

OPEC bulletin

11-12/22

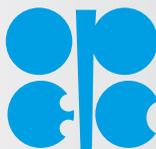
ADIPEC 2022:
International Exhibition
and Conference

**World Oil
Outlook:**
launched at
ADIPEC

OMV's
virtual reality
training
programme





OPEC 
**International
Seminar**

Save the date

July 5–6, 2023

Hofburg Palace, Vienna, Austria

The 8th International OPEC Seminar will be held under the theme:

*‘Towards a sustainable
and inclusive
energy transition’*

Promoting fact-driven energy literacy

Many educational establishments around the world are committed to promoting ‘energy literacy’. It is important work. Recognizing the role of energy and how it serves as one of the most fundamental components of daily life has a multitude of benefits. Someone who is energy literate understands how much energy they use, where it comes from, can think cogently about energy systems, and can assess the credibility of information they receive about energy.

Knowledge of the oil industry transcends ‘energy literacy’. The products derived from petroleum extend far beyond transportation and energy systems. An essential ingredient for fertilizer is synthetic ammonia, necessary for farming at industrial scale to help feed the world. In the health industry, petroleum products are used in lifesaving equipment including pacemakers, MRI machines, bags and tubes used in intravenous therapy, syringes, surgical instruments, monitors and stethoscopes. Hearing aids, computer monitors, prosthetics, clothing, glasses, contact lenses, aspirins, shampoos, soaps, and antiseptics all are produced from crude oil via the petrochemical industry.

There is a critical need to improve awareness and knowledge about the realities of the oil industry. This is especially the case regarding public discussions and policy formation related to tackling the climate challenge. OPEC is resolved that its contribution to these discussions is fact-based, data driven and grounded in realism.

Our Organization shares the goal of seeing a reduction in greenhouse gases. However, it believes that the policies in pursuit of this goal should be fact-based and not exacerbate energy poverty or produce other harmful unintended consequences.

OPEC seeks to promote awareness and understanding of the oil industry, as well as the activities of the Organization itself, in a multitude of ways. An illuminating example is the Organization’s publications:

1. The ‘*OPEC Annual Statistical Bulletin*’ first appeared in 1965 and provides a comprehensive collation of oil, gas and energy data, with a big emphasis on Member Countries.
2. In 1967, the Organization first published the ‘*OPEC Annual Review and Record*’, changing to its present name in 1977, of the ‘*OPEC Annual Report*’.

3. Beginning life as the ‘*OPEC Review*’ – ‘A digest of energy reports’ – in October 1976, the ‘*OPEC Energy Review*’ is a quarterly academic journal containing a selection of original research papers on the global energy industry and related topics.
4. The ‘*OPEC Monthly Oil Market Report*’ provides data and analysis on current market developments; this was first made available to the public in 1996, having been an internal report previously.
5. The year 2007 saw a notable addition to these publications, with the launch of ‘*OPEC’s World Oil Outlook*’, a yearly analytical publication presenting the Secretariat’s research and views on medium-to-long-term issues affecting the oil sector.

November 1966 saw the first issue of the ‘*OPEC Bulletin*’, the Organization’s monthly news magazine; starting with just four A5-sized sheets, this has evolved out of all recognition and now, constitutes a high-quality journal, comprising of articles, features, analysis and opinion on a wide variety of energy-related issues and cultural topics.

OPEC’s publications reflect the fact an interdisciplinary approach is necessary for understanding the energy industry. The publications touch on topics related to technology, science, engineering, geology, and mathematics, as well as history, economics, the arts and the societal impact of the industry.

For its part, the *OPEC Bulletin* is committed to increasing awareness and understanding of the oil industry. This month’s edition includes articles on the events that OPEC has organized or participated in recently, but also has articles on OMV’s Innovation and Technology Center and the early history of the oil industry in Romania.

Education is a life-long process. It is often said one is never too old to learn. As the OPEC Secretary General, Haitham Al-Ghais, said when talking to the youth at ADIPEC recently (*see p8*), “learning never stops.”

Acquiring more knowledge about the realities of the oil market is a vital step in an informed policy making process. OPEC is committed to raising awareness of this industry; an industry that affects the daily lives of billions of people. 



4



8

Conference Notes

4 DoC participants hold steady

ADIPEC

8 Checking in at ADIPEC 2022
16 Impressions from ADIPEC 2022

World Oil Outlook 2022

18 OPEC launches WOO 2022 at ADIPEC

Tribute

24 The Prince who led OPEC through challenging times

COP27

26 COP27 sees a return to Africa

African Energy Week

32 Secretary General addresses African Energy Week
40 OPEC-Africa Roundtable highlights the continent's key role in the energy future
42 Barkindo Lifetime Achievement Awards

Angola Oil and Gas Conference

44 2022 Edition of the Angola Oil and Gas Conference takes place in Luanda
50 OPEC Secretary General meets with President Lourenço of Angola
51 OPEC Secretary General meets with Minister Azevedo of Angola
52 OPEC visits the new headquarters of Angola's Ministry of Mineral Resources, Petroleum and Gas

Energy Outlook

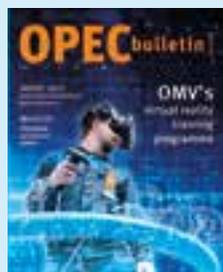
54 OPEC, non-OPEC CoC participants convene for 12th Technical Meeting

Legal Workshop

56 The 4th Annual Legal Workshop takes place in Vienna

Outlook

60 Asian energy and oil outlook lays out future requirements



Cover
This month's cover shows an apprentice learning the ropes at OMV's Schwechat refinery via virtual reality training (see feature on page 68).

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OPEC Membership and aims

OPEC is a permanent, intergovernmental Organization, established in Baghdad, on September 10–14, 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 December 31, 2019. Qatar joined in 1961 and left on December 31, 2018. Indonesia joined in 1962, suspended its Membership on December 31, 2008, reactivated it on January 1, 2016, but suspended its Membership again on December 31, 2016. Gabon joined in 1975 and left in 1995; it reactivated its Membership on July 1, 2016. The Republic of the Congo joined the Organization on June 22, 2018.



18



32



44

Spotlight 62 Malaysia – reliable and dependable OPEC partner

Spotlight 64 OPEC, Japan hold technical meeting

Awards ceremony 66 Long-serving OPEC employees recognized

Virtual Reality Innovation 68 OMV boasts world-class virtual reality training programme
76 OMV Centre of Excellence a fascinating look at the underground world of oil

Arts & Life 86 OPEC Member Countries continue to stay on the cutting edge of architecture
94 Zaha Hadid

Arts & Life 96 Ploiesti, Romania: The ‘Capital of Black Gold’

OPEC Secretary General’s Diary 100 Visitors and visits by the Secretary General

Briefings 102 Visits to the OPEC Secretariat

OPEC Fund News 106 Power to the people

Noticeboard 108 Oil industry events

Markets 109 November – Global oil inventory developments
111 December – Review of 2022 and outlook for 2023

Publications 117 Reading material about OPEC



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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.

Editorial policy

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DoC participants hold steady

On December 4, 2022, the 46th Joint Ministerial Monitoring Committee (JMMC) and the 34th OPEC and non-OPEC Ministerial Meeting (ONOMM) took place by videoconference. The OPEC Bulletin reports on the outcome.





HRH Prince Abdul Aziz Bin Salman Al Saud, Saudi Arabia's Minister of Energy and Head of Delegation to OPEC and Chairman of the OPEC and non-OPEC Ministerial Meeting, participated remotely in the Conference.



When ministers from OPEC and non-OPEC participating countries in the 'Declaration of Cooperation' (DoC) met via videoconference at the 34th ONOMM they were faced with a myriad of oil market uncertainties.

The meeting came almost two months after the DoC participants had taken a unanimous decision at the 33rd ONOMM on October 5 to adjust output downwards by a combined 2 million barrels/day (m b/d), starting in November.

This October decision was noted in the December 4 *communiqué*, which stated that the 33rd ONOMM production adjustment was purely driven by market considerations. It also added that, in retrospect, the decision had been recognized by market participants as necessary

The Secretariat team at the 46th Meeting of the JMMC: Haitham Al Ghais (c), OPEC Secretary General; Dr Ayed S Al-Qahtani (l), Director, Research Division; and Behrooz Baikalizadeh (r), Head, Petroleum Studies Department; with other members of OPEC Management and Member Country delegates who attended the meeting in person.



The 46th Meeting of the JMMC was held on December 4 via videoconference.

and, the right course of action towards stabilizing global oil markets.

With this in mind, DoC participants held steady to the course set at the 33rd ONOMM, while also “adhering to the approach of being proactive and pre-emptive.”

Participating countries reiterated their “readiness to meet at any time and take immediate additional measures to address market developments and support the balance of the oil market and its stability if necessary.”

The next JMMC is set to meet at the beginning of February 2023, and the meeting also reiterated that the committee had the authority to hold additional meetings, or to request an ONOMM at any time to address market developments. The 35th ONOMM is currently scheduled for June 4, 2023.

185th (Ordinary) OPEC Conference

On the day before, December 3, 2022, the 185th (Ordinary) OPEC Conference met via videoconference.

The Conference welcomed new ministers: Hayan Abdul Ghani AlSawad, Deputy Prime Minister for Energy Affairs, Minister of Oil of Iraq, and Dr Bader AlMulla, Deputy Prime Minister, Minister of Oil of Kuwait. The Conference also extended their sincere thanks to their predecessors in office: Ihsan Abduljabbar Ismael of Iraq and Dr Mohammad Abdullatif Alfares of Kuwait.

The Conference adopted the new Long-Term Strategy that has been produced over the last two years and is the result of exhaustive and robust research and analysis. The Conference recorded the Organization’s particular thanks to OPEC’s Board of Governors and all other delegates to the meetings.



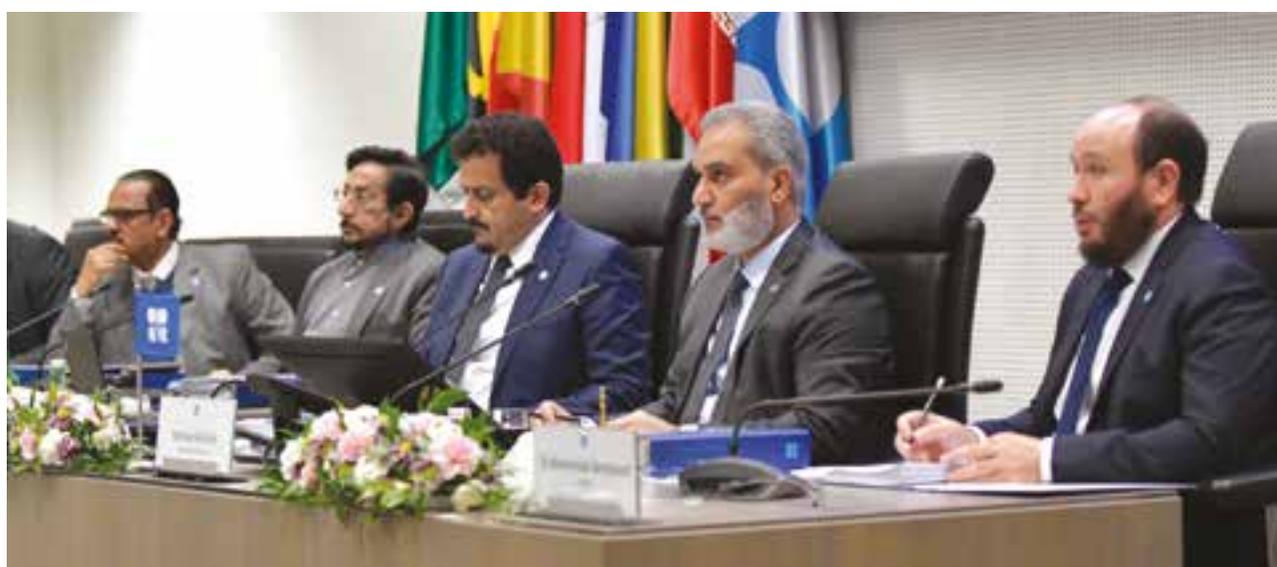
Haitham Al Ghais, OPEC Secretary General.

The Conference elected Gabriel Mbaga Obiang Lima, Minister of Mines and Hydrocarbons of Equatorial Guinea as President of the Conference for one year, with effect from January 1, 2023, and Vincent De Paul Massassa, Gabon's Minister of Petroleum, Gas, Hydrocarbons and Mines, as Alternate President, for the same period.

The Conference appointed Mohammad Al Shatti, Kuwait's Governor for OPEC, as Chairman of the Board of Governors for the year 2023, and Mustafa Abdulla Almkhtar Benisa, Libya's Governor for OPEC, as Alternate Chairman, for the same period. 

“[The decision of the 33rd ONOMM] was purely driven by market considerations and recognized in retrospect by the market participants to have been the necessary and the right course of action towards stabilizing global oil markets.”

— Press release of the 34th OPEC and non-OPEC Ministerial Meeting



Haitham Al Ghais (second r), OPEC Secretary General; Dr Ayed S Al-Qahtani (c), Director, Research Division; Dr Abderrezak Benyoucef (r), Head, Energy Studies Department; Behrooz Baikalizadeh (second l), Head, Petroleum Studies Department; and Shakir Mahmoud A Alrifaiyeh, Head, Office of the Secretary General.



Dr Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology and Managing Director and Group CEO of the Abu Dhabi National Oil Company (ADIPEC).

Checking in at ADIPEC 2022

*The Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) 2022 brought together policy makers, energy leaders and industry professionals from around the world to share insights on the latest trends affecting the global energy sector. This included the evolving global economic situation, energy supply and demand trends, the energy transition, geopolitical shifts, and next generation energy solutions. With OPEC Secretary General, **Haitham Al Ghais**, and other OPEC officials in attendance, the OPEC Bulletin's **James Griffin** reports from the event.*



HRH Prince Abdul Aziz Bin Salman Al Saudi, Saudi Arabia's Minister of Energy.

The 33th edition of ADIPEC took place against a backdrop of multiple complexities affecting the global energy landscape. It was a point cited by Dr Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology and Managing Director and Group CEO of the Abu Dhabi National Oil Company (ADIPEC) in his opening remarks to the event, with Sheikh Mansour bin Zayed Al Nahyan, UAE Deputy Prime Minister and Minister of the Presidential Court, present.

Al Jaber said that “energy is everybody’s top priority” today as the industry goes through what he described as a “perfect storm”. This past year, he added, has taught us that “energy security is the foundation of all progress – economic, social and climate progress.” In this regard, he implored the need for all energies.

“The world needs all the solutions it can get, it is not oil and gas, or solar, not wind of nuclear, and hydrogen. It is all of the above, plus the clean energies yet to be discovered, commercialized and deployed ... The world needs maximum energy, minimum emissions.”

Al Jaber said global efforts should focus on a new, bold, realistic and pragmatic pathway that benefits humanity, the climate and the economy, with references made to the then upcoming COP27 in Sharm el Sheikh, Egypt and next year’s COP28 in the UAE.

He concluded: “We need to hold back emissions, not progress. The world is looking for solutions and I believe the energy industry can unite a dividing world in finding them. I believe that the future is forged by those who make the first move. So today, I extend an open invitation to all our partners around the world. Let’s make that move together and forge that future.”

The importance of partnerships was also reinforced in opening remarks from HRH Prince Abdul Aziz Bin Salman, Saudi Arabia’s Minister of Energy, who underscored the Kingdom and the UAE’s shared vision on sustainability as a “twinning” factor.

“There is so much that we could prove together in our twinning, you can call it, aspiration. We should continue to be the exemplary two countries for energy producers,” he said.



Ministerial Panel



HE Suhail Mohamed Al Mazrouei
Minister of Energy and Infrastructure
United Arab Emirates



HE Shri Hardeep Singh Puri
Minister of Petroleum and Natural Gas
Minister of Housing and Urban Affairs, India



HE Tarek El Molla
Minister of Petroleum and Mineral Resources
Arab Republic of Egypt



Special Presidential Coordinator
Amos Hochstein
United States of America



L–r: John Defterios, Professor of Business, NYU Abu Dhabi, and former CNN emerging markets editor, was the moderator of the high-level ministerial panel session; panelists Suhail Mohamed Al Mazrouei, Minister of Energy and Infrastructure of the United Arab Emirates; Shri Hardeep Singh Puri, Minister of Petroleum and Natural Gas and Minister of Housing and Urban Affairs of India; Tarek El Molla, Minister of Petroleum and Mineral Resources of the Arab Republic of Egypt; and Amos Hochstein, Special Presidential Coordinator of the US.

He added that both countries have “young, ambitious and determined populations that cannot and will not stand for us sitting doing nothing in preparing for their better future to come. We and the UAE are going to be exemplary producers, hydrocarbon producers, but also achieve all the sustainability goals.”

The opening ceremony was concluded with a high-level ministerial panel session, overseen by moderator, John Defterios, Professor of Business, NYU Abu Dhabi, and former CNN emerging markets editor.

This included Suhail Mohamed Al Mazrouei, the UAE’s Minister of Energy and Infrastructure, who reiterated Al Jaber’s point of the need for the “whole spectrum of energy”, with the UAE focused on diversifying energy sources and reducing emissions. He also stressed the importance of the ‘Declaration of Cooperation’ (DoC) to helping achieve balanced and stable markets, which are vital to ensuring necessary future investments are made.

High-level bilaterals

The opening saw many comments related to the importance of advancing cooperation, working together,

knowledge sharing and better understanding among all stakeholders. It was a theme that ran through the conference. It was also a core part of the OPEC Secretary General’s participation, including through various high-level bilateral meetings.

On the first day of ADIPEC, Al Ghais met with the newly appointed Kuwaiti Deputy Prime Minister, Minister of Oil and Chairman of the Kuwait Petroleum Corporation’s (KPC) Board, Dr Bader Al Mulla. They discussed recent oil market developments and ways to strengthen cooperation between the Organization and Kuwait.

Al Ghais also met on the sidelines of the event with Hardeep Singh Puri, India’s Minister of Petroleum and Natural Gas and Minister of Housing and Urban Affairs, and later with Shinichi Nakatani, Japan’s State Minister of Economy, Trade and Industry. Both meetings touched on current global oil and energy market conditions, as well as opportunities to strengthen cooperation between OPEC and the respective countries.

The Secretary General, and others in the OPEC delegation, also toured the ADIPEC exhibition, visiting the booths of OPEC Member Countries and non-OPEC oil-producing countries participating in the DoC.



Dr Bader Al Mulla (l), Kuwaiti Deputy Prime Minister, Minister of Oil and Chairman of the Kuwait Petroleum Corporation (KPC) Board, with OPEC Secretary General, Haitham Al Ghais.

Leadership roundtable

Following the successful launch of the *World Oil Outlook (WOO) 2022* on the first day of ADIPEC (see page 18), the OPEC Secretary General and an accompanying OPEC Secretariat delegation took part in a leadership roundtable under the Chatham House rule on day two.

Titled, *'The role of oil and gas in a new energy world: energy security, climate response, industry innovation and future supply perspectives'*, the session was hosted by Al Ghais, chaired by Albert Hanna, Independent Energy Advisor, and moderated by Andrew Horncastle, Partner & Head of Energy and Natural Resources at Oliver Wyman IMEA.

Al Ghais in his initial remarks said: "Over the past year, we have all been delivered a reminder of the strains related to energy security, energy affordability and the need to reduce emissions playing out in regions across the world."

He stressed that focusing on only one of these issues, while ignoring the others, can lead to unintended consequences. He underscored the importance of utilizing all available energies, innovating and developing cleaner and more efficient technological solutions, and transitioning to a more inclusive, fair, and equitable world in which every person has access to energy.

Participants agreed that over the past year or so, the



Al Ghais with Hardeep Singh Puri (r), India's Minister of Petroleum and Natural Gas and Minister of Housing and Urban Affairs,



Al Ghais with Shinichi Nakatani (l), Japan's State Minister of Economy, Trade and Industry.

context of energy globally has changed and we now have what some have deemed, a poly-crisis. In this regard, inflation, rising interest rates, supply chain issues, the pandemic, geopolitical developments, and access to finance for the industry were all noted.

There was consensus of the need to invest in all forms of energies, and at the same time utilize existing and new technologies to reduce emissions. To help achieve this, there was a call to bring all stakeholders to the table, with many highlighting the importance of

the upcoming COP meetings in Egypt and the United Arab Emirates (UAE).

The term 'inclusive' was referenced on many occasions, not only in terms of embracing all energies and all industries, but all peoples too, with United Nations Sustainable Development Goal 7 highlighted.

From the perspective of the oil and gas industry, there was also talk of the need to be proactive, lead discussions, and improve communication with other stakeholders and the broader public.

The OPEC delegation and visitors at the OPEC ADIPEC stand.





The OPEC Secretary General and an accompanying OPEC Secretariat delegation took part in a leadership roundtable titled, ‘The role of oil and gas in a new energy world: energy security, climate response, industry innovation and future supply perspectives’, the session was hosted by Al Ghais, chaired by Albert Hanna, Independent Energy Advisor, and moderated by Andrew Horncastle, Partner & Head of Energy and Natural Resources at Oliver Wyman IMEA.



Albert Hanna, Independent Energy Advisor, chaired the roundtable on ‘The role of oil and gas in a new energy world: energy security, climate response, industry innovation and future supply perspectives’.



Andrew Horncastle, Partner & Head of Energy and Natural Resources at Oliver Wyman IMEA, moderated the leadership roundtable.



Dr Ayed Al-Qahtani (r), Director of the Organization's Research Division, took part in a special session titled: 'The mobility challenge: Charting the electrification of the energy industry'.

Other roundtables

As part of OPEC's participation, Dr Ayed Al-Qahtani, Director of the Organization's Research Division, also took part in a special session titled 'The mobility challenge: Charting the electrification of the energy industry'.

Al-Qahtani discussed a variety of issues, with specific reference to the transportation sections of the recently released *WOO 2022*. In this, the total road transportation fleet is expected to reach 2.5 billion, an increase of almost 1bn from 2021 levels. The electric vehicle fleet is set to approach 540 million vehicles by 2045, representing around 22 per cent of the global fleet.

As Al-Qahtani highlighted, it means that "internal combustion engines are expected to remain the dominant

technology for both passenger and commercial road transportation, despite the projected increase in electric vehicles."

Elsewhere, Dr Abderrezak Benyoucef, Head of OPEC the Secretariat's Energy Studies Department, and Behrooz Baikalizadeh, Head of the Petroleum Studies Department, took part in a roundtable titled 'New business models of NOCs and IOCs: Driving a low carbon world'.

Future leaders programme

The OPEC Secretary General's final formal commitment at ADIPEC was a Future Leaders Programme event. With changes to energy business models, new developments

Dr Abderrezak Benyoucef (l), Head of OPEC the Secretariat's Energy Studies Department, and Behrooz Baikalizadeh (r), Head of the Petroleum Studies Department, took part in a roundtable titled: 'New business models of NOCs and IOCs: Driving a low carbon world'.





Delegates of the leadership roundtable took time out for a group photo.

related to energy transition, and ever-evolving technologies in the workspace, future leaders in the energy sector are having to bring different skills and ways of thinking compared to previous generations.

The future talent pool of industry leaders were addressed by Al Ghais and the UAE's Mazrouei in the session, with a focus on the opportunities to make a difference in the sector and, in turn, create a legacy.

Mazrouei was asked about what he saw as the key ingredients for success. He said the "first is values. You develop them, and believe in them." He underscored the importance of being humble, and working hard, iterating that "education is a non-ending endeavour."

He stressed the benchmark is being the best in what you do, and added that no-one should be worried about failure. "If you don't fail, you will not succeed; you will always learn something new."

He also underscored the value of being passionate about what you do, and spoke more broadly of the importance of this to the UAE. As a country, he said, we want to "make the UAE the best country in the world, a positive contributor to the world, and this means we need to be passionate about what we are doing."

In looking to the audience, he said that "you are the innovators of tomorrow ... with passion, perseverance, patience and teamwork, you will get there."

Al Ghais followed a similar theme in stating that "learning never stops" and in the line in which he extolled, "never say no to any challenge."

Here he recalled part of his own journey from when he first entered the doors of Kuwait Petroleum Corporation (KPC) almost 30 years ago, to taking up the challenge of working for Head of KPC's Regional Office in Beijing in 2005, which then "opened so many doors for me."

He said he had never once regretted taking the decision to be part of this great industry and he still has the same enthusiasm for the oil business that he had when he started at KPC.

Al Ghais highlighted the importance of "breaking down barriers" and for the Middle East region, in particular, he stated that "we should be proud of energy developments in the region, it is an industry you should all feel proud to belong too."

He highlighted that the energy industry offers dynamic opportunities to young people with diverse skill sets and educations in science, technology and engineering, and added that it gives bright young people the chance to make meaningful and sustainable contributions to their communities and the world at large.

He concluded by saying that "you need to believe in yourselves, your job, this industry. It is your future, and remember to always be the best you can be." 

Impressions from ADIPEC 2022





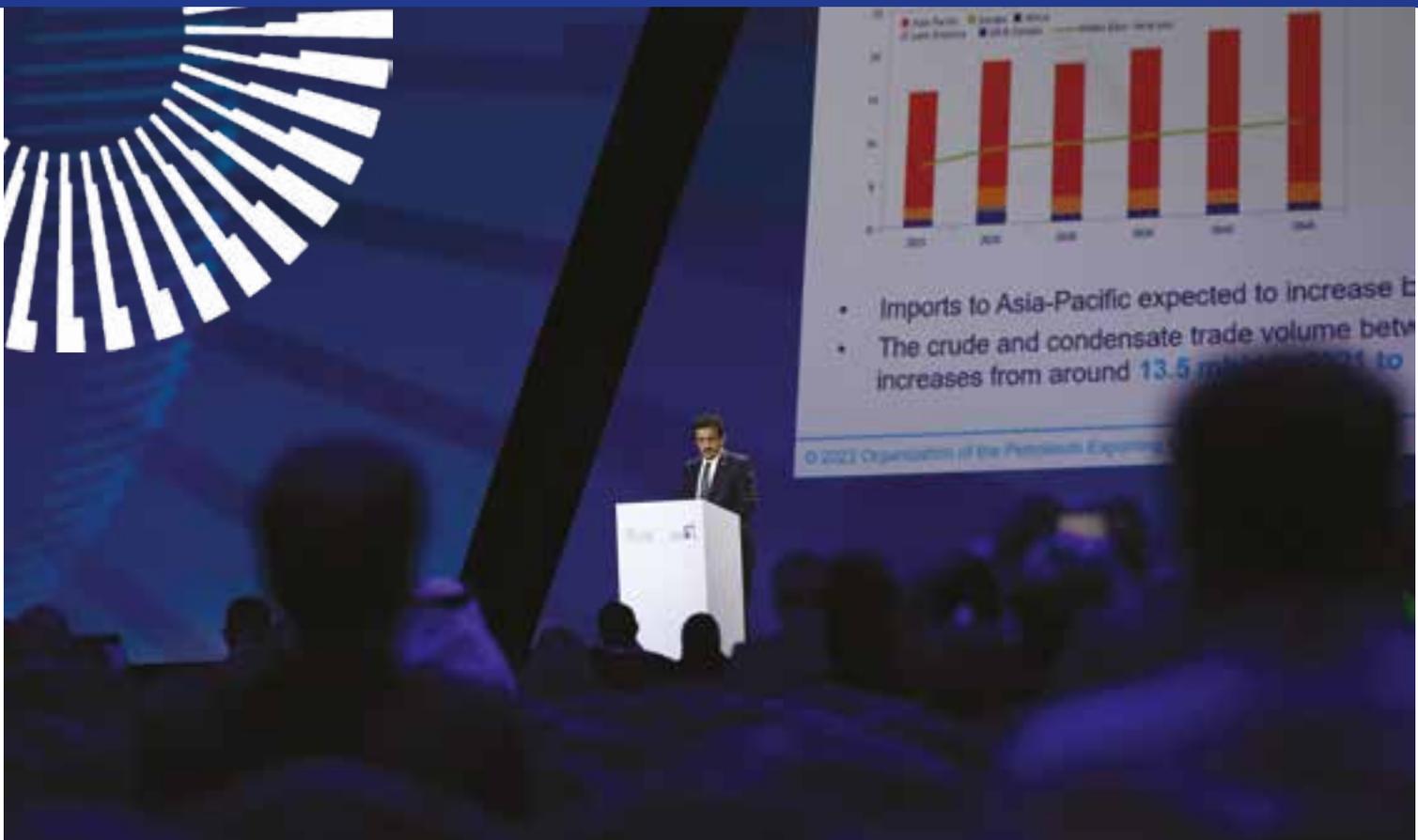


L-r: Eithne Treanor, Founder and CEO of ETreanor Media, moderated the WOO special session; on the panel were: Haitham Al Ghais, OPEC Secretary General; Dr Ayed S Al-Qahtani; Dr Abderrezak Benyoucef, Head of OPEC's Energy Studies Department; from the same department, Dr Jan Ban, Senior Research Analyst; Dr Mohammad Alkazimi, Upstream Oil Industry Analyst; and Julius Walker, Senior Research Analyst.



OPEC launches WOO 2022 at ADIPEC

The 2022 edition of the OPEC World Oil Outlook (WOO) was launched at the Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) 2022 in the United Arab Emirates (UAE). The OPEC Bulletin's **James Griffin** reports on the event, with the OPEC Secretary General, **Haitham Al Ghais**, and the WOO team from the OPEC Secretariat, joined by a number of special high-level guests and hundreds of attendees.



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

Introduced by John Defferios, Professor of Business, NYU Abu Dhabi, the OPEC Secretary General began his remarks by thanking the government of the United Arab Emirates, its Energy Ministry, the Abu Dhabi National Oil Company (ADNOC), as well as the organizers of ADIPEC, who have provided the Secretariat this platform to launch the WOO.

He specifically thanked high-level attendees, Suhail Mohamed Al Mazrouei, the UAE's Minister of Energy and Infrastructure, and Alfred Stern, Chairman of the Executive Board and CEO of OMV. Both of whom would provide remarks later.

Looking back, Al Ghais said that the WOO has “evolved in many ways since it was first launched in 2007, but its key guiding principle remains the same: to support sustainable market stability and to provide a transparent platform from which to review, analyze and evaluate how the oil and energy scene may develop in the years and decades ahead.”

The issue of sustainable market stability, as well as helping return balance to the market, he added, “can also be seen clearly through the prism of the ‘Declaration of Cooperation’ (DoC) between 23 OPEC and non-OPEC producers, as well as the ‘Charter of Cooperation’ (CoC)

that provides a longer-term institutional framework for this landmark cooperation.”

While leaving the more in-depth WOO insights to a later presentation from Dr Ayed S Al-Qahtani, Director of OPEC's Research Division, the Secretary General concluded by taking the opportunity to thank the WOO team at the Secretariat. He said: “Year-on-year the team continues to push the boundaries of our research, to provide more data and analysis that can stimulate both debate and action.”

High-level interventions

In his remarks, Al Ghais once again reiterated the importance of investments, particularly given the WOO sees energy demand increasing by 23 per cent between now and 2045, or 2.7 million barrels of oil equivalent a day annually. The investment issue was one also picked up on by two high-level guests in their remarks at the launch.

Suhail Mohamed Al Mazrouei, the UAE's Minister of Energy and Infrastructure said that today's platform was a great opportunity to share ideas about energy, and noted that the transition requires a reliable base load of oil and gas for it to happen, underscoring the importance



Eithne Treanor (r),
Founder and CEO
of ETreanor Media,
moderated the event;
seen with Haitham Al
Ghais, OPEC Secretary
General.

of investments in all energies. In this regard, he stressed the particular importance of alleviating energy poverty.

