathered policymakers, practitioners, businesses, and civil society representatives from across the MENA region and the world to discuss important issues related to climate change. The event also saw Saudi Arabia launch a number of important climate-related initiatives. The OPEC Bulletin reports.



MENA Climate Week 2023 was a timely opportunity for all stakeholders to share climate solutions and ultimately take concrete actions. The goal of the week was to address the complexities, challenges and opportunities of climate change, collectively offering views that will ultimately be considered as part of the climate ‘stocktake’ at COP28 in November. The stocktake is an assessment of progress made against the 2015 Paris Agreement.

MENA Climate Week, organized by Saudi Arabia in collaboration with the UNFCCC, took place around eight weeks before the start of COP28 in the United Arab Emirates (UAE), adding significant weight to the event.

HRH Prince Abdul Aziz Bin Salman, Minister of Energy of the Kingdom of Saudi Arabia said: “We are pleased to host the second edition of MENA Climate Week in Riyadh, a sign of the Kingdom’s unwavering commitment to exploring all solutions to the climate challenges we currently face. MENA Climate Week will explore advancing climate action and inclusive approaches including the Circular Carbon Economy approach which promotes the use of all available technologies, forms of energy and mitigation opportunities that would contribute to achieving climate goals.”

OPEC Secretary General Haitham Al Ghais, who also attended MENA Climate Week, made specific reference to the importance of the event in his remarks to launch the World Oil Outlook 2023 (see page 4). The two events coincided in Riyadh; with Al Ghais stating that the climate event was testament to the proactive role Saudi Arabia and OPEC Member Countries were taking on climate related issues.

HRH Prince Abdul Aziz Bin Salman, Minister of Energy of the Kingdom of Saudi Arabia, speaks at MENA Climate Week 2023.



MENA CLIMATE WEEK

RIYADH 2023

The event considered four major systems-based tracks with a view to providing region-focused contributions to inform the global stocktake: Energy systems and industry; Cities, urban and rural settlements, infrastructure and transport; Land, ocean, food and water; and Societies, health, livelihoods, and economies.

With the focus on Saudi Arabia, the Kingdom also highlighted what it was doing in terms of its commitment and efforts to combat climate change, including the announcement of a number of new projects and innovations.

Groundbreaking mechanism

The guest of honour at the launch of the WOO 2023, Prince Abdul Aziz highlighted one of the key announced initiatives from Saudi Arabia, a groundbreaking Greenhouse Gas Crediting and Offsetting Mechanism (GCOM) for the domestic market. According to GCOM, the scheme aims “to incentivize the deployment of emission reduction and removal activities at scale to support and enable climate-related national strategies, policies, and programs.”

Once launched, GCOM will be accessible to all entities within the Kingdom, offering an incentive for developing activities in emissions reduction and removal to reach the Kingdom’s net-zero target by 2060.

Announced on October 9 by the Clean Development Mechanism Designated National Authority, the development is part of the Kingdom’s efforts to reduce the impact of climate change, under the directions of HRH Prince Mohammed bin Salman, Crown Prince and Prime Minister, and realize the environmental sustainability objectives of Saudi Vision 2030.

According to a report of the Saudi Press Agency, the GCOM operation is an implementation of the domestic market mechanism announced by Prince Abdul Aziz in November 2022 at the Saudi Green Initiative held during COP27 in Sharm el-Sheikh, Egypt.

Saudi Arabia’s Ministry of Energy said that GCOM was in alignment with the UNFCCC, and will support achieving the Saudi Nationally Determined Contributions, unlocking a myriad of financial opportunities among national entities striving to meet their climate objectives.





HRH Prince Abdul Aziz Bin Salman, Minister of Energy of the Kingdom of Saudi Arabia (r), and Raj Kumar Singh, Minister of Power and New and Renewable Energy of the Republic of India, sign a MoU between their two countries.

Memorandum of Understanding with India

MENA Climate Week also saw Saudi Arabia and India sign a Memorandum of Understanding (MoU) to cooperate on electrical interconnectivity, green/clean hydrogen and supply chains. The MoU was signed by Prince Abdul Aziz and Raj Kumar Singh, India's Minister of Power and Minister of New and Renewable Energy.

According to Saudi Arabia's Ministry of Energy the MoU "aims to establish a general framework for cooperation between the parties in electrical interconnection, electricity exchange during peak times and emergencies, co-development of projects, co-production of green/clean hydrogen and renewable energy in both countries. It would also look to establish "secure, reliable, and resilient supply chains of materials used

in the green/clean hydrogen and renewable energy sectors."

It added, "this would be in accordance with the countries' respective capabilities, applicable laws, and regulations in both countries."

When speaking at MENA Climate Week, Minister Singh noted that green hydrogen was a promising alternative for accelerating India's energy transition and stated the government had launched the National Green Hydrogen Mission to harness hydrogen energy with an initial outlay of US\$2.3 billion.

Empowering Africa

A further development during the week was the unveiling of the 'Empowering Africa' initiative by Saudi

Arabia’s Oil Sustainability Program (OSP), Ministry of Communications and Information Technology (MCIT), and the Ministry of Health (MOH) to help bring cleaner energy, connectivity, e-health, and e-education solutions to the continent.

According to the Ministry of Energy, which oversees the OSP, ‘Empowering Africa’ builds on the Clean Fuel Solutions for Cooking Program, a vital Middle East Green Initiative component. The new initiative will fund electric cooking stoves and introduce essential connectivity solutions, e-education platforms, and e-health services to rural areas in Africa.

OSP, MCIT, and MOH are set to announce additional details on the initiative at COP28 later this year.

Global CCS Institute

During the week, Saudi Arabia also announced that it had joined the Global CCS Institute. With a target to reach net zero by 2060, Saudi Arabia has a diverse portfolio aimed at reducing carbon emissions, including through the use of carbon capture and storage technology (CCS).

In joining the Global CCS Institute, Prince Abdul Aziz said: “Getting ambitious climate projects off the ground

will require partnerships and region-specific expertise and knowledge, and being a member of the Global CCS Institute will enhance that further.”

He added: “CCS is a needed technology that will drive a low-emission transition across hard to abate industries. In 2022, Saudi Arabia announced plans to develop one of the largest CCS hubs in the world, where 44 million tonnes of CO₂ will be mitigated annually through CCS efforts in the Jubail by 2035.”

The Global CCS Institute has a diverse membership of over 200 strong members spanning 33 countries, including 13 government members. Saudi Arabia’s Ministry of Energy, which is leading the government’s CCS efforts, said it would work closely with the Institute on CCS capacity building.

Ministers meet on sidelines

The Saudi Press Agency also reported that on the sidelines of MENA Climate Week, Prince Abdul Aziz inaugurated a meeting of Arab ministers responsible for climate affairs.

In a speech during the meeting, Prince Abdul Aziz said Saudi Arabia congratulated its brothers in Egypt on the outstanding success in organizing COP27, and on

MENA Climate Week 2023 session, titled ‘Empowering Africa’.



Ministry of Energy, Kingdom of Saudi Arabia



Ministerial group picture at MENA Climate Week 2023.

the significant achievements they made for developing countries. “They have maintained the momentum for implementing the UNFCCC and the Paris Agreement in line with their fundamental principles and despite the challenges and diverse perspectives involved.”

He added: “We also support our brothers in the UAE and affirm our solidarity with them as Arab countries to achieve balanced and comprehensive aspirations during their upcoming presidency of COP28 in Dubai.”

Prince Abdul Aziz also emphasized that tackling climate change was a collective responsibility, with varied responsibilities between developed and developing nations as outlined in international agreements, considering their historical contributions to greenhouse gas emissions.

The importance of enhancing collaboration between MENA countries was also highlighted by Mariam bint Mohammed Almhairi, the UAE’s Minister of Climate Change and the Environment, at the event.

“MENA countries share many of the dangers entailed by the climate change fallout, which requires promptly finding solutions that are more effective to boost their ability to face such shifts and adapt to them. The UAE’s view is that we must take swift action to lead a just and

equitable energy transition for countries in the region by replacing traditional energy systems with clean and renewable alternatives, while also ensuring energy security in the future,” she explained. ❄️



HRH Prince Abdul Aziz Bin Salman, Minister of Energy of the Kingdom of Saudi Arabia (l), with Haitham Al Ghais, OPEC Secretary General.

ADNOC: a leader in carbon management

In recent months, the Abu Dhabi National Oil Co. (ADNOC) has taken a number of significant steps in its decarbonization plans, with a focus on key technologies such as carbon capture utilization and storage (CCUS) and direct air capture (DAC). The OPEC Bulletin reports on some of its recent announcements.

Over the past year or so, there has been a shift in thinking in how best to approach the challenges related to energy security, energy availability and the need to reduce emissions. This has been evident in the lead up to COP28 that will take place in Expo City Dubai in the United Arab Emirates from 30 November to 12 December, with an increasing focus on pragmatic, realistic and inclusive solutions.

This has been evidenced in various fora by Dr Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology, group CEO of ADNOC, United Arab Emirates

Special Envoy for Climate Change, and President-Designate for COP28.

Speaking at the recent Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC), he said that in terms of solving the global energy challenges, “everyone must be at the table to make the transformational progress needed”.

When looking at the petroleum industry, he added: “I firmly believe that just as this industry has enabled human prosperity in the past, it will be essential to solving the global challenges we all face today. No other industry has the same ability to manage the complexity, depth of knowledge, capital, technology and scale that is needed for the task at hand.”

It is on the technology front where much of the industry is now focusing, with a host of CEOs pointing to developments and investments the industry is making in cutting edge, best-in-class technologies that will reduce emissions.

One of these companies is ADNOC, and recent statements have reinforced the fact that the company is a leader in carbon management. Moreover, ADNOC is not only looking to decarbonize its operations, it is also investing in renewables and low carbon fuels, building



Dr Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology, United Arab Emirates, and President-Designate for COP28.

a global hydrogen value chain, and advancing nature-based solutions such as planting mangroves in the United Arab Emirates.

CCUS

In early September, ADNOC announced a final investment decision to develop one of the largest carbon capture projects in the Middle East and North Africa.

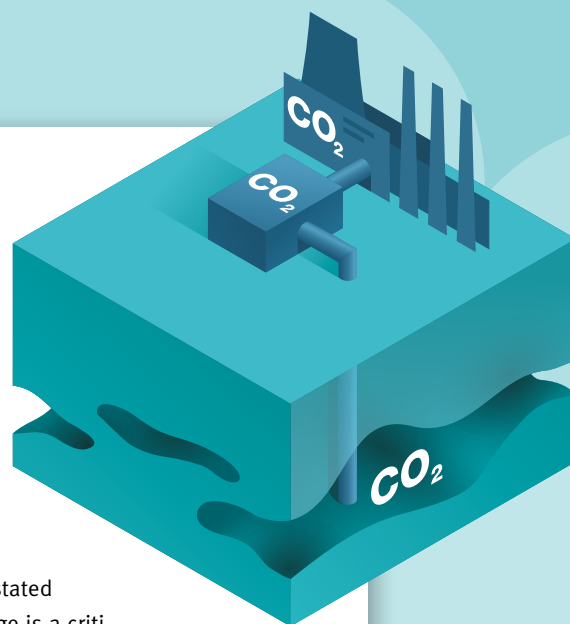
The Habshan CCUS project will have the capacity to capture and permanently store 1.5 million tonnes per annum (mtpa) of carbon dioxide (CO₂) within geological formations deep underground. ADNOC said the project would triple the company's carbon capture capacity to 2.3 mtpa.

The project is set to be built, operated and maintained by ADNOC Gas on behalf of ADNOC and will include carbon capture units at the Habshan gas processing plant, pipeline infrastructure, and a network of wells for CO₂ injection. The CO₂ will be permanently

stored in reservoirs deep in the sub-surface through the deployment of closed-loop CO₂ capture and reinjection technology at the well site.

Musabbeh Al Kaabi, ADNOC Executive Director of Low Carbon Solutions and International Growth, said: "The Intergovernmental Panel on Climate Change has stated that carbon capture and storage is a critical enabler for the world to achieve net zero by mid-century. This landmark project, is one of many tangible initiatives that ADNOC is delivering as we accelerate our decarbonization plan to meet our Net Zero by 2045 ambition.

"As ADNOC continues its transformation towards a lower carbon future, it is our intention to make further



إجراء دراسة مشتركة لبناء أول منشأة في المنطقة على نطاق تجاري لـ "الالتقاط المباشر للهواء" INVESTING IN JOINT STUDY FOR THE REGION'S FIRST COMMERCIAL SCALE DIRECT AIR CAPTURE FACILITY



Signing the agreement between ADNOC and Occidental: Musabbeh Al Kaabi (r), ADNOC Executive Director of Low Carbon Solutions and International Growth and Vicki Hollub, President and CEO of Occidental.

investments to significantly reduce our emissions, including in carbon capture and storage, and push the boundaries of innovation and technology with our partners, to build on our world-leading legacy and industry leadership in carbon management.”

ADNOC opened its first carbon capture, transportation and storage facility at Al Reyadah in Abu Dhabi in 2016. The facility has the capacity to process up to 800,000 tons of CO₂ per year captured at Emirates Steel Arkan.

The company also announced in early October with Fertigllobe, a strategic partnership between ADNOC and OCI Global, a pilot deployment of what is described as the world’s first cost-effective modular CycloneCC carbon capture unit at Fertigllobe’s 100 per cent owned nitrogen fertilizer plant in the Al Ruwais industrial complex in the United Arab Emirates.

The CycloneCC technology, which has been developed by Carbon Clean, is designed to improve the economics of point source carbon capture within industrial facilities.

DAC

During ADIPEC in early October, ADNOC and Occidental announced an agreement to undertake a joint preliminary engineering study for the construction of the first megaton-scale DAC facility outside of the US.

The agreement is the first project to reach the technical feasibility stage since the two companies signed a strategic collaboration agreement to explore such projects in the United Arab Emirates and the US earlier in 2023.

The study will assess the proposed one mtpa DAC facility to be connected to ADNOC’s CO₂ infrastructure for injection and permanent storage into saline reservoirs not used for oil and gas production. ADNOC is in the testing phase of the world’s first full sequestered CO₂ injection well in a carbonate saline aquifer in Abu Dhabi.

Al Kaabi said at the signing: “Today’s announcement represents continued positive momentum in our partnership with Occidental to significantly scale up promising carbon management technologies.”

CO₂ pipeline.



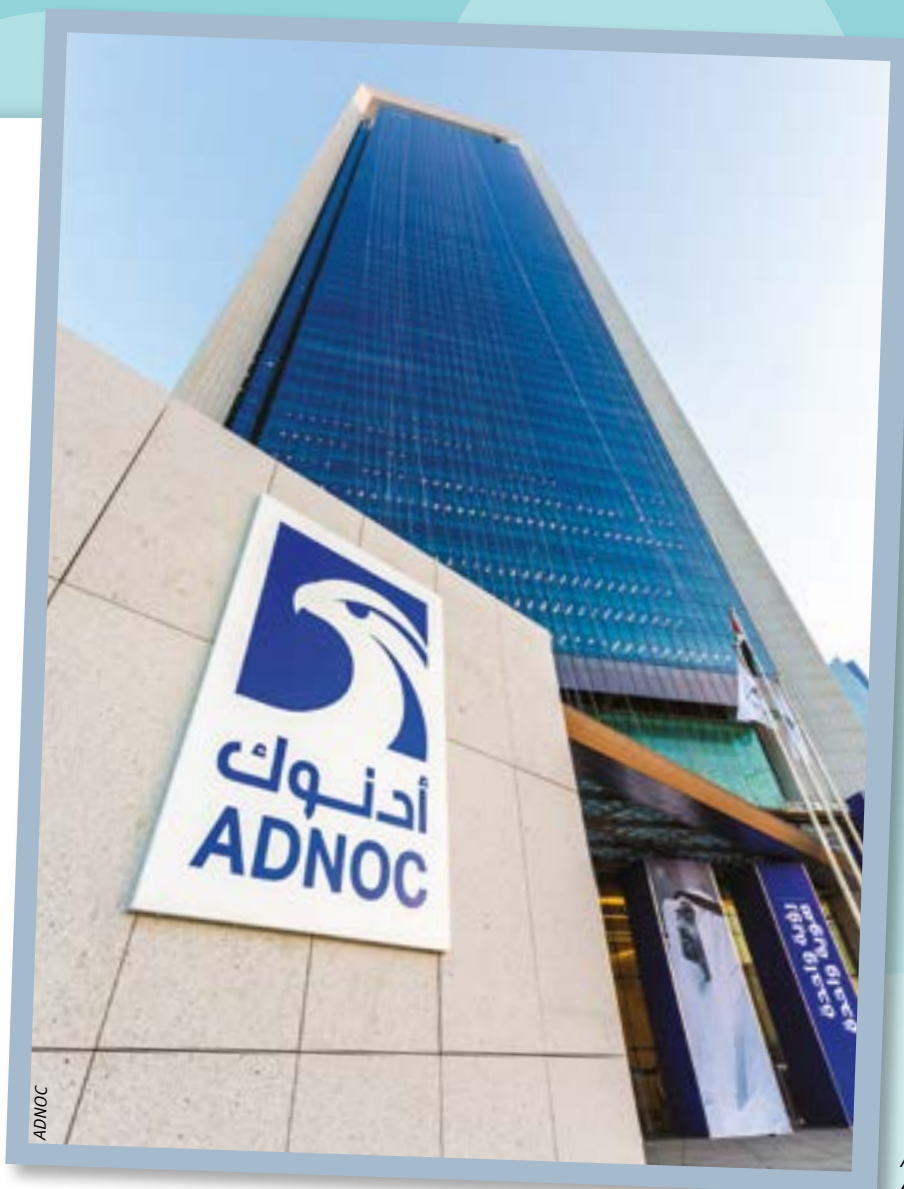
Vicki Hollub, President and CEO of Occidental, said: “The speed at which the Oxy and ADNOC teams have developed the feasibility and Pre-FEED plan for a DAC plant in Abu Dhabi underscores the urgency needed to deliver global-scale climate solutions and eliminate greenhouse gas emissions. We will continue to leverage our carbon management expertise to deliver value and accelerate our ability to achieve our net-zero targets and help others meet theirs.”

Other projects

ADNOC has also made significant progress in other areas related to technology and reducing emissions. For example, this can be viewed in its methane abatement programme where the company is prioritizing the deployment of advanced technology to identify and eliminate methane emissions.

The company says: “Our 2022 methane emissions were 6 per cent lower than in 2021, achieved by a reduction in flaring through the effective use of flare recovery compressor systems during turnarounds in gas processing plants; operational enhancements of rotating equipment for better energy efficiency; performing leak detection and repair surveys and repair interventions; and enhancing the accuracy levels of methane emission factors based on actual measurements.

ADNOC is also partnering with 44.01, a carbon mineralization technology company, to deploy their Earthshot Prize winning technology to help permanently mineralize CO₂ within peridotite rock formations in Fujairah. The company says it is the first energy company in the Middle East to pursue this.

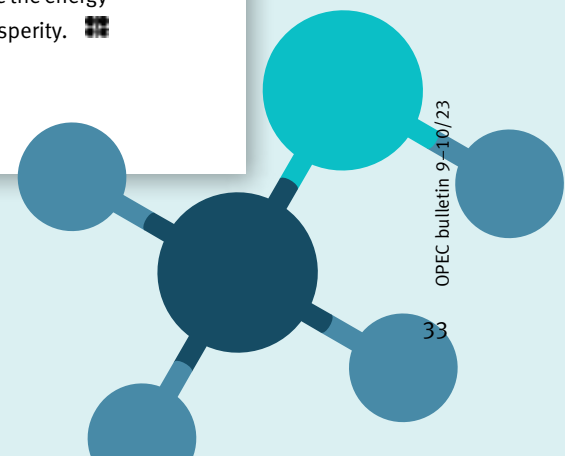


ADNOC headquarters, Abu Dhabi.

Pioneer in carbon management

ADNOC’s recent announcements and initiatives have reinforced its position as a pioneer in carbon management, and this looks set to continue with the company having an initial \$15 billion allocation to low-carbon solutions.

It is investments in these types of technologies and partnerships such as the one between ADNOC and Occidental that are vital to the industry’s future, to not only reduce emissions, but also to help enable the energy security that is vital to the world’s future prosperity. 🏠



Oxy leading the way in direct air capture technology

Occidental Petroleum (Oxy), a leading US oil and gas company, is an outspoken proponent of DAC and investing considerable capital in scaling up this exciting technology. The company is about to build the world's largest DAC plant in Texas, and has big plans for the future. Oxy provided an exclusive interview to the OPEC Bulletin. By Maureen MacNeill

Oxy CEO Vicki Hollub exuded enough enthusiasm to fill a room as she discussed the potential for DAC to change the oil industry before a distinguished audience of industry leaders at the recent 8th OPEC International Seminar on 5 July, held at the beautiful Hofburg Palace in Vienna, Austria.

“Every time we faced a challenge, our industry stepped up and met that challenge and often exceeded what we expected. I think the same is going to happen here with what some people call a transition. It is a transition, but it is not a transition out of oil and gas. It is a transition into a world where we can actually offset the emissions from oil and gas.”

The way to do that, stated Hollub, is to use DAC, capturing carbon from point sources.

“We use that CO₂ back in the oil reservoir... the reality is, if you put CO₂ into an oil reservoir, you are going to produce incremental oil from the reservoir that is going to be carbon neutral or carbon negative. By doing that, you are actually generating a lower cost of net zero oil.”

That net zero oil can be used subsequently to create net zero jet fuels and net zero maritime fuels, she added.

“So, over time, as we get our entire industry working on this and doing this, we can actually offset the emissions that oil and gas production makes...we will be able to change the end industry. We will be able to help the world achieve its goal of capping global warming at one and a half degrees.”

Towards this end, Hollub called on the industry to play the main role in leading this solution, cautioning that “...we can only do this if we accept that fact and if

we get others to look at the data and go with us down this path to make that happen.”