Alfred Stern, Chairman of the Executive Board and CEO of OMV, began by thanking the OPEC team, and said that rather than calling it the WOO, he suggested “WOW”, given that it has been providing valuable insights and data for the last 16 years.

From this perspective, he stated that “in times like this when energy security is at stake, and emotions are starting to take over some of the decisions. It is critical for us as an industry to get reliable data, far enough out that helps us to take the right decisions.”

He added that “our industry is about long-term investments ... to progress energy security, energy affordability ... and to help reduce emissions.” We must push forward with more sustainable energies, he said, and also expressed that the future energy world will be a more diverse energy world.

WOO highlights

The opening remarks helped set the scene for the broader WOO presentation by Al-Qahtani. He stated the WOO examines developments in energy and oil demand, oil supply and refining, the global economy, policy and

technology developments, demographic trends, environmental issues and sustainable development.

Offering an assessment of medium- and long-term prospects, he said, it is important to stress that is not a book of predictions. He recalled: “Back when we put together the previous *World Oil Outlook in 2021*, no-one could have foreseen the impactful events of 2022 related to such issue as the energy crisis, particularly in Europe, and geopolitical developments.”

The *Outlook*, he said, provides a helpful and insightful reference tool, one that underscores OPEC’s commitment to knowledge-sharing and data transparency. He then presented a number of highlights from the *WOO*, with the key elements below:

- The world economy is expected to more than double in size, and the global population rise by 1.6 billion between now and 2045.
- Global primary energy demand is forecast to continue growing in the medium- and long-term, increasing by a significant 23 per cent in the period to 2045.
- The world needs to annually add on average 2.7 million barrels of oil equivalent a day (m boe/d) to 2045.
- All forms of energy will be needed to address future energy needs.
- Energy poverty remains an issue throughout the forecast period, with a wide gap remaining between developed and developing countries.
- Oil is expected to retain the largest share in the energy mix throughout the outlook period, accounting for almost a 29 per cent share in 2045.
- Other renewables — combining mainly solar, wind and geothermal energy — expand by 7.1 per cent *pa* on average, significantly faster than any other source of energy.
- All major fuel types witness growth, with the exception of coal.
- Globally, oil demand is projected to increase from almost 97 million barrels/day (m b/d) in 2021 to around 110m b/d in 2045.
- Non-OECD countries drive oil demand growth, expanding by close to 24m b/d over the forecast period, whereas the OECD declines by over 10m b/d between 2021 and 2045.
- India is set to be the largest contributor to incremental demand, adding around 6.3m b/d to 2045.

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

- Oil demand in aviation leads the sectoral breakdown with growth of 4.1m b/d from 2021 to 2045, given its slower initial recovery from the COVID-19 pandemic. It is followed closely by road transportation and petrochemicals.
- Non-OPEC liquids supply expands in the medium-term to 71.4m b/d by 2027, before an expected decline to 67.5m b/d by 2045.
- OPEC liquids are set to grow to 42.4m b/d by 2045, with its share of global supply rising from 33 per cent in 2021 to 39 per cent in 2045.
- Global refining capacity additions are projected at 15.5m b/d between 2022 and 2045.
- Robust medium and long-term refinery capacity expansion in the Asia-Pacific, Middle East and Africa, is partly offset by closures in developed regions.
- Strong demand growth is expected to lead to a tightening medium-term downstream market relative to 2021.
- The global oil sector will need cumulative investment of \$12.1 trillion in the upstream, midstream and downstream through to 2045, equating to over \$500 billion each year.
- Recent annual investment levels have been significantly below this, due to industry downturns, the pandemic, and the increasing focus on environmental, social, and governance (ESG) issues.
- Crude and condensate flows between the Middle East and Asia-Pacific remain the most important oil trade link, with volumes increasing from below 13.5m b/d in 2021 to 19.5m b/d in 2045.
- The Asia-Pacific region is forecast to remain the most important crude oil importing region throughout the forecast period, with imports rising by over 7.5m b/d.
- Technological advancements are set to shape the global energy landscape while public policies relating to energy demand and supply are expected to become more stringent over the forecast period.
- Enhanced global cooperation could allow for a more coherent, balanced and integrated approach for realizing the Paris Agreement and the interlinked Sustainable Development Goals.



Panel session

What followed was a panel-moderated session with Eithne Treanor, Founder and CEO of ETreanor Media. Alongside the OPEC Secretary General and Al-Qahtani on the panel were Dr Abderrezak Benyoucef, Head of OPEC's Energy Studies Department, and from the same department, Dr Jan Ban, Senior Research Analyst, Dr Mohammad Alkazimi, Upstream Oil Industry Analyst, and Julius Walker, Senior Research Analyst.

The following are a few key excerpts from the session:

On looking at OPEC's work, including the WOO, through the lens of the DoC helping bring stability to the market, Al-Ghais said:

"Without a shadow of doubt the DoC has been the cornerstone for stability in oil markets ... looking back to the 2015–16 downturn that led to the creation of the DoC and how it helped rescue the industry from a massive downturn ... and then during COVID-19 and the historic April 2020 decision.

"Let us imagine the oil market with the DoC, and then without the DoC. I think that anybody that knows this business can agree that had it not been for the DoC we would have had much bigger swings, more volatility,



Dr Abderrezak Benyoucef, Head of OPEC Secretariat's Energy Studies Department.



Dr Jan Ban, Senior Research Analyst at OPEC.

much worse situations. We try to maintain a stable environment to attract investment. Investment today, is critical for tomorrow and for the years to come ahead, as we can see in the WOO.”

On some specifics of what has changed in the years WOO, Al-Qahtani said:

“We had to revisit some of our own assumptions that relate to everything, from the economy side to population, to the cost of things, how fast we think technology could evolve in various fields, how fast we see policies tightening in various aspects.

“It is a fresh look into all of these issues and of course it has generated slightly different results, but it does reaffirm the message that oil and gas will remain a critical and pivotal part of the energy mix going forward.”

Energy transition

On whether the current energy crisis might accelerate the energy transition in the short-, medium- and long-term, and whether this is considered in the report, Benyoucef said:

“We see some revisions, such as delays in certain policies in some countries, and near-term we have also seen Europe shift from some coal to oil use in power generation. We also now hear more talk about energy security,

last year at ADIPEC the focus was very much on net zero, but this year it is energy security.

“We see a renewed focus on the need all energy sources in the future ... and this includes a large increase in renewables, from around 8m boe/d to 38m boe/d, but this expansion comes from a low base. We see oil and gas still being the mainstays of the energy mix by 2045.”

Short-term issues

On this year's upward revision of around 1m b/d to oil demand by 2045, Ban said:

“First of all, I will start with the short-term issues. We have seen a faster recovery from the COVID-19 demand decline than what we expected a year ago, and this will likely continue in the coming years. Additionally, given the current market situation, geopolitical circumstances and the fact that energy security is coming to the fore in many countries, we see a bit of a deferral of what we previously saw as a deceleration in oil demand growth.

“The combination of these two factors means by 2027 demand is around 2m b/d higher than what we projected last year. But expected tightening policies beyond the medium-term, means some of this additional demand will likely be eliminated. It means, as you say, by the end of the period we have an upward revision of 1m b/d.”



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The OPEC team presenting the WOO 2022.

Outlook for Russian supply

On the outlook for the Russian supply, Alkazimi said:

“Contrary to many analyst’s initial assessments, we took a more realistic view on Russian production. We look at a different and broader perspective, where Russian supply dropped in the first quarter of the year, before rebounding to slightly less than 11m b/d in the third quarter. That being said, we are factoring in some further drop over the medium-term given the current situation, before Russian sees a longer-term recovery.”

On whether the WOO is over-estimating the potential for US tight oil growth, Walker said:

“It is true that US crude production has not

recovered as much as first estimated when production was shut in due to the pandemic, but it will probably reach pre-pandemic levels in the latter part of this year or next year. At the same time, NGLs production, which is not talked about as much and makes up a big chunk of US production, has not stopped growing in this period.

“We are seeing companies in the shale sector returning money to investors, maintaining capital discipline, investing less than they might have done previously. However, investments are happening, we see growth in US supply and rig counts are increasing too. Looking forward, with healthy fundamentals, we are confident that US supply will continue to grow and make up as much as 50 per cent of medium-term non-OPEC supply growth.”

The Prince who led OPEC through challenging times

HRH Prince Abdul Aziz Bin Salman has played a key role in successfully leading OPEC, and the Declaration of Cooperation (DoC), since the onset of the pandemic, writes Hassan Hafidh.*



HRH Prince Abdul Aziz Bin Salman Al Saud, Saudi Arabia's Minister of Energy.

Writing about the Organization of the Petroleum Exporting Countries (OPEC) is not an easy task. Nor is writing about an experienced Prince who dedicated most of his life to serving his country and the Vienna-based Organization that supplies more than 30 per cent of the world's crude oil.

Prince Abdul Aziz Bin Salman is the longest-serving Minister with OPEC. He started his career as the Saudi Deputy Energy Minister, serving for many years until he was appointed the Minister in September 2019. The Prince has spent more than 35 years working closely with the Organization.

One of the milestones that helped the Organization become a significant player in the world's energy arena was Prince Abdul Aziz's efforts to bring in ten non-OPEC oil-producing countries to join OPEC through the Declaration of Cooperation (DoC), also known as OPEC+.

Over the years, the Prince's calm diplomacy won the hearts of energy ministers worldwide. And through his personal connection and diplomatic skills, he brought into the DoC countries such as Azerbaijan, the Kingdom of Bahrain, Brunei Darussalam, Kazakhstan, Malaysia, Mexico, the Sultanate of Oman, the Republic of Sudan and the Republic of South Sudan.

The DoC also includes one of the world's largest oil producers after Saudi Arabia: The Russian Federation.

The reality is the DoC is now a significant player in the world's energy spectrum.

Countries that opposed OPEC and its policies have now realized that OPEC and its allies can help stabilize

the world's oil market. It has delivered especially in challenging times such as the COVID-19 pandemic, which had a sudden and major impact on the global economy and the oil market.

Prince Abdul Aziz, working in hand-in-hand with all the OPEC and non-OPEC Ministers, played an instrumental role during the early days of the pandemic, ensuring the success of OPEC+. Through its notable framework, the Organization took bold and swift decisions that resulted in the largest and longest production adjustments in the industry's history, restoring stability to a highly volatile oil market.

Through the Prince, the Kingdom continues to inspire DoC with its forward-looking plans to adapt to the ever-evolving dynamics brought on by the energy transition. One example is the Saudi Green Initiative initiated by HRH Crown Prince Mohammed bin Salman. The vision will help support an inclusive and fair energy transition towards greater sustainability.

OPEC is now well recognized internationally and is much stronger, with its partners bringing the total number of countries participating in the DoC to 23. Who knows who will join later? The door is open for others to participate, as stated by the group's Charter of Cooperation.

OPEC+ was created in December 2016, an outcome of the big surplus in world production that overshadowed demand, especially in 2015 and 2016. Then in early 2020, the pandemic precipitated a nearly worldwide lockdown that reduced oil consumption to the minimum.

At one point, the price of West Texas Intermediate crude fell to about minus-\$38 per barrel, meaning sellers had to pay buyers to receive crude oil.

With his Ministerial colleagues, the Prince reacted quickly to save the oil market by calling for an urgent Ministerial meeting. After close consultations among the DoC participants, other market participants, and many other stakeholders, the DoC countries moved swiftly to adjust production and avert a market collapse. These unprecedented actions have been widely praised for providing a platform for stability and gradual recovery.

History will remember the instrumental role of Saudi Arabia's Energy Minister during the early days of the COVID-19 pandemic. At a meeting of OPEC+ on April 12, 2020, co-chaired by the Prince and Russian Deputy Prime Minister Alexander Novak, the two leaders thrashed out a historic agreement. They adjusted crude oil production



HRH Prince Abdul Aziz Bin Salman Al Saud (l), with Hassan Hafidh, former Head of OPEC's PR & Information Department.

by 9.7 million barrels/day (m b/d) from May 1 to June 30, 2020.

For the subsequent six months, from July 1 to December 31, the total adjustment agreed was 7.7m b/d. It was followed by a 5.8m b/d adjustment from January 1, 2021, to April 30, 2022 and a gradual unwinding thereafter.

The baseline for calculating the adjustments was the world oil production in October 2018. The Kingdom and the Russian Federation both had the same baseline level of 11m b/d. The DoC participants agreed to a possible extension of the agreement during a review of market conditions in December 2021. The deal has been extended since then and is still working, as evidenced by the outcomes of the 33rd OPEC and non-OPEC Ministerial Meeting on October 5, 2022. This approach is a clear sign of its success.

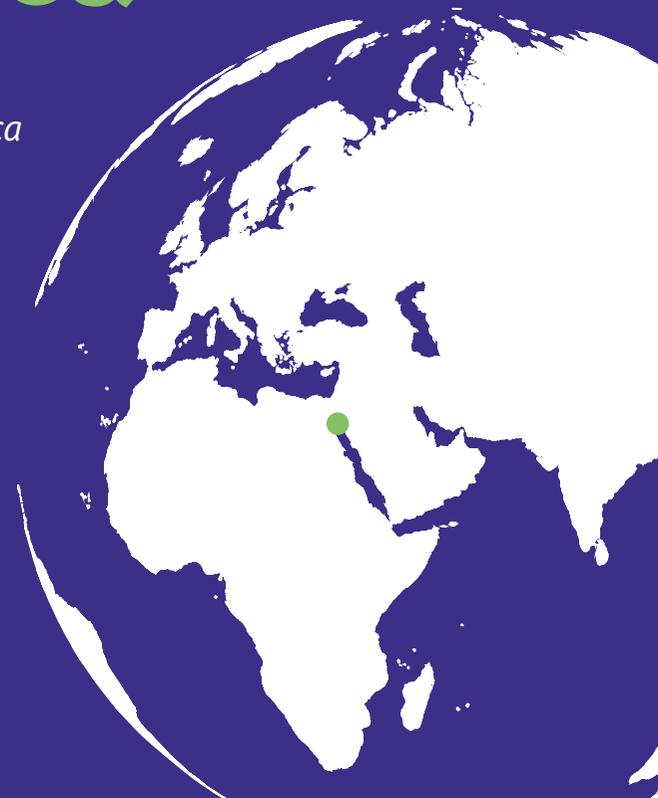
There is no doubt that Prince Abdul Aziz played a pivotal role in securing the consensus needed to reach these decisions and implement the production adjustments. Now, the DoC, under the chairmanship of the Prince, meets regularly and decides on the next steps. During the most recent session, he reiterated that the group was ready to act whenever needed. ■■

* *Hassan Hafidh is the former head of the PR and Information Department at the OPEC Secretariat. Before joining OPEC in 2014, he had worked for ten years each at Reuters and The Wall Street Journal, reporting on oil and gas in Iraq and the Gulf Region.*



COP27 sees a return to Africa

The **UN Climate Change Conference** returned to Africa for the first time since 2016, with Sharm el-Sheikh in Egypt hosting COP27 from November 6–20, 2022. It was a critical event for addressing the needs of developing countries, especially on matters related to climate finance, loss and damage, and support for adaptation. The OPEC Bulletin’s **James Griffin** reports on some of the key outcomes, as well as OPEC Secretariat and Member Country participation.





In an open letter to Parties and Observers to COP27 a few days before the event began, Sameh Shoukry, Egypt's Minister of Foreign Affairs, then COP27 President-designate, said the event “creates a unique opportunity for the world to come together, mend multilateralism, rebuild trust and unite at the highest political levels to address climate change.”

He also noted that COP27 had unofficially been labelled “the implementation-COP,” with Parties expected to proceed with a transformative agenda aimed at moving from pledges to actions on the ground.

The comments set the scene for delegates arriving in Sharm el-Sheikh, an Egyptian resort town located on the southern tip of the Sinai Peninsula on the coastal strip along the Red Sea. With around 33,000 participants, COP27 would become the second most attended COP, after COP26 in Glasgow in 2021.

The negotiations were intense, and led to the original end date of Friday, November 18 being pushed back to the weekend. The two overarching cover decisions titled the ‘*Sharm el-Sheikh Implementation Plan*’ were finally gavelled through at dawn on November 20. As a result, COP27 became the second-longest COP, after COP25 in Madrid in 2019.

The deliberations culminated in one key breakthrough: an agreement to set up a ‘loss and damage’ fund, which would offer vulnerable nations financial assistance in helping tackle climate change.

“This outcome moves us forward,” said Simon Stiell, UN Climate Change Executive Secretary. “We have determined a way forward on a decades-long conversation on funding for loss and damage — deliberating over how we address the impacts on communities whose lives and livelihoods have been ruined by the very worst impacts of climate change.”

Parallel events

In parallel with the formal negotiations, the Global Climate Action space at COP27 provided a platform for governments, businesses and civil society to collaborate. This included a number of thematic days, hosted



Sameh Shoukry, Egypt's Minister of Foreign Affairs speaks at the event.



Simon Stiell (l), UN Climate Change Executive Secretary; with António Guterres (c), UN Secretary General; and other delegates.

by the Presidency, with a focus on issues related to finance, science, energy, and real-world climate solutions, among others.

Moreover, a number of initiatives were launched in Sharm el-Sheikh, including what is known as ‘just energy transition partnerships’. In this regard, the focus was on deals between developed and emerging economies to help accelerate the shift away from coal as a way to speed up emission reductions.

For example, on the sidelines of the G20 leaders’ summit in Bali on November 15–16, developed countries announced a \$20 billion agreement with Indonesia, who this year holds the G20 presidency. The fund includes both public and private finance contributions.

At COP27, countries also agreed that a “just and equitable energy transition” must be based on national development priorities and include social protection and solidarity measures, such as providing retraining programmes and support for coal workers affected by the transition.

The event also established a work programme on a ‘just transition’. The programme will also convene an annual ministerial roundtable as part of this process.

OPEC Secretariat participation

OPEC Secretary General, Haitham Al Ghais, led a delegation from the OPEC Secretariat to COP27, chairing two *ad-hoc* coordination meetings for OPEC Member

Countries and non-OPEC countries participating in the ‘Charter of Cooperation’ (CoC) during the event. The meetings provided a platform to help promote understanding and enable coordination among Member Country and CoC country delegates and negotiators on critical issues of common interest.

The second of these was the first Joint OPEC-Gas Exporting Countries Forum (GECF) Coordination Meeting on Climate Change. The OPEC Secretary General co-chaired the gathering with the GECF Secretary General, Mohamed Hamel. More than 50 participants exchanged views and addressed key issues in the negotiation processes that closely relate to the position of energy-exporting developing countries.

Al Ghais also delivered an OPEC Statement to the High-Level Segment of the UN Climate Change Conference on November 16. The full statement reads:

“Madame President, distinguished delegates, Thank you to Egypt for the gracious hospitality and excellent arrangements.

At this pivotal point in negotiations — significantly — COP27 returns us to Africa.

Africa is vital for OPEC; seven of our 13 Member Countries hail from this great continent.

Being in Egypt that is also a country with significant and diverse energy resources, underlines the importance of having all voices at the table.

We need to abide by the principles of equity and common but differentiated responsibilities and respective capabilities, with developed countries taking the lead to address climate change and fulfilling their commitments to support developing countries. A promise made, but unfortunately not yet delivered.

Our approach must be guided by trust and inclusivity, consider the particular circumstances and priorities of developing countries, and ensure a low-emissions future in which every person has access to energy.

Clarity and transparency with commitment are required on climate finance and investment. We have heard calls for energy-exporting countries to play a key role in ensuring stable global energy markets, and, simultaneously calls for an end to financing hydrocarbon projects.

The complex and intertwined challenges of energy affordability, energy access, energy security and sustainability must be supported through this multilateral process, recognizing the sovereignty of all nations and the right to development.

The multiple global crises we face underline the importance of working with, rather than against each other.

A just and inclusive transition is not about the misguided narrative of abandoning one energy source for another.

The key lies in ensuring a long-term investment-friendly climate, with sufficient finance available; one that is fair and viable for both producers and consumers; developed and developing nations.

For the oil industry alone, we see global investment requirements totaling \$12.1 trillion between now and 2045.

The oil industry is part of the solution. Its resources and expertise can be harnessed to help develop efficient technological solutions, such as CCUS, the CCE framework and hydrogen, ones that can contribute to a reduction in emissions as part of unlocking a low-emissions future.

There are already technologies available in OPEC Member Countries that can contribute to significant emission reductions.



Haitham Al Ghais, OPEC Secretary General, delivering his speech to COP27.

Oil is set to represent at least 29 per cent of the global energy mix by 2045. Relying solely on renewables will not provide the energy the world needs. The focus should be on all energies.

Science shows us that there is no one size fits all solution and technologies such those I have highlighted are required to achieve the Paris Agreement goals. This is also evident in IPCC reports.

These are not myths. They are facts. If we do not get it right this time then we could sow the seeds for future energy crises.

We need to focus on ‘all-peoples, all-fuels and all-technologies’ approach. This will be vital in finding a sustainable way forward that leaves no one behind.”

Member Country focus

OPEC Member Countries were very active in Egypt, with many taking the opportunity to present new initiatives, programmes and targets. This following provides some highlights.

Saudi Arabia presented over 60 initiatives as part of its environmental plan at the summit, including the



Above and below: The first Joint OPEC-Gas Exporting Countries Forum (GECF) Coordination Meeting on Climate Change in session.

second editions of the Middle East Green Initiative (MGI) and the Saudi Green Initiative (SGI) Forum. These were launched with the arrival of Saudi Arabia's Crown Prince HRH Mohammed bin Salman Al Saud to the country's pavilion in Sharm El-Sheikh, which was also later visited by the OPEC Secretary General.

At the SGI Forum, the country's Minister of Energy, HRH Prince Abdul Aziz Bin Salman Al Saud, announced three new projects to further enhance the Kingdom's national and regional climate action.

The first was the launching of the Circular Carbon Economy (CCE) Knowledge Hub to help facilitate regional collaboration in CCE technologies, and share best practices and learnings. The second was the establishment of a regional centre to advance emissions reductions, in conjunction with the United Nations Economic and Social Commission for Western Asia. The third was that Saudi Arabia is set to host the next MENA Climate Week in 2023, in the lead up to COP28.

In a side event, Nigeria shared information about its





programmes on carbon capture and storage (CCS) and announced it will join other countries in launching CO₂ removal initiatives. There was also reference to the country's actions to promote technology within its policy framework, to establish a national technology roadmap, and the launching of Nigeria's Africa Center of Excellence for Carbon Management and Technology Innovation.

Kuwait announced a commitment to becoming carbon neutral in the oil and gas sector by 2050 and in the whole country a decade after that. The country also reaffirmed its commitment to regional and international environmental resolutions and initiatives, including the MGI.

The United Arab Emirates was also prominent at the event, launching the National Net Zero by 2050 Pathway, which sets the timeframe and identifies the mechanisms of implementing the UAE Net Zero by 2050 Strategic Initiative, introduced in October 2021.

The pathway defines the country's climate ambition with an absolute emission reduction target of 18 per cent compared to the UAE's updated second Nationally Determined Contribution (NDC) under the Paris Agreement by 2030, 60 per cent by 2040, and 100 per cent by 2050, compared to 2019.

Speaking on the announcement, Mariam bint Mohammed Almheiri, the UAE's Minister of Climate Change and Environment, said: "Powered by technology, innovation, and R&D, the Pathway is expected to bring significant gains in terms of job creation, GDP growth, and air quality. We are determined to walk the talk and take decisive measures to contribute to global climate action so that we can build a more sustainable and climate-resilient future for our planet."

From Egypt to the UAE

Egypt's long history of promoting dialogue and cooperation, including helping incubate OPEC's establishment back in April 1959 when the five founding fathers of OPEC forged a 'gentlemen's agreement' in Cairo, before the Organization was launched in Baghdad in September 1960, enabled COP27 to deliver a number of positive outcomes.

It is now onto OPEC Member Country, the UAE, whose participation at COP27 helped lay the groundwork for COP28, which it is scheduled to host from November 30 to December 12, 2023. 

Secretary General addresses African Energy Week

*From October 18–21, 2022, African and global energy leaders descended on the southernmost tip of Africa for this year’s African Energy Week (AEW). Secretary General, **Haitham Al Ghais**, led an OPEC delegation to Cape Town to participate in both the Conference and Exhibition. The OPEC Bulletin’s **Scott Laury** reports.*



The pristine seaside location of Cape Town made for a dramatic backdrop for this year’s AEW Conference and Exhibition.

Established in 2021, AEW is the African Energy Chamber’s annual event, bringing together African and international energy leaders, investors and business executives from across the public and private sectors for

four days of intense dialogue and information exchange on the future of Africa’s energy industry.

“In 2022, the event returns bigger and better than ever before, serving as the official meeting place for Africa’s energy elite,” AEW’s official website reads. “At the forefront of the African energy industry, AEW promotes the role Africa plays in global energy matters and is centred around African-led dialogue and decision making.”

As a leading African energy industry event, the organizers also state that one of the goals for AEW is to contribute to ending energy poverty by 2030. And thus, this issue was figured prominently, and aptly so, on the Conference’s programme.

Opening keynote

On the day of the Opening Ceremony, OPEC Secretary General, Haitham Al Ghais, delivered a keynote address to attending leaders, officials and Conference delegates.

He began by offering a fitting tribute to his predecessor, the late Mohammad Sanusi Barkindo, who was a beloved figure in his native Nigeria and indeed across the continent and amongst the wider OPEC and non-OPEC family.

“I would like to commend my predecessor and my late



NJ Ayuk, Executive Chairman of the African Energy Chamber, opened the event.

brother, Mohammad Barkindo, who was a native son and true champion of Africa”, he stated. “His contributions to this continent, to his native Nigeria and indeed to OPEC are too numerous to mention here.”

Al Ghais then asked that all in attendance pause for a brief moment of silence, after which a special video tribute was aired in which Barkindo’s legacy to OPEC, to Africa and to the wider global industry was eloquently portrayed.

The Secretary General then recognized NJ Ayuk, Chairman of the Africa Energy Chamber, for his efforts in organizing the high-profile event and for the excellent programme that was developed for the various sessions of the Conference.

“African Energy Week continues to go from strength to strength and is now a leading event on the global industry calendar,” he said.

He also thanked the host city of Cape Town for their excellent hospitality, remarking on the city’s natural beauty.

“I could not think of a more beautiful and scenic location to host an event than this magnificent city of Cape Town,” he stated. “This city’s magical mix of natural beauty, history and sophistication truly set it apart as a world treasure!”

He continued by recognizing OPEC’s Heads of

Delegation that were present, as well as officials attending from ‘Declaration of Cooperation’ (DoC) countries.

Before continuing with his remarks, he invited delegates to attend the OPEC-Africa Roundtable Dialogue, which took place the following day and was co-chaired by the Secretary General and the OPEC Conference President.

Stabilizing role of the DoC

The theme for the Secretary General’s keynote address was *‘Africa’s role in global energy security: Driving energy investments towards a sustainable future and the role of OPEC as an important source for energy security’*.

Al Ghais began by lauding the ongoing productive role being played by the DoC during recent weeks in which the global oil market had experienced high levels of uncertainty and heightened volatility. In this regard, he also thanked the leadership that has continued to skillfully steer OPEC and the DoC through a challenging period.

“Allow me to take a moment to thank the OPEC President of the Conference, Bruno Jean-Richard Itoua, for his ongoing leadership of OPEC during these challenging times, and also recognize the highly successful efforts of the OPEC and non-OPEC ‘Declaration of Cooperation’,



A tribute to the late Mohammad Sanusi Barkindo, former OPEC Secretary General, was offered by Al Ghais with a brief moment of silence, after which a special video tribute was aired showcasing Barkindo's legacy to OPEC, to Africa and to the wider global oil industry.

under the leadership of Chairman, HRH Prince Abdul Aziz Bin Salman Al Saud, Minister of Energy of Saudi Arabia and Alexander Novak, Deputy Prime Minister of the Russian Federation,” he stated.

He cited as an example the decisions that were taken by the OPEC and non-OPEC Heads of Delegation at their October and December Ministerial Meetings, when they continued to support the global oil market through proactive and pre-emptive decisions, which continue to help foster a sustainable stability in the global markets.

“With macroeconomic headwinds forecast for the months ahead and the very real potential for a global recession, there has been a consensus among the Ministers regarding the need to act now to prevent a crisis later,” he explained. “I want to thank our African Heads of Delegation for their ongoing support of these global efforts to stem the tide of volatility and to promote a lasting stability in the market.”

Looking farther ahead at the long-term outlook, the Secretary General made reference to the latest *World Oil Outlook (WOO)*, which OPEC launched on October

31, 2022, at the Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) in the UAE.

He proceeded to share some of the main findings from the flagship publication, which provides an annual review of the long-term forecasts for the energy industry.

Long-term energy demand rising; investment critical

Firstly, he noted that demand for energy will continue to rise dramatically over the long term. Indeed, the *WOO* predicts global energy demand will increase by 23 per cent, from 286 million barrels of oil equivalent/day (m boe/d) in 2021 to reach 351m boe/d in 2045.

Despite a minor decline, oil is still forecast to retain the largest share of the energy mix by 2045, and the combined market share of oil and gas in the global primary energy mix is expected to remain above 50 per cent to 2045. Nearly 71 per cent of this demand will come from non-OECD countries, predominantly in Asia, but also from Africa.

The Secretary General also highlighted the vital issue of industry investment, noting that cumulative oil-related investment requirements from now until 2045 are estimated to total \$12.1 trillion. Of this, \$9.5tr will go to upstream projects, \$1.6tr to the downstream and \$1tr to the midstream.

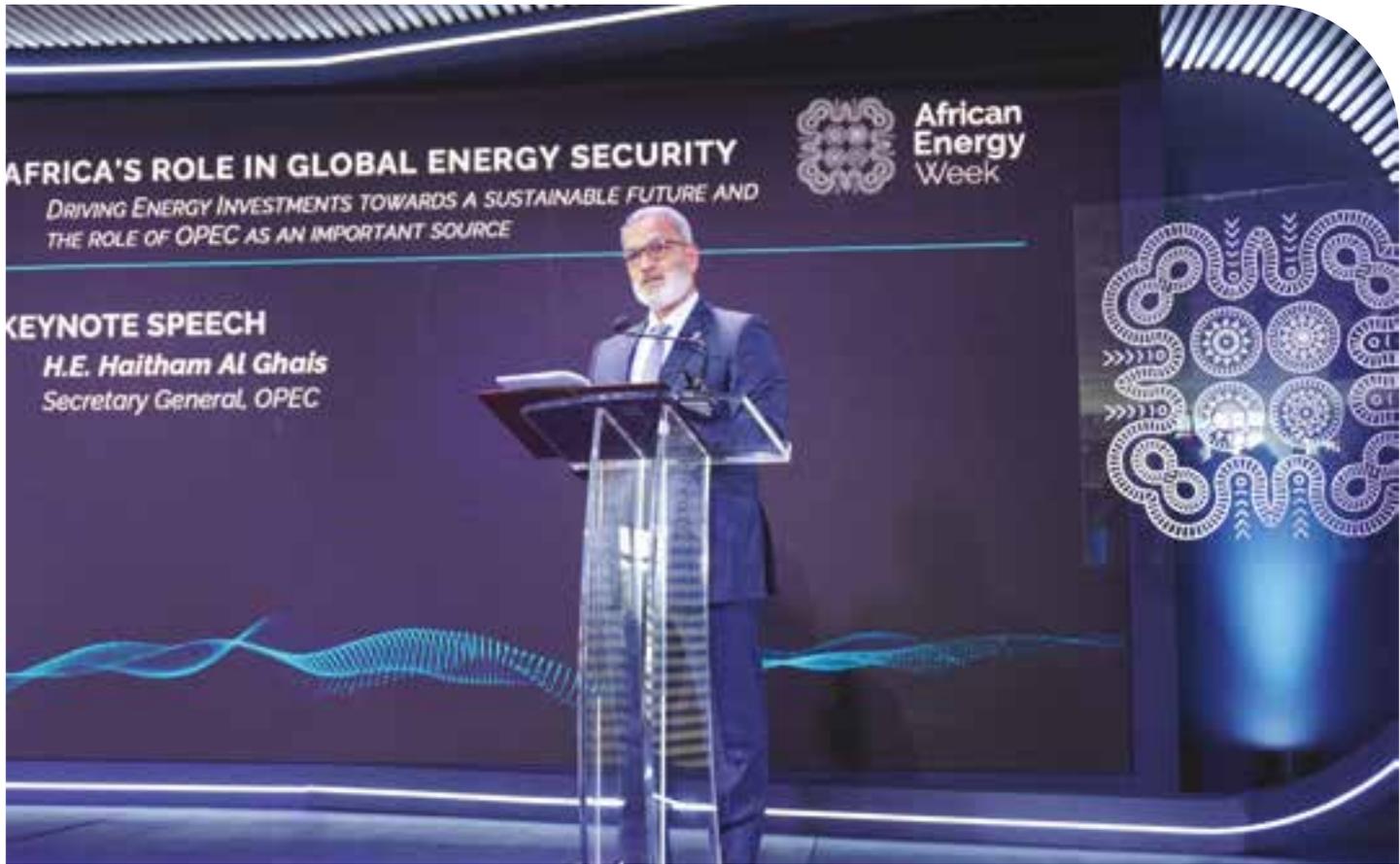
“If these investment needs are not met, we could eventually see a supply shortfall, resulting in heightened volatility,” he stated. “And, let me add here, that our efforts through the DoC are aimed at providing stable energy markets, which, in turn, are a pre-requisite for investor confidence and increased investment going forward.”

Energy poverty must be addressed

Another issue underlined by the Secretary General and one which was ranked high on the agenda at this year's AEW is the ongoing scourge of energy poverty.

“It is a sad fact that, as of 2020, roughly 733 million people were still without access to electricity, and about 80 per cent of these are here in Africa,” he emphasized. “On top of this, approximately 2.4 billion people, or nearly one-third of the global population, still had no opportunities for clean cooking solutions. I should add here that in Sub-Saharan Africa, 920 million are still without access to clean cooking fuels, an increase from 750m in 2010.”

Noting that these statistics were simply hard to



Haitham Al Ghais, OPEC Secretary General, giving the keynote speech at African Energy Week.

accept, Al Ghais made an appeal to the world’s leaders to rally together on this issue and help turn the tides on this terrible trend.

“I call on world leaders to unite and to mobilize their collective resources and political support to help reverse this tragic situation and bridge the gap between developed and developing countries,” he said. “OPEC supports the first-ever universal goal related to energy, SDG7, which seeks to ensure access to affordable, reliable, sustainable and modern energy for all.”

He added that access to energy, like education and healthcare, should not be considered a luxury but a basic human right, and vowed that OPEC would continue to collaborate closely with its Member Countries to advocate for real and lasting change on this issue.

A balanced and equitable energy transition

On the issue of climate change, the Secretary General emphasized that the ever-evolving energy transition will have massive implications for Africa.

“Countries around the world continue to adapt to the rapidly changing dynamics in the energy industry in an effort to mitigate the impacts of climate change,” he said. “In this context, Africa is unfortunately in a fragile position. In addition to suffering serious economic setbacks due to the fallout from the COVID-19 pandemic, African countries stand to be on the losing end of the consequences of climate change. Unfortunately, the inequalities that were already in place previously are now in danger of being amplified.”

In response, he added, OPEC will continue to advocate at the international level for an energy transition that leaves no one behind.

He explained that COP27 in Egypt provided a strategic platform for OPEC’s Member Countries to advocate for a balanced and fair process on issues related to adaptation, mitigation and the means of implementation, particularly climate finance and technology.

“As an industry, we must approach these critical issues together through dialogue and cooperation, ensuring that all voices are heard and all viewpoints are considered,” he said. “Simply said, there is no “one-size-fits-all”



Haitham Al Ghais, with delegates to the conference.



Haitham Al Ghais, with Gabriel Mbaga Obiang Lima (r), Minister of Mines and Hydrocarbons of Equatorial Guinea.



Haitham Al Ghais, with Dr Omar Farouk Ibrahim (l), Secretary General of the African Petroleum Producers' Organization (APPO).



Delegates at the panel discussion included Gabriel Mbaga Obiang Lima (r), Minister of Mines and Hydrocarbons of Equatorial Guinea.

solution. Different countries around the world have varying capabilities and diverse needs. Thus, reducing emissions should have multiple paths, as set out by the Intergovernmental Panel on Climate Change (IPCC), and all of them should be considered as potential options.”

Additionally, he pointed out that any future energy and climate roadmap would need to be developed in accordance with the core principles of the United Nations Framework Convention on Climate Change (UNFCCC), namely equity, historical responsibility and the principle of common but differentiated responsibilities and respective capabilities.

“This will be crucial, particularly for Africa, to ensure that its unique circumstances are taken into consideration,” he said.

Africa’s role in OPEC and in the global industry

The last topic covered by the Secretary General touched on the important role Africa’s Member Countries continue to play within OPEC and as part of the global energy industry.

He noted that with seven Members — Algeria, Angola, Congo, Equatorial Guinea, Gabon, Libya and Nigeria — Africa makes up more than half of OPEC’s overall membership.

“This increasing presence of Africa within OPEC led to

the establishment in June of 2021 of the first-ever high-level meeting of the OPEC-Africa Energy Dialogue,” he said. “This highly successful event is the latest in OPEC’s portfolio of global energy dialogues, which include the European Union, Russia, China, India, US independent producers, the Gas Exporting Countries Forum (GECF), in addition to other international organizations and corporations. Through this dialogue with Africa, we look forward to enhancing our focus on the continent and its promising energy future.”

The second instalment of the OPEC-Africa high-level dialogue took place on November 23 and was a highly successful follow-up to the inaugural meeting. Representatives from OPEC once again sat down with their counterparts from the African Petroleum Producers’ Organization (APPO), the African Energy Commission and the African Refiners and Distributors Association to discuss issues related to energy investment and finance in Africa, as well as the energy transition and its implications for the continent and its industry.

Turning to the outlook for Africa’s oil industry, Al Ghais said there is a bright future ahead and that the opportunities are vast.

“Home to five of the top 30 oil-producing countries in the world and several top gas-producing nations, the continent’s precious resources will continue to be highly sought-after over the long-term horizon in order to meet



Dr Adedapo Odulaja, Nigeria's Governor for OPEC, in attendance at African Energy Week.



Haitham Al Ghais, with Gwede Mantashe (r), South Africa's Minister of Mineral and Energy Resources.

the rapidly rising global demand for oil and gas," he said. "As of 2021, Africa was estimated to have proven oil reserves amounting to around 120 billion barrels. As far as production levels go, as of 2019, the continent produced 8.5m b/d of oil, which is around nine per cent of world output."

On the demand side, he added that developing regions, including Africa, with its rapidly growing population and dynamic demographical shifts, are expected to make up the majority of the world's energy consumption. Additionally, he said that all forms of energy will be needed, not only to support the ongoing recovery from the COVID-19 pandemic but also to satisfy longer-term energy requirements.

In terms of the downstream sector, he noted that the oil demand shock caused by the pandemic had resulted in numerous refinery closures worldwide, including Africa, and the fallout from this crisis has continued.

However, he added, OPEC forecasts 7.3m b/d of refinery capacity additions in the medium term, mostly in the Asia Pacific, the Middle East and Africa. Of this, Africa is expected to expand refining capacity by 1.2m b/d.

In terms of the long-term outlook, he said that a total of 15.5m b/d of refining additions are expected globally, of which 90 per cent will come from the Asia Pacific, the Middle East and Africa.

"These overall positive developments in the African downstream will help increase local refined



OPEC Secretary General, Haitham Al Ghais, met with Sani Mahamadou (I), Minister of Petroleum of Niger, on the sidelines of African Energy Week 2022 in Cape Town, South Africa.

They exchanged views on the global oil market and discussed ways to strengthen cooperation.

product output while reducing product imports from other regions,” he said with an optimistic tone.

In terms of future trends in trade, the Secretary General painted a positive picture, especially as pertains to inter-continental trade opportunities.

“There are excellent opportunities for enhanced inter-African trade and for increased cooperation among continent’s National Oil Companies in both the downstream and upstream oil and gas sectors,” he noted. “Additionally, the DoC and ‘Charter of Cooperation’ (CoC) provide excellent opportunities in this regard to help expand partnerships with non-OPEC producers in business, trade, research and development, technology and on other key collaborative efforts.”

Concluding his remarks, Al Ghais stressed the crucial need for enhanced energy cooperation at all levels and among all stakeholders across the African and global industry value chain.

“The DoC continues to be the torchbearer for multilateral energy cooperation, but I would like to urge all stakeholders here in Africa and around the world to join us as, together, we seek to achieve a lasting stability in the global energy markets,” he said. “This is the only way we will be able to enable renewed investment in the industry and support the further development of our economies. I think we all share a common goal in wanting to provide hope and a promising future for the generations to come.”

Haitham Al Ghais (c), with Foday Mansaray (l), Director General, Petroleum Directorate, Sierra Leone at the OPEC stand at African Energy Week.



OPEC-Africa Roundtable highlights the continent's key role in the energy future

*During African Energy Week 2022, a special session titled ‘OPEC-Africa Roundtable Dialogue’ was held to highlight the importance of cooperation and understanding between the Organization and the continent. OPEC’s **Ayman Almusallam** reports on the event.*

As part of this year’s edition of African Energy Week (AEW), a roundtable session was organized to focus on the dialogue between OPEC and Africa. The highly-anticipated event was hosted by Bruno Jean-Richard Itoua, Minister of Hydrocarbons of the Republic of the Congo and President of the OPEC Conference, and Haitham Al Ghais, OPEC Secretary General.

Gabriel Mbagi Obiang Lima, Equatorial Guinea’s Minister of Mines and Hydrocarbons; Dr Adedapo Odulaja, Nigeria’s Governor for OPEC; Puot Kang Chol, Minister of Petroleum of South Sudan; Sani Mahamadou, Minister of Petroleum of Niger; and Dr Omar Farouk Ibrahim, Secretary General of the African Petroleum Producers’ Organization (APPO), took part in the session.

The Roundtable was moderated by NJ Ayuk, Executive Chairman of the African Energy Chamber, and featured an extensive Q&A session at the end.

Promising future for Africa

At the Roundtable, OPEC President and Minister Itoua highlighted how proud he is, noting that Africans are hard-working people with ambition to help develop their countries.

On the ongoing ‘Declaration of Cooperation’ (DoC) process, the President underscored that all decisions are taken based on scientific data and are in the interest of all stakeholders, including producers and consumers. He added that participating countries had met a for long time on a monthly basis — a mechanism it can reinstate if necessary — adding that it was decided to meet less frequent at the 33rd OPEC and non-OPEC Ministerial Meeting held on October 5, 2022.

The President noted that the response to the DoC’s decisions taken in October were caused by emotions, stressing that the Meeting followed the usual process of examining oil market developments, and reviewing related data and trends. He also commended the efforts and the key role played by OPEC’s Research Division and its Director, Dr Ayed S Al-Qahtani.

OPEC: Key player in the energy landscape

Minister Lima started by recognizing the session’s importance in view that it will help highlight the crucial role played by OPEC. He emphasized that OPEC will continue to be a leading player in the energy landscape for decades to come despite the current discussions related to the energy transition, underlining the Organization’s objective of oil market stability. He stressed that fluctuations are harmful to national economies and planning.

The Minister encouraged all Africans, producers in particular, to participate in the dialogue, stressing that OPEC is open to cooperation with all stakeholders, not only its Member Countries. He also praised the Organization’s technical and research capabilities, noting that “technical expertise is important.”

Minister Lima also recognized the importance of the visit of the OPEC Secretary General to Africa, which encompassed numerous interactions and meetings with ministers, CEOs and executives, and other senior officials. He noted that the visit shows the importance of Africa for OPEC, as well as the importance of the continent’s natural resources.



Delegates at the OPEC-Africa Roundtable.

Africa: Great potential, wealth in natural resources

Secretary General Al Ghais highlighted the abundance in natural resources that the African continent enjoys, stating, “Africa’s potentials is massive.” He added that the time has come for Africa to move forward, noting that AEW can play a role in achieving this objective by spurring the necessary vision and the desire to accomplish it.

Al Ghais also pointed out that Africans are thirsty for work and have remarkable aspiration to develop, highlighting that “they have the same rights as others.” In this context, he emphasized the importance of cooperation, dialogue and building bridges between all, as well as the role of finance.

On OPEC’s affairs, the Secretary General pointed out that Equatorial Guinea is set to become the President of the OPEC Conference in 2023 — the Organization’s supreme authority — despite its level of production, highlighting that all OPEC’s decisions are taken by consensus whereby all Member Countries have equal voting rights.

Market stability guides OPEC’s decisions

Representing OPEC Member Country Nigeria, Dr Odulaja conveyed a statement on behalf of Timipre Sylva, the country’s Minister of State for Petroleum Resources, as well as his regret for not being able to attend the event in person. The Governor also paid a special tribute to the late OPEC Secretary General, Mohammad Sanusi Barkindo.

Dr Odulaja recalled that Nigeria joined OPEC in 1971, highlighting the positive relation between the Member Country and the Organization over the last 51 years. He emphasized that Nigeria will always be a loyal Member

Country of OPEC. The Governor also pointed out that the Organization’s resolutions are guided by market stability, underscoring that all decisions are based on data.

Referencing the country’s initiative ‘Decade of Gas’, the Governor acknowledged the importance of gas for Nigeria. He also addressed the blight of energy poverty, noting that the figures in this regard are alarming. He said that energy poverty is an underestimated dilemma.

DoC: Vehicle for market stability

At the Roundtable, Minister Chol highlighted that South Sudan is a key participant in the DoC, explaining that the decision-making process is based on consensus. “We are part of the decision-making,” he said. He also highlighted that the DoC aims for market stability, which is vital for planning and development.

Minister Mahamadou presented the recent developments in the national oil sector of Niger, highlighting that the African country aims to begin exporting of oil next year. “This is a game changer,” he said. The Minister also noted the potential revenue streams that can be generated through this breakthrough.

During the discussion, Secretary General Dr Ibrahim highlighted that OPEC and APPO play complimentary roles in the petroleum industry. He also praised the expertise and competence that OPEC has amassed over the years.

Dr Ibrahim also affirmed APPO’s support of OPEC’s decisions due to their rationale and objective to support market stability. “We fully support OPEC and its decision,” he stated. The Secretary General also pointed out that seven of OPEC Member Countries are also members of APPO. ■

AEW 2022 recognizes exceptional accomplishments, inaugurates **Barkindo Lifetime Achievement Awards**

During a high-level gala dinner on the sidelines of African Energy Week 2022 held in Cape Town, South Africa, numerous honours were bestowed upon individuals, companies and projects in recognition of their contributions to the advancement of the industry in Africa through innovation and intellect.



Mohammad S Barkindo Lifetime Achievement Award: Bruno Jean-Richard Itoua (l), President of the OPEC Conference and Minister of Hydrocarbons of Congo.



Mohammad S Barkindo Lifetime Achievement Award: Rodgers Beall, Founder of Africa Fortesa.



Mohammad S Barkindo Lifetime Achievement Award: Ousmane Ndiaye (l), Permanent Secretary of Cos Petrogaz.



Mohammad S Barkindo Lifetime Achievement Award: Pam Darwin (l), retired Vice President, Sub-Sahara Africa, Exploration and New Ventures, ExxonMobil.



Mohammad S Barkindo Lifetime Achievement Award: Peter Kutemann (l), Founder and Chairman of Dietsmann.



João Manuel Gonçalves Lourenço, President of the Republic of Angola.

Hotel Intercontinental in Luanda, Angola.

2022 Edition of the **Angola Oil and Gas Conference** takes place in Luanda

*At the Intercontinental Hotel in Luanda, the third edition of Angola's premier oil and gas industry event, the Angola Oil and Gas Conference 2022 (AOG 2022), took place from November 29 to December 1, under the theme, 'Promoting an Inclusive, Attractive and Innovative Oil and Gas Industry in Angola.' Government representatives, global energy companies, investors and service providers attended the event, which sought to showcase opportunities in Angola and maximize energy investments. The OPEC Bulletin's **Mathew Quinn** files this report.*

Unique opportunities in Angola

The Conference was organized by Energy Capital & Power in partnership with the Ministry of Mineral Resources, Petroleum and Gas of Angola; the African Energy Chamber; the National Agency for Oil, Gas and Biofuels Agency (ANPG); and AIDAC. High-level speakers included João Manuel Gonçalves Lourenço, President of the Republic of Angola; Dr Diamantino Azevedo, Angola's Minister of Mineral Resources, Petroleum and Gas; Haitham Al Ghais, OPEC Secretary General; and representatives from key market players and global majors including Eni, ExxonMobil, Chevron and TotalEnergies.

Angola has set itself very clear goals with regard to its oil and gas industry, and the conference sought to contribute to the attainment of those goals. As AOG 2022's website states, Angola seeks to "curb production decline, expand and promote exploration and new discoveries, ensure the participation of its population in its central economic engine, achieve fuel-independency through large-scale investments in refining capacity, diversify its economy and address the narrative of a just energy transition by developing its natural gas resources and other alternative sources of energy, ensuring economic development and widespread energy wealth." The event, therefore, sought to spur investment and deal-making in the Angolan and regional energy value chains.

NJ Ayuk, Executive Chairman of the African Energy Chamber, served as moderator for the opening ceremony. He stated, "We should not be apologizing for trying to drive up oil and gas. As we move forward, we need to embrace the future while looking at local content. This is an industry, and Angola has

played a part in driving energy growth not only in this country but across the globe. At this moment, when Angola starts stopping production decline, some are saying it is time to pack up. Azevedo and his team have always stood firm that while we believe in the energy transition and the path to the future, we believe our oil industry has a role to play in driving that future."

Keynote speech

The OPEC Secretary General delivered his keynote speech as part of the opening ceremony in Portuguese. He noted Angola's longstanding commitment to promoting multilateralism and international cooperation. "In a multitude of forums, President Lourenço has repeatedly underscored Angola's commitment to the principles of multilateralism and international cooperation, as the most effective means to address the challenges of our times," he stated. Al Ghais noted that in May, the African Union awarded President Lourenço the fully merited '*African Union Champion for Peace and Reconciliation*'.

Indeed, Angola's commitment to international cooperation was something that Minister Azevedo stressed in his own remarks. "I would like to reiterate our commitment to cooperation with our partners and international and regional organizations to continue guaranteeing the stability of the market," he said.

Al Ghais outlined the measures that the Angolan government have taken in recent years to reform the oil and gas industry, stating, "New agencies and bodies have been established in the regulatory sphere, policy has been harmonized, transparency improved and management enhanced."

Haitham Al Ghais, OPEC Secretary General.



Energy Capital & Power

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





Oil platform in Angola.



Shutterstock

The Secretary General gave OPEC's support for efforts aimed at improving the investment climate of Angola, as this is investment essential to meet the energy needs of the future.

Al Ghais further described how OPEC's *World Oil Outlook (WOO)* contains a series of statistics that support the case for an urgent need for investments in the oil industry. The world economy is expected to more than double in size, and the global population rise by a staggering 1.6 billion between now and 2045.

Global primary energy demand is expected to increase by 23 per cent between 2021 and 2045. Globally, oil demand is projected to increase from almost 97 million barrels/day (m b/d) in 2021 to around 110m b/d in 2045. As Al Ghais stated: "Given these trends, it is imperative, not just for this country or this region, that Angola realizes its full potential over the coming years. Simply put: it is essential for the world."

The Secretary General addressed the concern the Organization has with chronic underinvestment in recent years. This is particularly alarming, given that, as the

WOO has shown, the global oil sector will require cumulative investment of \$12.1 trillion through to 2045, equating to over \$500 billion each year.

The theme of investments was also emphasized by Minister Azevedo, who spoke of the reforms undertaken in the oil industry, stating: "The government dedicated emphasis to the inclusive and active participation of specialized labour and companies and has been able to create a favourable environment. The third edition of AOG intends to address the evolution of the oil and gas sector, the fundamental role of banks, funding the oil industry and local content and many more topics. This conference will propose solutions to the challenges with regard to the above topics."

Issue of energy poverty

In his address, Al Ghais also highlighted the stark statistics with regard to the scourge of energy poverty. As the UN has shown, in 2020, roughly 733 million people lacked access to electricity, about 80 per cent of these are in Africa. Around 2.4bn people use inefficient and polluting cooking systems. The Secretary General underscored



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NJ Ayuk (l), Executive Chairman of the African Energy Chamber, moderated the Ministerial Panel Session, which included (l-r): Cheikh Niane, Vice President of the Ministry of Petroleum and Energies, Republic of Senegal; Dr Diamantino Azevedo, Minister of Mineral Resources, Petroleum and Gas, Angola; Haitham Al Ghais, OPEC Secretary General; Tom Alweendo, Minister of Mines and Energy, Namibia; Gabriel Mbaga Obiang Lima, Minister of Mines and Hydrocarbons, Equatorial Guinea; Didier Budimbu Ntubuanga, Minister of Hydrocarbons, Democratic Republic of the Congo; and Foday Mansaray, Director General, Petroleum Directorate, Republic of Sierra Leone.

place when the global geopolitical situation is causing a lot of disruptions in the global commodity market, particularly with regard to oil and gas. Angola aspires to be a globally competitive hydrocarbon producer contributing to global energy security and addressing energy poverty in Africa while stabilizing the global market.” The President noted that the conference’s main focus is encouraging investment and the sustainable development of the entire oil and gas industry.

President Lourenço noted the purpose behind recent reforms in the oil industry, saying, “Angola is open to national and foreign private investment by promoting fair contractual terms for those interested in investing in the economy.” After he opened the Conference, the President toured the exhibition booths.

Ministerial Panel Session: a focus on understanding Africa’s needs

A ministerial panel entitled ‘*The right and will to develop: how to harness the resources of Angola and the region for an energy rich future*’, took place following the opening ceremony. The panel was moderated by AJ Ayuk, Executive Chairman, African Energy Chamber. In addition to the OPEC Secretary General, the panel included Minister Azevedo of Angola; Gabriel Mbaga Obiang Lima, Minister of Mines and Hydrocarbons of Equatorial Guinea; Didier Budimbu Ntubuanga, Minister of Hydrocarbons, Democratic Republic of the Congo; Tom Alweendo, Minister of Mines and Energy of Namibia; Foday Mansaray, Director General, Petroleum Directorate, Republic of Sierra Leone; and Cheikh Niane, Vice President of the Ministry of Petroleum and Energies, Republic of Senegal.

The Secretary General was asked to comment briefly on market conditions and the ongoing DoC process. With regard to the upcoming meetings of the OPEC Conference and OPEC and non-OPEC Ministerial Meeting, Al Ghais

the fact that cooking using open fires or inefficient stoves fueled by kerosene, biomass (wood, animal dung and crop waste) and coal, generates harmful household air pollution.

As AOG 2022 was one of the first major oil and gas events held after the 27th session of the Conference of the Parties of the UNFCCC (COP27), held in Sharm el-Sheikh, Egypt, the Secretary General outlined the key messages he had delivered at that event (see page 28 for details).

Al Ghais then provided an overview of the measures taken by the countries participating in the ‘Declaration of Cooperation’ (DoC) to support sustainable stability in the oil market. He touched on current developments in the oil market, and the ongoing need for DoC participating countries to continue to monitor market conditions and take action as necessary.

Address by the President

The event was officially opened by Angola’s President João Lourenço, who was accompanied by the First Lady, Ana Dias Lourenço. In his remarks the President said, “This conference is of great importance and is taking

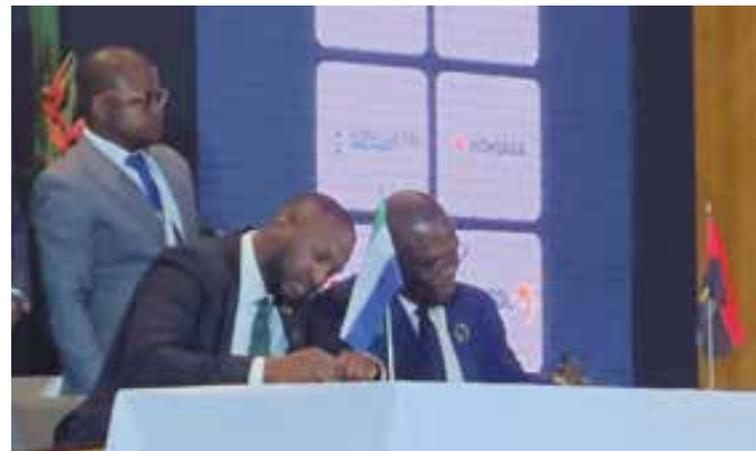


OPEC bulletin 11-12/22

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Namibia and Angola sign a Memorandum of Understanding on bilateral cooperation in the petroleum and natural gas sector.



Angola's National Agency for Oil, Gas and Biofuels (ANPG), and Sierra Leone's Petroleum Directorate signed a historic cooperation agreement.

stated, "We will be going over all the market fundamentals and reviewing everything from a purely technical perspective with no other perspectives taken. We look at the macroeconomic and global economy. We are seeing high inflation and monetary policies taking place, high sovereign debt levels, and supply chain issues. We forecast global economic growth at 2.7 per cent and 2.5 per cent, respectively."

Commenting on the ongoing reforms of the Angolan oil industry, Minister Azevedo stated, "My key nature is to do things first and speak after. Many new projects are coming up and you can surely wage that Angola is still crucial in the oil industry and all over the world. Our major concern is that our mineral resources be transformed in our country and our continent. This is why we always look at our projects with the perspective of adding value."

On the topic of regional cooperation, the Minister invited African countries to participate with Angola in constructing the Lobito refinery. The Minister stated, "You are all invited to become partners in this refinery. In order to challenge my colleagues, I am announcing it publicly. Let us not talk too much but let us act."

Minister Obiang Lima spoke of the challenges related to the energy transition. "The two problems our continent has is energy poverty and energy security.

Until these challenges are solved, we cannot talk about the transition," he stated, adding, "We need to stop acting like victims. We are the owner of the resources so the issue is how we exploit the resources. We need to start bringing solutions. For energy poverty, we need to increase capacity and generation."

He alluded to that important conclusion of the WOO, that all forms of energy will be required to meet the energy needs of the future. "We need to stop acting like victims. We are the owner of the resources so the issue is how we exploit the resources. We need to start bringing solutions. For energy poverty, we need to increase capacity and generation," he said.

Minister Ntubuanga made a powerful case on the issue of energy poverty. "We have launched a public tender. We do not have energy and need to start exploring what we have. It is not acceptable having our citizens dying without energy," he said. The Democratic Republic of the Congo is keen to develop its oil and gas sector. The Minister stressed that his country wants to start drilling and developing. "To have an energy transition, you need to have energy in the first place," he added. On the margins of the conference, Equatorial Guinea and the Democratic Republic of Congo signed a Memorandum of Cooperation to enhance existing synergies across their respective upstream, downstream, energy infrastructure and logistics sectors.

Echoing OPEC's oft repeated refrain that there can be 'non-one-size-fits-all' path to the energy transition, Minister Alweendo said, "We hope that our international partners will start to have a better understanding of Africa's needs. People think that the energy transition is a linear path but we all realise that it doesn't work that way. People need to create their own pathways based on their own circumstances." Later in the

The OPEC stand at AOG 2022.



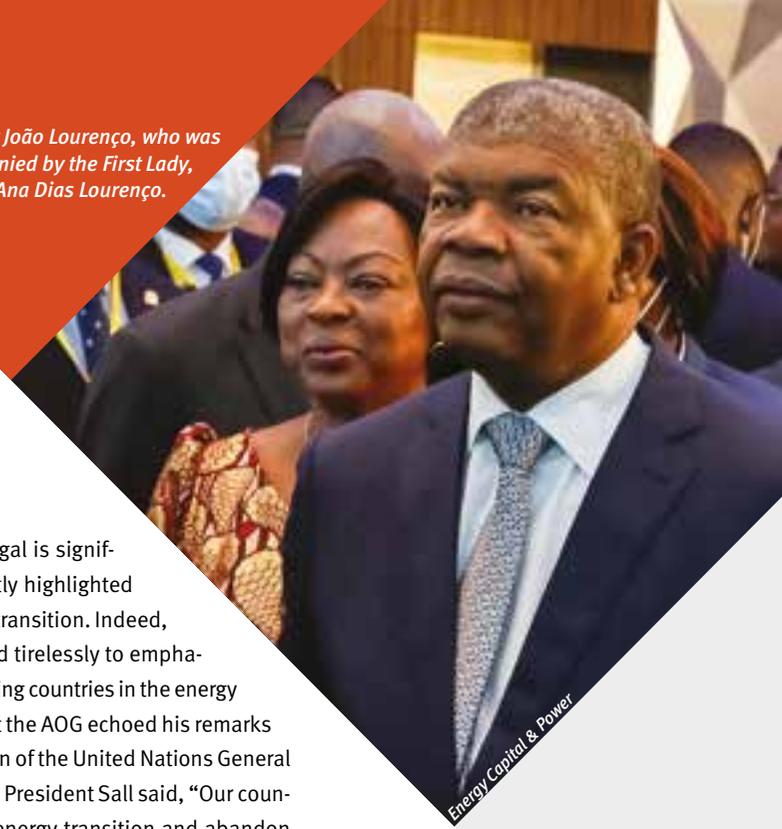
day, Namibia and Angola would sign a Memorandum of Understanding on bilateral cooperation in the petroleum and natural gas sector.

Bilateral agreements, dialogue and regional cooperation

Again another notable achievement from the conference was that Angola's National Agency for Oil, Gas and Biofuels (ANPG) and Sierra Leone's Petroleum Directorate signed a historic cooperation agreement aimed at establishing a shared commitment to promoting and intensifying collaboration across the oil and gas sector. Foday Mansaray said of the agreement, "We are focused on African content. This signing today further strengthens our collaboration with Angola. The signing fosters our relationship with Angola so that we can learn the lessons that they have learnt in the past. We are gearing up for production. One of the companies who are exploring from the last licensing round are expecting 8.2 trillion cubic feet (tr cu ft) of gas. We are a small country with new oil and gas and big ambitions."

During the panel discussions, Cheikh Niane noted the steps Senegal has taken to develop its industry, stating, "We are expecting the first oil and gas in 2023. We are planning for Greater Tortue Ahmeyim, which we are sharing with Mauritania, to export up to 2.5 million tons/year (m t/yr). We are also working on FID for next year for the second phase of the project because we want to increase it to 10m t/yr. Our President, Macky Sall, stated that Senegal will continue to drill and use our hydrocarbon resources. Developed countries need to decarbonize while developing countries industrialize and we are working on this."