Removing excess carbon dioxide (CO₂) from the atmosphere is seen as one part of the solution to meeting the Paris Agreement goals, ensuring that the global temperature does not rise by more than 1.5°C.

Texas facility

As this article goes to press, the world's biggest carbon capture facility is being built on 65 acres of arid scrubland in Texas, with the first sod of dirt being turned in June 2023.

A Canadian-founded company called Carbon Engineering, bought by Oxy in August 2023, is spearheading the \$1 billion project named STRATOS. Earlier that month, the Biden administration announced it would provide \$1.2 billion in funding to two facilities (STRATOS in Texas and Project Cypress in Louisiana), which will act as DAC “hubs” to propel the carbon-removal industry forward.

Oxy stated in a press release on 25 August that the company, together with its subsidiary 1PointFive, planned to begin detailed engineering and early site construction for its first DAC plant in Ector County, Texas, near Oxy's portfolio of acreage and infrastructure that are conducive to safe and secure storage of CO₂.

“The first stage of construction, which includes site preparation and roadwork, is scheduled to begin in the third quarter of 2022 and start-up is expected in late 2024.

“Upon completion, the first DAC plant will be the world's largest of its kind and will be an important step



Vicki Hollub, President and CEO of Occidental.

in advancing Oxy's low-carbon strategy to deliver large-scale carbon management solutions that accelerate a net-zero economy," stated the press release.

Once operational, the plant is expected to capture up to 500,000 metric tons of CO₂ per year, with the capacity to scale up to 1 million metric tons per year.

The focus is on carbon capture and energy efficiency, as well as on delivering operating cost improvements during the plant's lifespan, continued the press release.

"Construction of this transformative facility begins our journey toward providing commercial-scale DAC solutions that reduce and remove carbon emissions," said Richard Jackson, the president of Oxy's US Onshore Resources and Carbon Management Operations, in the statement.

"This plant's development is rooted in our carbon management expertise, strong record of delivering major projects and existing infrastructure that supports the commercialization of carbon capture, utilization and storage technologies. This plant could also anchor future low carbon projects and strengthen our portfolio of carbon management solutions."

Carbon Engineering has been innovating for more than a decade to deliver climate solutions at megaton scale, continued Carbon Engineering CEO Daniel Friedmann in the press release.

"Now, with construction starting on this first, large-scale facility, we are seeing our vision become a reality. In collaboration with our partners at 1PointFive and Oxy, today marks a pivotal moment in the deployment of Carbon Engineering's large-scale DAC solutions."

Going back in time

About ten years ago, the company started looking at how it could harness its skills in carbon management to make an impact on the climate and improve its business, stated an Oxy spokesperson to the OPEC Bulletin.

"We realized if we could capture atmospheric CO₂ from human-made sources and use it to create low-carbon products, it would reduce emissions while providing the resources that society needs.

"As a result, we learned about DAC and formed a partnership with Carbon Engineering, an innovative Canadian company focused on DAC technology. We found that pairing DAC with enhanced oil recovery could produce net zero oil because we are removing more carbon from the atmosphere than this oil will generate over its lifecycle."

As the global climate discussion advanced and 193 states — plus the EU — signed the Paris Agreement, Oxy realized there were broader applications to sequestering CO₂ and helping others decarbonize.

"We have a vision and a strategy that uses Occidental's carbon management expertise to address

“Every time we faced a challenge, our industry stepped up and met that challenge and often exceeded what we expected. I think the same is going to happen here with what some people call a transition. It is a transition, but it is not a transition out of oil and gas. It is a transition into a world where we can actually offset the emissions from oil and gas.”

— Vicki Hollub, President and CEO of Occidental.



“... if you put CO₂ into an oil reservoir, you are going to produce incremental oil from the reservoir that is going to be carbon neutral or carbon negative. By doing that, you are actually generating a lower cost of net zero oil.”

— Vicki Hollub, President and CEO of Occidental.

the climate challenge and help meet the target set in the Paris Agreement. The Intergovernmental Panel on Climate Change said that we need to remove carbon from the atmosphere if we are going to limit global temperature rise and achieve climate goals.”

Captured CO₂ can be sequestered in saline reservoirs, which creates a carbon removal credit that businesses can purchase to address their emissions, said the spokesperson.

“Credit removals are especially important for hard-to-decarbonize industries and companies that have made net-zero commitments.

We know that achieving global net zero by 2050 requires technological solutions that can quickly reduce

carbon emissions on a large scale. We designed our strategy to help Oxy and others reduce emissions by developing solutions like DAC.”

The decision to proceed with construction of the Texas plant followed the successful completion of a Front-End Engineering and Design study and extensive testing and validation at the

Carbon Engineering Innovation Centre, said the source.

1PointFive partnered with Carbon Engineering to commercialize and deploy DAC technology at scale.

The technology

DAC is a technology that captures CO₂ directly from the air using an engineered, mechanical system, explained the Oxy spokesperson. Carbon Engineering’s DAC technology has been designed to continuously capture CO₂ from atmospheric air and deliver it as a gas for use or storage, bringing together four major pieces of equipment that each have an industrial precedent.

The process starts with an air contactor — a large structure modeled off industrial cooling towers. A giant fan pulls air into this structure, where it passes across thin plastic surfaces that have potassium hydroxide solution flowing over them. This solution chemically binds with the CO₂ molecules, removing them from the air and trapping them in the liquid solution as a carbonate salt.

Subsequently, the CO₂ contained in this carbonate solution undergoes a series of chemical processes to increase its concentration, purify and compress it. This enables it to be delivered in gas form, where it is ready to be used or stored.

The chemical process involves separating the salt out from the solution into small pellets by allowing it to react with calcium hydroxide in a structure called a pellet reactor, which was adapted from water treatment technology, added the spokesperson. In this chemical reaction, in addition to precipitating out the calcium carbonate pellets, the original capture chemical to be used in the air contactor (potassium hydroxide) is regenerated.

These pellets are then heated in a third step to release the CO₂ as a pure gas form. This step leaves behind calcium oxide, which is mixed with water in the slaker to rehydrate it, reforming calcium hydroxide, which is then fed back into the pellet reactor, beginning the cycle again.

Keeping plant emissions low

The STRATOS plant and future Oxy DAC plants will be powered using zero or very low-emissions power, stated the spokesperson. It is anticipated that a variety of energy sources will be needed, including wind, solar and potentially other types of energy, depending on location and technological development in the coming years, they added.

1PointFive’s intention is for the emissions-free power that is provided for DAC to be sourced from new projects, ensuring that the DAC plant is not removing an existing supply of emissions-free power from the grid.

“For STRATOS, we entered into an agreement with Origo Energy to provide zero-emission solar power, including an on-site solar facility. For the South Texas DAC Hub, we intend to use renewable power and the project is expected to have new on-site solar and will also use renewable power purchase agreements via the grid from new projects.

“We are also working with Net Power, an innovative company that is advancing

zero-emissions natural gas power plants, which can accelerate emissions reductions in our existing operations and ultimately supply emissions-free power to our DAC facilities and sequestration hubs.”

Future plans

Oxy is not just in this for the short term. It is looking far into the future.

“We have a current scenario that supports building approximately 100 DAC plants by 2035. STRATOS, our first DAC facility, is under construction in Texas. We are also progressing our second DAC project in South Texas at the King Ranch by drilling test wells to gather geological data,” stated the spokesperson.

“We signed an agreement with ADNOC to commence a jointly funded preliminary engineering study for a 1 million ton-per-year DAC facility in the United Arab Emirates (see Bulletin article on p. 31). The study will

assess the feasibility of building the first megaton-scale DAC facility outside the US, using the same CO₂ extraction technology to be deployed in our Texas facilities.”

In terms of political support, the US has taken a leadership approach, providing incentives through the Inflation Reduction Act for the development of climate solutions, according to the Oxy spokesperson.

“This policy helps us accelerate our DAC plans. We expect the 45Q tax credits for carbon storage to jumpstart the voluntary market for the thousands of leading businesses that have established net-zero goals, which can be achieved by CO₂ removals enabled by DAC.

Our view is that if you want to solve the atmospheric CO₂ issue, then you need a commercial market to create scale. We believe that practical and good policies can be applied to create that commerciality in the long term, so that DAC becomes self-sustaining. The need for DAC as a carbon removal solution is clear and incentives can help us get their faster.”



Vicki Hollub speaks at the 8th OPEC International Seminar in Vienna, July 2023.

OPEC Secretary General addresses African Energy Week

*African Energy Week (AEW) took place from 16–20 October in Cape Town, South Africa, with OPEC Secretary General **Haitham Al Ghais** addressing participants via video message.*

AEW is the African Energy Chamber’s annual event that looks to unite African energy leaders, global investors and executives from across the public and private sector to discuss the future of the African energy industry.

AEW was formed in 2021 to help eliminate energy poverty by 2030. This goal remains as pressing as ever, with 675 million Africans continuing to lack access to electricity — including fully 50 per cent of the population in Sub-Saharan Africa — and two out of three health facilities and two out of three primary schools in Africa still not having electricity.

COVID-19 slowed efforts to eradicate energy poverty, ensuring that the global community must redouble its efforts to deliver universal energy access. Ahead of COP28 next month in the United Arab Emirates, the entire world must remember that energy transitions mean something very different for those without access to electricity and clean cooking fuels.

AEW provided an excellent forum to foster key discussions on the most effective path forward to shape the continent’s energy development trajectory, towards ensuring that each of Africa’s 1.4 billion people gains access to the affordable, reliable energy that they need to live a comfortable life.

OPEC, with seven Member Countries from the continent, is firmly committed to helping foster energy growth and alleviate energy poverty, with Al Ghais delivering the following remarks as a video message that was played at AEW.

“Excellencies, ladies and gentlemen, I commend the relevance of the overall theme of this year’s event, ‘The African Renaissance: Prioritizing Energy Poverty, People, Planet, Industrialization and Free Markets.’ It captures many of the key issues of our times.

“The term “renaissance” refers to a rebirth, a revival of cultures, peoples and economies. Today, Africa’s peoples and sovereign nations are drawing inspiration from what they want their own futures to look like and working hard to make this a reality.

“Africa’s future looks very bright in this respect; it will have the world’s largest working-age population by

Secretary General Al Ghais in a video address.



Waterfront view of Cape Town.



2040 and has an estimated 120 billion barrels of proven oil reserves, 18 trillion standard cubic metres of natural gas and many other resources to help propel it forward.

“To realize this potential, policymakers must realize that every nation has its own energy transition pathway to a sustainable energy future. In this regard, at COP28 later this year, global policymakers should pay equal attention to energy security, energy affordability and reducing emissions.

“With these issues in mind, and as this is African Energy week, I would like to highlight five points that I hope will provide you with food for thought in your discussions.

“First, financing institutions should ensure that adequate financial investments, policies and regulations are available for the entire energy mix. Unfortunately, stringent borrowing requirements — often under the guise of ESG criteria — are limiting capital for hydrocarbon projects. This is slowing Africa’s ability to develop using its own natural resources.

“In addition, the global oil sector will require cumulative investment of around \$12 trillion through to 2045 to continue meeting demand and delivering energy security. Ignoring the reality that recent annual investment levels have been well below this figure poses a grave risk to energy security and needs to be remedied.

“Second, the world must ensure just and inclusive energy transitions that reflect the needs, capabilities and stages of development of all sovereign nations.

“In a world in which Heathrow Airport consumes more energy than Sierra Leone — or in which two-thirds of all primary schools in Sub-Saharan Africa have no access to electricity — the same environmental yardstick should not be used to compare regions at vastly different stages of development. Instead, our goal should be an inclusive, equitable approach in which no country is overburdened beyond its capabilities.

“Third, policymakers must plan for our energy future based on facts and reality. Population growth, energy demand and urbanization will rise greatly in Africa and other regions. Globally, OPEC sees primary energy demand expanding by over 20 per cent between now and 2045 and oil demand increasing to around 110 million barrels per day in 2045. Africa is expected to see oil demand increase by close to 80 per cent over this period.

“It is clear that all energy sources, all relevant technologies, and unprecedented investment, collaboration and support are required.

“Fourth, moving forward, we need to strike a balance between delivering the affordable energy products and services that people require to live a comfortable life, and reducing emissions.

“In this respect, technological innovation is a key focus for OPEC. To ensure a sustainable future, many of our Member Countries are already investing heavily, in hydrogen projects, carbon capture utilization and storage facilities, and the circular carbon economy.

“More countries across Africa will be able to do the same if properly allowed to utilize their natural resources to generate revenues. Global climate challenges should be addressed fairly, especially as Africa contributes around three per cent to global annual greenhouse gas emissions, the smallest share of any continent.

“Fifth, utilising Africa’s natural resources like oil and gas will help deliver energy affordability and alleviate energy poverty. This is vital on a continent where hundreds of millions of people still lack access to electricity, and around a billion still rely on inefficient and polluting cooking systems.

“Everyone must understand that energy transitions mean something very different for those with very basic energy needs. Delivering universal energy access must be a priority.

“Ultimately, as the old African saying goes, “tomorrow belongs to the people who prepare for it today.” There is great wisdom in these words, and it is up to today’s policymakers to ensure that tomorrow’s global energy industry — including in Africa — is advanced enough to eliminate energy poverty, prioritize people, protect the planet, meet future energy demands and drive socio-economic development.”

Dr Ayed Al-Qahtani, Director of OPEC’s Research Division, was in attendance in Cape Town and spoke at a strategic roundtable titled ‘The African Energy Renaissance: Reinforcing African Priorities Amidst the Global Energy Transition.’

Al-Qahtani highlighted that “the successful development of the African oil and gas sector will be a vital factor in the determination of the continent’s socio-economic development, and achieving the much-anticipated economic growth and development of the continent by policymakers and investors.”

“**... the world must ensure just and inclusive energy transitions that reflect the needs, capabilities and stages of development of all sovereign nations.**”

— *Haitham Al Ghais, OPEC Secretary General*

Secretary General returns to Luanda to address **Angola's** premier energy event

*On 13 September 2023, OPEC Secretary General **Haitham Al Ghais** delivered a keynote address at the opening ceremony of the 4th Angola Oil and Gas Conference in the nation's capital of Luanda. The event took place under the patronage of **Jose de Lima Massano**, Angola's Minister of State for Economic Cooperation and **Dr Diamantino Pedro Azevedo**, Minister of Mineral Resources, Petroleum and Gas. The OPEC Bulletin's **Scott Laury** reports.*

Dr Diamantino Pedro Azevedo, Angola's Minister of Mineral Resources, Petroleum and Gas.

Now in its fourth iteration, the annual conference is Angola's premier energy event, attracting leading energy and petroleum figures from Africa and around the world to discuss the pressing issues of the day.

This year's event was held under the theme "Energy Security, Decarbonization and Sustainable Development" and covered critical issues facing the industry, including energy transitions, natural gas development, access to energy, national workforce development and sustainable economic development.

Angola — a key player, past and present

In his remarks, Secretary General Al Ghais opened by complimenting the organizers for the event's excellent programme and exhibition, not to mention the warm Angolan welcome bestowed upon the visiting OPEC delegation.

"I am once again struck by the quality of topics and caliber of speakers at the conference, the high standards of booths at the exhibition, and, above all, the warmth of the world-famous Angolan hospitality," he said.

He then recognized the critical role Angola had played historically and of late in helping OPEC achieve its goals of supporting lasting stability in the global oil market.

"I would like to thank Dr Diamantino Pedro Azevedo, Minister of Mineral Resources, Petroleum and Gas, for his outstanding contributions as Head of Angola's delegation to our Organization," he said. "It was only two short months ago that His Excellency participated in the 8th OPEC

International Seminar and he enriched our discussions immensely with his wise interventions."

Turning to the oil market and Africa's role therein, Secretary General Al Ghais stressed that the continent had a major role to play in meeting future demand.

Africa's great potential

"Blessed with an abundance of natural resources and young and dynamic populations, it is the legitimate aspiration of all countries on this continent to fulfil their potential," he said. "Of course, this involves exercising the sovereign rights of any nation or people to fully benefit from the oil and gas reserves that they are blessed with. Africa has 119 billion barrels of proven oil reserves and 18 trillion standard cubic metres of natural gas."

In the last few years, however, large corporations and investment firms have put in place environmental, social and governance (ESG) programmes that are hindering Africa's efforts to reach its full potential.

"Unfortunately, there are some efforts to restrict countries fully reaching their potential," Al Ghais explained.

"Stringent borrowing requirements, under the guise of ESG criteria, can hamper access

*Jose de Lima Massano,
Angola's Minister of
State for Economic
Cooperation.*



*OPEC Secretary General
Haitham Al Ghais.*





Delegates attend a session of the 4th Angola Oil and Gas Conference.

to capital. There have been disheartening calls by some voices to keep oil and gas reserves ‘in the ground.’”

These actions would not only impact sustainable development in the region, he added, they would also pose serious risks to energy security, especially considering the swiftly growing world

population and its associated energy requirements in the future.

According to OPEC’s World Oil Outlook, the global population is set to increase by 1.6 billion between 2021 and 2045, and the global economy is set to double in size during that timeframe.

All forms of energy required

As a result of these demographic and economic realities, Secretary General Al Ghais pointed out that global primary energy demand is forecast to increase by a significant 23 per cent in the period to 2045.

“Clearly, all forms of energy will be needed,” he said, adding that “globally, oil demand is projected to increase from almost 97 million barrels a day (mb/d) in 2021 to around 110 mb/d in 2045.

To meet this large upswing in demand, he added, the global oil sector would need cumulative investments of \$12.1 trillion through to 2045. However, recent annual investment levels have been significantly below this due to industry downturns and the increasing focus on ESG issues.



NJ Ayuk, Executive Chairman of the African Energy Chamber.

“Stability in the oil market is one of the essential prerequisites for an investment friendly climate in our industry,” Al Ghais emphasized. “For this reason OPEC and the ten non-OPEC oil producing countries participating in the ‘Declaration of Cooperation’ have committed themselves to carefully monitoring market conditions and taking action as appropriate to contribute to a balance between supply and demand.”

Chronic underinvestment could also exacerbate the already dire situation related to energy poverty.

The scourge of energy poverty

“Without requisite investment, the already tragic statistics [related to energy poverty] could worsen,” Secretary General Al Ghais warned. “The UN has already flagged issues related to the likelihood of achieving Sustainable

*Didier Budimbu Ntubuanga,
Minister of Hydrocarbons,
Democratic Republic
of the Congo.*



Development Goal 7, ensuring access to affordable, reliable, sustainable and modern energy for all.”

Al Ghais then proceeded to share some of the daunting statistics behind this pressing situation.

Globally, 675 million people still lacked access to electricity in 2021, he stated, while some 660 million

OPEC celebrates anniversary in Luanda

In a ceremony organized on the sidelines of the conference, OPEC celebrated its 63rd Anniversary.

The Organization was founded between 10 and 14 September 1960 by five oil producing countries (Iran, Iraq, Kuwait, Saudi Arabia and Venezuela) in the Al-Shaab Hall in Baghdad, Iraq. This milestone marked the beginning of a new chapter in the oil industry.

In honour of the occasion, a special anniversary-themed cake replete with an intricate OPEC oil barrel design was presented. In turn, the Secretary General presented gifts to Angola’s Head of Delegation to OPEC, Dr Diamantino Pedro Azevedo, Minister of Mineral Resources, Petroleum and Gas; as well as to Angola’s Governor for OPEC, Estêvão Pedro; an executive representing Sanangol CEO Sebastião Gaspar Martins; and NJ Ayuk, Chairman of the Africa Energy Chamber.

Haitham Al Ghais, commenting on the significance of the milestone, said, “OPEC is a unique Organization that has stood the test of time. For more than six decades, OPEC has supported oil market stability in the interest of all producers and consumers, as well as the global economy at large.”

“The history of OPEC is replete with many achievements,” he added. “We are grateful for the support of our Member Countries and the entire OPEC Family. I am confident that the Organization’s best days lie ahead.”



people would still be without electricity by 2030 if the current pace continued. In Sub-Saharan Africa, 50 per cent continued to lack access to electricity. In 2021, around 2.3 billion people — 29 per cent of the global population — still relied on inefficient and polluting cooking systems.

In addition, if current trends continued, Secretary General Al Ghais noted that only 77 per cent of the global population would have access to clean cooking solutions by 2030, leaving nearly 1.9 billion people behind, including 1.1 billion in sub-Saharan Africa. According to the World Health Organization, breathing in the smoke produced from cooking with polluting fuels could also lead to heart disease, stroke, cancer, chronic lung disease and pneumonia.

“The issue of fuel poverty is just one example of why it is so important that policies on climate change adhere to the principles of equity and common but differentiated responsibilities and respective capabilities,” Al Ghais underlined.

Unfortunately, he added, public discourse addressing the climate challenge had become increasingly polarized.

“The reality is that the oil industry must be part of the solution,” he said. “We all share the same goal: the reduction of emissions. We want to harness the industry’s resources and expertise to find technological solutions

and efficiencies to achieve that goal. For example, carbon capture storage and utilization, the Circular Carbon Economy framework and hydrogen are just some of the potential options.”

All hands on deck

Secretary General Al Ghais urged all industry partners around the world to unite in helping to address climate change in an inclusive and balanced manner.

“There is no ‘one-size-fits-all’ pathway to achieve our reduced emissions future,” Al Ghais stated. “It requires an ‘all-peoples, all-fuels and all-technologies’ approach. We are delighted that our Member Country, the United Arab Emirates, has emphasized this approach in the build-up to COP28, to be held in Dubai later this year.”

In referring back to the event’s theme, Secretary General Al Ghais concluded his remarks by lauding Angola’s role as a leading regional producer and a key contributor to OPEC and its goals on the international stage.

“As the theme of this conference suggests, striking a balance between ‘Energy Security, Decarbonization and Sustainable Development’ requires all stakeholders working together, with mutual respect among all nations and parties. It heartens me that an inclusive approach guides Angola in its role as a regional leader.”