President João Lourenço, who was accompanied by the First Lady, Ana Dias Lourenço.



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The position of Senegal is significant as it has consistently highlighted the dangers of an unjust transition. Indeed, President Sall has worked tirelessly to emphasize the needs of developing countries in the energy transition. Discussions at the AOG echoed his remarks to the 76th Regular Session of the United Nations General Assembly in 2021, where President Sall said, "Our countries cannot achieve an energy transition and abandon the polluting patterns of the industrialized countries without a viable, fair and equitable alternative ... Our countries, which are already shouldering the crushing weight of unequal trade, cannot bear the burden of an unfair energy transition."

Highly successful conference

Given the caliber of speakers, the quality of discussions and the number of agreements signed, AOG 2022 was a resounding success. Participants were in agreement of the great potential of Angola and the necessity of further regional and international cooperation. OPEC was pleased to participate in the event and express its pride in having Angola as a Member of the Organization. 🇳🇮



Haitham Al Ghais (second r), OPEC Secretary General, addresses the media, alongside (l-r): Estêvão Pedro, Angola's Governor for OPEC; José Barroso, Angola's Secretary of State for Oil and Gas; and Gabriel Mbaga Obiang Lima, Minister of Mines and Hydrocarbons, Equatorial Guinea.



João Manuel
Gonçalves Lourenço
(r), President of the
Republic of Angola, with
Haitham Al Ghais, OPEC
Secretary General.

OPEC Secretary General meets with President Lourenço of Angola

During the mission to Angola, OPEC Secretary General, Haitham Al Ghais, was received by João Lourenço, President of the Republic of Angola, at the Cidade Alta Palace in the Angolan capital of Luanda. OPEC’s Ayman Almusallam reports.

Dr Diamantino Pedro Azevedo, Angola’s Minister of Mineral Resources, Petroleum and Gas, and Head of its Delegation to the Organization, was present.

At the meeting, the Secretary General expressed his gratitude and appreciation to the President for Angola’s

significant contributions to OPEC, the ‘Declaration of Cooperation’ and the ‘Charter of Cooperation’.

Al Ghais stated: “Excellency, we, at OPEC, are very appreciative of your leadership role and exceptional wisdom,” adding, “I am confident that Angola will continue to play an important role in the global oil industry for years and decades to come.”

The Secretary General engaged with local and international media following the conclusion of the meeting. 

OPEC Secretary General meets with Minister Azevedo of Angola

As part of the mission to Angola, OPEC Secretary General, Haitham Al Ghais, and Dr Diamantino Pedro Azevedo, Angola's Minister of Mineral Resources, Petroleum and Gas, and Head of its Delegation to the Organization, held a bilateral meeting in Luanda. OPEC's Ayman Almusallam reports.

The meeting focused on discussions related to oil market developments and exploring possible avenues

to enhance the strong ties between the OPEC Member Country and the Organization.

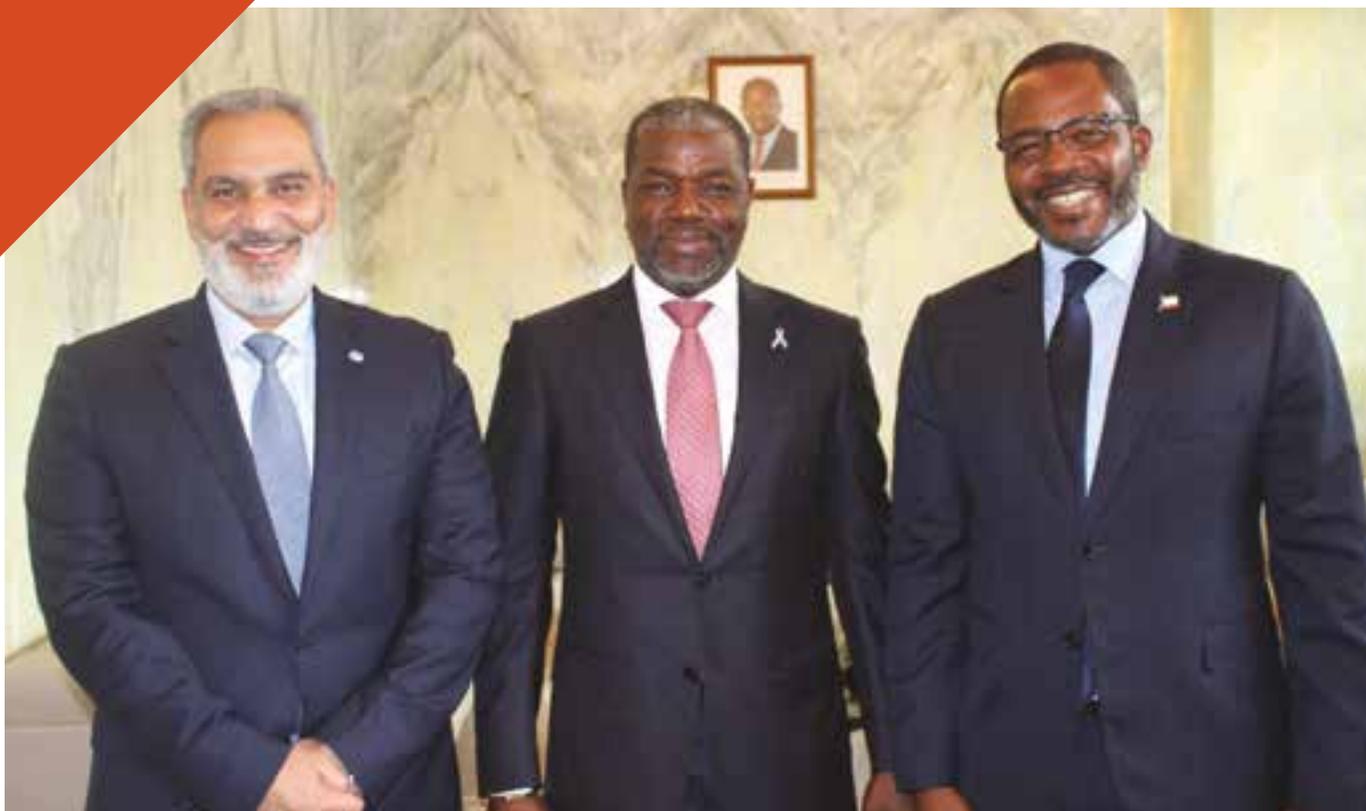
Estêvão Pedro, Angola's Governor for OPEC, attended the meeting.



Dr Diamantino Azevedo (l), Angola's Minister of Mineral Resources, Petroleum and Gas; with Haitham Al Ghais, OPEC Secretary General.



Dr Diamantino Pedro Azevedo (c), Angola's Minister of Mineral Resources, Petroleum and Gas; with OPEC officials (l-r): Ayman Almusallam, OPEC's PR Assistant; Estêvão Pedro, Angola's Governor for OPEC; Tona Ndamba, Chief Refinery & Products Analyst in OPEC's Petroleum Studies Department; and Haitham Al Ghais, OPEC Secretary General.



José Barroso (c), Angola's Secretary of State for Oil and Gas; with Haitham Al Ghais (l), OPEC Secretary General; and Gabriel Mbagha Obiang Lima (r), Equatorial Guinea's Minister of Mines and Hydrocarbons.

OPEC visits the new headquarters of Angola's Ministry of Mineral Resources, Petroleum and Gas

On the sidelines of the mission to Angola, OPEC Secretary General, Haitham Al Ghais, along with the accompanying delegation from the Secretariat, toured the new building and headquarters of the country's Ministry of Mineral Resources, Petroleum and Gas in Luanda. OPEC's Ayman Almusallam reports.

The tour was led by José Barroso, Angola's Secretary of State for Oil and Gas, and attended by Gabriel Mbagha Obiang Lima, Equatorial Guinea's Minister of Mines and Hydrocarbons and Head of its Delegation to OPEC.

Following a warm welcome by Secretary of State Barroso, Heads of Delegation took part in a brief photo session. The Delegations then visited the Ministry's various facilities and amenities, which are located across the building.

Among the highlights were the state-of-the-art meeting rooms with various capacities set for physical and online meetings, dedicated department for all services related to visa issues and the massive press room.

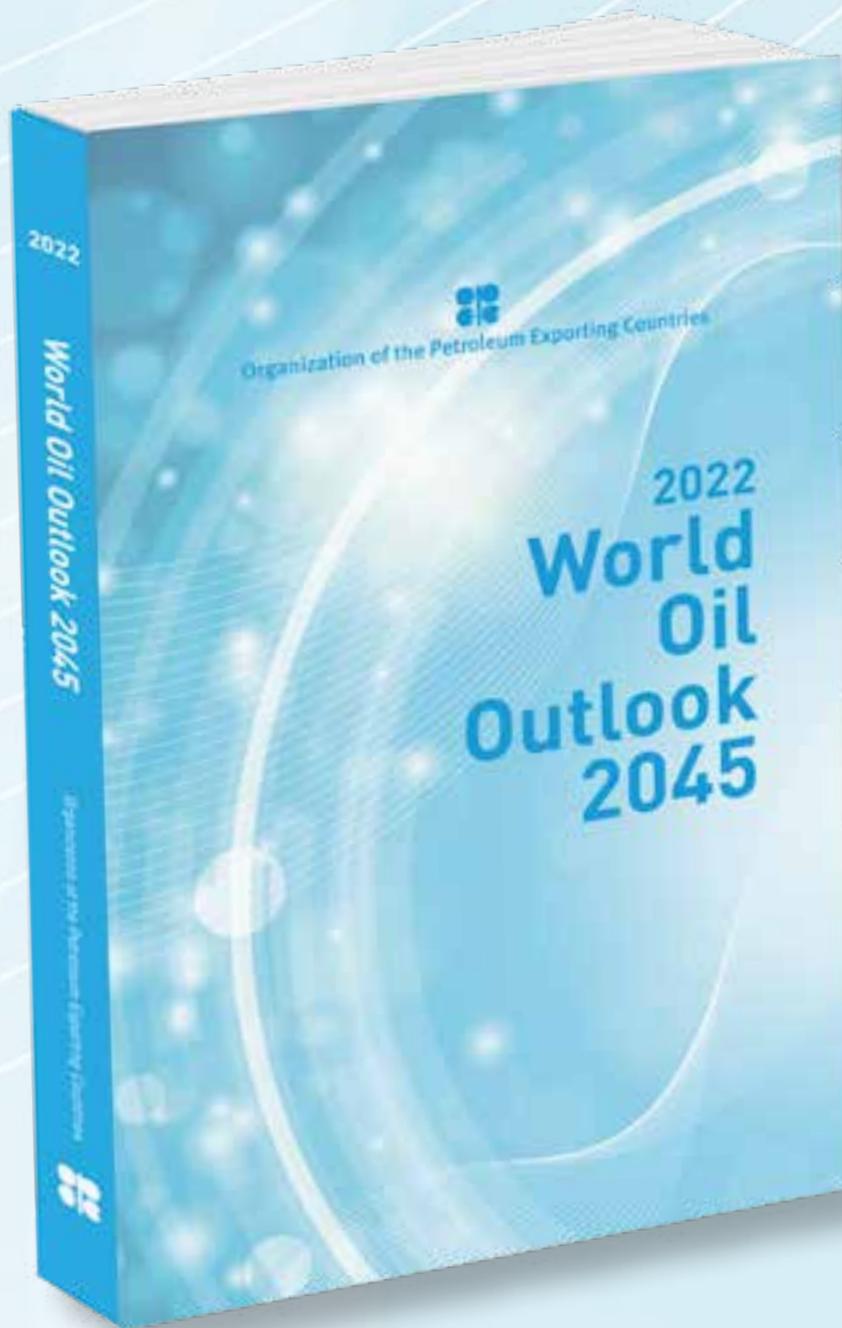
Given the importance of employees' welfare and health, the Ministry ensured that a number of entertainment facilities are available for its staff, including a modern fitness centre, rooftop restaurants, relaxing areas, among others.

The building was additionally decorated by various paintings and artefacts.

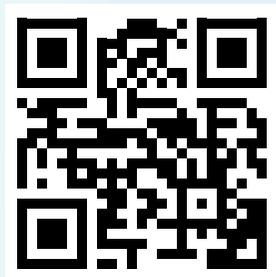
A press conference was held following the tour. It was attended by Minister Lima; Secretary General Al Ghais; Secretary of State Barroso; and Estêvão Pedro, Angola's Governor for OPEC.



One of the cultural artefacts seen on display in the building.



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OPEC, non-OPEC CoC participants convene for 12th Technical Meeting

On December 1, 2022, the 12th Technical Meeting of OPEC and non-OPEC oil producing countries participating in the ‘Charter of Cooperation’ (CoC) convened in Vienna and online to discuss the evolving dynamics related to economic growth and oil demand. The OPEC Bulletin’s Scott Laury reports.

The Meeting convened following the conclusion of the 138th Meeting of OPEC’s Economic Commission Board (ECB), which took place on November 29 and 30, 2022.

These technical meetings are held within the context of the CoC, a framework developed in conjunction with the ‘Declaration of Cooperation’ (DoC) as a means to expand platforms for cooperation and dialogue for the participating OPEC and non-OPEC countries of the DoC.

The meeting convenes twice a year to facilitate the sharing of insights and exchanging of views on oil market conditions and other key energy-related topics, with the goal of deepening mutual ties and understanding.

Special session

The 12th iteration of the meeting featured a special session with the theme: *Global economic growth and demand for oil: emerging from the COVID-19 pandemic.*

A panel of experts was invited to provide its viewpoints on the historical relationship between economic growth and oil demand growth in light of the ongoing post-pandemic economic recovery.

The experts’ presentations were centred on the various sectors of the global economy and how the demand for oil in these sectors may have shifted post-COVID, and to what extent this evolution may be structural in nature.

In his opening remarks, OPEC Secretary General, Haitham Al Ghais, noted that the historically close linkage between economic growth and oil demand growth had been impacted by the pandemic.

“The impacts of the pandemic on oil demand are still being closely examined. The lockdowns may have disconnected the historical co-relationship between oil demand and economic growth. The drastic drop in mobility in light of COVID interventions directly affected oil demand for an extended period, thus patterns deviated from what they were prior to the pandemic,” he said. “In fact, the pandemic led to both short- and long-term effects on mobility, with more people working from home and less business travel, along with the longer-term dampening of travel and tourism.”

Al Ghais added, however, that the jury was still out as to whether these shifts will become structural and long-lasting.

“It has become necessary to re-examine the issue of oil demand and how this relates to economic growth and whether changing circumstances brought about by sometimes severe mobility restrictions will become more permanent going forward,” he stated. “We will attempt in today’s meeting to uncover whether these changes are structural or temporary.”

A force for stability

In a separate session, delegates had the opportunity to discuss the ongoing implementation of the OPEC and non-OPEC DoC and its continued pivotal role in underpinning oil market stability.

The Secretary General, in his remarks, recognized the ongoing contributions of the DoC participating producers in helping to maintain stability in a highly volatile oil market beset by myriad uncertainties.

“Despite the dark clouds on the horizon, we continue



Participants of the Technical Meeting take time out for a group photograph.

our conscientious dialogues and cooperation at all levels in an effort to provide stability and balance to the market,” he said.

Al Ghais concluded by lauding the participating nations of the DoC and CoC for their ongoing staunch efforts in support of this pioneering framework in global energy cooperation.

“Our successes to date have, at their root, hard work, infinite patience and collaboration, values strongly displayed by our DoC and CoC partners over these past years. I want to congratulate these countries for achieving what they have so far in the face of considerable challenges,” he said. “Our contributions to market

stability during the crucial time since the beginning of the pandemic have most certainly shielded the industry, and indeed the world economy, from much more serious consequences. This cohesive group reached firm decisions regarding both the amount of voluntary oil adjustments and their duration and have shown flexibility and foresight in their actions. It will most certainly be remembered as an extraordinary time in OPEC history.”

“Our successes to date have, at their root, hard work, infinite patience and collaboration, values strongly displayed by our DoC and CoC partners over these past years.”

— Haitham Al Ghais, OPEC Secretary General

The 4th Annual Legal Workshop takes place in Vienna

*OPEC and the OPEC Fund for International Development (OPEC Fund) convened for the fourth edition of the Annual Legal Workshop at the OPEC Secretariat in Vienna. The OPEC Bulletin's **Scott Laury** reports.*



Haitham Al Ghais, OPEC Secretary General.



Leonardo Sempértegui, OPEC's General Legal Counsel.



Violet Onyemenam, General Counsel, OPEC Fund.

The Workshop was attended by the legal teams from OPEC and the OPEC Fund, in addition to OPEC Member Country legal experts, as well as invited speakers from global energy companies, international organizations and academia.

The OPEC Secretary General, Haitham Al Ghais, lauded the workshop, now in its fourth iteration, as an effective vehicle for enhancing cooperation between OPEC and its sister organization, the OPEC Fund, on regulatory and legal matters.

“Today, we will be building upon the solid foundation put in place over the course of our last three meetings, the latest of which was held about one year ago,” he said. “We have seen this workshop move from strength to strength as a highly effective forum for collaboration on key legal matters affecting both of our organizations.”

In remarks delivered to set the scene for the legal discussions, OPEC’s General Legal Counsel, Leonardo

Sempértegui, mentioned that the role of law and regulation is essential to ensure that the energy transition develops in a balanced way, taking into consideration both environmental and sustainable development goals.

The event took place under the Chatham House Rule.

Energy security and energy transition

Through three sessions, expert panelists addressed the legal and regulatory aspects surrounding the crucial issues of energy security, the energy transition, as well as the need to expand access to energy, particularly in developing nations around the world.

“These topics are both highly relevant and timely, as the world continues to navigate the parallel demands of providing energy security while also addressing climate change through a balanced and inclusive energy transition,” Al Ghais commented in his remarks. “At



The 4th OPEC-OPEC Fund Annual Legal Workshop convenes at the OPEC Secretariat.

the same time, these efforts must not preclude ensuring increased access to energy for all of the world's citizens.”

On the topic of energy security, it was pointed out that the ‘Declaration of Cooperation’ (DoC) has been instrumental in helping ensure stability and balance in the market during recent turbulent times as the global economy has continued to recover from the global pandemic and is now faced with rising inflation and a potential global recession.

“In terms of energy security, OPEC and its non-OPEC partners of the DoC continue to play a highly productive role in ensuring a steady supply of oil to its customers while promoting a lasting stability in market,” the Secretary General pointed out. “The high levels of volatility that the oil market and the global economy have experienced over recent months stem partially from unrealistic policies that advocate a swift transition away from fossil fuels.”

These policies, he added, are simply not a realistic option, and fossil fuels are in actuality forecast to play a key role in fueling economies around the world over the long-term horizon.

According to OPEC’s 2022 *World Oil Outlook (WOO)*, which was launched at the Abu Dhabi International Petroleum Exhibition and Conference on October 31, 2022, oil is forecast to retain the largest share of the

energy mix by 2045. Moreover, the combined market share of oil and gas in the global primary energy mix is expected to remain above 50 per cent to 2045.

In terms of demand, the WOO expects global energy demand to increase by 23 per cent, from 286 million barrels of oil equivalent/day (m boe/d) in 2021 to 351 m boe/d in 2045. These levels of demand mean that all energy sources will be required in the long term.

“Let me be clear, OPEC has always been a promoter of both sustainable development and efforts to combat climate change, but we need to have a balanced and inclusive approach,” Al Ghais stated. “We cannot simply choose one fuel over another. We must leverage all solutions to reduce GHG emissions and minimize their impact. With this in mind, and looking ahead, we will continue to advocate for a balanced, equitable and inclusive energy transition that leaves no one behind.”

The Workshop’s presentations and discussions centred on the various regulatory implications of these developments and how OPEC and its global partners of the DoC might best achieve an energy transition that is equitable, well thought out and adapted to the unique needs of its Member Countries.

The scourge of energy poverty

The Workshop also spent time exploring the highly



Staff of the Secretariat's Legal Office with (above l-r): Leonardo Sempértegui, General Legal Counsel; Dr Taiwo Adebola Ogunleye, Legal Advisor, International Matters; Beatriz Patiño-Skotton, Legal Advisor; and right (l-r): Khadija Umar, OPEC Assistant Legal Counsel; and Ricardo Gomez, Senior Legal Counsel, at the OPEC Fund.



complex regulatory aspects of energy poverty, which continues to be a pressing challenge in developing nations.

“We must not neglect the needs of the nearly roughly 733 million people who are still without access to electricity and the approximately 2.4 billion people who still have no access to clean cooking solutions,” the Secretary General said. “This is simply unacceptable.”

He went on to explain that during a recent trip to Africa, he took the opportunity to invite world leaders to elevate this issue to the top of their respective agendas.

“During my recent mission to Cape Town for *Africa Energy Week*, I extended an invitation to all world leaders to unite and mobilize their collective resources and political support to help reverse this tragic situation and bridge the gap between developed and developing countries,” he said. “I hope these world leaders will join OPEC in supporting the first-ever universal goal related to energy, SDG7, which seeks to ensure access to affordable, reliable, sustainable and modern energy for all.”

In this regard, he also took a moment to recognize the highly impactful projects being supported by the OPEC Fund around the world to help realize SDG7.

“Allow me to commend the OPEC Fund for the

excellent work they are doing around the world on this issue. They are making great inroads in supporting global efforts to achieve SDG7,” he stated.

The fourth edition of the Legal Workshop again proved to be a highly effective means to help foster deeper cooperation with the OPEC Fund on legal matters that are vital to both organizations, especially in light of the current challenges facing the energy markets.

“Together with the OPEC Fund, we continue to make great strides in enhancing our cooperation on legal matters that are pertinent to both of our organizations,” Al Ghais concluded. “In this regard, our efforts here today and in the future are geared to helping ensure that laws developed to regulate the energy industry or the energy transition are fair, balanced and inclusive.”

The fifth edition of the Workshop is scheduled to take place in the third quarter of 2023, and both organizations are already working on the topics that will be discussed. ■



L–r: Ken Koyama, Senior Managing Director and Chief Economist at the Institute of Energy Economics, Japan (IEEJ); Dr Ayed S Al-Qahtani, OPEC’s Director, Research Division; and Abderrezak Benyoucef, Head of OPEC’s Energy Studies Department.

Asian energy and oil outlook lays out future requirements

The 8th Technical Meeting on Asian Energy and Oil Outlook, held on November 10, brought together experts from several Asian countries in two panels to examine their current and future demand and supply picture.

OPEC’s Director of the Research Division, Dr Ayed S Al-Qahtani, said in his opening remarks that the event has become an integral part of the OPEC Secretariat’s calendar.

He stated that since its establishment in 2015, the technical meeting has become a regular part of OPEC’s growing energy dialogues with both consumers and producers.

“Asia is — and will continue to be — a major centre of economic growth, playing a fundamental role in the future of the energy industry, which makes this dialogue is extremely important.”

OPEC’s latest *World Oil Outlook 2022* released recently, shows that Asia-Pacific will be the world’s most important importing region until the end of the outlook period in 2045. The Director added that Asia’s local crude production supply will continue to fall and demand will continue to rise, with imports of crude and condensates in this timeframe projected to grow from 22.5 million barrels/day (m b/d) in 2021 to over 30m b/d by 2045.

“We are here as a solid and reliable energy partner, to help you meet the energy demand of your growing population and economics now and for many decades to come.”

With about 30 per cent of the global land area and nearly 60 per cent of the total population in 2020, Asia is the largest and most populous continent in the world,

said Dr Al-Qahtani. OPEC’s *WOO* sees the population growth trend for the region continuing, with knock-on economic effects; China and India alone will account for 37 per cent of global GDP in 2045. Primary energy demand growth in the same timeframe will rise by 23 per cent with India alone accounting for 28 per cent of this figure. This will have an effect on oil demand, which will increase by at least 24m b/d in the non-OECD.

The OPEC *WOO* also sees the overwhelming majority of growth in refineries to 2045 taking place in Asian countries and the Middle East.

Central and South Asia have seen great gains in overcoming energy poverty, continued Dr Al-Qahtani, with the number of people without access to electricity falling from 440 million people back in 2010 to 78m in 2020. However, 90m people in Asia and African who had access to electricity can no longer pay for their basic energy needs because of skyrocketing costs, due to the effects of the COVID-19 pandemic and geopolitical tension.

“Furthermore, the share of the population of Central and Southern Asia without access to clean cooking fuel did not change as dramatically in this timeframe. It only fell from 38 per cent in 2010 to 32 per cent in 2020, not yet accounting for the impact of the above-mentioned stressors.”

Having said that, 90 million people in Asia and Africa who had access to electricity can no longer pay for their basic energy needs due to skyrocketing costs in connection with the COVID-19 pandemic as well as geopolitical tension in Eastern Europe.

These facts will drive energy policy going forward. Thus, a foundation of collaboration and cooperation is essential in ensuring informed decisions lead to energy security of these key regions, he stated.

“Meeting the tremendous need for energy in Asia will require a strong and stable producer-consumer relationship going forward, based on transparent dialogue, along with knowledge and data exchange.”

Dr Al-Qahtani also mentioned investment, which is a major concern at the Secretariat. The 2022 WOO shows that at least \$12.16 trillion between now and 2045 is needed in the upstream, midstream and downstream to meet demand going forward.

“Instead of being able to recover from the massive loss of investment seen in the down cycle of 2014–16 and shortly after due to the COVID-19 pandemic, the industry faced new demands for a ‘green recovery’. This has included more stringent climate change criteria and calls to stop funding for new oil and gas projects. In light of the recent energy crisis, this is thankfully being re-examined, as countries clamour to meet their energy needs,” he said.

“We believe that part of the solution to addressing the climate change issue is ensuring that all countries’ energy needs are met in a sustainable manner and that each country can develop its solution to climate change depending on its capabilities and needs.”

Meeting sessions

The first session, entitled ‘Oil and energy market developments: drivers, challenges and long-term global outlooks

(Asian perspectives, key drivers and strategies)’ was moderated by Qahtani.

Head of the OPEC Energy Studies Department, Abderrezak Benyoucef presented the 2022 WOO, while Ken Koyama, senior Managing Director and Chief Economist at the Institute of Energy Economics, Japan (IEEJ), presented his Organization’s outlook.

The second session, called ‘Balancing energy security and the energy transition in the current geopolitical environment — an Asian perspective’, was moderated by Koyama and included speakers from China, India, Korea and Japan.

In the closing session, Dr Qahtani emphasized once again how helpful it is to hear the perspective from Asian colleagues.

“The concept of energy security has taken on a new urgency in the past couple of years, driven by pandemic and geopolitical-related instabilities, along with the increasing drive to address climate change at COP27 in Egypt. Asian economies will find their own unique ways to address these challenges, and we hope to keep abreast of these,” he said.

“Asia faces specific issues and has particular needs, which are of key interest to us in the Secretariat and within the OPEC family in adjusting our position going forward. Together we can ensure that the consumer-producer dialogue remains flexible, to adapt to any situation that may arise in the future.”



Freight ships in Singapore.



Delegates to the 8th Technical Meeting on Asian Energy and Oil Outlook, took time out for a group photograph.



Malaysia — reliable and dependable OPEC partner

*Malaysia has been a friend of OPEC's for many decades. It has played a critical role in the 'Declaration of Cooperation' since it was signed on December 10, 2016. As OPEC Secretary General, **Haitham Al Ghais**, recently received **Ikram Bin Mohammad Ibrahim**, Ambassador of Malaysia to Austria, at the OPEC Secretariat, the OPEC Bulletin's **Mathew Quinn** looks at the history of OPEC-Malaysia relations.*

Boleh spirit

OPEC attaches enormous importance to its blossoming relationship with Malaysia, a nation which has been an extremely valued member of the 'Declaration of Cooperation' (DoC) process. Malaysia is renowned throughout the world for the 'Boleh' spirit — a 'can-do-attitude' or working together in overcoming adversity. This spirit has been critical in the concerted efforts of the DoC participating countries in facing the challenges in the oil industry over the last six years.

Time and time again, the DoC participating countries have responded to the challenges they faced, including 2015–16 downturn in the oil market and the severe contraction in demand caused by the COVID-19 pandemic in 2020. After carefully reviewing market conditions, the DoC participating countries acted proactively and responsibly. The key element in uniting so many diverse countries behind the same goal, namely sustainable oil market stability, was, as they say in Malaysia — *berkerja sama* — a cooperative ethos, a togetherness.

The roots of the relationship between OPEC and Malaysia go further back than 2016. Officials from

Malaysia attended the 72nd (Extraordinary) Meeting of the Conference in Geneva in December 1984. Conference President Dr Subroto, also Indonesia's Minister of Mines and Energy, declared on this occasion: "This is a happy indication that some non-OPEC producing and exporting countries from the Third World are showing a greater degree of understanding and cooperation with us in our efforts to achieve market stability."

In April 1988, Malaysia was one of several non-OPEC countries that attended a joint meeting with OPEC to explore the possibility of joint action in light of market conditions. It also participated in January 1989 in a meeting of technical experts from OPEC and non-OPEC countries to discuss market developments. In April 1992, in advance of the Earth Summit in Rio de Janeiro, Malaysia participated in a ministerial meeting between OPEC and non-OPEC to discuss environmental matters.

The cooperation under the DoC was a manifestation of many decades of good relations between OPEC and Malaysia. The Secretary General was able to express OPEC's gratitude for this successful partnership when receiving Ikram Bin Mohammad Ibrahim, Ambassador of Malaysia to Austria, at the OPEC Secretariat. It is a relationship with a bright and promising future. ■■



Haitham Al Ghais, OPEC Secretary General, welcomes Ikram Bin Mohammad Ibrahim, Ambassador of Malaysia to Austria, to the OPEC Secretariat.



View of Kuala Lumpur, Malaysia.

OPEC, Japan hold technical meeting

The event culminates trailblazing efforts to expand cooperation between the Organization and a key oil-importing country.

Marking a major milestone in OPEC's outreach to leading oil-importing countries, the Secretariat hosted the OPEC-Japan technical meeting on November 14 with both sides underscoring the importance of enhanced cooperation.

The timing of the meeting between the OPEC Secretariat and the world's fifth-largest oil importer was significant. It took place as the United Nations COP27 climate conference was underway in Sharm el-Sheikh, Egypt, and six weeks before Japan takes the helm of the G7 group of advanced economies.

"This is a ground-breaking moment, and I am certain it will lead to a strong and enduring relationship between OPEC and Japan," OPEC Secretary General, Haitham Al Ghais, said in opening the technical meeting. He spoke via video link from Sharm el-Sheikh before returning to the COP27 discussions.

In his remarks, Al Ghais noted Japan's historic role in the global climate talks. "Twenty-five years ago, both advanced and developing nations gathered in Kyoto — a city that symbolizes global peace and environmental harmony — and pledged to reduce emissions," he said, adding that he congratulated Japan for its long-range plans to cut carbon emissions.

"At OPEC, we are fully committed to reducing our industry's carbon footprint, while at the same continuing to do our part to ensure a stable and sustainable energy supply for all nations," he added.

The Secretary General stressed the importance of OPEC's technical cooperation and dialogues with leading oil-producing and consuming countries, as well as key energy organizations. He drew attention to the shared benefits of these platforms.

"These dialogues have been welcomed by all participants as a way to strengthen awareness and mutual understanding when it comes to energy security and sustainability," the Secretary General said. "That is the bread and butter of what OPEC does."

"The dialogue process contributes to common understanding and an inclusive approach on a variety of energy issues," he added, "and put us in a much stronger position to understand the market and conditions affecting it. This definitely helps avoid unwanted volatility."