*Tona Ndamba,
Chief Refinery and
Products Analyst in
OPEC's Petroleum
Studies Department.*

OPEC official speaks to Angolan youth

On behalf of the OPEC Secretariat, Ms Tona Ndamba, Chief Refinery and Products Analyst with the Petroleum Studies Department, addressed Angolan youth during the conference at a session entitled “Youth and Energy: Possibilities and opportunities to drive our future’.

The special town hall meeting was organized as a platform to foster discussions on how young, local talent can get involved in the Angolan energy sector and help shape the future of the industry.

Ms Ndamba, a native of Angola, is a key member of OPEC’s research team and a positive example of how young Angolans can make a difference in international energy organizations such as OPEC.

The best is yet to come for Africa

*On the sidelines of the 4th Angola Oil and Gas Conference, OPEC Secretary General **Haitham Al Ghais** took time to speak with regional and international media through a press conference and a one-on-one interview that was broadcast on MSNBC Africa.*

When asked by MSNBC about the 63rd anniversary of OPEC, which was celebrated on the sidelines of the Conference in Luanda, Al Ghais emphasized that OPEC had had a long and rich history and had “stood the test of time”.

He added that the Organization’s success had much to do with the cohesion of its Members and the group’s dedication to reaching consensus on important decisions, even during challenging times of market volatility.

“It’s been a long journey. Over six decades of success that started with the bravery and foresight of our five founding members who came up with the innovative idea to start this Organization,” he said. “Today, we are a proud group of 13 members from all over the world, including seven members from right here in Africa. So, as you can see, OPEC is an international organization that welcomes all producers that share the same objective, which is to maintain stability in the global oil market.”

In a question related to Africa and its strong, historical ties to OPEC, Al Ghais stressed the key role the Continent played not only within OPEC but as a key provider of the world’s oil and gas requirements.

“Africa is richly blessed with abundant oil and gas reserves and has great potential for future growth, in addition to having a dynamic young workforce that will be key to helping drive the industry forward in the years to come,” he stated. “With this in mind, I believe the best is yet to come for Africa.”

Finally, on the topic of oil and its role in the future, Al Ghais was adamant that oil had not only been a crucial driver of economic and social development to date, it would continue to be a highly sought after resource.

“We should be proud as an industry for what oil has provided to the world, in terms of technological advancements, social and human development and of course economic prosperity,” he said. “If you look around at what we have today, from the planes in which we fly to the automobiles we drive to the computers on which we type to the medical supplies we rely on, and much, much more, none of it would have been possible without oil. And our research tells us that it will continue to be a highly valued resource well into the future.”

OPEC Secretary General Haitham Al Ghais addresses media at a press conference during the 4th Angola Oil and Gas Conference.



Shutterstock

Oil rig in Angola.

OPEC Secretary General speaks at Oxford Energy Seminar

*The Oxford Energy Seminar has been held annually since 1979. In this year's edition, OPEC Secretary General **Haitham Al Ghais** was invited to deliver a lecture and subsequently partake in a question and answer session. The OPEC Bulletin reports.*

The OPEC Secretary General, Haitham Al Ghais, was welcomed to the hallowed grounds of academia to address government officials, industrialists, corporate executives and other professionals in the global energy industry at the Oxford Energy Seminar, which was held on the campus of St Catherine's College at Oxford University in mid-September.

St Catherine's College is the largest college within Oxford University and while one of the youngest Oxford Colleges it can trace its roots back to 1868, over 150 years ago. While the Oxford Energy Seminar is decidedly younger, this year's edition was its 43rd iteration and the event has become an important date on the international energy event calendar.

OPEC Seminar messages

The Secretary General began by offering his thanks to Nader Sultan, the Director of the Oxford Energy Seminar, and Dr Bassam Fattouh, the Director of the Oxford Institute for Energy Studies, who received the OPEC Award for Research in 2018.

Al Ghais then recalled the OPEC Seminar that had taken place in early July, sharing a few key messages from the event that specifically related to the topic of his speech: 'Fostering Transparency and Collaboration in Energy Transitions'.

First, he said, "energy security for all and reducing energy emissions must go hand in hand. You cannot tackle one without fully engaging with the other."

Second, "a sustainable future requires all energy sources, all relevant technologies, and unprecedented investment, collaboration and support."

Third, "every nation and peoples have their own energy transition pathways. The capacities and national

circumstances of all developing countries must be taken into account. The energy transition agenda cannot be dictated by a select few. Rather, it requires that all voices are heard, and the differing perspectives taken on board."

And fourth, "our energy future needs to be based on facts, not fantasy. This is the only way to deliver a just, inclusive and realistic transition."

Data-based outlooks

In looking to frame the discussions for his session with the assembled delegates, Al Ghais said he hoped to initially provide some basic facts.

This focused on base case figures for most current data-based outlooks that saw significant growth for energy and oil demand, as the global population expands, economies grow, and the world looks to alleviate the scourge of energy poverty.

From the perspective of expanding oil demand numbers, and those that may question this forecast, he recalled the 'peak oil supply' debates of the 1990s and 2000s. "We heard oil geologist Colin Campbell tell us in the late 1990s that global oil production would peak around 2004 or 2005, after which the world would have to rely on ever-dwindling, more expensive oil. He spoke of huge consequences for the global economy. It was alarmist, and not conducive to stable markets. It was also way off the mark. As we all know, peak supply has still not happened."

In terms of recent talk of 'peak oil demand', he noted that there had been a particularly focus on net-zero goals and the one that has perhaps garnered the most publicity was the International Energy Agency's (IEA) Net Zero Emissions by 2050 scenario.



Haitham Al Ghais,
OPEC Secretary General.

Nader Sultan,
Director of the Oxford
Energy Seminar.



He said: “Only a few years ago these were viewed by many as the only path forward. What these scenarios suggested, had to be followed. Obviously, we all support the need to reduce emissions, but over the past 18 months or so, it is clear that many policymakers are rethinking their approach to net zero.”

He highlighted that legitimate concerns over net zero policies were being raised: how much would they cost in their current form? What benefits would they bring? Would they actually work as advertised? And are there other options to help reduce emissions?

Given that he was speaking in the UK, he made specific references to some of the recent shift in energy policies from the government there. “The new bywords are ‘pragmatic and proportionate’, words that OPEC has used in relation to the way forward.”

Normative scenarios

The Secretary General also noted that the IEA’s Net Zero Emissions by 2050 scenario was described by the IEA itself as a normative one, or what some would see as prescriptive as it described a pre-specified future, which was then back-casted.

In reality, he said, “it describes a highly implausible scenario, with demand for hydrocarbons withering away and replaced by what is described as cheap and effective renewable energy and still to be proven technologies.”

He also added that “we should remember that 30 years ago fossil fuels made up over 80 per cent of the energy mix, and this remains the same today. What this emphasizes is that we cannot replace an energy system overnight, or even in two-to-three decades. We have to work with what we have, accept the reality, and focus on the task of reducing emissions, not choosing energy sources.”

Haitham Al Ghais speaks to Oxford
Energy Seminar attendees.



Working together

Al Ghais stated that “the world’s focus needs to be on ensuring that rising energy demand and the issue of climate change are not at odds with each other.

“On the contrary, the world should act with determination to ensure that emissions are reduced and people have access to the energy products and services they require to live a comfortable and prosperous life.”

This requires massive investments, he said, and stated that talk of the need for no new investment in oil projects would only lead to energy chaos.

Looking ahead, he concluded, “addressing the energy and climate challenges must put fairness at its heart, and be based on the energy realities we see before us. It is only through doing this that governments, businesses and communities can come together to deliver genuine and real change.”



Dr Bassam Fattouh,
Director of the
Oxford Institute for
Energy Studies.

“... a sustainable future
requires all energy sources,
all relevant technologies, and
unprecedented investment,
collaboration and support.”

– Haitham Al Ghais,
OPEC Secretary General

Secretary General addresses 11th Energy Markets Forum in Fujairah

*Fresh from a highly successful mission to this year's ADIPEC, followed by the release of the 2023 OPEC WOO at the King Abdullah Petroleum Studies and Research Center in Riyadh, OPEC Secretary General **Haitham Al Ghais** visited Fujairah to deliver a keynote address at the 11th Energy Markets Forum on 11 October. The OPEC Bulletin's **Scott Laury** reports.*

Under the theme 'Energy security and emission reductions must go hand-in-hand,' the Energy Markets Forum in Fujairah was held under the patronage of HH Sheikh Hamad bin Mohammed Al Sharqi, Member of the United Arab Emirates (UAE) Supreme Council and Ruler of Fujairah, and was attended by HH Sheikh Saleh Al Sharqi, Chairman of the Port of Fujairah.

Haitham Al Ghais, OPEC Secretary General, addresses the Forum.

The Secretary General was also received by Sheikh Hamad with the two discussing the current oil market situation, the UAE's significant support for OPEC, and with Al Ghais commending Fujairah's major port and its role in exporting and importing oil around the world.

In his remarks to the forum, Secretary General Al Ghais began by thanking the Emirati hosts for their excellent hospitality and commended the organizers for the Forum's high-quality programme.

Stable markets support energy security

Al Ghais then noted the relevance of the Forum's theme, especially in light of the upcoming COP28. "As we approach COP28 later this year in the UAE, I think the overall theme of this forum, '*Navigating the Age of Energy Security: Opportunities & Challenges?*' presents an extremely important perspective," he said. "The issue of energy security goes to the core of OPEC's founding commitment to support a stable and sustainable oil market, in





HH Sheikh Hamad bin Mohammed Al Sharqi, Member of the United Arab Emirates Supreme Council and Ruler of Fujairah (r) with OPEC Secretary General Al Ghais.

the interest of energy security for producers, consumers and the global economy.”

OPEC’s role in global energy markets has gained additional traction over the past six years, he added, due to its cooperation with other leading oil producing countries through the Declaration of Cooperation (DoC).

“Together, we have been front and centre in helping reduce volatility and in supporting a balanced and stable global oil market,” he explained. “The importance of energy security and market stability is not only vital for the short term, it is critical for the long term too.”

On climate change, the Secretary General noted that any energy transitions would need to leverage a multi-faceted strategy, namely reducing emissions while also ensuring energy supply and security.

“In this regard, it is vital we take a fact-based approach to deliver just, inclusive and realistic transitions and a sustainable energy future for all,” he said.

“Some remain ideologically driven about our energy future. They dismiss certain energies and technologies as part of the past, not part of the future.”

This narrative, he added, extends to oil, with some analysts asserting that fossil fuel demand could peak before 2030 and some net-zero targets and scenarios envisioning global demand dropping by 20 million barrels per day (mb/d) to around 80 mb/d by 2030. With this target being a mere six years from now, he added that this was simply not a realistic scenario, especially when considering population growth.

“Over the period to 2030, it is expected that another half a billion people will move into cities across the world as the global economy continues to expand, and there remains a critical need to bring modern energy services to those billions that continue to go without basic energy access in many parts of the world,” he stated. “This requires more energy,

View of Fujairah City.



Wikimedia Commons



HH Sheikh Saleh Al Sharqi, Chairman of the Port of Fujairah.



Secretary General Al Ghais presents HH Sheikh Hamad bin Mohammed Al Sharqi with a special gift.

and as our recently published World Oil Outlook 2023 shows, global energy demand is set to expand by 23 per cent in the longer period to 2045.”

All energy sources required

To meet this rising demand, the Secretary General explained, all energy sources would need to be leveraged, including renewables, with oil remaining a significant part of the energy mix for the foreseeable future.

“By 2045, oil is still expected to make up almost 30 per cent of the global energy mix,” he said. “Recent energy and economic-related developments, as populations glimpse what many initial net zero policies and targets mean for them and policymakers re-evaluate their approach to energy transition pathways, have seen the OPEC Secretariat reassess its outlook for oil demand.”

He then cited the demand forecast from the WOO 2023, which sees oil demand reaching 116 mb/d by 2045, around 6 mb/d higher than in the WOO 2022.

“There is also the potential for this level to be even higher if societies and governments continue to push back on the over-zealous green and net-zero targets,” he added.

Turning to the dire issue of industry investment, Al Ghais pointed out that levels were not where they needed to be to meet future demand.

Meeting future demand

“To meet this level of demand, investment requirements out to 2045 total \$14 trillion, or around \$610 billion on average per year,” he

stated. “It is vital that these are made; it is beneficial for both producers and consumers. Calls to stop investments in new oil projects are misguided and will only lead to energy and economic chaos.”

He then touched on the impressive efforts of OPEC’s Member Countries and their investments in cutting-edge technologies to reduce emissions.

“From the perspective of reducing emissions, it is a taboo in some energy circles to suggest that the oil industry can reduce emissions,” he said. “To those we say we are already doing so. One needs to look no further than here in the UAE. The industry, with OPEC Member Countries playing an important role, is already investing heavily in hydrogen projects, carbon capture utilization and storage facilities, carbon dioxide removal, direct air capture and the circular carbon economy.”

Concluding his remarks, Al Ghais underlined that the Paris Agreement was about reducing greenhouse gas emissions, regardless of the source, and that all stakeholders must do their part to make a difference.

“Energy transitions are not about moving from one fuel to another, but about lowering emissions from all sources,” he said. “As we look to COP28, OPEC is not dismissing any energy sources, technologies, or peoples, and believes that all stakeholders should do the same. A sustainable energy and economic future has to focus on all energy sources, all relevant technologies, the views of all people, and deliver unparalleled investment, collaboration and support. We owe this to future generations.”



HH Sheikh Saleh Al Sharqi presents a special gift to Haitham Al Ghais.

The Port of Fujairah

The Port of Fujairah is located on the northeast coast of the United Arab Emirates, 70 nautical miles from the Strait of Hormuz.

It is a key shipping hub for the United Arab Emirates and the wider region, facilitating trade between east and west and connecting the United Arab Emirates with markets in the Indian sub-continent and Africa.

The port hosts the second-largest bunkering hub and third-largest storage hub globally, offering world-class facilities at the heart of a geographically and strategically important energy corridor.

To accommodate the energy transport needs of some of the world's most important shipping companies, the port encompasses nine deep-water berths and a jetty for very large crude carriers.

History

In 1978, construction of the port began, with container operations starting up in 1982. The port became fully operational in 1983.

Since then, the port has experienced steady growth and enhancement. Today, it offers a full range of services, from container services to general cargo and dry and wet bulk facilities, in addition to storage, bunkering and refining.

To illustrate the level of expansion it has seen since its founding, the port started out with a quay measuring a mere 370 metres in length; today, the quay stretches a distance of more than 9.5 kilometres.

HH Sheikh Hamad bin Mohammed Al Sharqi, Member of the Supreme Council and Ruler of Fujairah, has been instrumental in making this project an overwhelming success.

Under his leadership, the United Arab Emirates has witnessed the Fujairah Oil Industrial Zone and the Port of Fujairah rise in stature to become the Middle East's largest commercial storage hub for refined and crude oil, thereby enabling national oil companies, international oil companies and global oil traders to expand their commercial operations both regionally and internationally.

Fujairah is also the location for the Abu Dhabi Crude Oil Pipeline, a key transport link for Abu Dhabi to export its premium crude oil.

A regional and global hub

The oil storage facilities at Fujairah have grown exponentially since the port's founding, rising from 550,000 cubic metres (cbm) in 1994 to a forecasted 17 million cbm by the end of 2023.



The Fujairah Oil Tanker Terminal is the United Arab Emirates' premier hub location for bunkering and oil trading activities. The facility was custom-designed to ensure the safe and efficient handling of high volumes of both crude oil and refined products that are imported and exported by 15 internationally recognized terminal storage companies active at the port.

In June 2017, the Port of Fujairah and Abu Dhabi Ports signed a 35-year concession agreement granting Abu Dhabi Ports exclusive rights to provide services for container, general cargo, roll on-roll off and cruise ships. The terminal capacity is expected to reach 720,000 twenty-foot equivalent units and 1.3 million tonnes of general cargo by 2030.

A fleet of more than 100 privately owned supply vessels operate on a 24-hour basis from the port's dedicated supply boat berths.

In 2022, nearly 12,500 vessels arrived at the Fujairah offshore anchorage area, and the number of varied service companies increased to more than 430.

Looking ahead, and to facilitate future growth, the port commissioned the construction of a new service harbour in 2019, which is designed for the service and maintenance of vessels and tugboats.

OMV Innovation & Technology Centre tour inspires 2023 Vienna Energy Scholar Programme participants

*The third iteration of the Vienna Energy Scholar Programme (VESP) took place from 4 to 8 September 2023, gathering 15 young participants. The VESP is part of the **OPEC Academy**, which acts as an umbrella for OPEC's educational programmes. The aim of this year's VESP — met via a variety of insightful presentations and discussions of real-world case studies and examples — was to provide the participants with the tools and knowledge to inspire them to work together and be successful in the energy landscape, should they choose to do so. Towards this end, OPEC designed a stimulating programme that demonstrated that the oil industry — and indeed the energy sector overall — is constantly evolving and improving.*



VESP participants pose with representatives of OPEC's PR & Information department.

At the OPEC Secretariat, the participants learned from experts about the role of OPEC and its Member Countries; short- and long-term outlooks in the energy sector; how data and technology are used in the energy industry; institutional and regulatory frameworks for the energy sector; and the UN Framework Convention on Climate Change and Sustainable Development Goals. In addition, they engaged with representatives from the **Austrian Foreign Ministry** on global developments in the energy sector and international climate policy, learned about renewable energy projects from **Wien Energie**, and discussed energy planning with **Stadt Wien**.

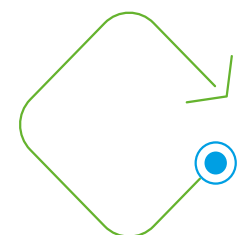
The participants also spent a full day at the **OPEC Fund for International Development**, where they learned,

inter alia, about public sector operations, the private sector and trade, finance operations, environmental, social, and governance issues, and effective development. Finally, they visited **OMV's** Innovation & Technology Centre, where they learned about OMV's innovative approaches to energy business.

Read on to step into the participants' shoes during their visit to the Centre, where they learned about the intricate processes, innovative practices and hard work taking place behind the scenes to make OMV's prospecting and exploration, drilling, well



(l-r): Leonardo Sempértegui, General Legal Counsel; Dr Ayed S Al-Qahtani, Director, Research Division; and Thomas Resch, City of Vienna.





VESP participants arriving at the OMV Innovation & Technology Centre.



OMV Innovation & Technology Centre

completion and production of oil, gas and water as safe and efficient as possible.

OMV Innovation & Technology Centre

Located north-east of Vienna in Gänserndorf — a fifty-minute drive from the OPEC Secretariat — the backdrop to the Centre could serve as an apt microcosm of today's energy

landscape in Austria. Even from the bus, the participants were fascinated by the oil, gas, wind, and photovoltaic technology dotted across the tranquil countryside.

Upon arriving, OMV Austria General Manager Wilhelm Sackmaier warmly welcomed the VESP participants to the Centre and answered their initial questions, including what the purpose of the pumpjacks outside was (artificial lift), and at what depths oil and gas were found

The Centre is located north-east of Vienna in Gänserndorf.





The Centre is home to 57 4k projectors & screens.

(varied). Following a safety video, the participants met their knowledgeable tour guide, Ms Federica Comoglio, a geologist working as an optimization engineer, before moving upstairs to the exhibition area. Aided by 1,600m² of presentation space spread across two levels, futuristic lighting and 57 4K projectors & screens, the entire oil extraction process is divided into easily understandable and stimulating exhibits — including a 360-degree cinema — that contain a variety of facts and real-world examples that immediately piqued the VESP participants’ interest.

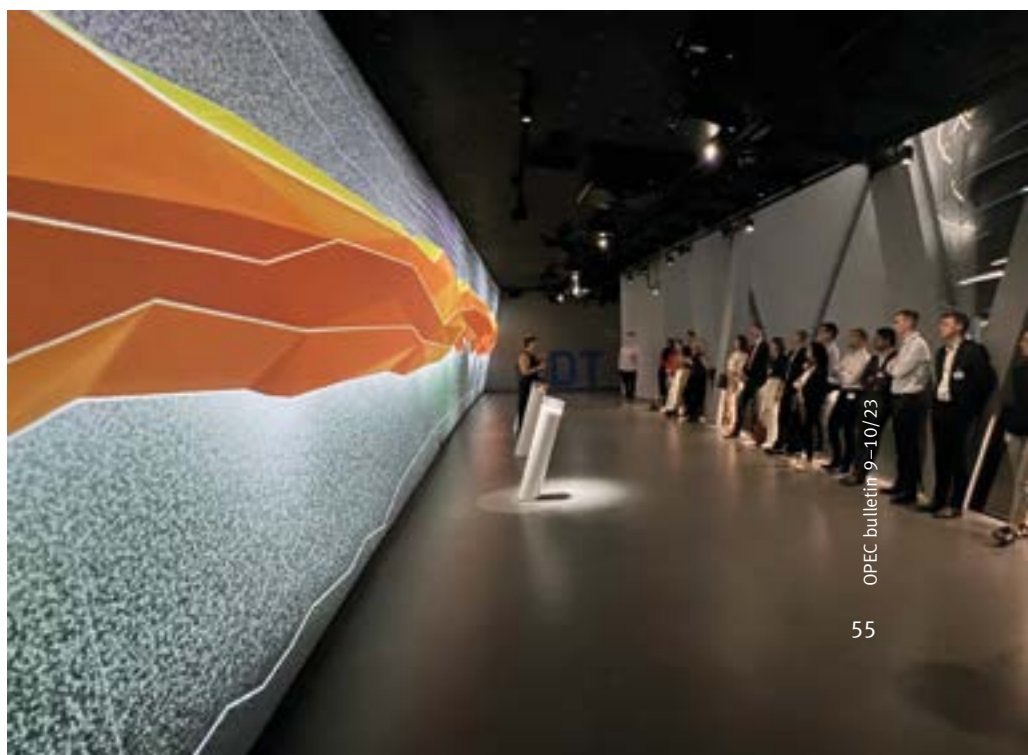
Prospecting and exploration

They began their tour by learning that the processes of prospecting and exploration seek to identify areas with favorable conditions for oil accumulation. The search for oil is located in the upper levels of the Earth’s crust, with hydrocarbons being found in drop form in the pores of rocks and not in underground caves or lakes, which the participants learned were common misconceptions. To maximize the likelihood that they find suitable deposits, geologists, among other tasks, gather physical and digital information on rock characteristics like fluid properties, examine fossils, conduct seismic acquisitions, and extract core samples.

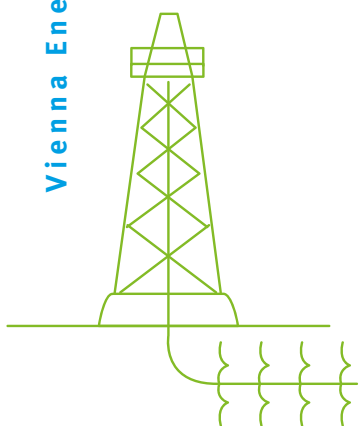
By analyzing fossils and integrating this analysis with other geological data, geologists are able to learn about the area’s geological history and reservoir characteristics. For example, by comparing fossils in various layers

of rock, they can establish a chronological sequence of sedimentary deposits, which is crucial in identifying rock formations with oil. Following this stage, and if the evidence from fossils, surface signs and initial geological data are positive, the next step in the process is generally to conduct a seismic acquisition.

A seismic acquisition refers to the process of using seismic waves in a carefully constructed grid at depths of over 5000 metres. Ms Comoglio showed the participants related technology, including geophones, which convert ground vibrations into analogue voltage signals. She noted that two million geophones were used in Austria’s largest seismic campaign and that it takes months to process a single acquisition. However, the



The entire oil extraction process is divided into easily understandable and stimulating exhibits.



The VESP participants were fascinated to see a real core sample from a depth of 8,548 metres (black slate, 155 million years old).

results are worth it, providing a good understanding of key details such as differences in pressure, the size and form of deposits and boundaries between rock layers.

The participants also learned about cores, cylindrical rock samples that provide valuable physical information on rock formations and help in answering whether hydrocarbons are present and economically viable. Rock formations with unsuitable levels of porosity and permeability, for example, may not be suitable. The OMV facility in Gänserndorf has 50 kilometres of core samples from all over the world; laid out end-to-end they would reach almost ten times around Vienna’s Ringstrasse, or roughly the distance from Vienna airport to downtown Bratislava.

Drilling and well completion

The above-mentioned steps next enable geologists to produce a reservoir model. Once completed, and once a promising reservoir has been identified, geologists can provide coordinates for where exploratory drilling operations can begin. Next, a drilling rig moves to the coordinates and starts drilling or “spudding in”; one rig can drill many wells, and each drilling process is attributed a low, medium, or high level of complexity.

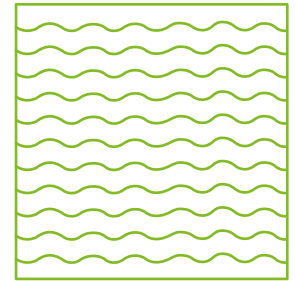
Although advances in technology in recent years have enabled more sophisticated and deeper wells to be dug,

drilling remains a complex endeavor. During the drilling process, the participants learned that recovered saline water can be mixed with bentonite — a coolant and lubricant — before being pumped down the drill string and exiting through the drill bit. This aids in bringing the drill cuttings (broken rock) to the surface and cooling the drill bit. They were also astonished to learn that highly durable diamond drill bits are often used for drilling through hard rock formations.

Ms Comoglio stressed that safety was critical during the drilling process, with strict safety measures implemented and many parameters constantly monitored. These include rates of penetration, gas levels, vertical depth, and measured depth, for example. Usually, drillers can expect to find gas at the top of a reservoir, followed by oil and then water. Experts in the drilling cockpit at OMV’s headquarters in Vienna have constant access to this data and can intervene if necessary. This is to mitigate risks, such as gas entering the well, rising to the surface and exploding; torque exceeding certain parameters; or the drill bit encountering a fracture or fault line, allowing fluid to escape.

While drilling, the participants learned that casing is installed for reinforcement and isolation. Steel pipes are lowered into the well and cemented into place, ensuring zonal isolation and preventing fluid migration. Technological advances ensure that drills can now be





An interactive display demonstrating how artificial lift works.

sent down with the casing, making the process more economically and time efficient. With each completed section, drillers “put a completion” in before moving on to the next section. The participants learned that the structure of the well usually resembles a telescope, becoming smaller and smaller in each subsequent section.

Overall, the participants learned that the characteristics of the rock in question dictate the speed of drilling. In one example of successful drilling provided to the VESP participants, OMV took 12 days to drill to a depth of 2,550 metres. In doing so, the OMV team impressively came within two metres of the planned target. The participants also learned that OMV holds the record for the deepest well drilled in Austria; a depth of 8,553 metres

in 1983, at Zistersdorf Uebertief 2a. Nowadays, OMV can use horizontal drilling from a single site to reach multiple deposits, reducing the company’s footprint.

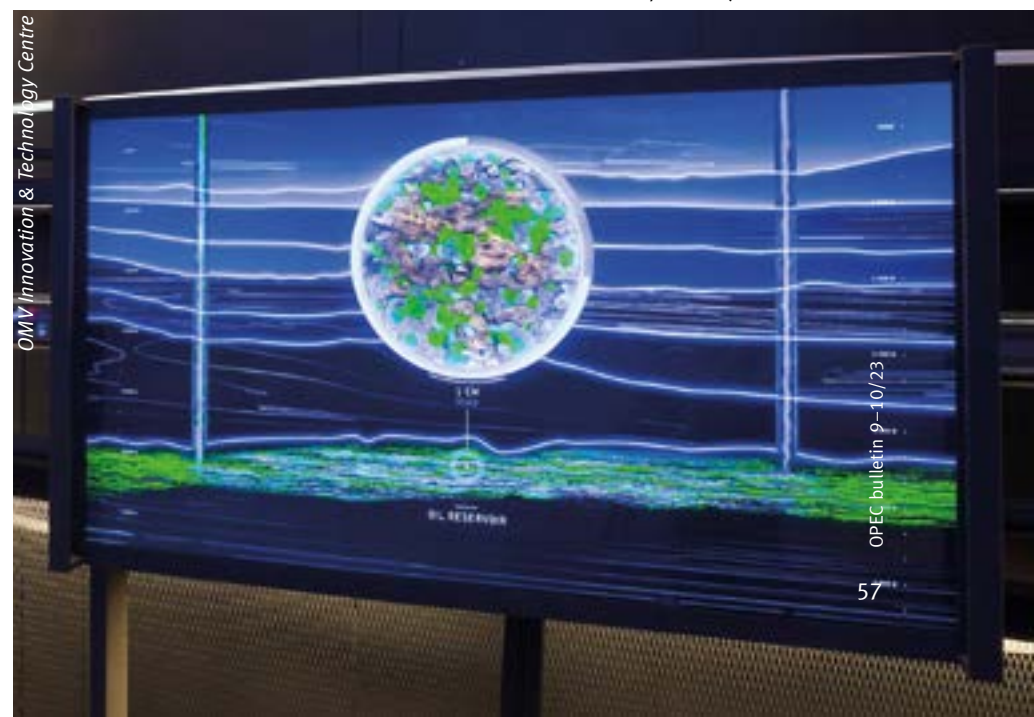
Production of oil – primary and second recovery phases

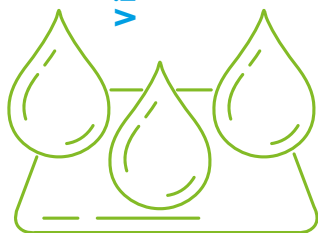
Once a well is completed, the participants learned that production operations can begin. There are two primary stages of oil extraction: primary and secondary recovery. During primary recovery, oil is extracted using the natural pressure within the reservoir. However, natural pressure is usually only enough to bring a maximum of 20 per cent of the total oil available to the

A visual depiction of an oil reservoir.



OMV drilling is accurate enough to come within two metres of target coordinates, even at tremendous depths.





surface. As the pressure declines over time, pumps and artificial lift become necessary to extract the liquid, thereby maximizing a well's operational lifetime. OMV has approximately 4000 pumpjacks in operation across the globe with an operational life from 2 to 4.5 years — a world-leading standard in endurance. This is not accidental, with OMV technicians designing and tailoring their equipment to a given deposit's conditions in order to mitigate corrosion and prolong the longevity of equipment.

Elsewhere, OMV is also highly proficient in using enhanced oil recover techniques to extract an even greater proportion of a reservoir's remaining oil by altering the properties of the oil or the reservoir to facilitate extraction that is more efficient. For example, by injecting recovered saline water (read on for more on recovered water) to displace oil, the oil extraction rate rises to 35 per cent. Furthermore, this injected water can be tailored to include substances like polymer, which makes the oil more viscous, thereby improving the recovery rate to 55 per cent, or alkali, which brings the recovery rate to 65 per cent. These methods make commercial and environmental sense and help OMV to achieve high rates of oil

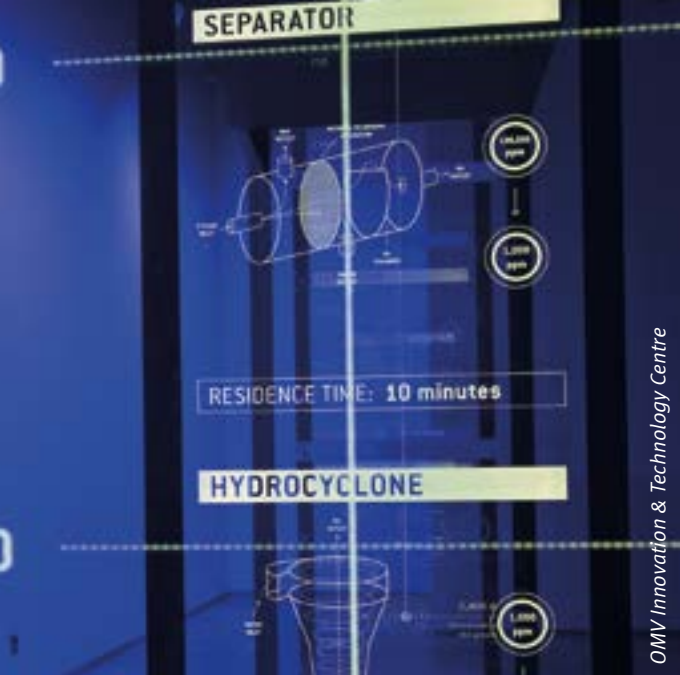
recovery, as underlined by the impressive production of approximately 392,000 barrels of oil equivalent per day in 2022.

Separating oil from water and gas

The participants learned that, when oil is pumped to the surface, saline deposit water always comes with it. In addition, they were surprised to learn that approximately 95 per cent of what is pumped to the surface in Austria is usually actually water, while it is 75 per cent in Romania and 30 per cent in the Middle East. Oil production requires various surface facilities to process the extracted fluids, including separators, which separate oil, gas, and water; storage tanks, which hold the separated oil; and treatment facilities, where impurities are removed from the crude oil before it is transported for refining.

The Centre presented six specific means to separate water from oil and gas — as part of a multistage process — namely separators, hydrocyclones, tanks, flotation, media filters and membranes. Separators rely on fluids having different densities, for example, enabling their





OMV Innovation & Technology Centre

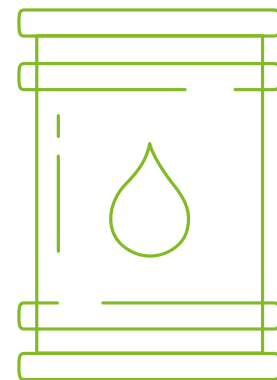
Hydrocyclones allow oil to leave from from the top of the device and water from the bottom in one minute.

separation efficiency, speed, available resources and infrastructure. Incredibly, OMV experts achieve clean deposit water in which less than 5 parts per million of oil remain.

A View Full of Energy

Aptly labelled ‘A View Full of Energy’, at the end of their tour, the participants enjoyed using telescopes from a viewing area to get a closer look at the impressive array of energy-related technology dotting the Weinviertel. It served as an inspiring end to an exceptional tour, which was enriched at every turn by real-world examples stemming from OMV’s 60 years of experience amassed across the globe.

Upon leaving the Centre, one participant remarked that they would never again be able to turn on their gas cooker or put petrol in their car without thinking about the intricate processes, innovation and hard work taking place behind the scenes to make these modern conveniences possible. Take a visit to the OMV Innovation & Technology Centre for yourself and you will be hard pressed to disagree.

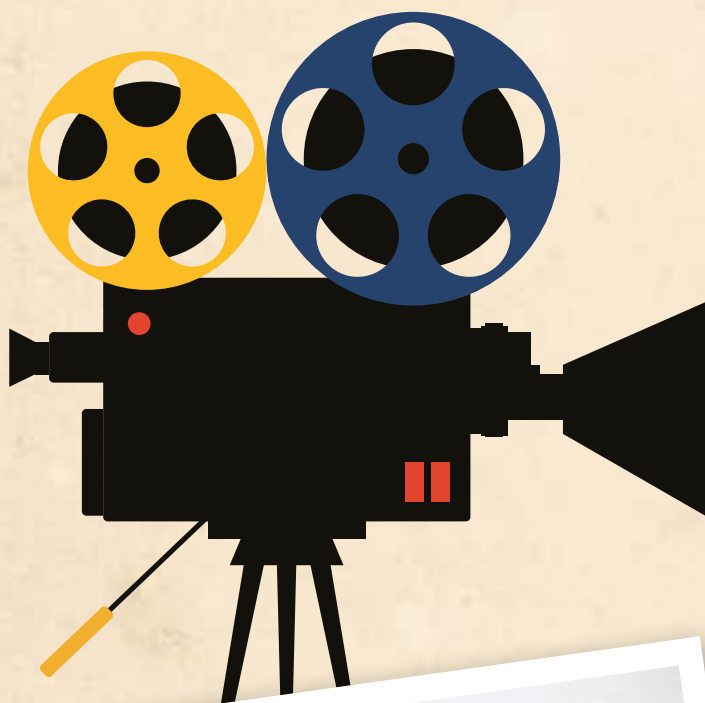


separation in ten minutes. Hydrocyclones — which the participants learned were particularly useful offshore — on the other hand, quickly allow oil to leave from the top of the device and water from the bottom in one minute. The selection of a specific separation method depends on the composition of the mixture, the desired

VESP participants gather for a group photograph with OPEC staff in front of the Centre.



Planes, trains, and automobiles; **oil** as the cradle of **modernity** and **filmmaking**



It is difficult to imagine that the global film industry, which is currently valued at almost \$100 billion, was born out of a pewter block coated with bitumen, a petroleum product, in the year 1826. Nicéphore Niépce may not have known it at the time, but by capturing the first 'fixed' photograph through a camera obscura, the French inventor set humanity on a path of unprecedented creativity and self-discovery.

The result of Niépce's experiment in his 'View from the Window at Le Gras' set the scene for over half a century of developments in photography. This progress in turn led humanity to wonder if it could go one step further and breathe motion into something as still as a memory on a roll of film.

Hand in hand from the very beginning

The essence of both fossil fuels and cinema is anchored in the concept of motion, as demonstrated by their interlaced history. Indeed, it was not by chance that the first 'film' ever created was of a horse, the progenitor of all modern forms of transport; in the late 1870s,



The first 'fixed' photograph, 'View from the Window at Le Gras'.



'The Horse in Motion', 1878.

English photographer Eadweard Muybridge set out to deduce the mechanical nature of a horse's stride. The still sequential images he captured as a result of his elaborate experiments were later re-animated using an invention of his own design called the zoopraxiscope, a precursor to the film projector.

Shortly thereafter, in 1888, George Eastman — the founder of Kodak — began selling the inaugural, hand-held Kodak camera, which contained a spool of strippable paper film. A year later, he revolutionized the industry with the introduction of the first roll of transparent, flexible film made out of celluloid, a petroleum by-product. Such breakthroughs led to a veritable arms race between Eastman's contemporaries, including Thomas Edison, Louis Le Prince and the Lumière brothers, which in turn helped usher in the age of film.

Lights, camera, full steam ahead

Cinema is an artistic medium that represents the prevailing cultural and socio-economic zeitgeist like no other. Indeed, any singular film is as much a personification of its era as it is a prime mover, fuelling discussions, cultural trends and even affecting market dynamics.

Representing fossil fuel-powered modernity, and a promise of discovery, the train embodies this notion perfectly, defining much of the 19th century and correspondingly being used

by filmmakers to push the cinematic envelope. Although long since dismissed as a myth, the story of how audiences simultaneously swerved at the 'Arrival of a train at La Ciotat' in the late 1880s remains embedded in the collective memory of cinephiles the world over.

Trains were used to great cinematic effect in 1903 in 'The Great Train Robbery' — one of the first narrative-driven films to ever shoot on location and incorporate a full cast of actors — and again in Buster Keaton's 1926 release of 'The General', one of the most expensive and influential silent films of the 20th century. Over time, the cinematic railroad has been used paradoxically to instill both a sense of calm and uneasiness, something the master of suspense, Alfred Hitchcock, used to great effect in 'Suspicion' and 'Strangers on a train'.



Buster Keaton riding the cowcatcher in 'The General', 1926.



Up, up and away

Trains aside, French illusionist and film director Georges Méliès tested the waters of what it meant to reach for the stars by inviting viewers on ‘*A Trip to the Moon*’ in 1902. With this visionary take on the final frontier, Méliès not only transported science-fiction to the visual plane, he demonstrated that the sky, contrary to popular belief, was most definitely not the limit, something the Wright brothers would emphatically prove with the help of their gasoline-powered flight at Kitty Hawk one year later.

Already adept at ground-based forms of transportation, fossil fuels and advances in technology enabled humanity to develop efficient, safer powered flight in rapid fashion, with Hollywood naturally soon following.

In 1927, eight years after the end of the First World War, the technological marvel ‘*Wings*’ became one of the first major aviation-centric war films. Owing to its outstanding visuals, visceral depiction of the Great War and genre-melding use of optic cues, it gained widespread critical acclaim and became the first motion picture in history — and the only fully silent film to date — to receive an Academy Award for Best Picture. Unsurprisingly, it has served as a blueprint for action-oriented cinematography ever since. Oil made the dream of flight a reality; the magic of cinema brought that reality to the masses.

‘*Wings*’ poster, 1927.



Wikimedia Commons

Still from ‘*A Trip to the Moon*’, 1902.

From well to pump to the big screen

Beginning in earnest in the 1900s, oil and its derivatives began to appear in millions of homes in the shape of medical products, cosmetics, textiles, appliances and — of course — automobiles. It did not take long for government agencies and oil companies, including BP, Shell and Standard Oil and its descendants, to start using the visual medium by producing educational training videos and advertisements.

In this respect, Standard Oil took the lead in the late 1910s by commissioning production companies to generate animated shorts, advertisements, as well as a comprehensive live-action reel chronicling a considerable part of the oil production and distribution process from well to consumer. Following suit, ‘*The Story of Petroleum*’, a silent short film produced in the early 1920s by Sinclair Oil, endeavoured to answer much of the same questions, albeit with a significant focus on the company’s own activities and services.

Sinclair’s controversial ‘*The World Struggle for Oil*’, co-produced and endorsed by the US Bureau of Mines, was released around the same time and took a more theatrical approach to branding. The picture guided audiences on a journey through time, highlighting the countless uses of oil in historical settings from antiquity to the industrial revolution, before culminating in an unambiguous marketing pitch for Sinclair.

The uproar that followed eventually led the industry to slowly transition away from such unabashed marketing, with companies and partnerships like Metro-Goldwyn-Mayer, Twentieth Century, Paramount, Columbia, Warner Brothers, and Disney subsequently utilizing imaginative PR campaigns to great effect.

The ‘soft power’ of narrative filmmaking had begun to take centre stage, with the 20th century bearing witness to a veritable boom in motion pictures inspired specifically by the oil industry.



Wikimedia Commons



The Story of Petroleum, 1923

Still from 'The Story of Petroleum', 1923.



'High, Wide and Handsome', released in 1937, recounts an underdog story set during the mid-19th century oil boom in the US, pitting a small farming town against big capital in a fight to preserve their right to produce oil. The film successfully melded together all the trappings of the genre with explicit antitrust messaging, echoing a popular contemporary sentiment concerning the need for economic reform and market democratization in the wake of the Great Depression. Elsewhere, the highest grossing film of 1940, 'Boom Town', doubled down on the need for positive messaging, painting a life of discovery and adventure associated with wildcatting.

Amassing a staggering ten Academy Award Nominations and one Oscar for Best Director, 'Giant' — a cult classic US Western film — continues to remain relevant almost 70 years since its release. Using Texas oil field development as a backdrop for its narration, the film shines a spotlight on issues of race, individual self-fulfilment, legacy, social injustice, and the irreversible nature of industrial change.

More recently, many consider the enthralling and timeless character study that is Paul Thomas Anderson's 2007 movie 'There Will Be Blood' a benchmark in what an industry-focused drama should look like. In stark contrast to the Petrocinema that came before it, the film does not indulge in romanticization of the past, instead intimately dissecting the prerequisites and costs of success.

Filmmaking and oil: a symbiotic relationship

Ultimately, since 1826, oil has been at the heart of driving revolutionary progress in visual self-expression, playing a role in eventually sparking the medium of fictional cinema that in turn managed to perpetuate the glamour of petroculture, as well as the agency, liberty and modernity that a petroleum-powered life enables and personifies.