First steps

Japan is heavily dependent on energy imports to fuel its economy. In 2019, the OECD country imported around three million barrels/day (m b/d). Imports slumped to 2.4m b/d in 2020, the first year of the COVID-19 pandemic, and grew to nearly 2.5m b/d last year, making it the fifth largest importer of oil (after China, the US, India and South Korea), according to OPEC's *2022 Annual Statistical Bulletin*.

Japan plans to increase both nuclear and renewables to help reduce its dependence on imported coal. The country's target for 2030 is to reach a 20 per cent nuclear share in the electricity mix, according to the OPEC's *2022 World Oil Outlook*. This includes constructing new units, as well as restarting some of the units that were shut down after the Fukushima accident in 2011.

In addition, Japan intends to increase the share of renewables in its energy mix by up to 38 per cent by 2030, up from around 23 per cent currently. This includes major investments in offshore wind and solar.

Given its important ties to OPEC Member Country suppliers, enhancing cooperation with Japan has been a priority of Al Ghais since he became Secretary General on August 1 of this year. He has engaged with senior Japanese officials on the sidelines of two major events — the G20 Energy Transition Ministerial Meeting in Bali, Indonesia, in early September and the Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) in Abu Dhabi in early November. These meetings have helped lay the groundwork for holding the technical meeting.

During the November 14 technical meeting, Dr Ayed S Al-Qahtani, Director of OPEC's Research Division was joined at the OPEC Secretariat by Kikuchi Nobuyuki, Director of the Resource Security Division, in the Japanese Ministry of Foreign Affairs, and other Japanese officials. Hasegawa



Night view of an oil refinery in Yokohama, Japan.



Delegates to the OPEC-Japan technical meeting, held on November 14 at the OPEC Secretariat.

Yuya and Watanabe Masashi, Directors from Agency for Natural Resources and Energy in the Japanese Ministry of Economy, Trade and Industry, as well as experts from Japan Organization for Metals and Energy Security (JOGMEC) joined via video link.

Dr Al-Qahtani pointed out that the Asia-Pacific is the world's leading oil-importing region and cited Japan's global economic prominence.

"This underlines the significance of today's meeting and the importance of a strong and stable producer-consumer relationship going forward," he said. "Furthermore, this platform allows us to significantly enhance our knowledge base about the growing and changing needs of Japan and indeed the entire Asia-Pacific region."

He further noted that OPEC's long history of dialogues with multiple stakeholders contributes to global energy security, stability and supply sustainability. "Our regular meetings and interactions with other leading oil-producing nations and major consuming countries demonstrate our enduring commitment to enhancing producer-consumer dialogue, while also creating opportunities for the exchange of data and energy outlooks," he said.

Japan's commitment to dialogue

Kikuchi Nobuyuki, who addressed the meeting following Dr Al-Qahtani's remarks, drew the rapt attention of the participants by delivering a few opening lines in Arabic. Then, switching to English, he underscored the importance of technical dialogue.

"Cooperation and technical dialogue are needed more than ever before," he said, stressing that cooperation can help address the current energy challenges while also enabling a smooth energy transition.

"Accessibility to affordable energy is a basic human need," he added, noting that fossil fuels remain an important part of the energy mix. He also stressed the importance of working with OPEC to help address global energy needs.

Experts from OPEC and Japan made presentations during the technical meeting. OPEC's Petroleum Studies Department provided a synopsis of the short-term oil market outlook while the Energy Studies Department offered an overview of latest *World Oil Outlook*, which was released at ADIPEC on October 31.

Japan's ambitious energy plans

Hasegawa Yuya and Watanabe Masashi presented an overview of the country's energy plans, consumption patterns and its strategy for cutting greenhouse gas emissions by 46 per cent from 2013 levels by 2030 and achieving carbon neutrality 20 years later. Though the country projects oil demand beginning to fall by around two per cent/year, Japan is expected to remain a key oil importer.

In addition, the presentation focused on Japan's initiatives to take a leading role in the development of both hydrogen and ammonia as zero-emission fuels while emphasizing importance of the realistic energy transition toward net-zero society in Asia and the world.

All the presentations prompted a number of questions and a lively discussion, underscoring the importance of having such technical exchanges.

In wrapping up the meeting, both sides agreed on the importance of technical cooperation; improving data sharing, including through institutions such as the Joint Organisations Data Initiative (JODI); and the potential for exchanges of experts. They also affirmed the importance of regular staff consultations and high-level discussions such as those carried out in Bali and Abu Dhabi by Secretary General Al Ghais, and senior Japanese representatives.

In closing the meeting, Dr Al Qahtani praised Japan's "pragmatic and practical energy transition plan" and stressed the importance of continuing to engage with Japan during its G7 presidency in 2023 and beyond.



Long-serving OPEC employees recognized



OPEC Secretary General, Haitham Al Ghais, honoured 38 OPEC Secretariat employees during the Long Service Award Ceremony on December 14, 2022. The Hilton Vienna Park Hotel — festively decorated for the year-end holidays — provided a backdrop for the ceremony and buffet lunch. It marked the first time since the onset of COVID-19 that the ceremony was held for Category II employees who have achieved career milestones — ranging from ten to a remarkable

40 years of service — for 1919 to 2022. In opening the event, Secretary General said it was “a special privilege to pay tribute to the Secretariat’s staff whose unique qualifications and vast institutional knowledge are not only admired and appreciated, but irreplaceable.” The award was introduced by the 102nd Ordinary Meeting of the Board of Governors in February 2001 and is granted for every five years to staff beginning with their tenth year of service. 



Awardees with 10 years of service.



... 20 years of service.



... 15 years of service.



... 30 years of service.



... 40 years of service.

OMV boasts world-class virtual reality training programme

Built up over time, the visionary training programme at OMV's Schwechat Refinery near Vienna, Austria minimizes money and staff hours lost by training new employees in a safe environment where consequences aren't serious. The OPEC Bulletin's Maureen MacNeill reports.



An apprentice learns the ropes at OMV's Schwechat refinery via virtual reality training.

The task: to manage a unit that shows fluctuating pressure readings, which can indicate a pressure problem, and thus avert a bigger issue. The solution: with guidance, find the valves that need to be opened/closed and machines that need to be turned on/off to regulate the situation. The pressure cannot be turned off in one unit until another nearby unit is running to take over the task.

Christopher Schmid, OMV Expert Operator and Apprentice Trainer and Erich Brodmann, a consultant and retired OMV employee who was behind the planning and development of virtual reality (VR) training in the company from its onset are on hand to make suggestions. "Try the valve at the bottom ... now the one on the main exit pipe," says Brodmann, calmly relaying instructions. The equipment is making a choked and distressed sound, rendering it even more realistic. I squat, twist to find the valve and turn it, a green hand indicating the action is taking place.

Wandering through the virtual world inside of the VR head gear, I am assured the design and layout are identical to the actual refinery, built up through photos taken and parameters entered over time.



Simulation of inside elements for an upcoming OMV project.

I feel my heart rate climb slowly, as the problem resists being solved easily. After trying a few manoeuvres, the display still shows something is out of order. This is combined with a light dizziness as my physical form adjusts to the feeling of being disembodied and floating in space.

“Do you feel OK?” asks Brodmann after a few minutes. With an affirmative, the process continues until the problem is solved, which takes several minutes. The experience is so close to the real thing that the feelings of searching for an answer, trepidation at not finding one and finally solving the problem are close to what they would be in a real situation. The big difference is that failure to solve the problem does not lead to real damage.

Hands-on training

Two trainees are in the room throughout the visit, either practicing modules or observing. Kevin Weinhönig, 16, and Michael Lackner, 24, both speak highly of the VR training.

“When I was in the training centre, it was easy to understand,” says Weinhönig. “How to open a valve, what is in the cupboard. Theory is good and useful but when you’re out in the plant you need to know what to do.”

“If it’s only theoretical you have to search for things,” adds Lackner, who says he has already completed 29 of 30 modules. “This way you know the routine and the work better. It’s safe, nothing can happen. You learn what you do wrong.”

His first time ‘inside’ the VR simulator helped Weinhönig to better understand what to do in the field, “You can try everything ... you have a more secure feeling outside,” he says, adding that he can only manage an hour at a time using the VR machine. VR training can sometimes cause nausea.

“Once you get used to it, it’s ok,” chuckles Lackner.

The two trainees work together, in a peer-to-peer apprenticeship approach, teaching each other, says René Reich, Team Lead Operator and Apprentice Trainer at the plant. “It also helps them to repeat.”

About 800 people work at the Schwechat refinery plant, which is near the Vienna International Airport, with

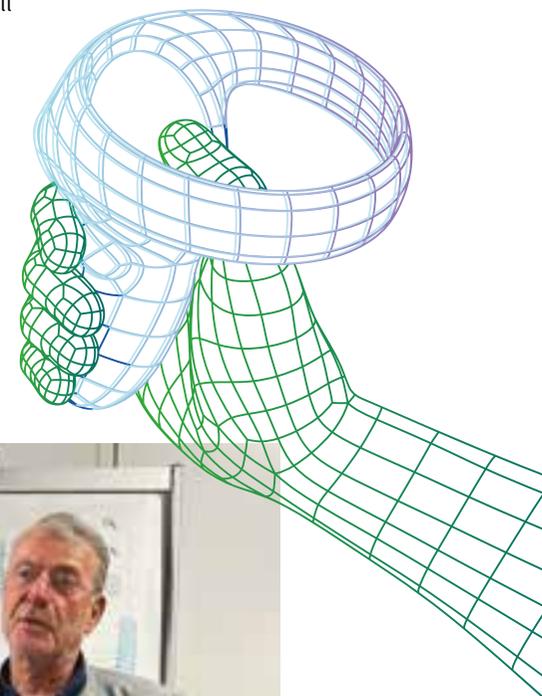
about 500 who work in the refinery itself requiring the training, says Reich.

The two young men will eventually be able to make rounds of the site independently and look for problems, which must then be reported.

“When there’s nothing, it’s better!” laughs Lackner, adding he likes the work because it’s very interesting and technical.

The training consists of 3.5 years in total, and both Lackner and Weinhönig have completed their first year. Only after the training is complete will they be allowed to monitor the grounds without accompaniment.

Brodmann states in a presentation he gave at an OPEC workshop in June of this year that the VR training can improve safety, save money, avoid shutdowns, and lead to a large and safe reduction in training time. The training is open to apprentices and new entrants, as well as process engineers, distributed control system (DCS) operators, maintenance and other interested people, he says.



Erich Brodmann, a consultant and retired OMV employee who was behind the planning and development of virtual reality (VR) training in the company from its onset.

He adds that the system leads to employees having more initiative, networked thinking, reaction capacity, flexibility, calmness in a crisis, experience and expertise and the ability to work in a team, among other things.

“We try to give more and more back to the company. It’s not just a game,” states Schmid, who is part of an OMV legacy — his father and grandfather both worked for the company. Schmid is the successor of Alfred Kellner, who was a 3D co-developer and trainer from 2006 to 2020.

Back to the beginning

Brodmann explains that massive digital developments began in the oil industry and the refinery sector in the early 1980s. He began to see virtual environments as a digital enabler of the next decade for the energy sector

and feels lucky to have been on the ground floor of these developments.

The first important steps included the installation of thousands of new digital measuring points in refinery plants, and a change from pneumatic to electronic controllers. The next radical change was the purchase of DCSs instead of many individual controllers mounted on a large panel.

This enabled the operation of the refinery through digital systems and allowed for the automatization of many things, such as temperatures controlled by analyzers, for instance. On top of this came computer system optimization.

Brodmann — who led all plant simulator training

projects, developments and upgrades between 1997 and 2018 — likes to say that DCS and optimization systems are not complicated but complex. He additionally led the individual operator training from 2000 until the end of 2018, for a total of 800 training days, 500 operators, and 3,500 staff days.

It all started in 1996, when Brodmann’s boss came to him and asked him to build a simulator for fluid catalytic cracker (FCC) operators because it was very complex and suffered regularly from crashes.

“None of us knew what to do, but we did it,” says Brodmann. From 1997–2000 the FCC simulator was developed, from 2003–05 the oil distillation project and from 2008–10 the ethylene plant plan. By 2000, simulator training was being offered for FCC/gas concentration unit (GCU) DCS operators. The training was very successful, with a cost of \$2 million per simulator.

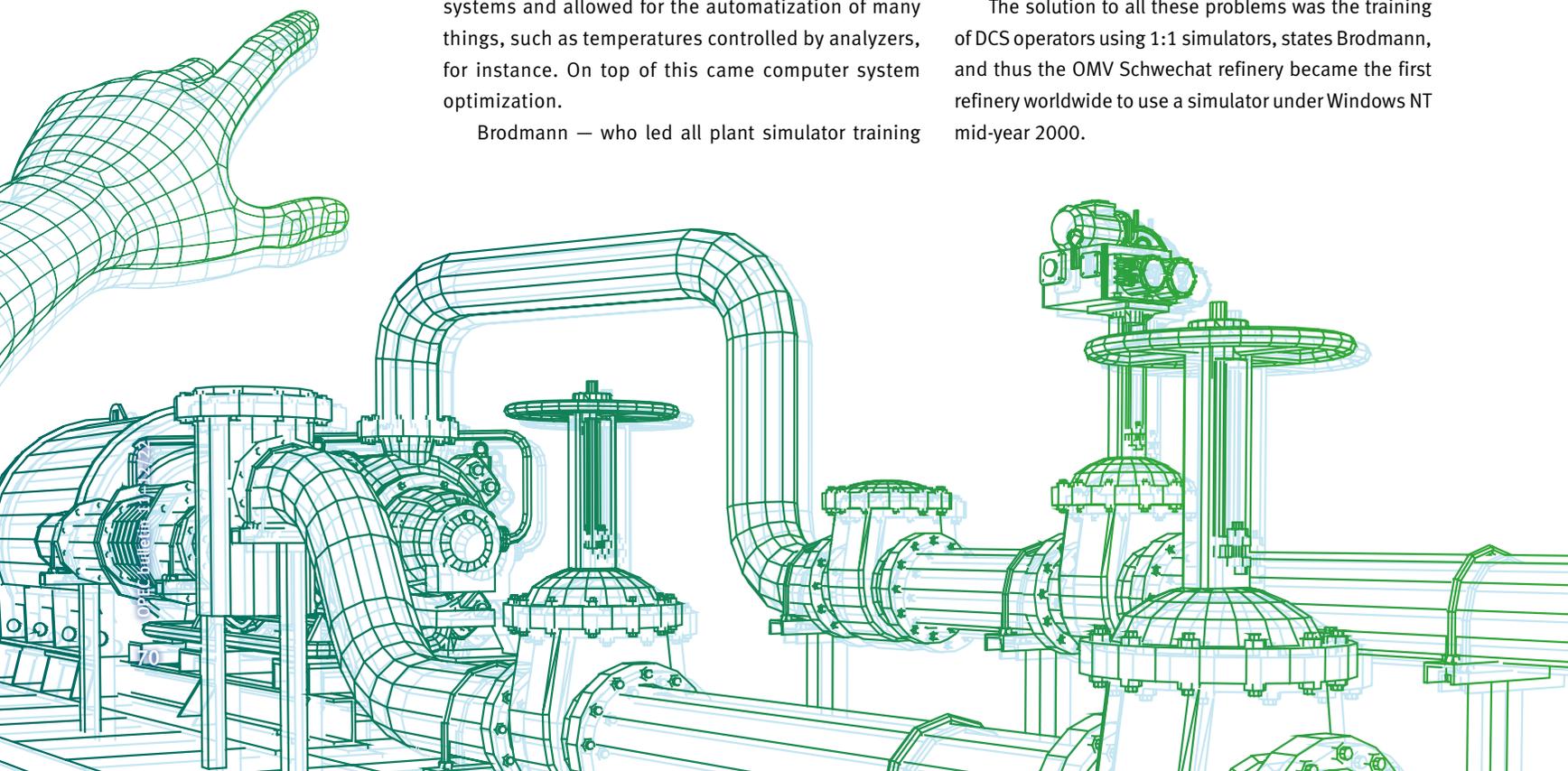
One plant is equipped with 5,000–30,000 measuring and tapping points, states Brodmann. In general, a refinery plant is controlled by four values: flow mount, pressure, temperature, and level, he says, adding that one operator has to control up to five different refinery plants in one DSC system today.

However, optimization has its own challenges and led to new questions, such as what happens in a crash and how does the operator know how to handle such situations? Safety training was also an issue, as safety standards continue to rise exponentially. In addition, the economic benefits of a plan are essential — one plant shutdown for 24 hours can cause the loss of millions of euros, excluding damages.

The solution to all these problems was the training of DCS operators using 1:1 simulators, states Brodmann, and thus the OMV Schwechat refinery became the first refinery worldwide to use a simulator under Windows NT mid-year 2000.

His first time ‘inside’ the VR simulator helped Weinhönic to better understand what to do in the field, “You can try everything ... you have a more secure feeling outside.”

— Kevin Weinhönic, apprentice at the OMV plant in Schwechat



Young pioneers

OMV was lucky to have had a pioneering colleague — Franz Grion — who got the idea for VR training while watching 3D virtual environment animations in a cyber-café in the Netherlands in 1996. His thought was to create a training tool for young people.

Grion determined that it would be possible to train refinery field operators in a similar setup to what he had witnessed. He, Alois Mochar and refinery CEO Hans Kaltenbrunner contacted Linz University Austria and Ars Electronica Linz regarding feasibility. From this sprang a study involving OMV and the University with Silicon Graphic. The high-performance graphic engine Onyx, which models complex scenarios, turned out to be the perfect base.

“They showed us our project, it was possible to get through a turbine in 3D, we saw this for the first time in 1996,” says Brodmann. At the time, Onyx was the most state-of-the-art graphic machine; it was also being used for high-end animation in films like Jurassic Park.

“When it started we had flight helmets from jet pilots in the USA. We could use the system for three hours, then it crashed and we had to send it back. Today it’s easy to get 3D glasses!”

Glasses and controllers are now exchanged every three to five years, adds Reich. “They were very expensive at first and now top-level glasses for VR cost approximately €1,000.

Roland Holm was one of four students from the University completing degrees focusing on the OMV system. He is now the owner of the company that runs its upgrading and further development — Phenomatics — which the four started upon graduation in 2003. Phenomatics specializes in the development of computer-based 3D simulation and safety training for industry and was also co-creator behind the VR system.

The training migrated to Windows in 2003 and new training scenarios were created, together with Phenomatics. Since September of that year, it has been part of safety training at the refinery. Today the system is called SAVE (Safety Virtual Environment).

As a result of the project, Phenomatics received an Innovation Award Austria the same year. Thus, seven years after conceptualization, 3D field operator training began in 2003, with great success.

Recognition didn’t stop there. SAVE was awarded a ‘Good Practice Commendation’ by the European Union’s Agency for Safety and Health at Work in 2006, which



René Reich demonstrates the virtual reality training programme.

recognized the positive contribution that OMV and the Schwechat Refinery are making to promoting the occupational health and safety of young people.

“With backup software, we can run the simulator, we don’t have to programme it like we did in the past. We tell the machine what to do and it creates scenarios around that,” Schmid says.

“We will never stop developing it, it is the future,” adds Reich.

Possible applications

The 1:1 field training is very useful in allowing apprentices to walk through the grounds and conduct their future job virtually. They practice what items to take on rounds and how to check equipment in the field. They also learn how to solve basic problems.

Trainees can start and stop pumps, control valve capacity, move valves for flow control and see the inside of a distillation column to know how it operates, for example.

“The main use is to rehearse for maintenance,” states Reich, adding that 15 basic modules have been

developed to help provide an understanding of internal functioning. Brodmann explains that modules change as needed.

Trainees go through the modules twice and training is blocked off in weeks. “With (COVID-19) we need to catch up with both old and new trainees,” says Reich.

The first modules can be done alone because they are quite simple, but “when they are complicated, we are with them,” he explains.

The apprentices — who usually come from high schools, polytechnic schools or colleges — gain the chemical and technical basics in their first year of training. When they are finished with the first modules, they go into the plant and start in the workplace, says Reich.

One of the trainees steps into the simulator and is sent to start up the small refinery. He comes to work, puts on safety clothes, and removes a dangerous object in the way. The simulator shows which safety gear is necessary and what is not allowed, along with the dangers in the vicinity.

“Exactly like in reality,” says Brodmann, stating the crude plant is 1:1 in sync with the VR programme. The student puts out a fire. “Every student has to learn how to put out a fire and how to work with the fire department,” he says.

Then the trainee goes to the distillation column, where internal functions and processes are visualized. The various products, from the light



Maureen MacNeill, reporting for the OPEC Bulletin, tries out the virtual reality equipment on site.

gasoline on the top to the heavier products below, have different colours for identification purposes.

The column level is increasing because the trainee forgot to open a valve. He can see the problem in the column and is talked through how to fix it. A stripper is then shown using steam to make a cleaner separation of products.

“Now he’s inside the furnace. If the oxygen level is not properly set, it shows a dark orange flame and is smoking,” says Reich.

If the student changes the grid, there is more (blue flame) or less oxygen content, continues Brodmann, having a look at the analyzer. “This is very important because crude furnaces burn 8,000 cubic metres of gas per hour. If a furnace has one per cent more or less oxygen, it can save a lot of money, which is a big point in a refinery.

“If it has the optimal setting, it is performing best and this reduces emissions and cost.”

Next the student goes to a heat exchanger, the internal workings of which are clearly shown through animation, with a product coming in one side and cooling water the other. Flow directions are also indicated.

At the compressor, the control panel is to the left. The oil pressure and product pressure are clear to see, and the compressor sounds realistic.

“He’s trying to solve the problem. The pressure is blocked inside ... maybe the valve is blocked?” says Reich. An instrument indicating megawatt hours shows a drop when the compressor is turned off. The student shuts valves off one-by-one to try and solve the problem.

“There is a spill, he shouldn’t touch it,” states Reich. “He should start the other pump and shut this one.” The student then pushes a service wagon to a pump to conduct a servicing.

“With the wagon he can make a complete pump service. This can increase the understand-

ing of the context,” states Brodmann, who praises the students when they do something well.

The student is walked through how to shut off the pump by locating the off switch. When everything is in order, he restarts it step-by-step. Open the valve, apply pressure, check pressure, pumping, see if it works.

Reich states that if it is packed with sealing oil and the gasket doesn’t work, that it should be pumped out.

The student tries this, but the motor has too much pressure. He must then shut off one pump, but first has to turn on a second one and ensure it is stable. Next comes the adjustment of different valves, and finally he can go back and turn the other pump on.

Under pressure

“You feel pressure when it doesn’t work out,” says Brodmann.

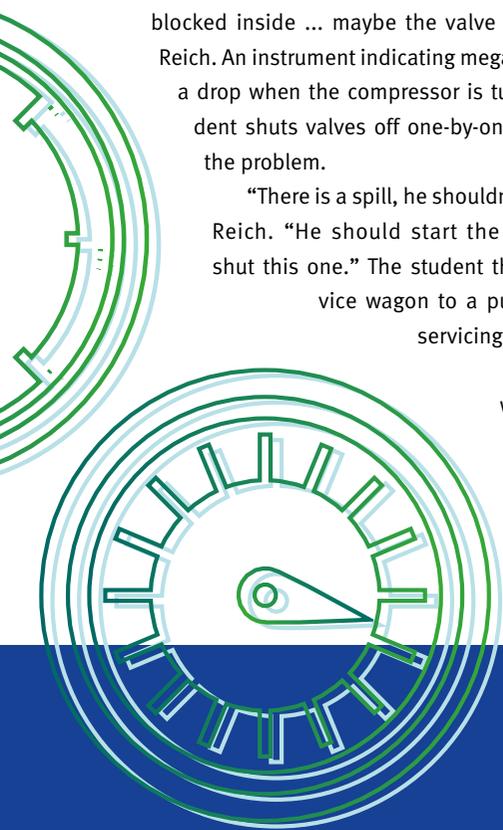
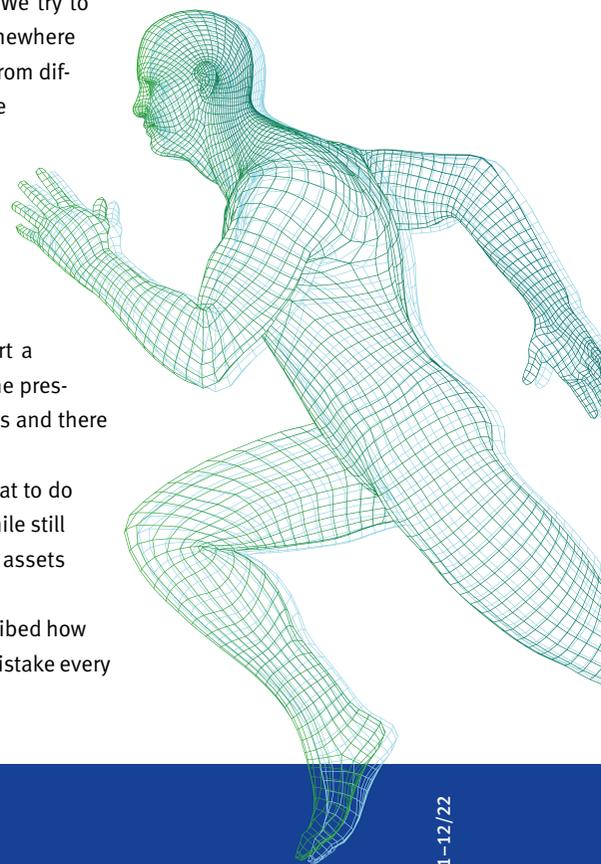
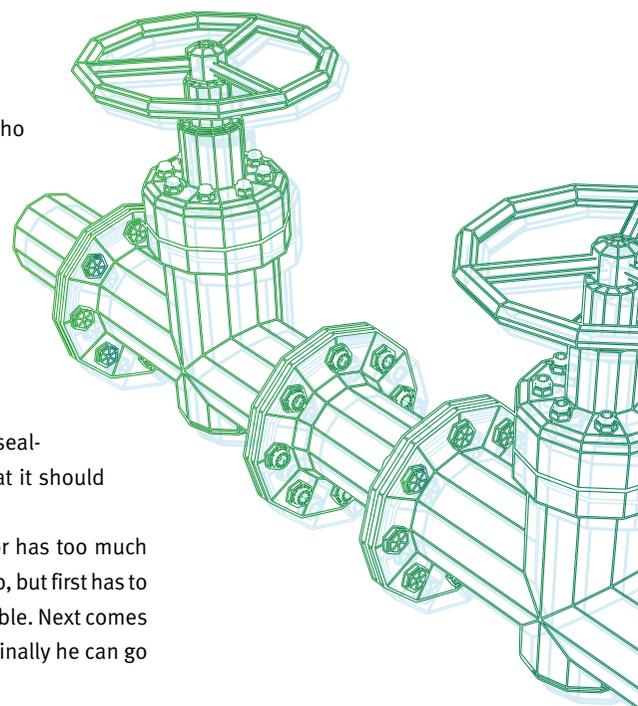
“You learn not to panic,” says Reich. “We try to implement equipment we have in reality somewhere in the refinery. All the equipment we see is from different plants, and is in use in the refinery,” he adds.

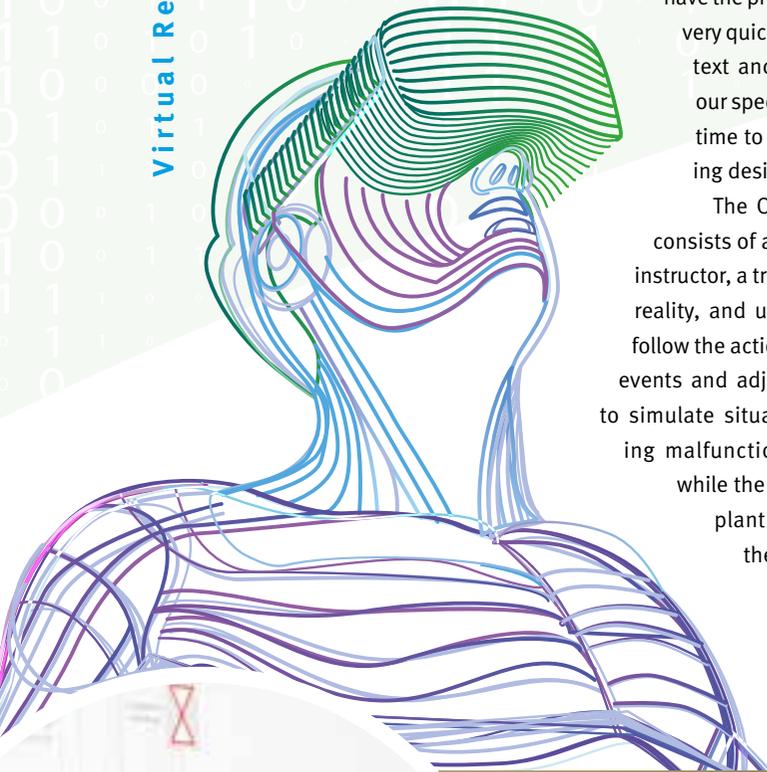
“I don’t think too many refineries have training simulators. Most have 3D models, that’s not new to refineries, but they’re not used much for training.

“We see everything from a simulated point of view. In our simulators if you start a pump, you switch a button, you really see the pressure flow, the valve moving, increasing amps and there is sound. It’s very detailed.”

Another goal is to train operators on what to do during hazardous operational situations, while still ensuring the safety of all the people and assets involved, Brodmann states.

“I had a friend at Austrian Airlines who described how flight simulators work. There can be a new mistake every day,” he said.





His friend explained that if there's an airplane crash, pilots must use a checklist, but "we have the philosophy to master crashes very quickly with recognition of context and performance caused by our specific training. I spent a lot of time to develop this special training design."

The OMV virtual training setup consists of a simulator operated by an instructor, a trainee who moves in virtual reality, and up to five co-trainees who follow the action. The instructor can start events and adjust values in every detail to simulate situations in a plant, including malfunctions such as shutdowns, while the trainee has to operate the plant with joysticks to handle the simulated situation. The spectators assess whether the trainee is doing the job properly, offering advice along the way.