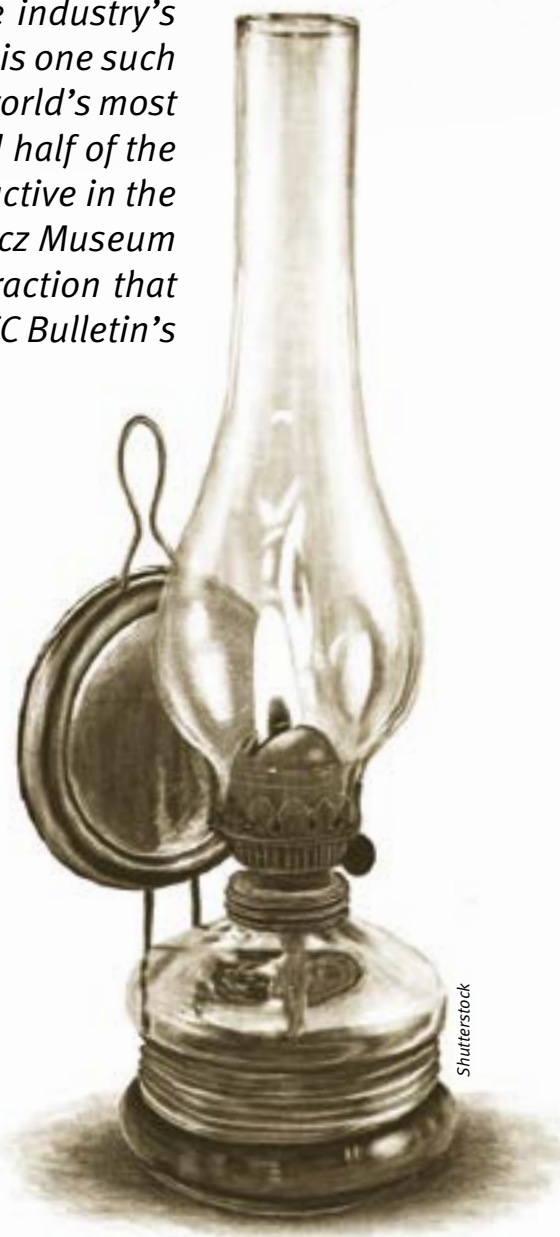
For well over a century, both the oil and filmmaking industries have inspired each other to reach new heights. This mutually beneficial arrangement has led to the creation of some of the most profound and poignant cinematic experiences in history. And the beauty of it all is that this well of inspiration is far from dry. ■



Poster for 'Giant', 1956.

The Ignacy Łukasiewicz Museum of the Gas and Oil Industry — preserving the heritage of the oil industry

*The history of oil is truly global in scope and many locations that are not, in present times, immediately associated with petroleum were once thriving oil regions that played a critical role in the industry's origins. The tiny locality of Bóbrka in southeastern Poland is one such example. Poland might not rank high-up on the list of the world's most prolific oil producers in 2023, but for much of the second half of the nineteenth century, this region was one of the most productive in the world. Currently, it is the site where the 'Ignacy Łukasiewicz Museum of the Oil and Gas Industry' is located, a fascinating attraction that showcases some key moments in the history of oil. The OPEC Bulletin's **Mathew Quinn** files this report.*





Author stands in front of 'Franek', a hand-dug oil well from the 19th century.

Old Carpathian forest

The first thing one notices at the entrance of the 'Ignacy Łukasiewicz Museum of the Oil and Gas Industry' is the area's stunning natural beauty. The museum is in the middle of primeval forest, rich in biodiversity and beauty, and a quiet part of the world. The small town of Bóbrka is in the Subcarpathian (Podkarpacie) Voivodeship (province) of Poland, about 190 kilometres from Krakow.

The visitors centre is modern, but otherwise it feels like one is stepping back in time. What is particularly captivating about the museum is that it consists of an 'open air' exhibition. Exploring it involves a walk through a forested area of 19.6 hectares that exhibits an outstanding range of items and artefacts from the nineteenth century. The other thing to note is that some quantities of oil are still drilled here. This is an active oil mine. One can smell, hear and feel oil.

The region's people were familiar with petroleum that

was seeping naturally out of the ground long before the birth of industrial scale production. People used the substance for medicinal purposes, for lighting and in construction. The famous Polish poet, Władysław Bełza, when writing about Bóbrka in 1885, describes tales of bygone times in the following way:

"Just in the middle of a forested wilderness (...) whose sinister swoosh accompanied folk tales about a reputedly wondrous spring hidden in the forest thicket, there was a small pond with water incessantly boiling and filling the air with mysterious soughing."

Model of 19th century well.



19th century means of transporting barrels.



Ignacy Łukasiewicz

It was in the 1850s that a series of developments coalesced, changing the fortunes of this forested region and indeed, the oil industry forever. Three men were heavily involved in this process. Ignacy Łukasiewicz, a humble pharmacist; Tytus Trzeciecki, a landowner and pioneer in starting the region's oil production; and Karol Klobassa-Zrencki, the owner of the land around Bóbrka.

Łukasiewicz worked in a pharmacy in Lviv, called the 'Pod gwiazdą' ('Under a Star'). In 1853, in cooperation with Jan Zeh, having undertaken several experiments with petroleum, they began to focus on distilling viable lamp oil, which could be used in kerosene lamps. Having obtained kerosene, Łukasiewicz commissioned Adam Bratkowski, a local tinsmith, to construct a lamp that would correspond to the physical and chemical properties of the new product.

Why is this invention so important? Simply put, kerosene lamps transformed

the course of the history of oil. As Dan Yergin, the industry's most famous historian wrote in his monumental work, 'The Prize,' "In its first decades, the oil business provided an industrializing world with a product called by the made-up name of 'kerosene' and known as the 'new light,' which pushed back the night and extended the working day."

As a New York chemist in 1864 attested, "Kerosene, has in one sense, increased the length of life among the agricultural population. Those who, on account of the dearth or inefficiency of whale oil, were accustomed to go to bed soon after sunset and spend almost half their time asleep, now occupy a portion of the night in reading and other amusements." Demand for kerosene for lighting spurred oil rushes in many parts of the globe in the second half of the nineteenth century.

In 1854, Łukasiewicz met Trzeciecki, who had bought some samples of oil from the area around Bóbrka. Trzeciecki offered cooperation in the extraction and processing of crude. In 1861, Łukasiewicz, Trzeciecki and Klobassa started a company: Trzeciecki provided the capital; Klobassa gave the land and the oil field; and Łukasiewicz became the manager of the entire project. The oil field became lucrative and Łukasiewicz would also build a refinery in the neighbouring town of Jasło.

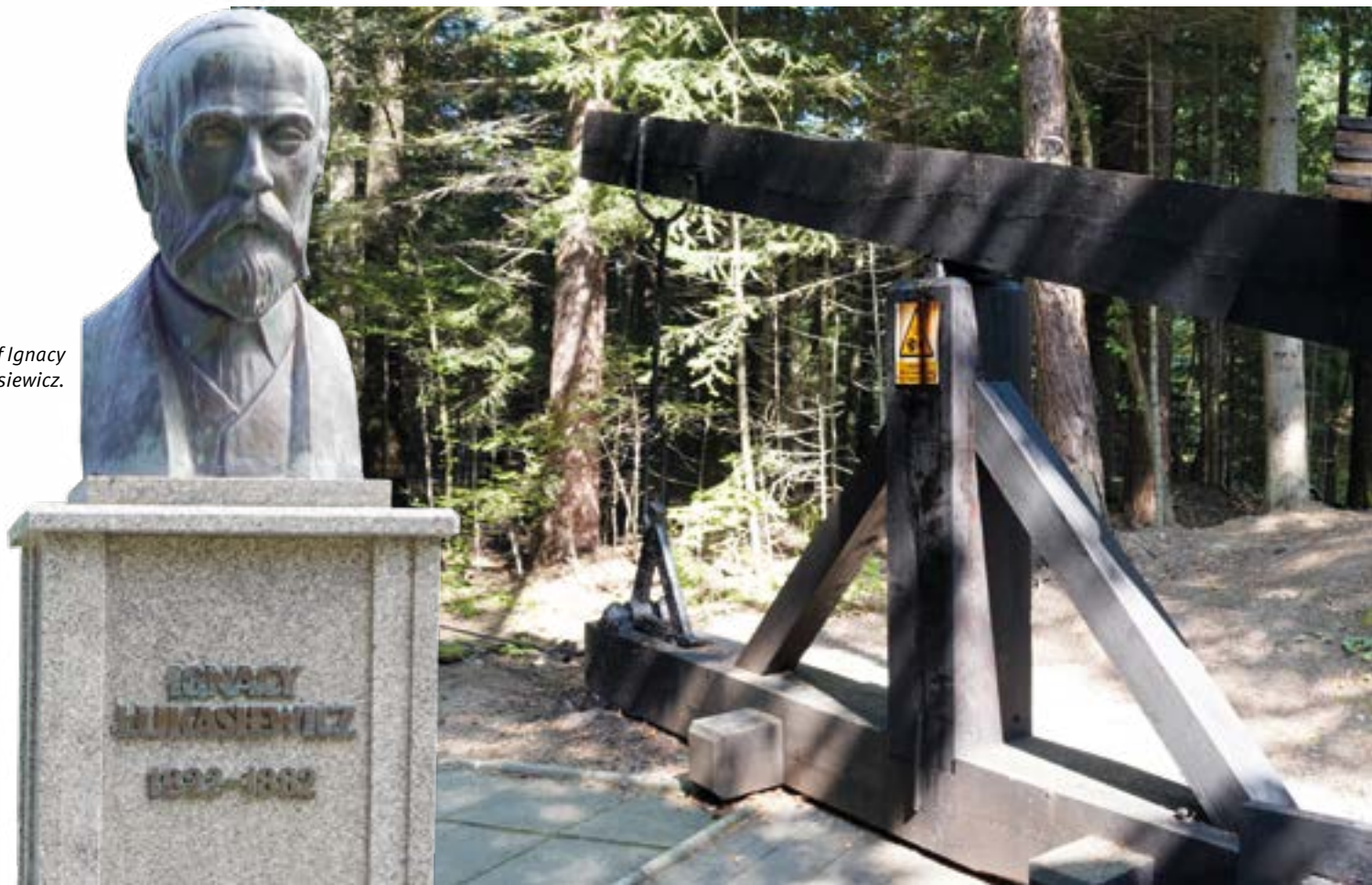
Poland



Bóbrka

'Janina', a hand-dug oil well from the 19th century.

Statue of Ignacy Łukasiewicz.



In 1871, the thriving enterprise was dissolved and Łukasiewicz gave up one third of his shares, while retaining his role as director. The oil field was becoming world renowned for the efficiency of its production techniques and state-of-the-art organization. The labour force was primarily recruited from local villages, but they were trained in oil-production skills by professionals in Germany and Romania.

From hand-dug to steam-powered wells

The open-air component of the museum shows how Łukasiewicz constantly sought to apply the most modern oil extraction techniques, with exhibitions highlighting the evolution of drilling methodologies. It contains two ‘oil digs’ (a well dug by hand). These wells are called ‘Franek’ (1860) and ‘Janina’ (1878), which continue to produce oil until the present day.

The first production facilities were ditches built on the site of a ‘boiling spot’ where abundant outflows of oil were found. A wooden tripod was erected on top of the dug well, which was also known as a ‘cellar.’ A workman was lowered into the ‘cellar’ with hand-powered ventilators used to provide fresh air down to the ‘cellar’ bottom. The bottom of the cellars were lit by miner’s lamps.

‘Franek’ measures 120 centimetres, by 120 cm and is 20 metres deep. Again it is worth reminding readers, this is a hand dug pit. In the quiet solemnity of the forest, where the only noise is the bubbling of the oil at the bottom of the pit, with eyes closed one could be transported back to 1860. ‘Janina’ was dug by hand to a depth of 96 metres and was later deepened by manual drilling to a depth of 156 metres. The museum remains one of the unique places in the world where visitors see active ‘cellars.’

With time, Łukasiewicz modernized the enterprise and adopted new drilling methods, including the steam engine drive, which could drill to a depth of 240 metres. This was known as the ‘Canadian drilling rig’ method. Refining continued to be perfected and the kerosene from the area became renowned for its high quality, which Łukasiewicz successfully marketed and took to national and international shows and exhibitions. According to the tour guide, even J D Rockefeller sent Standard Oil employees to Bóbrka to



Steam technology transformed oil drilling.



The Refinery Hall and exhibition on distribution of oil products.

pick up techniques and methods for refining the best quality kerosene.

Łukasiewicz passed away in 1882. The Bobrka oil field would then change owners over subsequent decades. It survived the turmoil of Europe's twentieth century wars and continues to pump oil to the present day. However, it went into mostly terminal decline at the turn of the twentieth century.

Establishment of a museum

Those working in the Polish oil industry had always been extremely proud of the rich heritage bequeathed to them by those early years of scientific discovery and engineering innovation. In 1961, they decided to establish a museum in the oilfield areas. Vintage construction tools are now preserved to remind younger generations of this rich legacy.

The museum contains a treasure trove of artefacts and pieces, including an obelisk funded by Łukasiewicz in 1872 to commemorate the establishment of the oil mine in 1854. Another highlight of the tour is a prototype treadmill-like pumping unit from 1875 for oil wells, mobile drilling units for shallow wells, as well surface equipment.

A special collection is devoted to displaying Łukasiewicz memorabilia held in 'Łukasiewicz House.' It contains photographs, paintings and geological maps

documenting the Polish oilfields. There is a large collection of kerosene lamps, as well as a recreation of Łukasiewicz's office, as it was when he worked there.

Recreations of workshops are also adorned to evoke the Golden Age of the Polish oil industry. This includes a wooden blacksmith's shop from 1856, a machine shop from 1864, and a boiler house from 1867. Various accoutrements from the twentieth century are also on display, including a vintage petrol station.

The exhibition pavilion contains a screen and displays which describe the history of oil. There is also an underground display, which informs visitors about the process and use of natural gas, as well as other items of geological significance.

All the components within the museum — including the buildings, shafts and equipment that date from the nineteenth century, in addition to the reconstructed objects and exhibits illustrating the development of the oil industry in the twentieth century — are integrated into the landscape arrangement, creating a logical and coherent whole. In fact, it is displayed chronologically, so that visitors have the impression that they are travelling in time.

A local and national hero

Poland is very proud of the accomplishments of Ignacy Łukasiewicz. Many towns near Bóbrka celebrate various



www.bobrka.pl



stages of his life. Rzeszow contains the pharmacy where his career began. Jasło has an obelisk commemorating the founding of his first oil distillery. Krosno has an enormous mural on the back of several buildings, as well as a museum containing the largest collection of kerosene lamps in Europe. There is a monument to him in the town centre.

There are also monuments for the oil industry in Harkłowa, Ustrzyki Dolne and Sanok. In 2018, as part of the celebrations marking the centenary of Polish independence, the Bóbrka mine was added to the list of '100 Historical Monuments for the Centenary of Regaining Independence' campaign.

The year 2023 marks the 170th anniversary of Łukasiewicz distilling oil to kerosene. The world and the oil industry have changed much in the intervening period. Nevertheless, this invention revolutionized the fortunes of an industry and set in motion a constant process of experimentation in the ever-expanding usages of oil.

The kerosene lamp literally transformed lives. It illuminated places that hitherto had never been illuminated. Within a few decades its place as the world's primary artificial light-giver would be usurped by electricity. Yet the extraction and refining techniques intended for the ultimate goal of kerosene would be applied to other uses of oil. The advent of the internal combustion engine would take this story to an entirely new plane.

Understanding the history of oil tells us so much about our modern world. However, it also celebrates humanity's capacity for ingenuity — how scientific discovery can affect daily life. The staff and all involved in working at the 'Ignacy Łukasiewicz Museum of the Oil and Gas Industry,' as well as the Polish authorities, have done an outstanding job in preserving this history and heritage, but perhaps most importantly, made it accessible to future generations.



Replica of Ignacy Łukasiewicz's office.



Nadir Guerer (r) receives laudation, presented to him by Peter Florianschütz, a Member of the Austrian Parliament.

Former OPEC staffer receives laudation from City of Vienna

*In a ceremony at the Wappensaal des Wiener Rathauses (Great Hall of Heraldry at the Vienna City Hall), former OPEC staff member **Nadir Guerer** was recognized by the City of Vienna for his 40 plus years of dedicated service to the OPEC Secretariat and his role in evolving and bettering relations between the Organization and the city.*

The Great Hall of Heraldry features coats of arms for the nine Austrian federal states and their state capitals, all designed by the famous Austrian artist, Hans Robert Pippal. The room also features silk damask wallpapers and large crystal chandeliers, and is today a fitting venue for honours and events.

In early September, the venue hosted an event that honoured two individuals: the Honourable Dr Erwin Kubesch, a former Ambassador, who was awarded the Gold Decoration of Honour for service to the City of Vienna, and Nadir Guerer, who received the Gold Merit Award of the City of Vienna.

Secretary General remarks

Following an opening musical accompaniment from Atmos Quartett of Mozart's 'Divertimento in B-Dur KV 136', there were speeches given related to the award recipients.

In support of the honour bestowed on Nadir, the OPEC Secretary General, Haitham Al Ghais, provided a laudatory speech in which he noted that Nadir was the

first OPEC employee to receive an award from the City of Vienna. On behalf of OPEC, he added, "I would like to express

my sincere thanks to Mayor Michael Ludwig for this.

Looking back on Nadir's educational history, he went to school in Turkey and the US before completing his postgraduate studies at the Diplomatic Academy in Vienna with a thesis on energy issues." Al Ghais noted that that was "an excellent prerequisite for a career in our Organization."

The Secretary General also highlighted Nadir's diplomatic skills in his significant contributions "to maintaining, even intensifying, relations with our host country Austria and our hometown of Vienna."

In this, he highlighted three key aspects. First, Nadir had attended more than a hundred ministerial meetings that took place in Vienna. Second, Nadir had

been instrumental in the preparation of the substantive content of past OPEC Seminars, many of which had taken place at the Hofburg Palace in Vienna.

And third, in terms of the relationship with Vienna, Nadir had the idea to institutionalize the now well-established 'Vienna Energy Scholar Programme', a joint initiative of OPEC and the City of Vienna to promote young energy researchers. Additionally, Nadir had also been directly involved in the 'Vienna Energy Club'.

The Secretary General sincerely congratulated Nadir on his well-deserved mark of appreciation and wished him and his family many more happy and contented years.

He then added that "we hope even after Nadir's retirement, the relations between OPEC and the City of Vienna, as well as the numerous energy events with OPEC's participation in the city, will continue to flourish."



Haitham Al Ghais,
OPEC Secretary
General.



Nadir Guerer (r), with
Haitham Al Ghais, OPEC
Secretary General.



Opening musical accompaniment from Atmos Quartett of Mozart's 'Divertimento in B-Dur KV 136'.

The OPEC team congratulates!

Award and interview

Following the award, Nadir offered his humble thanks to the Secretary General for his kind remarks, the City of Vienna for the honour, his family for their continual support and encouragement, and his former colleagues for the years of excellent teamwork.

The OPEC Bulletin also took the opportunity to sit down with Nadir, to further explore some of his history at OPEC and with the City of Vienna. The following is a transcript of the conversation.

OPEC Bulletin (OB): The award you received was from the City of Vienna, but in many respects it focused on the relationship between OPEC and the city. How important is this relationship? How did you feel you were able to help evolve the relationship?

Nadir: Vienna has been home to the OPEC Secretariat for almost six decades, moving here in 1965. It is proud to be one of the oldest and most significant organizations in Austria's capital.

The Republic of Austria and the City of Vienna have always been extremely cooperative and generous hosts in providing an enabling environment so the Organization can fulfill its functions effectively. I have seen this personally over many decades, 100s of ministerial meetings,

OPEC Seminars, other events, and most recently, through the historic Declaration of Cooperation between OPEC and non-OPEC producers.

Many of these events have also taken place at Vienna's most historic buildings, such as the Hofburg and the City Hall, and with participants from the highest levels of government in both Austria and Vienna.

Behind the significant accomplishments, there has also been a solid foundation of close working relationships between various government ministries, the City of Vienna and the Organization. I always felt privileged to be part of this and was proud to contribute to this collaboration, particularly alongside my colleagues at the Secretariat.

Two elements that were very close to you were the Vienna Energy Scholar Programme and the Vienna Energy Club? Could you provide a few further insights?

Nadir: Yes, indeed! Both activities underline the importance of dialogue, interaction and broader outreach, and reflect upon the widely recognized position and role of Vienna in the global energy community.

For the Vienna Energy Scholar Programme, or VESP, the Secretariat had been considering for many years how the Organization could extend its gratitude to, and deepen its cooperation with our host country Austria.

This eventually led to the VESP that was jointly hosted by the OPEC Secretariat and the City of Vienna for the first time in October 2021, with the aim of promoting education and raising awareness of energy sector developments, challenges and opportunities among youth.

It has proven to be an extremely successful addition to OPEC's outreach, with the third iteration taking place during the first week of September 2023. It was a tremendous honour to be part of its first instalments, and I have no doubt it will continue to go from strength to strength.

From the perspective of the Vienna Energy Club, the idea was first initiated in September 2009 with the aim of providing an informal platform to exchange views for Vienna-based international organizations dealing with energy.

OPEC, together with the OPEC Fund, has been part of the Vienna Energy Club since its inception. Twice-yearly meetings reflect the importance of close engagement and cooperation, including with various Austrian government ministries, in today's complex and interdependent energy world.

During my time at OPEC, I always felt the Vienna Energy Club was an excellent sounding board for a variety of energy issues.

You often talked about team spirit at the Organization. How essential was this to get things done?

Nadir: It was vital. It was the only way to get things done. The nature of the industry and the work, its interwoven complexities, the intensity required, meant we always required a well-coordinated team of dedicated professionals.

The strong sense of team spirit has always been pivotal in the Organization's achievements and accomplishments. The resilience and reputable position of the Organization in the international community has been built on a cooperative and respectful environment. I truly commend the staff at the Organization, and the many Secretaries General that I had the honour to work for, for the dedication and commitment they showed to ensuring OPEC always moved forward.

You are one of the longest ever-serving employees of the Organization (also the longest serving Austrian), stretching out over 40 years. How do you recall OPEC when you started, and how was it when you retired?

Nadir: The challenging and often difficult years of the early 1980s paved the way for the Organization to pursue active dialogue and cooperation in later years with major oil industry stakeholders.

For example, the cooperative efforts with non-OPEC producers, most recently through the DoC and the Charter of Cooperation, with a host of consumers, the establishment of the International Energy Forum Secretariat that was inaugurated in 2005, the Cancun Ministerial Declaration in 2010, I could go on.

The focus was on advancing transparency and improving information exchange, and it is clear that this has evolved positively over the decades. This has also manifested itself in OPEC's publications, with the sharing of key publications, such as the Monthly Oil Market Oil Report and the World Oil Outlook.

I have witnessed a great deal of positive change over my time at the OPEC Secretariat.

The Organization has become more proactive, particularly in recent times, it has become increasingly agile, and the broadening of its cooperative efforts have been vital to OPEC becoming an established part of the global energy community.

I am proud to have worked for such an important international organization, dedicated part of my life to its objectives, and I wish OPEC, the Secretary General, and all the staff, the very best in the future. 🇳🇵



Nadir Guerer.



OPEC colleagues (l-r) Dr Jan Ban; Dr Haris Aliefendic; Nadir Guerer; and James Griffin.



50th JMMC reviews oil market outlook

The 50th Meeting of the Joint Ministerial Monitoring Committee (JMMC) that took place via videoconference on 4 October 2023 reviewed crude oil production data for July and August 2023 and noted the overall conformity for participating OPEC and non-OPEC countries of the DoC.

The committee urged all participating countries to achieve full conformity and adhere to the compensation mechanism.

The committee also reaffirmed the commitment of all participants to the DoC, which extends to the end of 2024 as agreed at the 35th OPEC and non-OPEC Ministerial Meeting (ONOMM) on 4 June 2023.

It also noted the adjustment for the frequency of monthly meetings to become every two months for the JMMC and the authority of the JMMC to hold additional meetings, or to request an ONOMM as agreed at the ONOMM on 5 October 2022.

The committee said it “will continue to closely assess market conditions noting the willingness of the DoC countries to address market developments and stand ready to take additional measures at any time, building on the strong cohesion of OPEC and participating non-OPEC oil-producing countries.”

The committee also expressed its full recognition and support for the efforts of the Kingdom of Saudi Arabia aimed at supporting the stability of the oil market and reiterated its appreciation for the Kingdom’s additional voluntary adjustment of 1 mb/d and for extending it until end of December 2023.

The committee also acknowledged the Russian Federation for extending its additional voluntary reduction of exports by 300 kb/d until the end of December 2023.

The next meeting of the JMMC (51st) is scheduled for 26 November 2023.



Aramco to enter global LNG business by acquiring stake in MidOcean Energy



Aramco, one of the world's leading integrated energy and chemicals companies, has signed definitive agreements to acquire a strategic minority stake in MidOcean Energy for \$500 million.

MidOcean Energy is a liquefied natural gas (LNG) company formed and managed by EIG, a leading institutional investor in the global energy and infrastructure sectors.

MidOcean Energy is currently in the process of acquiring interests in four Australian LNG projects, with a growth strategy to create a diversified global LNG business. The strategic partnership with MidOcean Energy marks Aramco's first international investment in LNG.

The agreement builds on the relationship between Aramco and EIG, which was part of a consortium that acquired a 49 per cent stake in Aramco Oil Pipelines Company, a subsidiary of Aramco, in 2021.

Amin H Nasser, Aramco President & CEO, said: "We are pleased to be strengthening our strategic partnership with EIG through this acquisition, which marks Aramco's first international investment

in LNG. We anticipate strong demand-led growth for LNG as the world continues on its energy transition journey, with gas being a vital fuel and feedstock in various industries. We believe that gas will be important in meeting the world's rising need for secure, accessible and more sustainable energy."

Completion of the transaction is subject to closing conditions, which include regulatory approvals. Aramco also has the option to increase its shareholding and associated rights in MidOcean Energy in the future.



Amin H Nasser, Aramco President & CEO.



African Export-Import Bank signs agreement expected to raise Republic of Congo's crude oil production



On 2 October 2023, in Brazzaville, the African Export-Import Bank (Afreximbank) signed an agreement to provide a \$300 million facility to Trident OGX Congo. It is expected that this will raise the Republic of Congo's crude oil production by approximately 30 per cent and create a considerable number of jobs.

The lending facility will enable Trident OGX Congo to implement a capital expenditure programme to raise crude oil production in the Mengo-Kundji-Bindi II (MKB II) oil fields, located in the coastal plains encompassing Pointe Noire, the foothills of the Mayombe mountains and the periphery of Cabinda, an exclave of Angola.

Trident OGX Congo will use the proceeds of the facility to finance partially a seven-year development programme in the MKB II permit area.



Benedict Okey Oramah, President and Chairman of the Board of Afreximbank said: "This important project, which promises to bring investment of about US\$1.5 billion into Congo's oil and gas sector, will generate significant revenues that will enable the Government to create more jobs and provide more socio-economic infrastructure for the people of Congo."

He also noted that the MKB II oil field operations would adhere to best practices when it came to environmental standards and hydraulic fracturing.

In a press release, the African Energy Chamber commended Afreximbank for the provision of the \$300 million financial facility, expecting that it would "contribute significantly to the Republic of Congo's industrialization, trade development, and economic progress."

Benedict Okey Oramah, President and Chairman of the Board of the African Export-Import Bank (Afreximbank).





Kuwait Foreign Petroleum Exploration Company reaches agreement with Shell to acquire 40 per cent stake in Block 3 offshore Egypt



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On 20 September 2023, it was reported that Kuwait Foreign Petroleum Exploration Company (KUFPEC) had reached an agreement to buy a 40 per cent stake in oil and gas major Shell's Block 3, located in the Egyptian portion of the Mediterranean Sea.

The agreement is subject to government and regulatory approvals, and Shell will remain the operator in Block 3.

KUFPEC CEO Mohammad Salem Al-Haimer said: "We are glad to expand our presence in Egypt in cooperation with our international operating partners in highly prolific exploration basins in line with our

2040 strategy. This new partnership in Block 3 empowers KUFPEC to boost its offshore assets and exploration activities in Egypt."

Khaled Kacem, Shell's Vice President & Country Chair for Egypt, was similarly pleased, stating that "the proximity of this block to Shell's existing assets and other exploration blocks Shell holds in the area will help accelerate the company's offshore ambitions and support Egypt in meeting its energy supply needs."

In August 2023, Shell Egypt and partners commenced drilling activities in Blocks 3 and 4 in the Mediterranean Sea, with the exploration plan entailing that three wells are drilled consecutively. 



TotalEnergies sells 40 per cent stake in Block 20 offshore Angola to Petronas


On 28 September 2023, it was announced that French energy company TotalEnergies had closed the sale of a 40 per cent stake in Block 20 in the Kwanza Basin in Angola to Petronas Angola E&P LTD, a unit of Petronas, for \$400m (€380.7m).

Block 20 comprises the Cameia and Golfinho oil discoveries located around 150 kilometres south-west of Luanda, which will be developed through a system of subsea wells connected to a Floating Production, Storage and Offloading unit.

Oil production capacity is estimated to be 70,000 b/d and the two fields are scheduled to start producing oil in 2026.

According to a TotalEnergies press release, "The project will include the best available technologies to minimize greenhouse gas emissions and the facilities

will be designed for zero flaring, with the associated gas entirely reinjected into the reservoirs."

Following the deal's completion, TotalEnergies now holds an operatorship stake of 40 per cent in Block 20 while PAEPL owns a 40 per cent stake and Sonangol Pesquisa e Produção owns a 20 per cent interest. 



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An oil tanker in the bay of Luanda.

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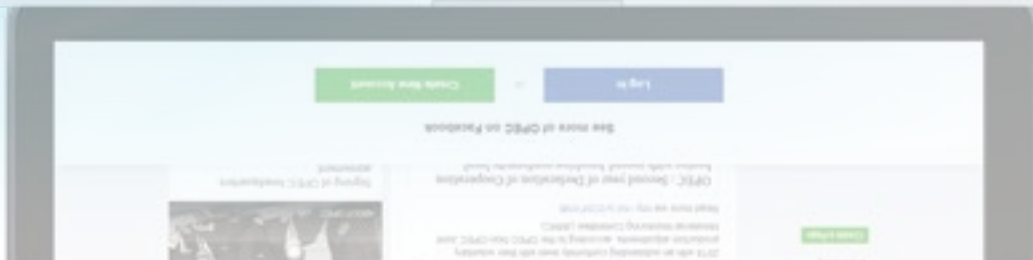
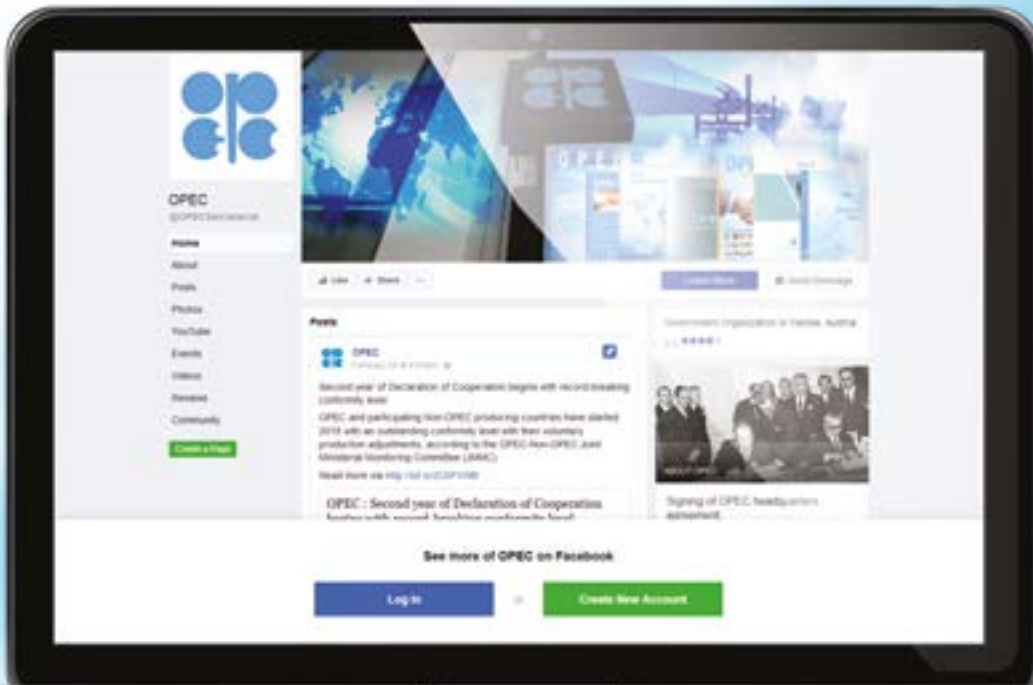
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OPEC Secretary General's diary

In the course of his official duties, **Haitham Al Ghais**, OPEC Secretary General, visits, receives and holds talks with numerous dignitaries. The following records some of those events.



3 July: Al Ghais meets with Suleiman Al-Herbish (above and I), who served as Director-General of the OPEC Fund for International Development from November 2003 to June 2018. A long-time supporter of people-centered development and driving socio-economic progress in developing countries, Al-Herbish implemented a process of institutional transformation during his tenure that made OFID's work more efficient and visible. He also succeeded in broadening how development funding is provided and strengthened the OPEC Fund's cooperation with other development organizations. Prior to joining the OPEC Fund, Al-Herbish served for 13 years as Saudi Arabia's Governor for OPEC.



1 September: Al Ghais (r) welcomed Omar Sultan Al Olama, UAE Minister of State for Artificial Intelligence, Digital Economy and Remote Work Applications, Director General of the Prime Minister's Office at the Ministry of Cabinet Affairs, to the OPEC Secretariat.



7 September: Al Ghais (l) received Isabel de Jesus da Costa Godinho, Ambassador and Permanent Representative of Angola, at the OPEC Secretariat.



7 September: Al Ghais (r) met with Abdullah bin Khalid Tawlah, Ambassador Extraordinary and Plenipotentiary, Embassy of the Kingdom of Saudi Arabia to Austria.



8 September: Al Ghais (r) held a meeting with representatives of the Research Committee on Foreign Affairs and National Security of Japan's House of Councillors. In attendance was Ryuta Mizuuchi (l), Ambassador of Japan to Austria, and Kuniko Inoguchi (c), Chairman of the Research Committee on Foreign Affairs and National Security.



28 September: Al Ghais (l) welcomed Abdullah bin Khalid Tawlah, Ambassador Extraordinary and Plenipotentiary, Embassy of the Kingdom of Saudi Arabia to Austria, to the OPEC Secretariat.

Visits to the Secretariat

Students and professional groups wanting to know more about OPEC visit the Secretariat regularly in order to receive briefings from the Public Relations and Information Department (PRID). PRID also visits schools under the Secretariat’s outreach programme to present on the Organization and the oil industry. Here we feature some snapshots of such visits.



5 September

Attendees from Arbeitsgemeinschaft Staat und Gesellschaft, Duderstadt, Germany.



10 October

Visitors from Arbeitsgemeinschaft Staat und Gesellschaft, Köln, Germany.



11 October

Students from Capital Market Academy, Bangkok, Thailand.



16 October

Students from SPE Student Chapter, Montanuniversität Leoben, Austria.



BACK TO BASICS

REDISCOVERING TRADITIONAL FARMING FOR CLIMATE RESILIENCE

Can we mass-produce food for billions of people without further damaging our ecosystems? As the debate continues, traditional and natural farming methods gain popularity based on the fact that they increase productivity, lower carbon emissions and promote biodiversity.

By Başak Pamir, OPEC Fund



Masanobu Fukuoka, pioneer of natural farming methods.

Given the growing impact of climate change on agriculture, the need for resilient farming practices is becoming increasingly urgent. While innovation plays a crucial role in developing new technologies, there is also a growing recognition that going back to basics and embracing traditional farming techniques can enhance climate resilience.

One such method is the Fukuoka Agriculture Method, which combines simplicity, natural processes and sustainability. The method has inspired a revival of organic farming around the world. By prioritizing traditional wisdom and ecological balance, it can offer a pathway towards resilient and sustainable agriculture.



Nurturing resilience through simplicity

The Fukuoka Agriculture Method, developed by Masanobu Fukuoka, a Japanese farmer and philosopher celebrated for his natural farming and revegetation of deserted lands, is rooted in the idea of working in harmony with nature. This approach emphasizes four key principles: no-till farming, natural fertilization, minimal weeding and permanent ground cover.

By avoiding soil disturbance through plowing or tilling, preserving soil structure, and nurturing a diverse ecosystem, the Fukuoka Method helps farms become more resilient to climate change impacts. The model is recognized for its ability to reduce soil erosion, enhance water retention, promote biodiversity, and sequester carbon.

Masanobu Fukuoka was born in 1913 in Japan. Trained as a microbiologist and agricultural scientist, he began his career as a research scientist specializing in plant pathology. Fukuoka called his agricultural philosophy “shizen nōhō” translated as “natural farming” or referred to as “do-nothing farming”. He spent many years travelling around the world giving lectures, working directly to plant seeds and revegetate areas.

Fukuoka reinvented the concept of seed balls by developing his own version called “seed bombs.” These are small spheres made by encapsulating seeds within a mixture of clay, compost and sometimes other additives like nutrients, beneficial microorganisms or a mix of seeds from various crops, flowers, and herbs.

These seed balls are designed to protect the seeds and provide them with favorable conditions for germination and establishment. Fukuoka would scatter these seed bombs in the fields, allowing

“
If you let nature do its work, it will give you what you need.
”

Hüseyin Genç, founder of the Üç Elma Farm

them to naturally break down with rain or soil moisture, releasing the seeds and promoting the spontaneous growth of diverse vegetation.

A project supported by the United Nations Development Programme trained and supported local farmers in Timor Leste to apply the Fukuoka approach. The project was aimed at cultivating open forest land to protect community buildings from natural disasters, as well as adopt the system for farming agricultural crops to promote sustainable land management and enhance crop yield.

In addition, the Üç Elma Farm (Three Apples) in Turkey’s central Anatolian province Çankırı uses the Fukuoka Method, which improved crop yields, reduced erosion, increased biodiversity and enhanced sustainability.

Hüseyin Genç, the founder of Üç Elma, says Fukuoka practices foster healthier ecosystems and resilient farming. “We want to show that a different way of agriculture is possible. This is exactly how we used to do farming in Anatolia until 1950, when industrial production based on pesticide application to enhance yields arrived. For generations, my family has been farming with these methods.”

Genç, who lives on the farm with his wife and daughter, examines what “increased yield” means. He says: “When you are producing 600 kilograms of something full of poison with genetically modified seeds, I can assure you that those seeds will enter the soil with their illness. The Fukuoka Method says if you let nature do its work, it will give you what you need. For example if you put pesticides on an apple tree, more apples will stay on the tree. But the tree is not designed to nurture all these apples, so the apples get less of what they need and they are now different and less nutritious. This is our principle at Üç Elma Farm. We let nature take control.”



Photos: Courtesy of Hüseyin Genç



Forthcoming events

East Africa Energy, Oil and Gas Summit and Exhibition, 7–9 November 2023, Nairobi, Kenya. Details: Global Event Partners, Suite 1, 3rd floor, 11, 12 St James's Square, St. James's, London SW1Y 4LB, UK. Tel: +20 10 01 79 79 86; e-mail: mshiha@gep-events.com; website: <https://eaogs.com>.

Operational Excellence in Oil and Gas, 7–10 November 2023, Houston, TX, USA. Details: IQPC Ltd, Anchor House, 15–19 Britten Street, London SW3 3QL, UK. Tel: +44 207 36 89 300; fax: +44 207 36 89 301; e-mail: enquire@iqpc.co.uk; website: www.oilandgasiq.com/events-opexinoilandgas.

Central Africa Business Energy Forum, 8–10 November 2023, N'Djamena, Chad. Details: CABEF Association, BP 4553 Douala, Cameroun. Tel: +237 655 96 96 96; e-mail: sales@cabeforg.com; website: www.cabef2023.com.

European Refining Technology Conference, 13–16 November 2023, Lago Maggiore, Italy. Details: The World Refining Association, Bedford House, Fulham Green, 69–79 Fulham High Street, London SW6 3JW, UK. Tel: +44 207 38 48 013; fax: +44 207 38 47 843; e-mail: enquiry@wraconferences.co.uk; website: <https://worldrefiningassociation.com/event-events/ertc>.

Hassi Messaoud Expo, 15–17 November 2023, Ouargla, Algeria. Details: Petroleum Industry Communication, Lotissement Saïd Hamdine Cite 122/98 LOGTS AADL Bt A1 Et 1 Aprt 05 Bir Mourad Rais 16013 Alger, Algeria. Tel: +213 561 80 89 13; fax: +213 21 54 15 46; e-mail: contact@hassi-messaoud-expo.com; website: www.hassi-messaoud-expo.com/Default.aspx?lg=en.

LNG Bunkering Summit, 15–17 November 2023, Washington, DC, USA. Details: IQPC Ltd, Anchor House, 15–19 Britten Street, London SW3 3QL, UK. Tel: +44 207 36 89 300; fax: +44 207 36 89 301; e-mail: enquire@iqpc.co.uk; website: www.oilandgasiq.com/events-lngbunkeringna.

MSGBC: Oil, Gas and Power 2023, 21–22 November 2023, Nouakchott, Republic of Mauritania. Details: Energy Capital Power, 30 Hudson St, De Waterkant Cape Town 8001, South Africa. E-mail: sales@energycapitalpower.com; website: <https://msgbcoilgasandpower.com/event/msgbc-oil-gas-power-2023>.

World LNG Summit and Awards, 28 November–1 December 2023, Athens, Greece. Details: dmg :: events, 6th floor, Northcliffe House, 2 Derry Street, London W8 5TT, UK. Tel: +44 20 36 15 28 73; fax: +44 20 36 15 06 79; e-mail: info@worldlngsummit.com; website: www.worldlngsummit.com.

Practical Nigerian Content Forum, 4–7 December 2023, Yenagoa, Nigeria. Details: dmg :: events, 6th floor, Northcliffe House, 2 Derry Street, London W8 5TT, UK. Tel: +44 20 36 15 28 73; fax: +44 20 36 15 06 79; e-mail: conferencemarketing@dmgevents.com; website: www.pncnigeria.com.

West Africa Offshore Upstream Conference 2023, 5–6 December 2023, Abuja, Nigeria. Details: LTS Innovate, e-mail: amelial@ltsinnovate.com or info@ltsinnovate.com; website: <https://offshore-west-africa-congress.ltsoilgas.com>.

Asia-Pacific Industrial Gas Conference, 5–7 December 2023, Kuala Lumpur, Malaysia. Details: GasWorld, Tel: +44 18 72 22 50 31; e-mail: conferences@gasworld.com; website: www.gasworldconferences.com/upcoming/#/.


8th Annual Atlantic Council Global Energy Forum, 5–7 December 2023, Dubai, United Arab Emirates. Website: www.atlanticcouncil.org/programs/global-energy-center/global-energy-forum.

International Oil, Gas and Energy Expo, 5–7 December 2023, Erbil, Iraq. Details: Erbil International Fairs Centre, Sami Abdul-Rahman Park, Mosul Road, Erbil 44001, Iraq. Tel: +964 75 11 00 01 00; mobile: +964 66 25 54 433; e-mail: exhibit@erbilfair.com; website: www.erbilfair.com/event/international-oil-gas-energy-expo-ogexpo-iraq-erbil.

Energy Transition MENA 2023, 6–7 December 2023, Dubai, United Arab Emirates. Details: Reuters Events; Canada Square, Canary Wharf, London E14 5AQ, UK. Tel: +44 207 37 57 50 0; fax: +44 207 37 5 7 576; website: <https://events.reutersevents.com/energy-transition/energy-mena>.

Energy Conference, 7 December 2023, Baton Rouge, LA, USA. Details: Society of Louisiana Certified Public Accountants, 3850 N Causeway Blvd, Suite 1650, Metairie, LA 70002, USA. Tel: +1 504 464 10 40; e-mail: info@lcpa.org; website: <https://www.lcpa.org/cpe/015144mb:2023-energy-conference-1st-day-only>.