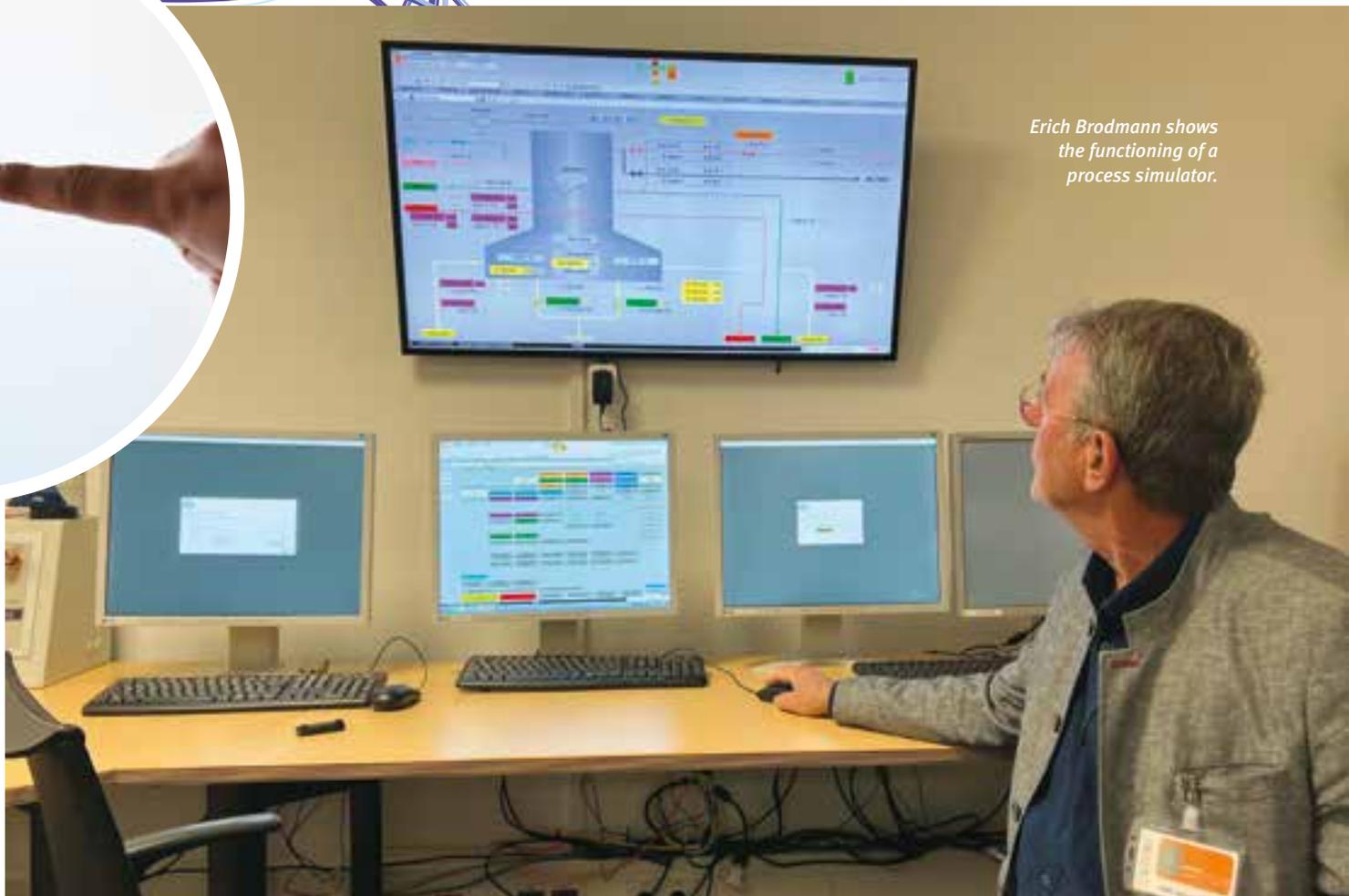
Trainee mistakes are welcome, says Brodmann, because it is best to learn from blunders without any hazardous impact.

Brodmann concludes that implementation of the simulators can reduce system safety issues to a minimum, while at the same time achieving economic advantages, including resource optimization.

Further applications

Another application is planning future projects, explains Schmid. For example, the ReOil© project is currently under development and aims to convert plastic waste back into oil. OMV could use VR to examine the functionality of the project. "They came to the conclusion that a small pipe was not supported well and would swing in operations," states Brodmann, allowing the error to be corrected in the plans before the plant is built.

OMV staff can put projects in and do 3D model take-offs, says Reich. "We can have a 30 per cent, 60 per cent, 90 per cent complete 3D model, then we can see where lines are crossing each other, we can see where we need to adjust placing, etc.



Erich Brodmann shows the functioning of a process simulator.

Schmid refers to a physical model of the refinery outside the door of the training room. “That was how they planned a plant in the 1970s (with a floor plan) and this is how we plan one in 2022. We work to get more and more information about the inside,” says Reich, as the model becomes more complete.

“This is really early, but those who will operate ReOil© can try to get familiar with their surroundings ... so when the plant starts next year, they will know how to run it.

“It will recycle used plastics down to their main molecules using chemicals, says Schmid.

Growth and development

The OMV Group continues to explore, expand and look for more training opportunities. This led to combining the DCS simulators with the SAVE 3D simulator, for which Brodmann and three colleagues received a patent. Experts from different systems need to connect, he adds.

Brodmann and Schmid take us to another part of the building, where there is a process simulator for a crude

plant, FCC unit and ethylene plant. The FCC has 7,000–8,000 points of measured data, the crude plant 8,000 and the ethylene plant 15,000.

These rooms include a lot of screens, keyboards, mice, electronic boards for minutes clocked and training performance, along with flare monitors and radios, while plant drawings and photos show every detail. Then there are the famous monitoring boards with red emergency buttons.

A lot of things can happen in units to destabilize them, including power loss, steam and water outages, or outages of the gas used to run the ovens, Brodmann adds. Those are the easiest problems to manage.

The operators work in teams, and if one has a problem and has to reduce operations to 50 per cent, other operators in different parts of the same plant have to reduce at the same time for safety reasons.

“Sometimes you can quickly solve a problem and sometimes not.

“It’s hard to decide when to push the red button,” says Brodmann. “There will be a lot of questions. If you do push the button, a decision is made and the next steps are well-known.”



Participants and trainers in OMV’s virtual reality training programme at Schwechat refinery, joined by members of the OPEC editorial team. Front: Herwig Steiner; middle row (l–r): Erich Brodmann, Maureen MacNeill, René Reich; back row (l–r): Michael Lackner, Christopher Schmid, Kevin Weinhönig.

OMV Centre of Excellence a fascinating look at the underground world of oil

*OMV, Austria's largest oil and gas producer, has built the Innovation and Technology Centre among the softly rolling landscape and windmills north of the Austrian capital of Vienna, near Gänserndorf. The Centre, located in the middle of one of Europe's oldest oil-producing areas, tells the story of the company's oil and gas production, past and present, in a compelling way, including an exciting trip to a virtual underground. The OPEC Bulletin's **Maureen MacNeill** reports.*





Innovation & Technology Center

As far as the eye can see there are farmland, grape vines, windmills and pump jacks. Here energy meets nature in a harmonious dance. The only sound, besides bird song, may be the distant humming of a windmill.

It's hard to imagine that the area is ground zero for the country's oil production, but it remains so today. While nearly 100 years ago the Weinviertel was only a centre for oil, now there is also gas, wind and photovoltaic (PV) — in fact one of the largest PV system in Austria is located here, generating 14.25 GWh of CO₂-neutral electricity, which is distributed to OMV for its own production facilities.

Twenty kilometres from this site, OMV came to life in 1956, after WWII when Austria regained its sovereign rights. In 2021, the company has a turnover of €36 billion and produced 486,000 barrels of oil equivalent/day (boe/d) of hydrocarbons and products, with an annual refinery capacity (from three refineries in Europe) of about 500,000 boe/d and 22,400 employees globally.

“Our reservoirs last and we know how to exploit them,” says Reinhard J Oswald, Senior Vice-President of Operations, to a group of 13 students participating in a joint OPEC-City of Vienna training course called the Vienna Energy Scholar Programme. Oswald is responsible for branch offices around the world, except Romania and Malaysia, which have their own teams.

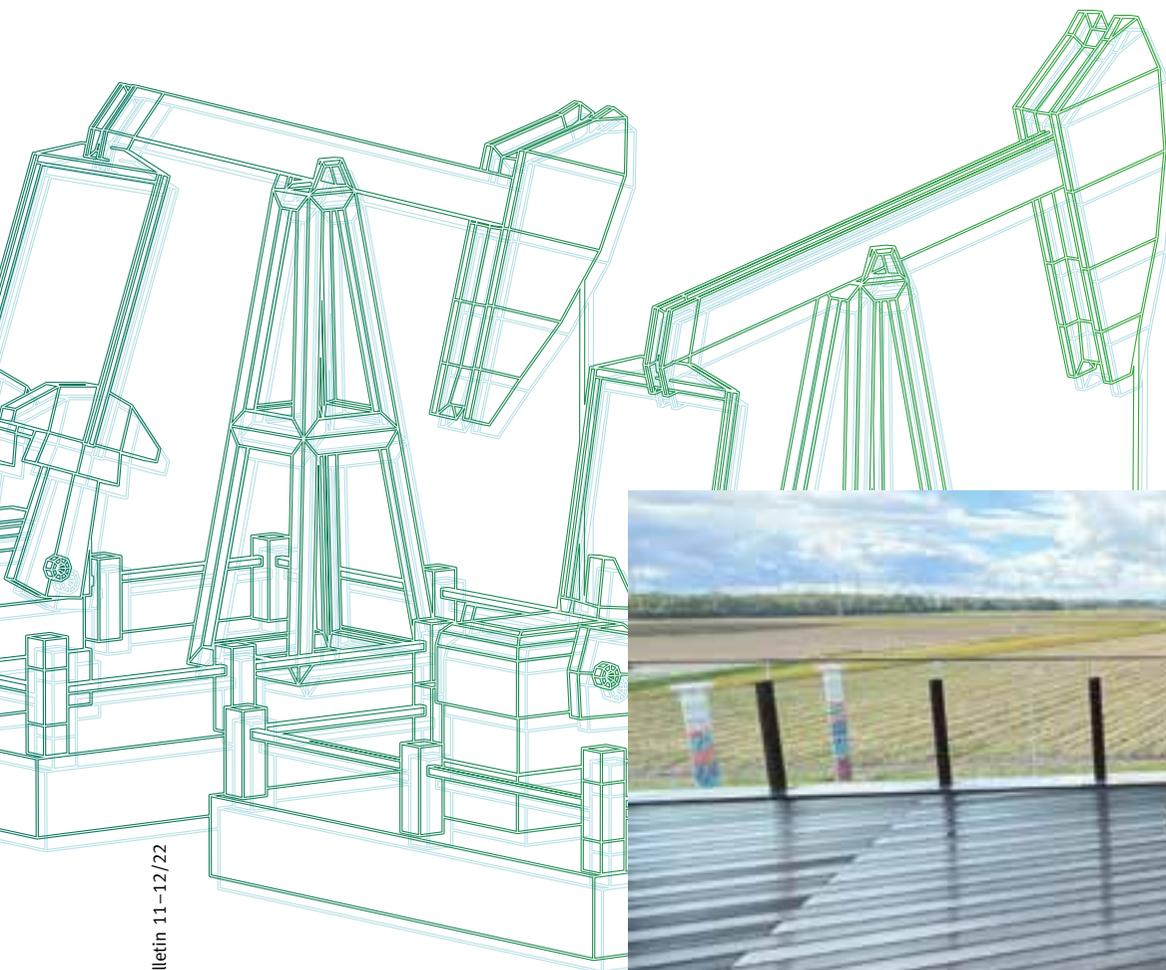
According to its website, the company is one of the most efficient operators of mature fields in the world, producing 30–60 per cent of available oil using the latest technologies in the fields of salt water management and directional drilling, along with enhancing feed pump service life.

Historical timeline

OMV was founded about two decades after first oil was located in 1934 at Gösting 2, where 40 tons of clean oil was produced.

In 1945, the Soviets took over oil production in the country, and in 1949 the largest oil field in Europe — the Matzen field — was discovered, which became the main oil resource in the Vienna Basin. The development of this discovery brought oil production in Austria to a record high of 3.6 million tons in 1955.

As a consequence of the Austrian State Treaty, signed in Vienna on May 15, 1955, all Soviet operations were handed over to the Republic of Austria, and OMV was formed the next year. By



this time, oil demand in the country was being completely met by local production.

The year 1960 saw the company open the Schwechat refinery near Vienna. A few years later, in 1968, OMV completed its first natural gas contract with the former USSR and in 1974 developed the first Europe-wide underground gas storage facility.

In 1983, Zistersdorf Uebertief 2A became the deepest borehole in Europe, drilled at 8,553 metres.

The company opened its first filling station in Vienna on June 26, 1990. By the end of the 1990s, activities in the Matzen oil field picked up again and exploration intensified to areas over 4,000 metres deep.

Meanwhile, in 2003 the largest oil discovery in Austria was made in 25 years. The Erdpress 1 exploration well uncovered an estimated 4.5 million boe of oil and gas resources. More significant gas resources were discovered in the Vienna Basin just two years later.

By 2010, the company was seeing its highest production since 1980, with 15.4m boe annually, after 60 years of production.

In 2015, a new plant extraction station in Matzen was started and a new, state-of-the-art, environmentally friendly salt water treatment plant called Schönkirchen was commissioned.

The company launched the largest 3D seismic campaign in Europe in 2018.

“We’ve had top technical achievements. Digitization is the key to success,” says Oswald. “The challenges of the energy sector call for action,” he added.

One-quarter of Austria’s total gas demand is held underground and the reservoirs are already 93 per cent full, says Oswald, referring to the current European shortage of gas. “The question is how long they will stay full with the limited gas coming via Ukraine. But we don’t need much anymore.”

Climate challenges

Society has gotten used to a cycle of mining raw material, producing products, consuming them and disposing of them, states Oswald. “This won’t work for the future.”



*Reinhard J Oswald,
Senior Vice-President
of Operations.*

“To reduce CO₂ quickly, either it has to be captured or put back into the ground where it came from ...”

— Reinhard J Oswald, Senior Vice-President of Operations, OMV

OMV is working to develop a circular economy to counter this way of living. “We are changing from a linear to a circular company. We don’t dispose, we recycle. This is true for plastics. Decomposing plastic is sent to Schwechat (Refinery) to make raw material again,” he says.

Switching to a “green” economy is going to take a lot of plastic, he adds, which is used in everything from photovoltaic modules to windmills to electric vehicles.

The company has already for some time been taking oily salt water, cleaning it and reinjecting it for flooding in enhanced oil recovery (EOR). It has lately also started focusing on reusing CO₂, including putting more effort into producing synthetic fuels from CO₂ combined with hydrogen to make methane. “Also in the refinery business we are trying to close the loop.

“Raw materials from recycling are used for base products. The cycle is closed,” he states, adding that the company is at the beginning stage of developing this cycle.

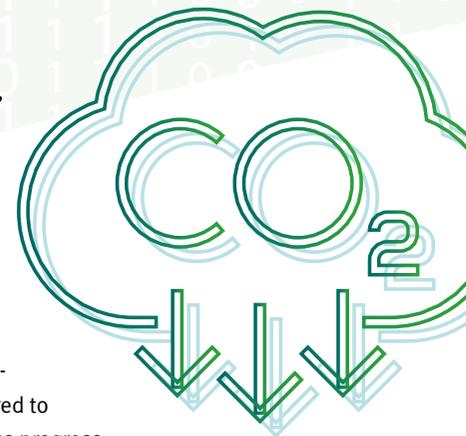
OMV is additionally using biomass — for example discarded cooking oil Austrians use to fry their beloved schnitzel — to replace kerosene. This is being used

by Austrian Airlines, though not much is produced yet, says Oswald. “It’s a starting point.”

He adds that everyone underestimated the CO₂ problem and technology had to be discovered to solve the problem, thus progress is only now being seen.

Meanwhile, he adds, there needs to be enough oil and gas to keep the system running, with E&P providing full recycling and minimizing the CO₂ footprint. Currently, only two per cent of Austria’s energy comes from wind and PV, the rest from fossil fuels, biomass and hydropower. The majority of energy still comes from oil and gas, adds Oswald.

Technologies developed for oil and gas can also be used to recover geothermal energy, another form of ‘green’ energy, he says. “There’s no difference whether it’s oil and gas, or hot water. The only difference is that oil and gas can be moved far, while the hot water customer has to be next door.”





The opening of the OMV Innovation & Technology Centre at Gänserndorf, with the Governor of Lower Austria, Johanna Mikl-Leitner, and OMV Deputy Chairman and Member of the Executive Board Chief Upstream Operations Officer, Johann Pleininger, in front of G&G projection mapping wall.

Hot water reservoirs run 3,000–4,000 metres deep.

“We are trying to create more geothermal, wind and PV. We will see a reduction in fossil fuel production over the coming decades, but we want to do it in a safe manner. We don’t want to run out of energy.

“By the 2050s we want to be a company that does not emit any CO₂. To be net-zero, we need negative CO₂ projects that take it out of the atmosphere to produce new green molecules.”

To reduce CO₂ quickly, either it has to be captured or put back into the ground where it came from, he states, adding OMV is focusing on CO₂ reinjection both onshore and offshore. By 2030, the company wants to inject five million tonnes of CO₂ into the ground.

“All green energy requires sustainable feedstock. The circular industry is a basis for this mind set. If all goes well, we won’t burn oil and gas for energy use by 2050, but we will still need it for feedstock,” states Oswald.

“From May to September we are able to produce CO₂-free because of using photovoltaic energy. Now we have to find out how to do it in winter and at night. We are an

environmental company. Organic farmers and wine producers are right outside our door.”

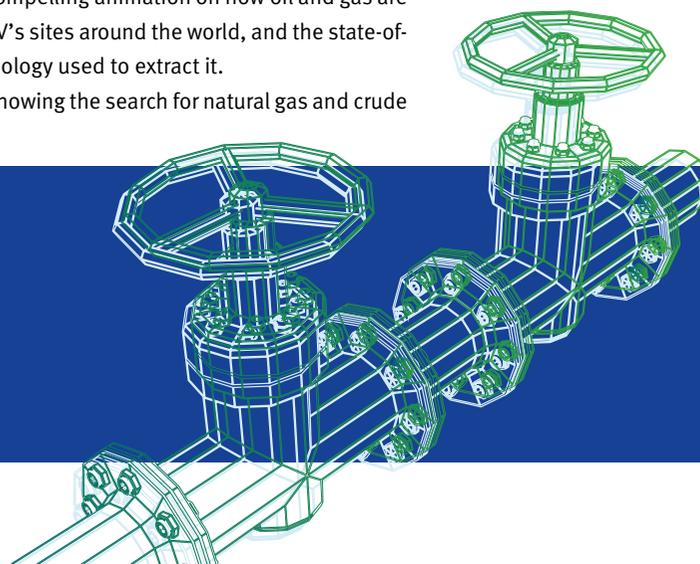
OMV wants to be green, a reliable provider of feedstock and fuels, polymers and green feedstock. Oswald adds there are not a lot of global green projects and OMV only started its project two to three years ago. “There is not a lot to benchmark against.”

Innovation and Technology Centre

Inside the brain centre of the facility, which just opened in the summer of 2020 at OMV’s Gänserndorf site, the student group is taken to its showroom. The building has a 15-degree twist, similar to the twist used by a rotating drill string while drilling.

Inside, it holds a 360-degree surround screening chamber (like the inside of a big drill), where the group is shown a compelling animation on how oil and gas are found at OMV’s sites around the world, and the state-of-the-art technology used to extract it.

“We’re showing the search for natural gas and crude



oil and how they're produced — a sphere in which a lot more goes on below the ground than above the surface. We want to make the invisible visible," says Andreas Walk, the creative force behind the OMV Innovation & Technology Centre (ITC) on the ITC's website.

The "invisible" are OMV's upstream technologies, ie those deployed for the exploration and production of oil and gas.

The idea for the technology centre originated with Johann Pleininger, OMV Executive Board member responsible for upstream: "Weinviertel is OMV's open-air laboratory. We produce oil and gas directly outside our front door. This is the place we develop and improve our technologies, which we then roll out worldwide. The goal of ITC is to make this technological expertise visible," he says on the website.

The students learn in the presentation that OMV cleans 40,000 cubic metres of salt water daily for enhanced oil recovery (EOR). Filtration of reused salt water is very important, and nut shell filters allow the filtering out of impurities to an incredible 1 ppm.

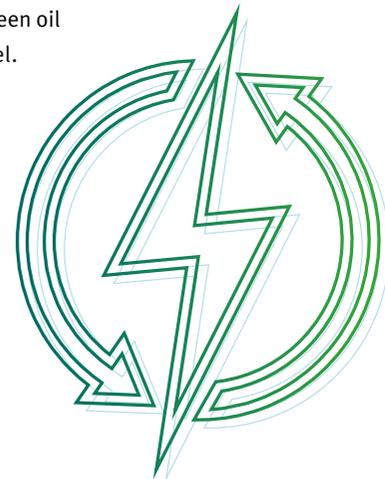
To drill, a plan is needed, and it starts with geologists and geophysicists creating a "thought model", says tour guide Blaz Bertoncel. Models are made of rock layers.

"Back then the success rate was 1/10 wells drilled, now it's 1/5 because of more sophisticated technology. We use 3D seismic, offshore air guns, impulse, synchronize, long streamer cables, geophones ..." Although corrosion technologies have improved the life of materials in drilling, it remains a major issue, he says.

Seismic impulses are shot 5,000 metres down, like an ultrasound or sonar, he states. Cap rock made out of clay is important, because oil and gas collects underneath. If they were not caught under such a roof, they escaped and helped create the atmosphere. The lightest component under cap rock is gas, then oil, then salt water from the sea.

Surveyors can guess whether what they reach is a gas or liquid, but have more trouble differentiating between oil and water, states Bertoncel. Drill cores are then made that are checked with UV light. Oil will turn up slightly golden.

Next porosity and permeability must also be examined, therefore, an exploration well is drilled. OMV





has a lab on site and analysis in house, which increases the speed of the process, he says.

“When drilling, safety is paramount. Now there are a lot of sensors to aid in that.”

A drill string consists of the drill bit part of a casing, which implements smaller and smaller drill bits.

“The round thing cutting rock is diamonds. They are made under one million pounds of pressure and cost \$50,000 for one bit.”

Drilling mostly takes place at ten metres/hour, but sometimes at 50–100 m/h, states Oswald. Drill fluid presses earth to surface on the outside of the drill. Meanwhile, horizontal drilling is undertaken because oil layers may only be two-to-four metres thick, he adds.

Through directional and horizontal drilling

technology, several separate reservoirs are intersected at the same time with one single well. Accessing reservoirs horizontally can greatly increase production.

“The accuracy is amazing, there’s a two-metre range of control even kilometres beneath the earth. It’s like drilling from Schwechat (Refinery, on the outskirts of Vienna) to the catacomb in St Stevens cathedral (in the middle of downtown).”

The well is cemented in a casing that is very hard, and the whole unit has a device blowout preventer. With overpressure the preventer can close around the drill string or completely cut the process.

Overpressure generally moves from inside a drill string to outside, but it can reverse, then the system closes and more heavy fluid is pumped in, says Oswald. Drilling fluid is expensive, so it’s recycled constantly.



Cuttings are sieved out. From the cuttings one can see a million years back in time, he adds.

The quality of the oil corresponds to depth and temperature it's exposed to. Deeper oil is lighter; it oxidizes as it goes up. Below 6,000 metres there is no oil, only gas, states Reinhard J Oswald. The deeper the oil, the older it is.

Matzen field

At the Matzen field 63 per cent of the oil is still in place, though it is more difficult to extract, says Oswald. A big success for OMV was extending the life of its pumps from 200 days to 2,200 days by making them more efficient, states Oswald. The operation time of OMV's production pumps reaches peak values of more than 6 1/2 years without downtime.

OMV uses quality assurance by checking all pumps in person. "It only costs €10,000 to check an installation, but half a million to replace it."

OMV also developed a sand sleeve to get sand up to the surface and deal with it there.

As oil and water rise, a H₂O reinjection well is used

to keep the oil moving, which allows for a 35 per cent recovery rate.

"There is a limit because oil is more viscous than water, and viscous salt water would be required for flooding. If a gel of H₂O was used (and reused), then recovery could reach up to 55 per cent. This new technology is now economically viable," says Oswald.

Surfactants can also be injected but cost a lot of money, he adds. OMV smart recovery is working on using natural acids to create a soap-like substance in the reservoir, with which 65 per cent recovery could be achieved. This technology is also viable now.

Nano particle recovery is also being examined, in which a vibration is introduced between oil droplets, which then vibrate out the oil. With this technique, recovery of 99.9 per cent has been reached in labs.

Another future direction is machine-learning algorithm, states the tour guide, which would save a lot of money.

"Reserve life doesn't depend on what's left, it depends on the price of oil and gas. It's a high-tech industry. We are very proud to provide Austria and a bit of the world with energy and feedstock." ■■

Unless otherwise credited, photos courtesy OMV.



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OPEC Member Countries continue to stay on the cutting edge of architecture

Over the last few years, some of OPEC's Member Countries have continued to unveil impressive architectural projects that are gaining notoriety, not only amongst architecture and design aficionados, but also increasingly by visitors and tourists. The OPEC Bulletin's Scott Laury takes you on a virtual tour.



It has been awhile since we have had the opportunity to report on some of the architectural gems that are being unveiled in OPEC's Member Countries, so now is the time to catch up on what has been happening.

Through this series of feature articles, we will cover some stunning designs from several superstars in the world of architecture.

These award-winning architects have gained the highest accolades for their projects located around the world. It is our pleasure to share with you how they have collectively shaped the streets, neighborhoods and skylines of OPEC's Member Countries.

The first installment in this series will profile three cutting-edge projects spearheaded by the late 'starchitect' Dame Zaha Hadid, whose award-winning work we have covered in previous editions of this publication.

Beeah Group Headquarters (Sharjah, UAE)

The first stop takes us to the Sharjah Emirate in the UAE for a futuristic design that appears to be something out of a *Star Wars* movie, but in reality will be the new global corporate headquarters of the Beeah Group.

Founded in 2007, the company began as a public-private partnership focusing on environmental and waste management. Its strategy has expanded in the meantime to encompass renewable energy and technology, green mobility, transport and education.

On its corporate website, the company states its purpose as follows: "Through innovation, full-circle resource management, and smarter solutions, the Group is addressing environmental challenges, deploying the latest digital technologies, and raising the quality of life for people across the MENA region."

The futuristic, undulating design of the Beeah Group's corporate headquarters in Sharjah, UAE, blends in perfectly with the surrounding desert topography.



An architectural centerpiece of the project is a 15-metre-high domed foyer designed to bring in natural daylight while enhancing natural ventilation.



The ultra-modernistic design of the headquarters is in line with the company's forward-looking focus on innovation, technology and environmental awareness.

The sleek architectural lines and shapes depict the undulating forms of rolling sand dunes and blend in perfectly with Sharjah's surrounding Al Sajaa desert topography.

The design conforms to LEED Platinum standards, which signify a top ranking in the sustainable building certification programme. The building's smart and green features include solar-powered energy and the capability of automatically adjusting temperature and lighting based on what time of day it is and levels of occupancy.

The curved, aerodynamic shapes of the buildings are designed to help protect it from extreme weather conditions, including high desert winds and sandstorms.

The structures are also built to minimize daytime exposure to the powerful desert sun through the use of exterior glass fibre-reinforced concrete panels, which, in turn, help to regulate internal temperatures.

The two wings of the building are connected by a central courtyard that the architects term an "oasis".

Another architectural centerpiece of the project is a 15-metre-high domed foyer designed to bring in natural daylight while enhancing natural ventilation.

The design also encompasses state-of-the-art meeting rooms, an auditorium and a visitor's centre.

"The headquarters is the latest milestone for Beeah Group as it continues to pioneer innovations for Sharjah and across the globe, establishing a base of operations for the group to diversify into new, future-critical industries," said ZHA in a comment published on the *Dezeen* magazine website. "With their new headquarters, Beeah demonstrates how technology can scale sustainable impact and ultimately serve as a blueprint for tomorrow's smart, sustainable cities."

Beeah officially opened the headquarters on March 30, 2022, in a formal ceremony led by HH Dr Sheikh Sultan bin Muhammad Al Qasimi, Supreme Council Member and Ruler of Sharjah.

After offering Sharjah dignitaries a tour of and briefing on the new headquarters, Salim bin Mohammed Al Owais, Chairman of the Board of Directors at Beeah, said: "It is truly a historic moment with His Highness the Ruler of Sharjah inaugurating the Beeah headquarters in the presence of HH the Crown Prince of Sharjah and the esteemed leadership of Sharjah government entities. The building is a landmark to the future-forward vision of HH the Ruler of Sharjah, reaffirming the Emirate as sustainability capital of the Middle East, a goal that we are driven to achieve as an organization."

The design features state-of-the-art meeting rooms, an auditorium and a visitor's center.

The Opus (Dubai, UAE)

The next project takes us to the Burj Khalifa business district of Dubai where Zaha Hadid Architects was awarded the design for the exclusive Opus mixed-use development, which features a 20-storey high, mirrored glass-facade tower with a highly unique hollowed-out void in the middle.

The development features a luxury hotel, in addition to office and residential space, a variety of high-end restaurants and a rooftop bar.

Other distinctive design features include a four-story high atrium and an asymmetric 38-metre-wide

and three-storey tall sky bridge connecting the two sides of the structure.

“The precise orthogonal geometries of the Opus’ elemental glass cube contrast dramatically with the fluidity of the eight-storey void at its centre,” explained ZHA’s project director Christos Passas in a statement published on the *Dezeen* website.

Some of the unique interior design elements, which were also managed by ZHA, include angular beds, decorative glass balls in the building’s lobby and sculptured balconies.

The exclusive Opus mixed-use development is located in Dubai’s bustling Burj Khalifa business district.





The project features a 20-storey high, mirrored glass-facade tower with a highly unique hollowed-out void in the middle.

Mahdi Amjad, the CEO of the project's developer Omniyat, explains in an article published in UAE-based newspaper *The National* how the idea came about to develop this property.

"When I established Omniyat in 2005, I was motivated by my desire to develop uncompromising creative signature buildings and I was fortunate enough to have worked for ten years with my dear friend and design

mentor Dame Zaha Hadid on the creation of The Opus," he said.

In another interview, Amjad lauds the creative aspects of the design. "The design conveys the remarkably inventive quality of Zaha Hadid Architects' work," he states. "It expresses a sculptural sensibility that reinvents the balance between solid and void, opaque and transparent, interior and exterior."

The development comprises a luxury hotel, in addition to office and residential space, a variety of high-end restaurants and a rooftop bar.





King Abdullah Petroleum Studies and Research Centre (Riyadh, Saudi Arabia)

The third and final project we will profile in this edition is located in the Kingdom of Saudi Arabia, which, like the UAE, has also benefited handsomely from the rich legacy of Dame Zaha Hadid.

Indeed, ZHA was the company selected to design the ultra-modern campus for the King Abdullah Petroleum Studies and Research Centre (KAPSARC), which is located in the capital city of Riyadh.

According to its corporate website, KAPSARC is an advisory think tank on global energy economics and sustainability providing services to entities and authorities in the Saudi energy sector.

“We are a community of thinkers combining human ingenuity, expertise, and research to solve pressing global energy challenges,” the Centre’s official website reads. “Through our advisory services to the energy ecosystem, KAPSARC’s experts provide day-to-day insights and updates using a multidisciplinary team approach to drive long-term value and deliver tangible results at scale.”

The 17-acre campus is comprised of five buildings: the Energy Knowledge Centre; the Energy Computer Centre; a Conference Centre with an exhibition hall and an auditorium; a Research Library and an inspirational space for prayer.



The King Abdullah Petroleum Studies and Research Centre encompasses a sprawling 17-acre campus in Riyadh, Saudi Arabia.



The campus' hexagonal honeycomb design organizes its five buildings around a large centralized public courtyard that is shaded by elegant canopies.



Like ZHA's Beech Group Headquarters project in Sharjah, the KAPSARC campus was awarded LEED Platinum certification in recognition of its efforts to minimize energy consumption and environmental impacts.

The campus' hexagonal honeycomb design organizes its five buildings around a large centralized public courtyard that is shaded by elegant canopies, which help provide much-needed shade from the bright sunlight coming in from the south. The positioning of the courtyard also optimizes the cooling effect from prevailing northerly winds.

In the hottest time of the year, an underground system of hallways enable students and faculty to comfortably move between the various buildings on campus.