World Oil Spill Conference, 7–8 December 2023, New Delhi, India. Details: Energy And Environment Foundation, F1–F2, Pankaj Grand Plaza, CSC Complex, Mayur Vihar – I, Delhi 110091, India. Tel: +91 99 71 50 00 28; e-mail: dranilgarg2011@gmail.com; website: www.worldoilspill.in.

12th Arab Energy Conference, 11–12 December 2023, Doha, Qatar. Details: Organization of Arab Petroleum Exporting Countries (OAPEC); PO Box 20501, Safat 13066, Kuwait, State of Kuwait. Tel: +965 24 95 90 00; e-mail: oapec@oapec.org; website: www.oapec.org. 

A review of world economic developments

September 2023

The global economic growth dynamics in 1H23 have been resilient despite the numerous challenges, including high inflation, elevated interest rates and geo-political tensions. This steady global economic growth trend continued into 3Q23, supported by buoyant consumer spending, especially in the services sector. With this, the global growth is expected at 2.7 per cent for 2023 and 2.6 per cent for 2024.

The downside risk for this projection include the elevated key interest rates in G7 except Japan, challenges in China's growth dynamic, and a continuation of the conflict in Eastern Europe. Sovereign debt levels have reached record highs in many economies, are also a rising concern.

However, an upside potential may come from less-accentuated inflation, providing central banks with room for accommodative monetary policies in the near-term.

Emerging Asia, particularly India, Brazil and Russia, could further surprise to the upside, with domestic demand and external trade accelerating. An even stronger-than-anticipated growth trend in China, supported by further fiscal and monetary stimulus, may provide additional support to global economic growth. Moreover, if the US continues to keep its current momentum, growth could turn out to be higher than expected.

Most of the support to global economic growth this year came from the ongoing rebound in the services sector. In particular, the contact-intensive areas of the services sector, including leisure, travel and tourism, experienced an extended boom after the long period of pandemic-related lockdowns. As China and Japan withdrew their COVID-19-related restrictions only at the start of this year, positive economic activity has been especially strong in East-Asia.

Going forward, an important dynamic in shaping the trajectory of the global economy will be the balance between the sectorial contributions of the industrial and services sectors. Economies that are skewed towards the industrial sector, which were more successful during the pandemic years, are currently lagging in terms of growth dynamic. The current large weight of the services sector contri-



bution is forecast to gradually taper off while the industrial input to the global economy is expected to gain momentum towards the end of the year.

The ongoing global economic growth is forecast to drive oil demand, especially given the recovery in tourism, air travel and steady driving mobility. Oil demand is expected to grow by 2.4 million barrels per day (mb/d) year-on-year in 2023 and 2.2 mb/d in 2024.

Pre-COVID-19 levels of total global oil demand will be surpassed in 2023 to average at 102.1 mb/d and rise further to 104.3 mb/d in 2024.

On the supply side, OPEC and non-OPEC countries participating in the Declaration of Cooperation continue to assess the market conditions, address its challenges and take necessary measure at any time and as needed in an effort to ensure market stability for the benefit of producers, consumers and the global economy.

MOMR ... oil market highlights

September 2023

Crude oil price movements — In August, the OPEC Reference Basket (ORB) increased by \$6.27, or 7.7 per cent, month-on-month (m-o-m) to average of \$87.33/b. The ICE Brent front-month contract rose by \$4.94, or 6.2 per cent, m-o-m to average \$85.10/b, and the NYMEX WTI front-month contract increased by \$5.29, or 7.0 per cent, m-o-m to average \$81.32/b. The DME Oman front-month contract rose by \$5.30, or 6.5 per cent, m-o-m to settle at \$86.46/b. The front-month ICE Brent/NYMEX WTI spread narrowed by 35¢ m-o-m to average \$3.78/b. The futures forward curves of ICE Brent, NYMEX WTI and DME Oman steepened further on the improving outlook for oil market fundamentals. At the same time, hedge funds and other money managers cut their total net long positions in ICE Brent and NYMEX WTI.

World economy — World economic growth forecast remains unchanged at 2.7 per cent for 2023 and at 2.6 per cent for 2024. US economic growth forecast remains at 1.8 per cent for 2023 and 0.7 per cent for 2024. Similarly, the Euro-zone economic growth forecast for 2023 and 2024 remains at 0.6 per cent and 0.8 per cent, respectively. Japan's economic growth forecast is revised up to stand at 1.5 per cent, while forecast growth for 2024 is unchanged at one per cent. China's 2023 economic growth forecast remains at 5.2 per cent, with 2024 slightly lower at 4.8 per cent, both unchanged from last month. India's 2023 economic growth forecast is revised up to six per cent, while growth for 2024 remains at 5.9 per cent. Brazil's economic growth forecast is revised up to 2.1 per cent in 2023, while growth for 2024 is unchanged at 1.2 per cent. For Russia, the 2023 economic growth forecast is revised up to one per cent, while the growth forecast for 2024 remains at one per cent.

World oil demand — World oil demand growth forecast in 2023 remains unchanged at 2.4 mb/d. Upward revisions made are all based on actual data received for China, US and OECD Europe, while Other Asia is revised downwards. In the OECD region, oil demand in 2023 is expected to rise by 100,000 b/d, while in the non-OECD region, oil demand is expected to rise by about 2.3 mb/d. For 2024, world oil demand is expected to grow by a healthy 2.2 mb/d, unchanged from the previous month's assessment. The OECD is expected to grow by about 300,000 b/d, with OECD Americas contributing the largest increase. The non-OECD is set to drive growth, increasing by about 2.0 mb/d, with China, India, Middle East

and Other Asia contributing the most.

World oil supply — Non-OPEC liquids supply growth forecast is revised up slightly to 1.6 mb/d in 2023. Main drivers of liquids supply growth for 2023 include the US, Brazil, Norway, Kazakhstan, Guyana and China. For 2024, non-OPEC liquids production is expected to grow by 1.4 mb/d, unchanged from the previous month's assessment. Main drivers for liquids supply growth next year are set to be the US, Canada, Guyana, Brazil, Norway and Kazakhstan. The largest declines are anticipated in Mexico and Malaysia. OPEC NGLs and non-conventional liquids are forecast to grow by around 50,000 b/d in 2023 to average 5.44 mb/d and by another 65,000 b/d to average 5.51 mb/d in 2024. OPEC-13 crude oil production in August increased by 113,000 b/d m-o-m to an average 27.45 mb/d, according to available secondary sources.

Product markets and refining operations — In August, refinery margins strengthened and reached their largest monthly gains since January 2023. In the US Gulf Coast (USGC), margins trended upwards for the third consecutive month given robust middle distillates performance, which drove margins to new highs. In Rotterdam, strong diesel exports to the US, amid healthy jet/kerosene requirements, led to lower availability for both products in the region. In Singapore, margins received support from a tighter product balance as delays in product export quotas limited product supplies from China to Singapore. The global refinery intake showed a 1.1 mb/d m-o-m gain in August to an average of 82.9 mb/d, resulting in a year-on-year intake growth of about 3.9 mb/d. In the coming months, refinery intakes are expected to come under pressure from rising offline capacities, amid the start of a heavy maintenance season.

Tanker market — The tanker market showed a mixed performance in August. Dirty tanker freight rates continued to decline across all monitored routes, as long tonnage lists and reduced activities weighed on rates. Very large crude carriers were down 12 per cent m-o-m on the Middle East-to-East route. In the Suezmax market, rates on the US to Europe route fell 20 per cent, despite the region seeing slightly more activity. Aframax rates on the Mediterranean-to-Northwest Europe route declined 20 per cent. Limited activities also prompted increased competition between the various vessel classes, further weighing on rates. In contrast, clean spot freight rates saw another month of im-

provements across the board on all monitored routes, amid increased activities toward the end of the month.

Crude and refined products trade — Preliminary data shows US crude imports in August averaged 6.9 mb/d, the highest since August 2019 amid increased flows from Latin America, while US crude exports moved back above 4 mb/d supported by higher flows to South Korea. Japan's crude imports edged up m-o-m in July to average 2.34 mb/d after witnessing a 12 month low in June, while the country's product flows experienced marginal adjustments. China's crude imports have shown some volatility in recent months, although with an overall good performance so far this year. Crude inflows fell to 10.3 mb/d in July, following two months above 12 mb/d, as refiners leaned on inventories. However, recently released August data show China's crude imports rebounded again to average 12.4 mb/d, with summer gasoline demand and positive export margins for diesel providing support. India's July crude imports declined m-o-m for the fifth month in a row to average 4.6 mb/d. India's product exports remained flat for the third month in a row, averaging 1.3 mb/d. Preliminary estimates show OECD Europe crude imports strengthened further in August, amid higher inflows from Brazil. Product imports were down slightly, as a sharp fall in diesel imports outpaced an uptick in jet and LPG.

Commercial stock movements — Preliminary data for July 2023 sees total OECD commercial oil stocks down by 7.9 mb m-o-m. At 2,779 mb, they were 190 mb below the 2015–19 average. Within the components, crude stocks fell by 14.2 mb m-o-m, while products stocks rose by 6.3 mb m-o-m. OECD commercial crude stocks stood at 1,348 mb in July, which is 114 mb lower than the 2015–19 average. Total product stocks stood at 1,430 mb in July, which is 77 mb below the 2015–19 average. In terms of days of forward cover, OECD commercial stocks in July remained unchanged at 59.5 days m-o-m, which is three days below the 2015–19 average.

Balance of supply and demand — Demand for OPEC crude in 2023 is revised down by 100,000 b/d from the previous month's assessment to stand at 29.2 mb/d, which is around 800,000 b/d higher than in 2022. Demand for OPEC crude in 2024 is also revised down by 100,000 b/d from the previous month's assessment to stand at 30.0 mb/d, which is 800,000 b/d higher than the estimated 2023 level.

The feature article and oil market highlights are taken from OPEC's Monthly Oil Market Report (MOMR) for September 2023. Published by the Secretariat's Petroleum Studies Department, the publication may be downloaded in PDF format from our Website (www.opec.org), provided OPEC is credited as the source for any usage. The additional graphs and tables on the following pages reflect the latest data on the OPEC Reference Basket and crude and oil product prices in general.

Winter oil market outlook

October 2023

The global refinery intake level declined from the post-pandemic record high of 82.5 mb/d registered in August 2023 to average 81.1 mb/d in September 2023. Despite the monthly decline, global crude intake increased by 1.8 mb/d y-o-y, in September 2023 owing to strong product demand, particularly in jet/kerosene markets, driven by increased air and road travel activities.

Until September, global refinery processing rates had remained elevated as strong refinery margins and robust transport fuel consumption strengthened product requirements and markets. However, in September, global refinery intake declined due to an increase in offline capacity, driven by intensified maintenance work, especially in the Atlantic Basin. Offline capacity reached 7.8 mb/d, up from 6.0 mb/d in the previous month. Additional downside risks are linked to weakening gasoline requirements as the summer driving season comes to an end. This counter-seasonal decline in global refining margins in September has likely added to the pressure on refinery intakes. Moreover, the reduction in product output mentioned earlier could potentially result in higher product prices in the short term.

In the US, diesel inventories currently stand below those typical for this time of the year. This divergence from previous patterns suggests that diesel availability in the US is likely to continue diminishing ahead of the winter season. In Europe, a diesel and gasoline export ban was imposed by Russia on 21 September, which was later amended to partially lift the diesel export ban, in order to avert domestic shortages and stabilize domestic fuel prices. This restriction weighed on diesel availability in the region. Meanwhile, Asian refiners are expected to keep refinery runs elevated and increase product exports in the coming month, amid potential improvements in East-West product pricing signals. This presents a favourable opportunity for Chinese refiners to exhaust their product export quotas on stronger refining margins ahead of the release of the next batch of quotas.

In 4Q23, global transportation fuel demand is expected to see some decline, consistent with seasonality and historical trends. The commencement

of extensive refinery maintenance is likely to constrain refinery throughputs, consequently exerting pressure on oil markets until refinery operations begin to recover, typically around November. However, the net effect of impending product supply dislocations and tightening product availability might support for crude markets toward the end of the year.

Looking ahead to the coming winter season, the seasonal increase in heating oil demand is expected, driven by rising requirements in the Northern Hemisphere. Overall, OECD Europe, OECD Americas, and OECD Asia Pacific, are poised to experience growth in demand for fuel oil and distillates required for heating in 4Q23. Accordingly, total heating fuel demand is forecast to grow by 70,000 b/d y-o-y in 4Q23. In OECD Europe and the US, heating oil will drive demand, while in OECD Asia Pacific, “other fuels” – primarily consisting of diesel and LPG – will drive demand in 4Q23. OECD Americas will see the largest increase in demand by 60,000 b/d, OECD Europe by around 10,000 b/d y-o-y, and Asia Pacific will remain almost unchanged y-o-y. In 1Q24, heating fuel demand in the OECD region is expected to see 100,000 b/d y-o-y growth, mostly from the Americas and Europe, with a marginal increase in the Asia Pacific.

Looking ahead and despite the usual seasonal rise in heating oil demand, ongoing uncertainty and economic developments in OECD Europe and other areas are expected to impact oil demand in the remainder of 2023 and in 2024. Consequently, OPEC and non-OPEC nations participating in the Declaration of Cooperation will continue to closely monitor market developments and address challenges in a proactive, pre-emptive and precautionary manner, in order to secure a sustainable and stable market.



MOMR ... oil market highlights

October 2023

Crude oil price movements — In September, the OPEC Reference Basket (ORB) rose by \$7.27, or 8.3 per cent, m-o-m to average \$94.60/b. The ICE Brent front-month contract increased by \$7.48, or 8.8 per cent, m-o-m to \$92.59/b, and the NYMEX WTI front-month contract rose by \$8.11, or 10.0 per cent, m-o-m to average \$89.43/b. The DME Oman front-month contract rose by \$6.90, or 8.0 per cent, m-o-m to settle at \$93.37/b. The front-month ICE Brent/NYMEX WTI spread narrowed in September by 63¢ to average \$3.16/b. The market structure strengthened and the front end of the futures forward curves for ICE Brent, NYMEX WTI and DME Oman steepened amid improving sentiment about the short-term market outlook. Hedge funds and other money managers raised their total net long positions in ICE Brent and NYMEX WTI last month anticipating a rally in oil futures.

World economy — The forecast for world economic growth in 2023 is revised up slightly to 2.8 per cent, but remains unchanged for 2024 at 2.6 per cent. US economic growth in 2023 is revised up to two per cent, but remains at 0.7 per cent for 2024. Eurozone economic growth is revised down in both 2023 and 2024 to stand at 0.5 per cent and 0.7 per cent, respectively. Japan's economic growth forecast for 2023 is revised up to 1.7 per cent, while growth in 2024 remains at 1.0 per cent. The forecast for China remains unchanged at 5.2 per cent and 4.8 per cent for 2023 and 2024, respectively. India's growth forecast for 2023 is revised up to 6.2 per cent, while growth for 2024 remains at 5.9 per cent. Brazil's forecast is revised up to 2.5 per cent in 2023, while growth for 2024 remains at 1.2 per cent. Russia's economic growth forecast for 2023 is revised up to 1.5 per cent, while the growth forecast for 2024 remains at one per cent.

World oil demand — The world oil demand growth forecast for 2023 remains unchanged at 2.4 mb/d. Downward revisions in the OECD are due to actual data for the first three quarters, while upward revisions in non-OECD in the 2Q23 and 3Q23 are due to higher-than-expected growth, mainly from China. In the OECD, oil demand in 2023 is expected to rise by around 100,000 b/d, while oil demand in non-OECD is expected to increase slightly to above 2.3 mb/d. For 2024, world oil demand is expected to grow by a healthy 2.2 mb/d, unchanged from the previous month's assessment. The OECD is expected to grow by about 300,000 b/d in 2024, with OECD Americas contributing the largest increase. The non-OECD is set to drive next year's growth, increasing by about 2.0 mb/d, with China, India, the Middle East, and Other Asia contributing the most.

World oil supply — Non-OPEC liquids supply growth forecast for 2023 is revised up to 1.7 mb/d. Main drivers of liquids supply growth for 2023 include the US, Brazil, Norway, Kazakhstan, Guyana and China. For 2024, non-OPEC liquids supply is expected to grow by 1.4 mb/d, unchanged from the previous month's assessment. Main drivers for liquids supply growth next year are set to be the US, Canada, Guyana, Brazil, Norway and Kazakhstan. The largest declines are anticipated in Mexico and Malaysia. OPEC NGLs and non-conventional liquids are forecast to grow by around 50,000 b/d in 2023 to average 5.4 mb/d and by another 65 tb/d to average 5.5 mb/d in 2024. OPEC-13 crude oil production in September increased by 273 tb/d m-o-m to an average 27.75 mb/d, according to available secondary sources.

Product markets and refining operations — In September, refinery margins came under pressure and showed a counter-seasonal drop following multi-month highs seen in the previous month. Stronger crude prices weighed on product crack spreads nearly all across the barrel despite lower product output due to the start of a heavy turnaround season. Over the month, the seasonal decline in gasoline demand — and subsequent gasoline stock builds — led to a drop in prices for that product in the US Gulf Coast and Rotterdam, while all other product prices showed a rise. In Singapore, fuel oil was the only product to show a price decline affected by ample supplies in the region. Global refinery intake fell by 1.4 mb/d m-o-m in September to average 81.1 mb/d.

Tanker market — Dirty freight rates showed mixed movement in September. Despite some strength in the second half of the month, VLCCs spot freight rates continued the decline in September, down from peaks seen earlier in June. Rates on the Middle East-to-West route led losses, falling 13 per cent. Suezmax and Aframax spot freight rates showed a mixed performance. Suezmax rates on the US Gulf Coast-to-Europe route declined 15 per cent, while rates on the West Africa-to-US Gulf Coast route rose five per cent amid a pickup in tanker demand. In the Aframax market, rates on the Caribbean-to-US East Coast route experienced a strong seasonal decline of 22 per cent, while rates on the Mediterranean-to-Northwest Europe route rose eight per cent, supported by temporary tightness in the market mid-month. In contrast, clean spot freight rates on average saw an improvement. Rates rose around the Mediterranean, as available tonnage remained tight, as well as in the Far East amid a pickup in activity in the regional product market.

Crude and refined products trade — Preliminary data shows US crude imports remained at strong levels in September, averaging 6.9 mb/d, the highest since August 2019. US crude exports also increased slightly to average 4.3 mb/d, representing a six-month high. China's crude imports surged in August, averaging 12.5 mb/d, the third highest on record. Product exports from China rose further to reach a five-month high, supported by a new round of product export quotas. India's crude imports continued to decline to a 10-month low of 4.4 mb/d in August, as the monsoon season weighed on domestic demand. India's product exports reached a five-month high, driven by outflows of fuel oil, jet fuel and other products. Japan's crude imports recovered further in August, averaging 2.5 mb/d, an increase of almost seven per cent m-o-m. Japan's product exports rose with gains driven by gasoline and kerosene. Preliminary estimates show OECD Europe crude imports reaching a peak in July before slipping seasonally over the subsequent two months.

Commercial stock movements — Preliminary August 2023 data sees total OECD commercial oil stocks down by 11.0 mb m-o-m. At 2,803 mb, they were 182 mb lower than the 2015–2019 average. Within the components, crude stocks fell by 26.0 mb m-o-m, while products stocks rose by 15.0 mb m-o-m. OECD commercial crude stocks stood at 1,348 mb in August, which is 99 mb lower than the 2015–19 average. By contrast, total product inventories rose by 15.0 mb in August to 1,455 mb, which is 83 mb below the 2015–19 average. In terms of days of forward cover, OECD commercial stocks rose by 0.2 days m-o-m in August to stand at 61.1 days, which is 2.0 days below the 2015–19 average.

Balance of supply and demand — Demand for OPEC crude in 2023 is revised down by 100,000 b/d from the previous month's assessment to stand at 29.1 mb/d, which is 700,000 mb/d higher than in 2022. Demand for OPEC crude in 2024 is also revised down by 100,000 b/d from the previous month's assessment to stand at 29.9 mb/d, 0.8 mb/d higher than the estimated level in 2023. 📊

The feature article and oil market highlights are taken from OPEC's Monthly Oil Market Report (MOMR) for October 2023. Published by the Secretariat's Petroleum Studies Department, the publication may be downloaded in PDF format from our Website (www.opec.org), provided OPEC is credited as the source for any usage. The additional graphs and tables on the following pages reflect the latest data on the OPEC Reference Basket and crude and oil product prices in general.

Table 1: OPEC Reference Basket spot crude prices \$/b

Crude/Member Country	2022				2023								Weeks 35–39/2023 (week ending)					
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	01 Sep	08 Sep	15 Sep	22 Sep	29 Sep
Arab Light — Saudi Arabia	99.33	96.20	91.58	82.44	83.80	83.56	80.26	85.65	77.72	77.18	83.45	89.55	96.51	90.27	94.04	96.96	97.98	98.04
Basrah Medium — Iraq	91.16	89.45	85.66	76.07	77.82	78.33	75.33	81.75	73.32	73.03	78.82	85.38	93.14	86.20	90.74	93.48	94.60	94.69
Bonny Light — Nigeria	95.73	95.02	92.84	80.69	82.36	82.88	79.24	85.94	75.63	74.18	79.92	86.52	95.53	87.42	93.23	95.40	97.01	97.39
Djeno — Congo	82.37	85.66	83.65	72.93	75.41	75.05	70.84	77.45	68.37	67.28	72.64	78.69	86.51	79.36	84.21	86.38	87.99	88.37
Es Sider — Libya	90.47	93.91	91.25	77.53	81.01	81.45	77.39	84.00	75.32	74.23	79.69	86.39	94.31	87.08	92.01	94.18	95.79	96.17
Girassol — Angola	92.26	95.61	92.76	78.69	82.05	84.06	80.31	87.01	77.20	76.30	82.09	89.05	97.46	90.31	95.16	97.33	98.94	99.32
Iran Heavy — IR Iran	97.18	93.21	88.73	79.11	81.56	81.88	78.80	84.58	76.47	75.33	81.48	87.58	94.63	88.29	92.11	95.20	96.15	96.11
Kuwait Export — Kuwait	98.69	94.72	90.13	80.46	82.94	83.19	79.86	85.49	77.44	76.44	82.39	88.77	95.70	89.50	93.16	96.25	97.20	97.16
Merey — Venezuela	73.70	71.56	66.94	58.17	61.74	61.95	57.25	62.58	56.22	57.37	63.28	68.48	75.51	69.34	73.39	76.00	76.76	76.74
Murban — UAE	92.45	93.54	90.90	80.17	82.53	83.36	79.55	84.11	75.66	75.52	80.78	87.24	93.86	87.61	91.33	94.55	95.57	95.19
Rabi Light — Gabon	89.36	92.65	90.64	79.92	82.40	82.04	77.83	84.44	75.36	74.27	79.63	85.68	93.50	86.35	91.20	93.37	94.98	95.36
Saharan Blend — Algeria	92.72	95.66	93.60	83.03	83.76	84.05	80.29	85.40	76.42	75.23	80.29	86.69	95.21	87.50	92.91	95.08	96.69	97.07
Zafiro — Equatorial Guinea	90.72	93.61	92.12	80.28	81.29	82.24	79.29	85.90	76.82	75.28	81.45	87.54	95.36	88.21	93.06	95.23	96.84	97.22
OPEC Reference Basket	95.32	93.62	89.73	79.68	81.62	81.88	78.45	84.13	75.82	75.19	81.06	87.33	94.60	88.01	92.16	94.98	96.10	96.14

Table 2: Selected spot crude prices \$/b

Crude/country	2022				2023								Weeks 35–39/2023 (week ending)					
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	01 Sep	08 Sep	15 Sep	22 Sep	29 Sep
Arab Heavy — Saudi Arabia	96.89	93.12	88.58	78.51	79.56	79.89	76.71	84.09	76.27	75.03	81.24	87.48	94.43	88.17	91.91	95.00	95.95	95.91
Brega — Libya	90.52	93.81	91.50	77.93	81.41	81.65	77.44	83.75	74.77	73.58	78.94	85.29	93.26	85.99	90.96	93.13	94.74	95.12
Brent Dtd — North Sea	89.82	93.11	91.10	80.38	82.86	82.50	78.29	84.90	75.82	74.73	80.09	86.14	93.96	86.81	91.66	93.83	95.44	95.82
Dubai — UAE	90.98	91.04	86.12	77.09	80.75	82.05	78.42	83.40	75.13	74.70	80.33	86.46	92.93	87.02	90.33	93.37	94.40	94.64
Ekofisk — North Sea	93.02	96.02	94.32	83.22	85.67	85.67	80.40	87.31	77.49	76.21	81.83	88.44	96.84	89.55	94.27	96.83	98.44	98.82
Iran Light — IR Iran	82.45	86.95	85.71	73.42	76.79	78.68	75.64	82.75	74.19	73.46	80.75	87.29	93.92	87.43	91.74	93.53	95.41	95.85
Isthmus — Mexico	81.44	83.57	79.26	67.48	68.82	68.27	65.13	72.61	65.78	66.31	72.56	79.56	87.24	80.25	84.96	87.13	88.67	88.95
Oman — Oman	90.80	90.80	86.15	77.43	80.87	82.23	78.49	83.28	74.91	74.65	80.54	86.49	92.73	87.08	90.29	93.42	94.29	93.97
Suez Mix — Egypt	82.32	86.82	85.58	73.29	76.66	78.55	75.51	82.62	74.06	73.33	80.62	87.16	93.79	87.30	91.61	93.40	95.28	95.72
Minas — Indonesia	88.91	91.06	89.21	79.14	81.57	81.53	77.10	81.36	73.72	72.58	77.47	84.97	91.12	84.47	88.20	91.20	92.72	93.58
Urals — Russia	68.63	70.54	67.98	52.23	52.21	51.91	49.74	59.97	55.22	56.64	65.12	74.54	84.23	75.76	81.31	83.98	86.06	86.74
WTI — North America	84.00	87.26	84.15	76.50	78.19	76.81	73.37	79.44	71.64	70.31	75.85	81.41	89.38	82.41	86.83	89.12	90.90	91.45

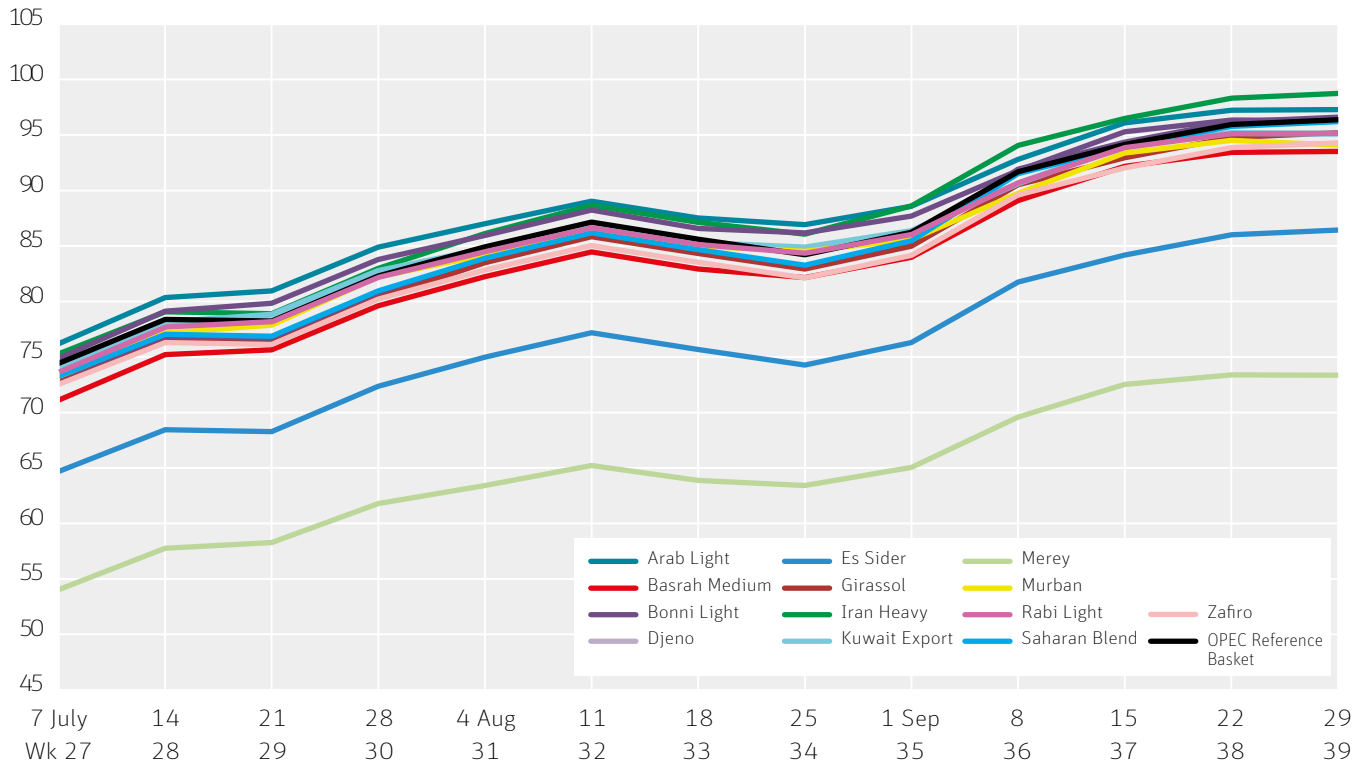
Notes:

Brent for dated cargoes; Urals cif Mediterranean. All others fob loading port.

Sources: Argus; Secretariat's assessments.

Graph 1: Evolution of the OPEC Reference Basket spot crude prices, 2023

\$/b



Graph 2: Evolution of selected spot crude prices, 2023

\$/b

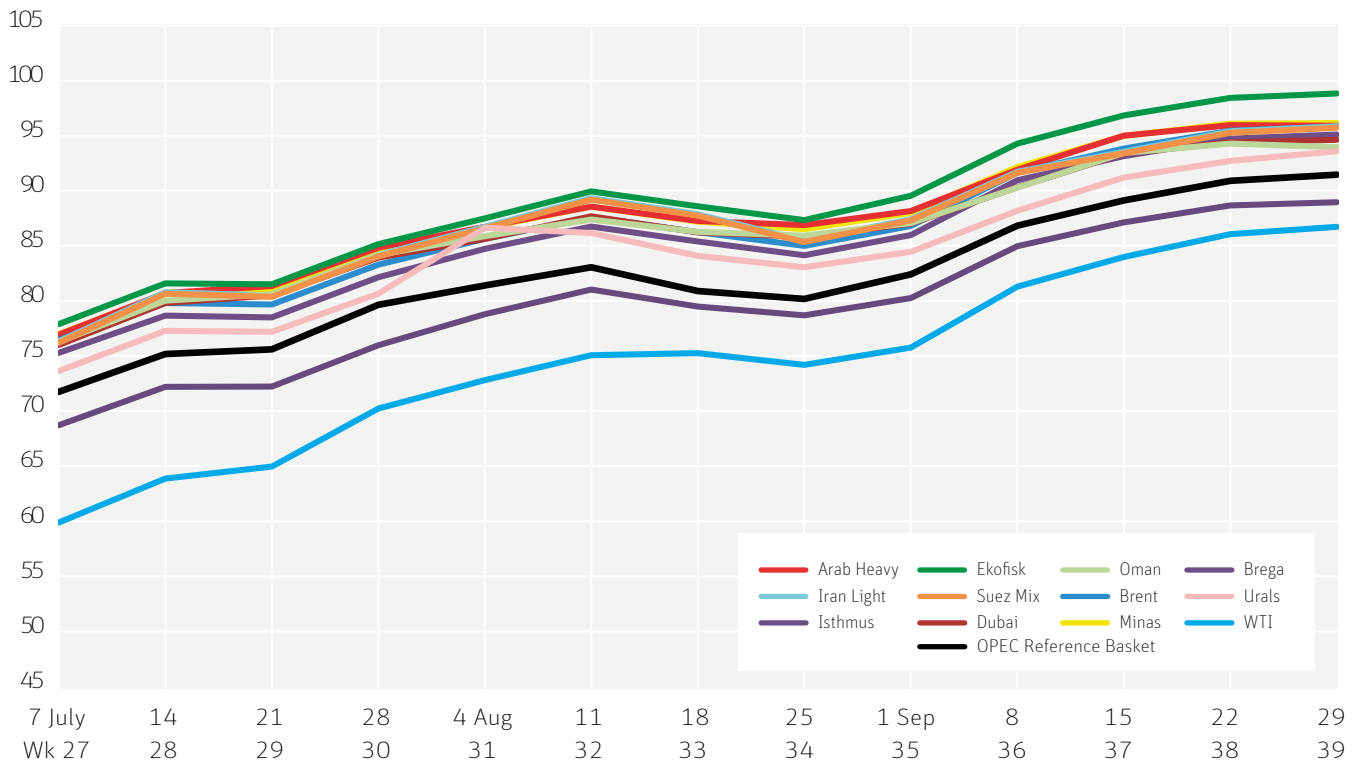


Table and Graph 3: North European market – spot barges, fob Rotterdam

\$/b

	naphtha	regular gasoline unleaded	diesel ultra light	jet kero	fuel oil 1 per cent S	fuel oil 3.5 per cent S
2022 September	69.03	124.73	135.02	139.42	82.58	62.10
October	74.30	137.02	139.35	162.90	82.06	59.29
November	73.87	127.89	132.26	134.93	74.32	60.78
December	65.57	110.33	121.12	120.72	64.77	55.92
2023 January	76.21	123.20	129.05	124.90	68.38	59.39
February	79.41	122.15	112.55	110.03	72.28	59.68
March	74.61	120.69	103.94	107.12	65.94	59.66
April	74.88	129.47	100.51	101.11	72.58	69.21
May	64.70	122.85	91.46	91.64	67.86	62.98
June	60.68	123.91	94.49	96.47	69.94	68.60
July	63.22	131.12	106.27	105.39	75.02	72.49
August	70.90	142.60	124.12	122.68	83.81	83.88
September	77.27	140.69	131.21	131.91	88.83	87.55

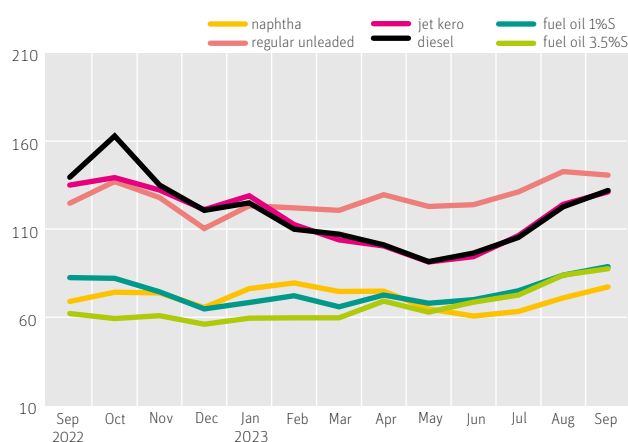


Table and Graph 4: South European market – spot cargoes, fob Italy

\$/b

	naphtha	premium gasoline 50ppm	diesel ultra light	fuel oil 1 per cent S	fuel oil 3.5 per cent S
2022 September	67.00	101.21	134.05	89.44	51.18
October	71.14	111.60	151.41	89.45	56.62
November	70.34	115.35	133.06	80.64	57.73
December	60.68	93.46	116.22	71.36	52.97
2023 January	73.95	102.57	126.21	74.50	54.67
February	76.70	102.34	110.96	76.71	55.16
March	70.23	104.28	107.97	70.91	58.18
April	71.54	107.49	102.24	77.13	67.38
May	63.28	95.96	92.25	72.46	62.35
June	59.28	99.62	96.83	74.14	63.22
July	61.32	107.81	106.23	78.65	73.28
August	68.74	117.34	123.03	87.46	80.86
September	74.24	119.75	131.60	92.29	85.03

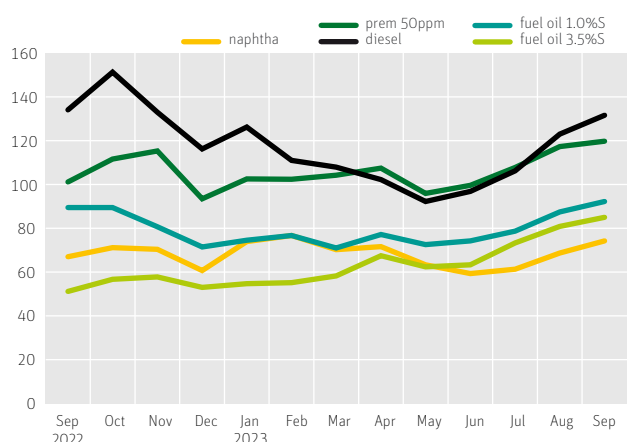
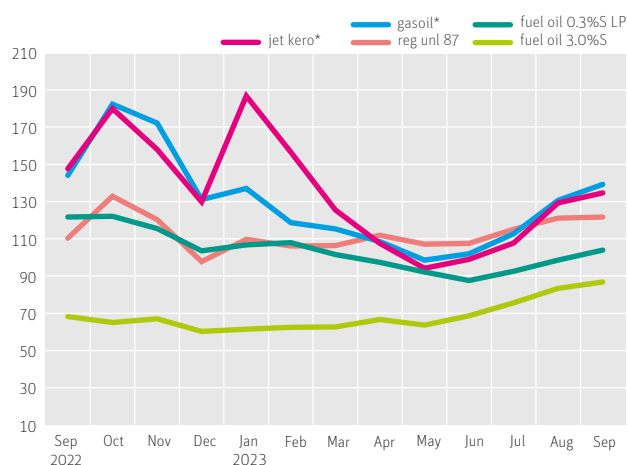


Table and Graph 5: US East Coast market – spot cargoes, New York

\$/b, duties and fees included

	regular gasoline unleaded 87	gasoil*	jet kero*	fuel oil 0.3 per cent S	fuel oil 3.0 per cent S
2022 September	110.22	143.93	147.65	121.67	68.18
October	132.91	182.33	179.98	122.15	65.00
November	120.38	172.17	157.91	115.52	67.01
December	97.78	130.99	129.90	103.45	60.24
2023 January	109.67	136.95	186.70	106.68	61.47
February	106.11	118.74	156.57	107.83	62.51
March	106.26	115.37	125.55	101.52	62.71
April	111.95	108.59	107.56	97.31	66.55
May	107.12	98.56	94.23	92.24	63.65
June	107.61	101.91	98.95	87.60	68.69
July	115.04	112.69	107.77	92.54	75.62
August	121.08	130.65	129.26	98.63	83.47
September	121.76	139.20	134.55	104.00	86.78



* FOB barge spot prices.

Source: Argus. Prices are average of available days.

Table and Graph 6: Singapore market – spot cargoes, fob

\$/b

	naphtha	premium gasoline unl 95	premium gasoline unl 92	gasoil	jet kero	fuel oil 180 Cst	fuel oil 380 Cst
2022 September	68.09	97.45	93.79	124.87	124.55	120.92	59.20
October	71.86	94.78	91.16	134.61	133.96	123.40	56.57
November	74.22	98.27	93.11	125.91	125.41	121.01	60.78
December	66.41	89.40	85.36	112.41	110.54	110.54	55.56
2023 January	72.52	98.83	95.49	113.98	111.94	115.07	57.98
February	76.98	99.36	95.86	103.71	101.05	106.77	61.18
March	73.19	98.59	94.25	98.85	95.33	98.86	64.39
April	71.54	100.14	96.52	96.91	92.91	96.78	71.74
May	62.25	90.29	85.69	88.51	86.37	88.59	65.98
June	57.01	92.30	87.43	91.52	90.45	90.06	65.25
July	62.43	98.60	93.13	101.02	99.55	98.85	73.39
August	70.70	107.23	101.84	117.15	116.01	116.59	82.48
September	74.73	109.92	104.47	122.44	121.42	122.77	81.18

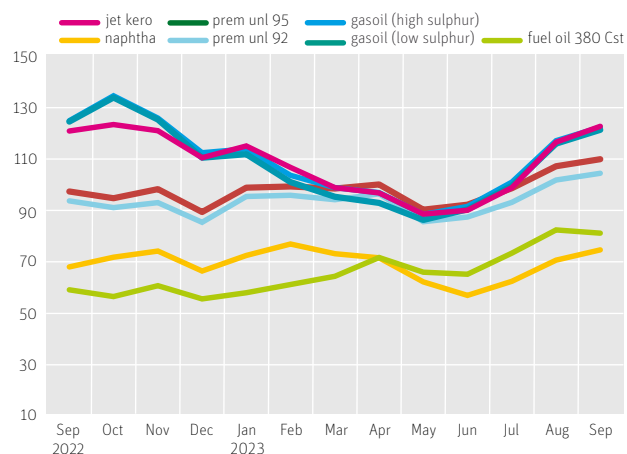
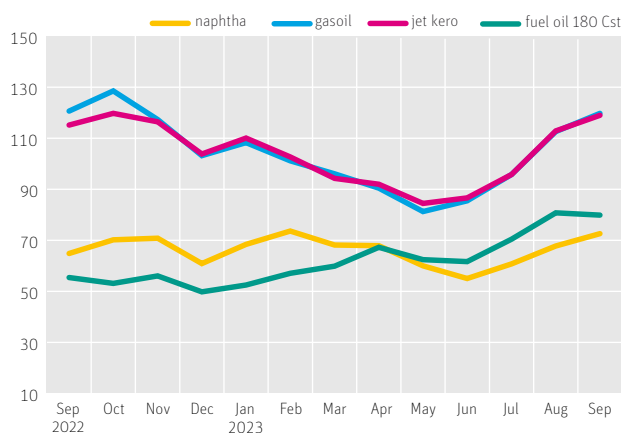


Table and Graph 7: Middle East Gulf market – spot cargoes, fob

\$/b

	naphtha	gasoil	jet kero	fuel oil 180 Cst
2022 September	64.83	120.62	115.16	55.41
October	70.20	128.57	119.73	53.12
November	70.93	117.34	116.48	56.07
December	60.88	103.25	103.86	49.80
2023 January	68.47	108.38	110.11	52.57
February	73.67	101.25	102.71	57.12
March	68.19	96.07	94.37	59.94
April	67.91	90.53	92.00	67.28
May	60.05	81.31	84.52	62.44
June	55.11	85.50	86.61	61.67
July	60.85	95.82	95.87	70.51
August	67.79	112.71	112.89	80.75
September	72.70	119.81	119.02	79.94

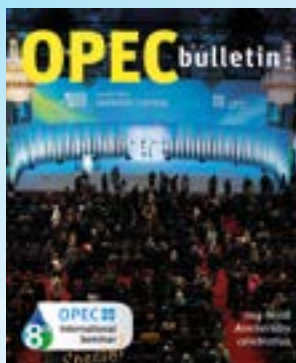


Source: Argus. Prices are average of available days.

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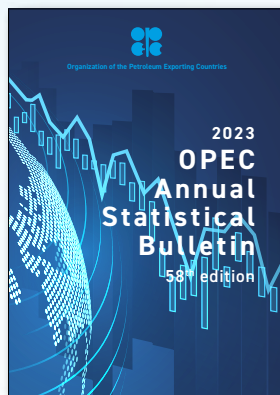
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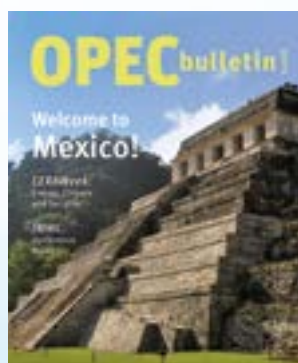
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