"KAPSARC's architecture is porous within," ZHA describes in an article published on *Archinect.com*. "Specific hexagonal cells strategically located within each building are left open to create a series of sheltered courtyards that bring softly-controlled daylight into the interior."

The sleek, futuristic white buildings that comprise the

In the hottest time of the year, an underground system of hallways enable students and faculty to comfortably move between the various buildings on campus.



campus' footprint promote KAPSARC's innovative, transparent and future-oriented mission in energy research and education.

Another interesting feature built into the design is the possibility to expand the campus further down the line if the organization expands.

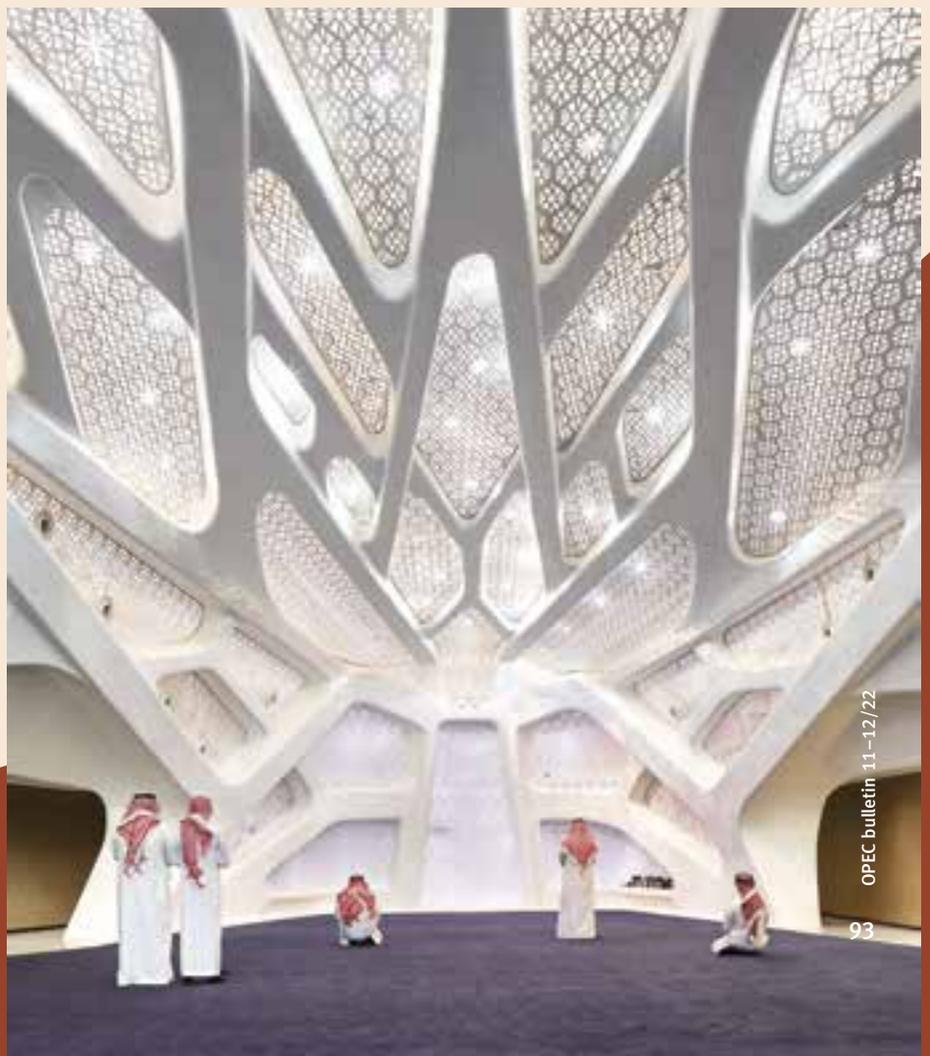
"KAPSARC's five buildings differ in size and organization to best suit their use," the architects explain in an article published on *Designboom.com*. "Each building is divided into its component functions and can be adapted to respond to changes in requirements or working methods. Additional cells can readily be introduced by extending KAPSARC's honeycomb grid for future expansion of the research campus."

More than 20,000 visitors had an opportunity to visit the new KAPSARC campus when it opened its doors in 2017 during Saudi Design Week.

Other significant projects awarded to ZHA in Saudi Arabia include a wetlands preservation centre in Diriyah and a metro station in Riyadh.

All pictures courtesy of Hufton + Crow.

The campus's five buildings include the Energy Knowledge Centre; the Energy Computer Centre; a Conference Centre; a Research Library and an inspirational space for prayer.



Zaha Hadid



The late Zaha Hadid was a globally-renowned, visionary architect whose rich architectural legacy transformed city skylines and urban environments around the world.

Zaha Hadid was born in Baghdad on October 31, 1950. Her father, educated in London, was an industrialist who also led a progressive party promoting democracy and secularism.

She attended a Catholic school with a diverse student body where French was spoken, and then went on to study mathematics at the American University in Beirut.

In 1972, she began her foray into architecture at the Architectural Association in London, which was known as a hub for experimental design.

Studying under veteran designers such as Elia Zenghelis and Rem Koolhaas, Hadid began to develop her unique, intuitive approach to architecture.

Greatly influenced by Russian avant-gardists such as Vladimir Tatlin, El Lissitzky and Kazimir Malevich, her final project before graduating was entitled Malevich's Tectonik and envisioned a hotel being built on Hungerford Bridge over London's Thames River.

After graduating, she joined Rem Koolhaas' Office for Metropolitan Architecture in Rotterdam, a company reputed for its cutting-edge designs and its gifted young talents.

By 1979, she was back in London where she started up her own practice.

In the years that followed, her firm, Zaha Hadid Architects, went on to establish a name for itself worldwide for its groundbreaking architectural style.

She started to gain notoriety with her futuristic designs proposed for the Peak Club in Hong Kong (1983), the Kurfürstendamm 70 in Berlin (1986) and the Cardiff Bay Opera House in Wales (1994). However, her breakthrough came when she received her first major commission to design a fire station on the corporate campus of the Vitra furniture company in Weil am Rhein, Germany.

Building on the success and acclaim of the Vitra project, Hadid continued to stay busy with a host of prominent projects well into the new millennium.

Her 2003 design for the Rosenthal Centre of Contemporary Art in downtown Cincinnati, Ohio, was also hailed as a transformative, future-oriented building. It also has the distinction of being the first museum in the United States to be designed by a woman.

The project was highly acclaimed by prominent industry figures and the media, including former New York Times architecture critic Herbert Muschamp, who went as far as to describe it as “the most important American building to be completed since the end of the Cold War.”

Hadid continued to make her mark around the world with designs for a wide variety of commercial, cultural and sporting venues, including the BMW Central Building in Leipzig, Germany (2004), the Phaeno Science Center in Wolfsburg, Germany (2005), the Italian National Museum of 21st Century Arts in Rome, Italy (2009), the Guangzhou Opera House in China (2010), the Aquatics Centre for the London 2012 Olympic Games (2011), the Heydar Aliyev Centre in Baku, Azerbaijan (2013) and the Al-Wakrah football stadium, which will host matches for this year’s World Cup in Qatar starting in November.

Hadid was also very active in designing projects in the Middle East. An article in this publication entitled ‘*A Modern Day Renaissance in the UAE*’ profiled her design for a performing arts centre located in Abu Dhabi’s vast and splendid Saadiyat Cultural District.

Hadid was joined by the crème de la crème in world architecture to design Saadiyat’s museums. They are all Pritzker Prize winners and include Jean Nouvel (Louvre), Frank Gehry (Guggenheim), Lord Norman Foster (Zayed National Museum) and Tadao Ando (Maritime Museum).

Hadid also designed Abu Dhabi’s signature Sheikh Zayed arch bridge named in honour of former president Sheikh Zayed bin Sultan Al Nahyan, the country’s principal founding father.

In Jordan, inspired by the ancient city of Petra, the country’s world wonder, Hadid submitted a visionary design for the King Abdullah II House of Culture and Art, which, if built, would be located in Amman.

In the UAE, Hadid proposed a cutting-edge, organic design for the Dubai Financial Exchange Building, to be located in the heart of the new waterfront business district.

One of Hadid’s recent designs took her back to her native land of Iraq, with a spectacular 170-metre high futuristic office tower on the banks of the Tigris River to house the country’s Central Bank.

The futuristic, fluid design of the tower and the ground-floor extension can clearly be identified with Hadid’s unique brand of architecture. Indeed, it comes

as no surprise that she has been termed in the industry as “the queen of the curve.”

Hadid’s website provides this description: “Rising from the sloping banks of the Tigris River in Baghdad, the design for the new headquarters of the Central Bank of Iraq (CBI) conveys the core values at the heart of the institution: Solidity, Stability and Sustainability.”

In her comments at the event, Hadid expressed her honour in being selected for the prestigious project.

“I am deeply touched that I have been asked to design the new headquarters for the Central Bank of Iraq,” she stated. “I was born in Iraq and I still feel very close to it. I feel very privileged to be working in Iraq on a design of such national importance.”

Her career hit an all-time high in 2004, when Hadid was bestowed architecture’s most coveted honour, the Pritzker Prize. In addition, she won two RIBA Stirling Prizes for her designs of the MAXXI Museum in Rome and London’s Evelyn Grace Academy. Other awards included France’s *Commandeur de l’Ordre des Arts et des Lettres* and Japan’s *Praemium Imperiale*.

In 2012, Hadid was made a Dame Commander of the Order of the British Empire. She was also appointed Honorary Member of the American Academy of Arts and Letters and Fellow of the American Institute of Architecture.

In the wake of her untimely passing on March 31, 2016, accolades from across the industry rolled in.

Amanda Leveté, one of her industry colleagues and a Stirling Prize winner, expressed her admiration of the artist’s work and her influence on the trade.

“She was an inspiration. Her global impact was profound and her legacy will be felt for many years to come because she shifted the culture of architecture and the way that we experience buildings. When my son was very young, Zaha showed him how to write his name in Arabic. It was the moment I realized the genesis of her remarkable architectural language. She was an extraordinary role model for women. She was fearless and a trailblazer — her work was brave and radical. Despite sometimes feeling misunderstood, she was widely celebrated and rightly so.” ■■

Ploiesti, Romania: The ‘Capital of Black Gold’

*The history of the petroleum industry in Romania goes back. Way back ... As early as 1440 CE, there were reports of petroleum seepages in the Bacau region of Moldavia, which was followed by accounts of extraction in that area and from south of Rasnov in the Prahova region of Wallachia. However, in the mid-nineteenth century, in the city of Ploiesti, Prahova, developments occurred which would transform the history of oil. With a boom in Romanian production in the early 20th century, Ploiesti had a good claim as the world’s capital city of oil. The OPEC Bulletin’s **Mathew Quinn** reports on this fascinating history and efforts the city has taken to preserve its oil heritage.*



*Mathew Quinn
in front of the
Museum.*

Industrial transformation

In front of the Petroleum-Gas University of Ploiesti stands a granite monument dedicated to two brothers: Teodor and Marin Mehedinteanu. In 1857 they commissioned a refinery, which would lay claim to being the world’s

convinced the city authorities in Bucharest to grant the Mehedinteanu brothers a concession for providing the city with kerosene for street lighting. As a result, Bucharest became the first major city in the world that was lit primarily by kerosene. Later in the century, between 1888 and 1896, Romania’s national railway began to generally use fuel oil. Many important developments in oil extraction technology and engineering were made in the Ploiesti region, including a drilling machine developed by the German pioneer of drilling technology, Anton Raky (1868–1943), between 1893 and 1896. This is currently displayed in the *Deutsches Museum*, Munich.

As a result of these developments, Ploiesti became known as ‘The Capital of Black Gold’.

first. It marked a significant moment for the history of the industry. The refinery consisted of an area of four hectares and contained cylindrical boilers, each of them having volumes of 10,000 litres. Its overall refining capacity was 7.5 tons/day. The manner in which this output was recorded meant that Romania became the first country in the world with an officially recorded oil output.

The refinery at Ploiesti produced high quality lamp oil and this

Early 20th century boom

With the dawn of the 20th century, the Romanian oil industry was about to embark on a boom. Dan Yergin, describes it in his seminal work, 'The Prize', in the following way:

A major new source of oil was emerging in Europe itself — Romania, where a minuscule supply had been eked out of hand dug pits on the slopes of the Carpathian Mountains. In the 1890s, investment by Hungarian and Austrian banks, combined with modern technology, began to push up the country's production dramatically. But the situation really transformed at the beginning of the twentieth century by the entry into Romania of Standard Oil, the Deutsche Bank, and Royal Dutch. These three groups ended up controlling much of Romanian industry and their impact was enormous. Romanian output grew sevenfold in the first decade of the twentieth century.

This period of rapid development saw intense foreign investment. On the eve of World War I, approximately three quarters of the invested capital in the Romanian oil industry was German, British and Dutch, while the Romanian capital had only an eight per cent share. The major international players attracted by the Romanian oil fields included Standard Oil, via its Româno-Americana subsidiary, which was created in 1904, and Shell through its Astra Româna subsidiary, created in 1910.

The oil fields around Ploiesti became of intense interest to the competing Great Powers of Europe in the build up to World War I. The activities of *Deutsche Bank* tied significant portions of the German economy to Romanian production. The decision of the Royal Navy to switch from coal to oil intensified Britain's interest in Romanian oil production. Throughout the 1910s, Romania was a major source of oil for the Royal Navy, as First Lord of the Admiralty, Winston Churchill, told the British Parliament in early 1913, that although the Admiralty tried to keep its fuel oil contracts secret, "the bulk of the contracts have usually fallen to American and Romanian contractors." Tension between Germany and Britain over Romanian oil would have important ramifications for the outbreak and course of the war, with tragic consequences.

World Wars I and II

It is one of the most remarkable stories during the War. The Allies' naval blockade on Germany left only one source of oil available to it— Romania, which remained neutral for the first two years of the war. Russian

Oil well no 12 from Cămpina erupting in 1899.



Commemorative monument dedicated to the brothers Teodor and Marin Mehedințeanu, located in front of the Petroleum-Gas University of Ploiești.



Wikimedia Commons



The Oil Museum in Ploiesti, Romania.



The Petroleum-Gas University of Ploiesti, Romania.

successes on the eastern front persuaded Romania to enter war in August 1916 against Austro-Hungary and, *de facto*, with Germany almost immediately as well. The significance of Romania's industry was transformed. As German General Erich Ludendorff framed it, "As I now saw quite clearly, we should not have been able to exist, much less to carry on the war, without Romania's corn and oil."

German and Austrian troops launched an attempted invasion of Romania in September 1916. The Romanians resisted, managing to hold the mountain passes which served as natural fortifications for the Wallachian Plain, where oil production around Ploiesti was concentrated. The British began to discuss whether their Romanian ally

should consider destroying its oil industry rather than let it fall into German hands.

On November 17, Germany breached the Romanian defensive lines and poured through the mountains. As Dan Yergin wrote, "The British government took matters into its own hands and recruited Colonel John Norton-Griffiths, MP, to organize the destruction of the Romanian oil industry." He arrived in Bucharest via Russia, the day after the Germans broke through the Romanian lines. The Romanian government reluctantly agreed to destroy their proud possession.

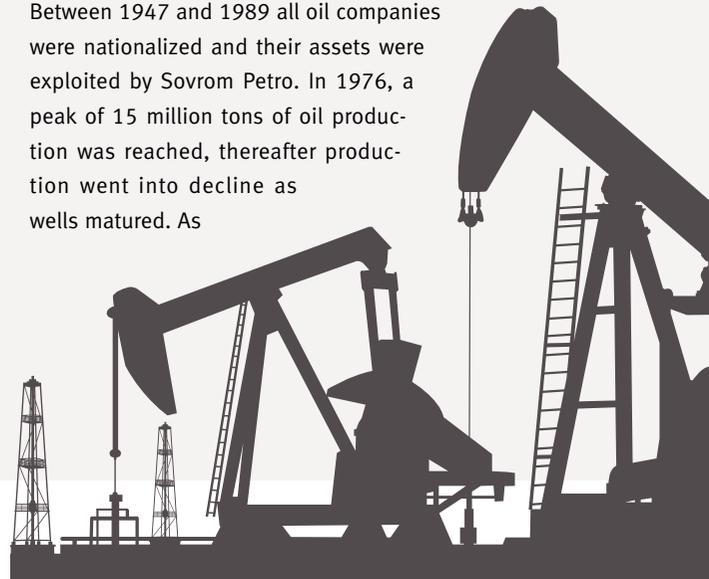
Destruction ensued. In total, some 70 refineries, and 800,000 tonnes of crude oil and petroleum products were destroyed under Norton-Griffiths's tutelage. From the Allies perspective, it happened just in time; on December 5, the Germans entered Ploiesti. It took the Germans five months before they could get production back online. By 1917, production was only a third of what it had been in 1914. By 1918, they had pushed this up to 80 per cent of the 1914 level.

The Ploiesti oil fields were highly coveted by Hitler in the build up to World War II. An illuminating statistic is the fact that Ploiesti provided 58 per cent of Germany's total oil imports in 1940. A factor affecting the decisions for the Nazis to launch an invasion of the Soviet Union in 1941 was that it would be a preemptive strike by the Germans to prevent Ploiesti falling into the hands of Stalin.

During the war, the Allies launched their so-called 'oil campaign' to cripple Nazi Germany's access to petroleum production through a strategic bombing effort. The United States Army Air Forces launched an air attack on Ploiesti on August 1, 1943. The Axis heavily defended Ploiesti, given its strategic importance. The result was this air attack was one of the costliest in the USAAF in the European theatre.

Post war developments

Between 1947 and 1989 all oil companies were nationalized and their assets were exploited by Sovrom Petro. In 1976, a peak of 15 million tons of oil production was reached, thereafter production went into decline as wells matured. As



Assistant Lecturer at the Petroleum-Gas University of Ploiesti, Dragos Cristea, described it, during the 1970s, the oil industry was a significant aspect of the Romanian economy. The country was an important location for training engineers and geologists and Romanian nationals shared their expertise abroad.

Following the revolution in Romania in 1989, all exploration and production activities were taken over by the Romanian Petroleum Company, a state-owned company. In 1997, it became SN Petrom. At the end of 2004, OMV Petrom was privatized, and Austrian OMV AG became the new majority shareholder.

OMV Petrom is currently the largest integrated energy company in Southern and Eastern Europe and is active in all aspects of the energy value chain. Many of the oil wells in Romania have matured but concrete measures have been taken to preserve the country's oil heritage.

Celebrating Romania's oil heritage

Petroleum-Gas University of Ploiesti: Prahova County has always been associated with pioneering education in the realm of the oil industry. In 1904, the Drilling and Refining Foremen School in Campina, was founded, the first of its kind in the world. Several pioneering engineers and geologists cut their teeth in the area.

By 1948, the education of professionals in the oil and gas industry evolved further with the founding of the Petroleum-Gas University of Ploiesti. For over 70 years, the university has produced oil industry specialists by maintaining the highest standards of excellence in education. With other 7,000 students across the undergraduate, masters, doctoral and post-doctoral programmes, the University is truly a world leader.

Oil Museum of Ploiesti: Founded in 1961 as part of efforts to commemorate the 100th Anniversary of the Romanian oil industry, the main purpose of the museum is to memorialize and preserve the history and heritage of the Romanian oil industry. It highlights the history of exploitation and the utilization of petroleum in Romania, as well as legal, social and political events related to it. Furthermore, it shows the origins and evolution of geological investigations in Romania, as well as the evolution of tools and techniques for drilling, production and processing.

The Museum contains a fascinating assortment of original documents, geological maps, technological documentation and photos. The Museum also has an

A pumpjack used for training at the Petroleum-Gas University of Ploiesti.



A "hecna" (a type of horse-drawn conveyor).

outdoor area which has a selection of tools and equipment used in the industry over the last 80 years. There are also displays on some of the leading Romanian geologists, chemists and workers in the fields of drilling and engineering. Its collection includes over 11,000 pieces.

Sarata Monteoru Oil Mine: A common excursion for students of the Romanian oil industry is the Sarata Monteoru Oil Mine. It is a mine unique in Europe, where crude oil extraction takes place through deep wells over 300 metres deep. Pits dug by human hands in the area were recorded as early as 1830. Today it is primarily used for research and training purposes for budding oil industry professionals.

The world's oil heritage

Industrial history is an important lynchpin for understanding the global economy of today. However, preserving it can be a challenge, particularly in Europe. The Museum of Oil in Ploiesti is an illuminating example of how this can be done properly. Furthermore, the students of the Petroleum-Gas University of Ploiesti are enthusiastic young people with an interest in a career in the oil and gas industry. All this serves to underscore what a fascinating country Romania is; one that is well worth a visit for anyone with an interest in the industry's past. ■■



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 pages record those events.*



October 24: Haitham Al Ghais (r), OPEC Secretary General meets with the Mayor of Vienna, Dr Michael Ludwig.



October 14: Al Ghais meets with journalist, Reza Zandi (r).



September 20: Al Ghais meets Dr Mohammed bin Hamad Al Rumhi (r), the former Ministry of Energy and Minerals of the Sultanate of Oman.



October 13: Al Ghais meets with Claudio Descalzi (l), CEO of ENI, Italy.



September 8: Al Ghais receives Talal Suleiman Al-Fassam, Ambassador of the State of Kuwait to Austria.



September 7: Al Ghais meets with IR Iran's National Representative to OPEC, Dr Afshin Javan (l).



September 6: Al Ghais meets with Mohammed Saadoon Mohsin (l), Iraq's National Representative to OPEC, and Director of Market Research and Strategic Planning Division, Oil Marketing Company (SOMO); and Dr Hisham Y Shalaan (c), Director General, Economic Directorate, Iraqi Ministry of Oil.



August 29: Al Ghais meets with Ambassador Mohsen Naziri Asl (r) of IR Iran to the UN and other International Organizations in Vienna, Austria.

Briefings

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.

Visits to the Secretariat



October 13

Journalists from the International Journalists' Programmes (IJP), Germany.



October 17

Officials from the *Arbeitsgemeinschaft Staat und Gesellschaft (asg)*, Duderstadt, Germany.



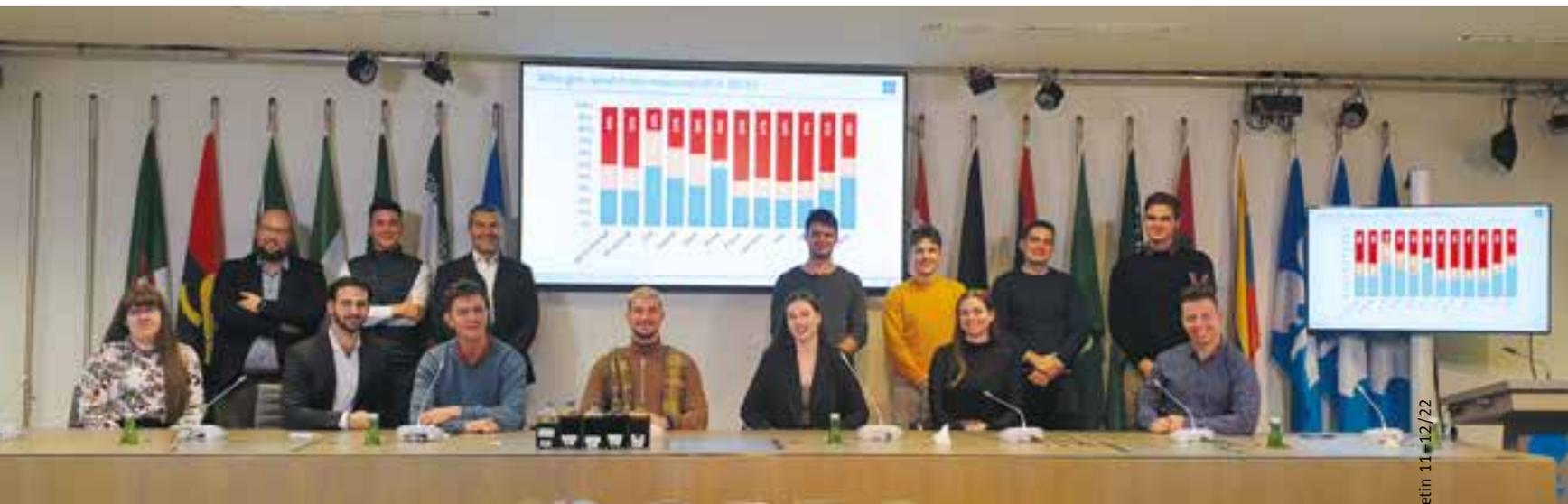
October 18

Students from Franklin University Switzerland, Sorengo, Switzerland.



October 20

Students from the Princeton University, Princeton, NJ, US.



October 21

Students from Mathias Corvinus Collegium, Budapest, Hungary.



November 10

Students from DIS Study Abroad, Copenhagen, Denmark.



November 14

Students from Institute for Internatinal Eduction of Students (IES), from Vienna, Austria, and the US.



November 18

Students from the University of Debrecen, Hungary.

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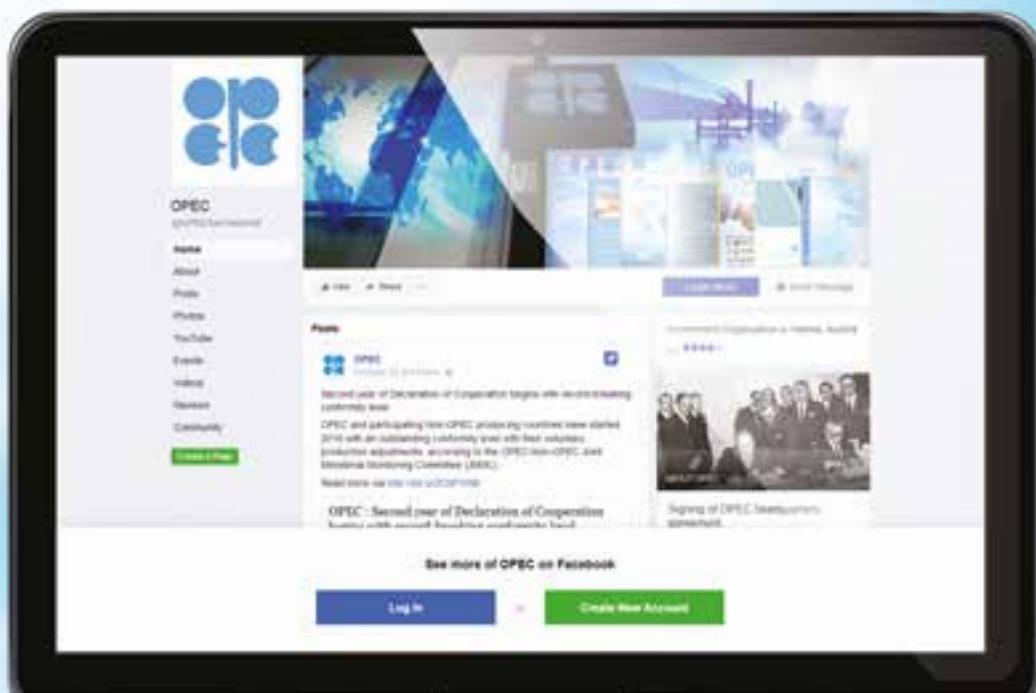
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POWER TO THE PEOPLE

For communities hard to reach, efficient electric lines and mini-grids could be transformative

By Nicholas K Smith, OPEC Fund

When we think of development impact, images of brand new hospitals or shiny new schools may spring to mind.

Building or upgrading transmission lines and off-grid systems may not have the visual oomph of those examples, but the role energy plays in sustainable development is foundational. Delivering that energy to places where it is unreliable or non-existent is one of the key drivers of sustainable development.



POPULATION WITHOUT ACCESS TO ELECTRICITY IN RURAL AREAS (millions)

Source: Tracking SDG 7: The Energy Progress Report, World Bank.

Oceania

4m

Sub-Saharan Africa

440m

Central Asia and Southern Asia

76m

Western Asia and Northern Africa

26m

Eastern Asia and Southeastern Asia

31m

Western Asia and Northern Africa

8m

The United Nations Sustainable Development Goal (SDG) 7 aims to “ensure access to affordable, reliable and modern energy for all by 2030” (see *Factfile box, below*). This includes areas like universal access to energy, clean cooking and increasing energy efficiency.

Although great gains have been made in delivering energy access for all, the numbers remain dire, especially in the wake of the COVID-19 pandemic which reversed years of steady progress.

The World Bank estimates that 750 million people lack access to electricity. Some 80 per cent of those, or around 600 million people, live in sub-Saharan Africa. Put another way, less than half of sub-Saharan Africans have electricity.

Transmission lines

Often the unsung heroes among development projects are the ones that make many other projects possible: how to get that energy to more people.

No matter the energy source, electricity still has to travel from the power plant to the end user. Yet many places in the developing world lack efficient transmission and distribution systems; much of the precious energy is lost when travelling long distances.

Adapting and modernizing transition systems is especially important to enhance physical resilience in the world of extreme climate events. Recent heat waves in California, cold snaps in Texas and wildfires in Australia strain power grids’ ability to deliver.

If the developed world is struggling to



keep up, developing areas need special assistance.

Some regions of Nicaragua, for example, have good coverage rates in some areas of the country while having a substantial portion of the population living off-grid. Over the next few years, demand is expected to increase, the country’s renewable energy resources need to be more fully utilized, and a reliable link to the regional electricity market needs to be established, all of which the transmission system will need to handle.

Recent investments (see *Factfile box below*) in the country’s transmission network aim to address these areas, as well as provide the necessary catalyst to create better living conditions and stimulate socio-economic development.

Mini-grids

Yet what about places that transmission lines cannot reach, or where it is too cost-prohibitive at the moment to do so? This is where mini-grids come in.

Especially impactful in rural areas, mini-grids are small systems that generate their own energy, either through single or multiple sources, and distribute that power to the immediate area. By definition, they are completely off the main grid, serve a small area, and do not generate great amounts of gigawatts that a standalone power plant might.

What’s more, mini-grids offer a more climate-friendly solution as the solar and wind resources often used to power them reduce the reliance on diesel generators.

Localized generation distribution systems aren’t only convenient for any places, they’re also essential to achieving SDG 7. The World Bank estimates that mini-grids are the most cost-effective way to electrify nearly half a billion people over the next decade. Reaching SDG 7 would mean about 40 per cent of all new connections over the next ten years will need to come via mini-grids.

Mini-grids can also be more agile than larger grid systems in adapting to the needs of the remote areas they serve.

A recent study in the journal *Cleaner Environmental Systems* found that most solar mini-grids in Bangladesh have cost-effective installations, many of those have generation capacities in excess of local needs while others have underestimated the demand in their particular communities. The study’s authors treat each of these seemingly negative scenarios as opportunities. For systems that are producing more energy than needed, they recommend encouraging consumers to link consumption with economically and socially productive activities. On the other hand, mini-grids not producing enough can easily be scaled-up to meet demand in a cost-effective way.

As the 2030 SDG deadline draws closer, the achievement of many of the goals, not just for energy, will come down to making the right connections.



SDG TARGET 7.B

“By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.”



NICARAGUA’S EL TORTUGUERO — LA ESPERANZA RURAL ELECTRICITY TRANSMISSION PROJECT

In order to stimulate the country’s socio-economic development, the OPEC Fund has committed \$20.5 million in support of strengthening Nicaragua’s rural electricity transmission network. The project will see the construction of a new substation, the expansion of an existing substation and about 100 kilometres of transmission lines to connect the two. More than 300,000 people are expected to benefit, which includes 5,000 new end-users. Besides the everyday benefits of reliable energy for internet, mobile phones, or a reading light to study by, the project also promotes better health and reduced air pollution by providing an alternative to toxic fumes used by kerosene lamps.



Forthcoming events

17th international conference on power-to-gas technology, January 9–10, 2023, Singapore. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/power-to-gas-technology-conference-in-january-2023-in-singapore>.

17th international conference on greenhouse gases and climate change, January 9–10, 2023, Bali, Indonesia. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/greenhouse-gases-and-climate-change-conference-in-january-2023-in-bali>.

17th international conference on oil and gas transportation, January 16–17, 2023, Zurich, Switzerland. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/oil-and-gas-transportation-conference-in-january-2023-in-zurich>.

ESF MENA 2023, Middle East energy & sustainability forum, January 22–24, 2023, Manama, Bahrain. Details: Europetro. Website: <https://europetro.com/esfmena>.

SPE reservoir characterization and simulation conference and exhibition, January 24–26, 2023, Abu Dhabi, UAE. Details: SPE. Website: https://www.spe-events.org/reservoir-characterisation?_ga=2.153367099.221754175.1667486556-1455531076.1667486556.

BBTC MENA 2023, Middle East bottom of the barrel and catalyst technology conference, January 25–26, 2023, Manama, Bahrain. Details: Europetro. Website: <https://europetro.com/bbtcmena>.

17th international conference on natural gas and oil, January 30–31, 2023, Dubai, UAE. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/natural-gas-and-oil-conference-in-january-2023-in-dubai>.

ECOMOF 2023: 4th Economic Community of West African States (ECOWAS) mining and petroleum forum and exhibition, February 1, 2023, Niamey, Niger. Details: AME Trade Ltd (Africa and Middle East Trade Ltd), 326 City Rd, London EC1V 2PT, UK. Tel: +44 207 70 04 949; fax: +44 207 68 13 120.

17th international conference on oil and gas projects in common fields, February 6–7, 2023, Bangkok, Thailand. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/oil-and-gas-projects-in-common-fields-conference-in-february-2023-in-bangkok>.

17th international conference on advances in oil, gas and coal technology, February 6–7, 2023, New Delhi, India. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/advances-in-oil-gas-and-coal-technology-conference-in-february-2023-in-new-delhi>.

17th international conference on processing of oil and gas, February 6–7, 2023, Lisbon, Portugal. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/processing-of-oil-and-gas-conference-in-february-2023-in-lisbon>.

17th international conference on oil and gas projects in common fields, February 6–7, 2023, Amsterdam, The Netherlands. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/oil-and-gas-projects-in-common-fields-conference-in-february-2023-in-amsterdam>.

<https://waset.org/oil-and-gas-projects-in-common-fields-conference-in-february-2023-in-amsterdam>.

IEW, India energy week, February 6–8, 2023, Bengaluru, India. Details: dmg::events. Website: www.indiaenergyweek.com.

EGYPS, Egypt petroleum show 2023, February 13–15, 2023, Cairo, Egypt. Details: dmg::events. Website: www.egyps.com.

17th LNG supplies for Asian markets 2023, February 14–15, 2023, Singapore. Details: Conference Connection's. Tel: +65 6338 0064; fax: +65 6338 4090; email: info@lng-conference.com; website: www.cconnection.org/events/lnga.

Argus Americas crude summit, February 15–17, 2023, Houston, TX, USA. Details: ArgusMedia, www.argusmedia.com/en/conferences-events-listing/americas-crude.

PGI 2023, 22nd Pacific and Middle East gas insiders by FGE, February 16–17, 2023, Singapore. Details: Conference Connection's. Tel: +65 6338 0064; fax: +65 6338 4090; email: info@lng-conference.com; website: www.cconnection.org/events/pgi.

Transportation oil & gas congress 2023, February 20–21, 2023, Istanbul, Türkiye. Details: BGS Group. Tel: +31 20 80 87 321; fax: +44 20 30 06 88 22; e-mail: request@bgs.group; website: <https://togc.events>.

ICNGEPPST 2023: 17th international conference on natural gas exploration, processing, production, storage and transportation, February 20–21, 2023, Jeddah, Saudi Arabia. Details: World Academy of Science, Engineering and Technology. Website: <https://waset.org/natural-gas-exploration-processing-production-storage-and-transportation-conference-in-february-2023-in-jeddah>.

Libya oil and gas, February 20–22, 2023, Tripoli, Libya. Details: PyramidsGroup Fuarcilik AS, Kucukbakkalkoy Mah Kocasinan Cad Gumrukcu Sok. No 8 34750 Atasehir, Istanbul, Türkiye. Tel: +90 216 575 28 28; e-mail: info@pyramidsfair.com; website: <https://libyaoilgasexpo.com>.

ESF Europ 2023, energy and sustainability forum, February 20–22, 2023, Amsterdam, The Netherlands. Details: Europetro. Tel: +44 207 357 8394; email: christina_romanova@europetro.com; website: <https://europetro.com/esfeurope>.

7th Africa 2023 oil & gas, international trade exhibition, February 23–25, 2023, Dar-Es-Salaam, Tanzania. Details: Expogroup Exhibitions Worldwide, Int'l Marketing Level 25, Monarch Office Tower, One Sheikh Zayed Road, Dubai, UAE. Tel: +971 4 30 50 755; fax: +971 4 37 21 422; e-mail: feedback@expogr.com; website: www.expogr.com/tanzania/oilgas.

Subsea tieback forum & exhibition, February 28–March 2, 2023, Galveston, TX, USA. Details: Endeavor Business Media, LLC, 331 54th Ave N, Nashville, TN 37209, USA. Tel: +1 800 54 77 377; website: www.subseatiebackforum.com.

Japan energy summit & exhibition, February 28–March 2, 2023, Tokyo, Japan. Details: dmg::events. Website: www.japanenergyevent.com.

Global oil inventory developments

November 2022

Global oil inventories consist of three major components. The first component is the total OECD oil stocks, commercial and Strategic Petroleum Reserves (SPRs), with OECD national government reporting systems providing data on their inventories. The second major component is non-OECD inventories, which have grown in importance in recent years as rising non-OECD oil demand – which has surpassed OECD oil demand levels – requires more stockpiling in these countries. Unfortunately, inventories in the non-OECD are hard to track due to incomplete data or the lack thereof. In the absence of regularly reported data, estimates are arrived at using information released by companies and ministries, as well as figures published in the Joint Organisations Data Initiative (JODI) database, which features official country data. The final component is oil at sea, which has increased in recent years, providing an important operational link between exporting and consumer countries.

Global oil inventories have increased since the beginning of this year by 158 million barrels and stood at 8,096m b at the of September 2022. OECD commercial stocks, non-OECD stocks and oil at sea witnessed stock builds, while SPRs in the OECD registered significant stock draws.

Over this period, total OECD commercial stocks have increased by 98m b. At the same time, non-OECD stocks and oil at sea rose by 111m b and 184m b, respectively. By contrast, SPRs were expected to register a significant draw of 236m b over the first three quarters of this year, with the bulk coming from the US, amounting to a planned 176m b, followed by OECD Europe drawing some 31m b and OECD Asia Pacific 29m b. These volumes are estimated to consist of 208m b of crude and 28m b of products, notably gasoline and middle distillates.

In 1Q22, global oil inventory levels continued

the declining trend observed since late 2020, as total oil demand outpaced global oil supply by 300,000 b/d. However, this trend was reversed in 2Q22 and 3Q22, as global oil supply outpaced total oil demand by 200,000 b/d and 1.1m b/d, respectively. This underlines the apparent move from a balance deficit to a surplus in terms of oil supply.

During the first three quarters of this year, the observed global oil stock build reflected that the global oil market saw a supply surplus of around 300,000 b/d *vis-à-vis* total world oil demand. This supply surplus was confirmed by low crude refinery runs, which are an indicator of oil demand performance. The drop in oil demand occurred on the back of weakening economic activity, spurred by rising inflation, monetary tightening by major central banks, aggravated geopolitical tensions, tightening labour markets and additional supply chain constraints.

The significant uncertainty regarding the global economy, accompanied by fears of a global recession contributes to the downside risk for lowering global oil demand growth. In addition, China's strict adherence to the "zero COVID-19 policy" adds to this uncertainty, making the country's recovery path even more unpredictable. To address this significant uncertainty and heightened market volatility, the proactive and pre-emptive decisions taken by the OPEC and non-OPEC producing countries in the 'Declaration of Cooperation' (DoC) will continue to contribute to global oil market stability. 



MOMR ... oil market highlights

November 2022

Crude oil price movements — The OPEC Reference Basket (ORB) fell m-o-m by \$1.70, or 1.8 per cent, in October to average \$93.62/b. The ICE Brent front-month rose \$3.02, or 3.3 per cent, to average \$93.59/b, while NYMEX WTI increased by \$3.23, or 3.9 per cent, to average \$87.03/b. The Brent/WTI futures spread narrowed m-o-m, contracting by 21¢ to average \$6.56/b. The market structure of ICE Brent and NYMEX WTI strengthened and the first-to-third month spreads moved into stronger backwardation. The combined futures and options net long positions of hedge funds and other money managers increased in both ICE Brent and NYMEX WTI.

World economy — The world economic growth forecast for 2022 and 2023 remains unchanged at 2.7 per cent and 2.5 per cent, respectively. This reflects the uncertainties that might affect GDP growth in 4Q22 and subsequent quarters. For the US, GDP growth in 2022 remained at 1.5 per cent, while the forecast for 2023 is unchanged at 0.8 per cent. Euro-zone economic growth for 2022 and 2023 are also unchanged at 3.0 per cent and 0.3 per cent, respectively. Japan's economic growth forecast remains at 1.5 per cent for 2022 and one per cent for 2023. China's 2022 growth forecast is unchanged at 3.1 per cent for 2022 and 4.8 per cent for 2023. The forecast for India is in line with the previous assessment for both 2022 and 2023 at 6.5 per cent and 5.6 per cent, respectively. Similarly, Brazil's economic growth forecast is unchanged at 1.5 per cent for 2022 and one per cent for 2023. Russia's GDP contraction in 2022 is estimated at 5.7 per cent, followed by a growth of 0.2 per cent in 2023, unchanged from last month's assessment. The global growth has clearly entered into a period of significant uncertainty and mounting challenges. This includes high inflation levels and the consequences of monetary tightening by major central banks, high sovereign debt levels in many regions and ongoing supply chain issues. Moreover, geopolitical risks persist and developments related to the COVID-19 pandemic, mainly in the Northern Hemisphere and China, remain a key uncertainty.

World oil demand — The world oil demand growth forecast for 2022 is revised down by 100,000 b/d to now stand at 2.5m b/d. Oil demand in the OECD is estimated to increase by around 1.3m b/d, while the non-OECD is seen growing by about 1.3m b/d. The second quarter of this year was revised slightly higher amid better-than-anticipated oil demand in the main OECD consuming countries. However, oil demand in 3Q22 and 4Q22 is revised lower due to the zero-COVID-19 policy in China, ongoing geopolitical uncertainties and weaker economic activities. For 2023, the global oil demand growth forecast is revised down by 100,000 b/d from the previous assessment to stand at 2.2m b/d. The OECD is expected to grow by 300,000 b/d and the non-OECD by 1.9m b/d. Oil demand growth is anticipated to be challenged by uncertainties related to economic activities, COVID-19 containment measures and geopolitical developments.

World oil supply — Non-OPEC liquids supply is

forecast to grow by 1.9m b/d in 2022, following a slight downward revision of 30,000 b/d compared with the previous assessment. An upward revision to Latin America and Russia liquids production was more than offset by downward revisions to Other Eurasia, OECD Europe and Other Asia. The main drivers of liquids supply growth for 2022 are expected to be the US, Canada, Guyana, China and Brazil, while Norway and Thailand are set to contribute the largest declines. For 2023, the forecast for non-OPEC liquids supply growth remains broadly unchanged at 1.5m b/d. The main drivers are expected to be the US, Norway, Brazil, Canada, Kazakhstan and Guyana, whereas oil production is forecast to decline primarily in Russia and Mexico. Nevertheless, considerable uncertainties persist regarding the potential for US shale production and the geopolitical situation in Eastern Europe, including the looming EU sanctions on imports of Russian oil. OPEC NGLs and non-conventional liquids are forecast to grow by 100,000 b/d in 2022 to average 5.39m b/d and in 2023 by 50,000 b/d to average 5.44m b/d. OPEC-13 crude oil production in October decreased by 210,000 b/d m-o-m to average 29.49m b/d, according to available secondary sources.

Product markets and refining operations — Refinery margins increased globally in October and showed solid gains in line with market expectations and historic seasonal trends. This was the result of a significant reduction in refinery product output as maintenance interventions further intensified in the West and offline capacities reached a peak in October. The resulting contraction of product balances in the Atlantic Basin provided a profitable environment for Asia to capitalize on product exports that ultimately supported their refining economics too, although the gains in Asia were more limited. Over the month, global refinery processing rates declined further, in line with historical trends, dropping 960,000 b/d in response to a rise in offline capacity amid peak autumn maintenance works. In the coming month, refinery intakes are expected to reverse course and recover. This will add nearly 1.5m b/d m-o-m, according to preliminary data, as major turnarounds come to an end. The need to restock diesel inventories, mainly in the West, should lend further support.

Tanker market — Dirty spot freight rates moved higher in October, with m-o-m gains seen on almost all major routes. Spot VLCC rates on the Middle East-to-East route rose eight per cent, while on the West Africa-to-East route they gained ten per cent. Rates on the midsize Suezmax and Aframax routes were broadly higher. Suezmax rates on the US Gulf Coast (USGC)-to-Europe route rose 16 per cent, while Aframax spot rates on the Cross-Med route increased 30 per cent. Only Aframax rates on the Indonesia-to-East route saw a decline, falling 11 per cent. All monitored routes were well above the levels seen in the same month last year. Clean rates saw diverging trends, with losses East of Suez outweighing gains West of Suez. On the

Middle East-to-East route, clean spot rates fell 38 per cent m-o-m in October.

Crude and refined products trade — Preliminary data show US crude imports fell to a six-month low in October at an average of 6.1m b/d, while US crude exports remained close to record high levels at an average of 4.0m b/d. US product imports recovered from the previous month's decline, while product exports fell back from the strong September levels to average 6.1m b/d. Preliminary estimates show OECD Europe's crude imports have averaged around 9m b/d over the last three months. Product imports into OECD Europe have risen gradually since August, amid higher flows from the Middle East and India. Japan's crude imports in September fell back from an over two-year high to average 2.8m b/d, although flows still registered the 14th-month of consecutive y-o-y gains. Japan's product exports increased further in September, reaching the highest monthly figure since February. China's crude imports continued to recover in September, averaging 9.8m b/d. Gains came as Chinese refiners began to boost product exports, particularly gas-oil, amid tight regional demand and the availability of product export quotas. China's product imports jumped 26 per cent on the back of higher inflows of LPG. Recently released October data shows China's crude imports increased to 10.2m b/d, while product exports fell 21 per cent amid improved domestic demand. India's crude imports continued to decline in September, reaching an 11-month low of 4.0m b/d. This broke a seven consecutive months of y-o-y gains. India's product imports and exports were broadly stable m-o-m in September.

Commercial stock movements — Preliminary September data shows total OECD commercial oil stocks up 13.4m b m-o-m. At 2,749m b, inventories were 21m b less than the same month a year ago, 198m b lower than the latest five-year average and 218m b below the 2015–19 average. Within components, crude and product stocks rose 6.5m b and 6.8m b, respectively, compared with the previous month. At 1,335m b, OECD crude stocks were 36m b higher than the same month last year, 70m b below the latest five-year average and 100m b lower than the 2015–19 average. OECD product stocks stood at 1,414m b, representing a m-o-m deficit of 56m b. This was 128m b lower than the latest five-year average and 118m b below the 2015–19 average. In terms of days of forward cover, OECD commercial stocks remained unchanged m-o-m in September to stand at 58.4 days. This is 0.8 days below September 2021 levels, 5.0 days less than the latest five-year average and 4.1 days lower than the 2015–19 average.

Balance of supply and demand — Demand for OPEC crude in 2022 is revised down by 100,000 b/d from the previous month's assessment to stand at 28.6m b/d, which is around 500,000 b/d higher than in 2021. Demand for OPEC crude in 2023 is also revised down by 200,000 b/d from the previous month's assessment to stand at 29.3m b/d, which is 700,000 b/d higher than in 2022. 

The feature article and oil market highlights are taken from OPEC's Monthly Oil Market Report (MOMR) for November 2022. 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.

Review of 2022 and outlook for 2023

December 2022

The global economy continued its recovery path throughout much of 2022, albeit at varying levels among regions, and with a notable slowdown towards the end of the year.

The Eurozone saw unexpectedly strong growth in 1H22 before decelerating in 2H22, amid rising inflation that prompted European Central Bank monetary tightening and concerns about a possible energy crunch in the winter heating season. The US economy faced challenges in 1H22, but recovered somewhat in 2H22, supported by ongoing healthy consumption levels. In the non-OECD, China's strict zero-COVID policy has dampened GDP growth in 2022. India witnessed strong economic growth in 1H22, but decelerated slightly in 3Q22 amid high inflation levels. For 2022, world GDP growth is estimated at 2.8 per cent.

Going forward, several challenges still lie ahead. For example, persistently high inflation may necessitate further monetary tightening measures by major central banks. Rising interest rates will be a cause for concern for countries with high sovereign debt levels. Tight labour markets, amid calls for higher wages, will add pressure, as will continued supply chain issues. However, a resolution of the geopolitical conflict in Eastern Europe and a relaxation of China's zero-COVID policy could provide some upside potential. Global GDP growth for 2023 is forecast at 2.5 per cent.

Global oil demand growth is estimated at 2.5m b/d y-o-y in 2022. In OECD Americas and Europe, lower-than-expected transportation fuel demand outpaced jet fuel demand recovery, leading to y-o-y growth of 1.4m b/d for the OECD. In the non-OECD, y-o-y growth of 1.2m b/d is expected. Renewed lockdowns in China weighed heavily on oil demand, with the country registering an oil demand contraction in 2022.

For 2023, world oil demand is expected to increase by 2.2m b/d y-o-y. OECD oil demand is forecast to increase by 300,000 b/d. This is mostly in OECD Americas, while other OECD regions are not

expected to see noticeable growth. In the non-OECD, oil demand is forecast to increase by 1.9m b/d, with China and India seeing the largest growth. This forecast assumes the successful containment of COVID-19 and a resumption of pre-pandemic economic growth in China, while India's oil demand is projected to be supported by continued healthy economic growth.

Non-OPEC supply growth in 2022 is estimated at 1.9m b/d. The main drivers of growth are estimated to have been the US, Canada, Guyana, Russia, China and Brazil. US shale oil companies continued to focus on shareholder returns, with higher production costs amid supply chain shortages and inflation limiting overall production growth.

In 2023, non-OPEC supply is forecast to expand by 1.5m b/d y-o-y. US tight oil output and offshore startups in Latin America and the North Sea are expected to drive growth. The US is expected to lead the way with a share of about 75 per cent of total growth, followed by Norway, Brazil, Canada, Kazakhstan and Guyana.

Non-OPEC upstream sector investment in 2022 is estimated at around \$424 billion, up around 19 per cent y-o-y. It is forecast at \$459bn in 2023, up by eight per cent y-o-y.

As the year 2022 draws to a close, the recent global economic growth slowdown with all its far-reaching implications is becoming quite evident. The year 2023 is expected to remain surrounded by many uncertainties, mandating vigilance and caution. This is reflected in the continued pro-active and pre-emptive joint efforts of the DoC to provide stability and balance to the global oil market, amid rapidly evolving market conditions.



MOMR ... oil market highlights

December 2022

Crude oil price movements — The OPEC Reference Basket (ORB) averaged \$89.73/b in November, falling m-o-m by \$3.89, or 4.2 per cent. The ICE Brent front-month fell \$2.74, or 2.9 per cent, to average \$90.85/b, and NYMEX WTI decreased by \$2.64, or 3.0 per cent, to average \$84.39/b. The Brent/WTI futures spread narrowed further m-o-m, contracting by 10¢ to average \$6.46/b. The market structure of ICE Brent and NYMEX WTI weakened significantly, and the first-to-third month spreads moved temporarily into contango in late November. The combined futures and options net long positions of hedge funds and other money managers fell significantly in both ICE Brent and NYMEX WTI.

World economy — The world economic growth forecast is revised up marginally to 2.8 per cent for 2022, after slightly better-than-expected 3Q22 GDP growth in a few economies. The 2023 global economic growth forecast remains unchanged at 2.5 per cent. For the US, GDP growth in 2022 is revised up to 1.7 per cent, while the forecast for next year remains unchanged at 0.8 per cent. Euro-zone economic growth for 2022 remains at three per cent, and is also unchanged for 2023 to stand at 0.3 per cent. Japan's economic growth forecast remains at 1.5 per cent for 2022 and one per cent for 2023. China's 2022 growth forecast remains at 3.1 per cent for 2022 and at 4.8 per cent for 2023. The forecasts for India remain at 6.5 per cent for 2022 and 5.6 per cent for 2023. Brazil's economic growth forecast is revised up to 2.4 per cent for 2022, but remains unchanged at one per cent for 2023. The 2022 forecast for Russia is revised up to a contraction of five per cent followed by growth of 0.2 per cent in 2023. With this, risks to global economic growth remain skewed downward due to challenges including high inflation, monetary tightening by major central banks, high sovereign debt levels in many regions and some ongoing supply chain issues. Moreover, geopolitical risks and the pace of the COVID-19 pandemic during winter remain uncertain.

World oil demand — The world oil demand forecast for 2022 remains unchanged at 2.5m b/d. The oil demand was adjusted higher in the 3Q22, amid better-than-anticipated transportation fuel consumption in OECD, offset by a downwardly revised estimate for 4Q22 due to a slowdown in the non-OECD amid reduced mobility and sluggish industrial activity in China. For 2023, world oil demand growth also remains unchanged at 2.2m b/d, with the OECD growing by 300,000 b/d and non-OECD growth forecast at 1.9m b/d. This forecast is subject to many uncertainties including global economic developments, COVID-19 containment measures mainly in China and ongoing geopolitical tensions.

World oil supply — Non-OPEC liquids supply is forecast to grow by 1.9m b/d for 2022, broadly unchanged from last month's assessment. Upward revisions to liquids production in OECD Americas, Russia and Latin America were offset by downward revisions to OECD Europe, Other Eurasia and Other Asia. The main drivers of liquids supply growth for the year are expected to be the US, Canada, Guyana, Russia, China and Brazil, while production is expected to decline mainly in Norway and Thailand. For 2023, non-OPEC liquids production growth remains largely unchanged and is expected to grow by 1.5m b/d. The main drivers of liquids supply growth are expected to be the US, Norway, Brazil, Canada, Kazakhstan and Guyana, whereas oil production is forecast to decline mainly in Russia and Mexico. Nonetheless, large uncertainties persist around geopolitical development in Eastern Europe, as well as the US shale output potential next year. OPEC NGLs and non-conventional liquids are forecast to grow by 100,000 b/d in 2022 to average 5.39m b/d and by 50,000 b/d to average 5.44m b/d in 2023. OPEC-13 crude oil production in November decreased by 744,000 b/d m-o-m to average 28.83m b/d, according to available secondary sources.

Product markets and refining operations — Refinery margins in the Atlantic Basin underwent a downward correction in November. This was due to the increasing refinery intakes as heavy refinery repair works subsided. The recovery in product output levels exerted pressure on product crack spreads, particularly those of gasoil/diesel. In Asia, however, margins continued to improve, supported by lower Dubai prices. Strong regional product demand led to stronger markets for all products across the barrel with the exception of gasoil/diesel. Global refinery processing rates began to recover during the month of November and rose by 2.1m b/d in response to a decline in offline capacity amid the end of peak refinery maintenance. Refinery intakes are expected to continue to recover in December, increasing by almost the same amount, according to preliminary data.

Tanker market — Dirty freight rates continued to move higher in November, with strong gains on all monitored routes. Aframax rates saw the strongest gains as refiners loaded-up on Russian crude ahead of EU sanctions. An ongoing shift to longer-haul routes due to trade dislocations also weighed on tanker availability. Aframax rates on the intraMediterranean route rose 43 per cent m-o-m in November and stood well above the levels seen in recent years. Suezmax rates saw similar support, with rates on the US Gulf to Europe route up 31 per cent m-o-m. VLCCs showed continued steady gains, up around 21 per cent on aver-

age. Clean spot freight rates on medium-range vessels were up 13 per cent both East and West of Suez, amid tight tonnage availability.

Crude and refined products trade — US crude imports recovered from a six-month low to average 6.3m b/d in November, while US crude exports reached a fresh record high of 4.2m b/d, according to estimates based on weekly data. China's crude imports continued to recover in October, averaging 10.2m b/d. China's product exports fell back from a 15-month high with declines across most major products. India's crude imports recovered the previous month's losses, averaging 4.2m b/d in October. Product exports from India declined by around 21 per cent, with diesel outflows sharply lower. Japan's crude imports continued to slip from a two-year high to average 2.7m b/d in October, in line with seasonal developments, but still showed 15 months of consecutive y-o-y gains. Tanker tracking data showed crude imports into the OECD Europe region remained steady in 3Q22 before dipping in November. Imports of Russian crude into OECD Europe were down by close to 1.0m b/d y-o-y in November, ahead of the implementation of EU sanctions, although flows to Turkey increased sharply reaching as high as 400,000 b/d, according to tanker tracking data, up from relatively minor levels last year.

Commercial stock movements — Preliminary October data sees total OECD commercial oil stocks up m-o-m by 22.5m b. At 2,748m b, they were 15m b less than the same time one year ago, 167m b lower than the latest five-year average and 197m b below the 2015–19 average. Within the components, crude and product stocks rose m-o-m by 12.9m b and 9.5m b, respectively. At 1,335m b, OECD crude stocks were 8m b higher than the same time a year ago, but 80m b lower than the latest five-year average and 118m b lower than the 2015–19 average. OECD product stocks stood at 1,413m b, representing a deficit of 23m b from the same time a year ago, 87m b lower than the latest five-year average and 79m b below the 2015–19 average. In terms of days of forward cover, OECD commercial stocks rose m-o-m by 1.0 day in October to stand at 59.1 days. This is 0.6 days below October 2021 levels, 4.0 days less than the latest five-year average and 3.3 days lower than the 2015–19 average.

Balance of supply and demand — Demand for OPEC crude in 2022 remained unchanged from the previous month's assessment to stand at 28.6m b/d, which is around 500,000 b/d higher than in 2021. Demand for OPEC crude in 2023 also remained unchanged from the previous month's assessment to stand at 29.2m b/d, which is 600,000 b/d higher than in 2022.

The feature article and oil market highlights are taken from OPEC's Monthly Oil Market Report (MOMR) for December 2022. 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	2021		2022										Weeks 44-48/2022 (week ending)					
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Oct 28	Nov 4	Nov 11	Nov 18	Nov 25
Arab Light – Saudi Arabia	80.81	75.49	86.15	93.82	112.99	107.24	116.44	117.27	108.98	104.89	99.33	96.20	91.58	96.09	96.32	96.08	93.02	86.04
Basrah Medium – Iraq	78.55	72.81	83.80	92.44	112.21	104.63	111.91	115.56	105.36	97.66	91.16	89.45	85.66	89.31	90.40	90.62	87.08	79.86
Bonny Light – Nigeria	80.73	74.43	86.85	98.76	120.68	106.39	115.07	125.22	117.58	106.08	95.73	95.02	92.84	95.12	97.72	99.02	94.06	86.49
Djeno – Congo	73.92	66.66	79.16	90.56	111.30	96.92	105.68	116.11	105.18	92.17	82.37	85.66	83.65	85.76	88.50	89.83	84.87	77.30
Es Sider – Libya	80.32	73.35	86.16	98.06	117.90	104.42	113.18	124.96	114.03	101.17	90.47	93.91	91.25	94.01	96.23	97.43	92.47	84.90
Girassol – Angola	82.29	75.16	88.28	100.78	121.58	105.28	113.95	127.03	119.15	105.99	92.26	95.61	92.76	96.41	98.75	99.86	94.74	85.41
Iran Heavy – IR Iran	80.50	74.68	85.59	93.04	112.40	106.28	115.48	115.85	107.63	102.24	97.18	93.21	88.73	93.02	93.47	93.24	90.17	83.19
Kuwait Export – Kuwait	81.13	75.38	86.28	93.84	113.28	107.46	116.82	117.26	109.19	103.82	98.69	94.72	90.13	94.51	94.89	94.64	91.58	84.60
Merey – Venezuela	61.21	54.89	63.58	71.02	88.12	83.40	88.07	92.25	84.72	80.03	73.70	71.56	66.94	71.37	71.31	70.99	68.27	61.93
Murban – UAE	82.06	74.57	85.11	94.18	112.48	104.48	109.97	117.53	105.97	98.04	92.45	93.54	90.90	93.45	94.13	94.37	91.65	87.17
Rabi Light – Gabon	80.91	73.65	86.15	97.55	118.29	103.91	112.67	123.10	112.17	99.16	89.36	92.65	90.64	92.75	95.49	96.82	91.86	84.29
Saharan Blend – Algeria	81.97	75.50	88.21	100.71	121.80	109.37	115.28	128.31	115.83	104.22	92.72	95.66	93.60	95.76	98.46	99.78	94.82	87.25
Zafiro – Equatorial Guinea	82.25	74.35	87.28	99.51	120.50	105.71	115.25	127.10	116.60	103.50	90.72	93.61	92.12	93.71	97.05	98.78	93.82	85.29
OPEC Reference Basket	80.37	74.38	85.24	93.95	113.48	105.64	113.87	117.72	108.55	101.90	95.32	93.62	89.73	93.56	94.38	94.51	91.09	84.18

Table 2: Selected spot crude prices
\$/b

Crude/country	2021		2022										Weeks 44-48/2022 (week ending)					
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Oct 28	Nov 4	Nov 11	Nov 18	Nov 25
Arab Heavy – Saudi Arabia	80.19	74.27	85.28	92.78	112.13	106.21	115.53	115.91	107.84	101.95	96.89	93.12	88.58	92.93	93.33	93.09	90.03	83.05
Brega – Libya	80.22	73.35	86.26	98.31	118.15	105.27	114.03	125.96	114.53	101.52	90.52	93.81	91.50	93.91	96.41	97.68	92.72	85.15
Brent Dtd – North Sea	81.37	74.10	86.61	98.01	118.75	104.37	113.13	123.56	112.63	99.62	89.82	93.11	91.10	93.21	95.95	97.28	92.32	84.75
Dubai – UAE	80.29	73.31	83.34	92.11	110.49	102.91	107.83	112.89	102.87	96.33	90.98	91.04	86.12	91.06	91.01	90.64	87.73	80.45
Ekofisk – North Sea	82.75	75.30	89.37	101.34	123.27	107.22	117.46	130.39	120.37	105.29	93.02	96.02	94.32	95.96	98.70	101.28	96.32	87.79
Iran Light – IR Iran	78.51	71.50	85.19	95.38	117.33	102.40	107.82	118.61	106.76	92.07	82.45	86.95	85.71	87.29	90.17	92.31	87.43	79.26
Isthmus – Mexico	75.50	68.50	79.55	89.68	107.42	100.40	108.32	113.85	100.47	89.09	81.44	83.57	79.26	83.53	84.25	84.00	80.40	73.33
Oman – Oman	80.29	73.22	83.62	92.03	110.96	102.40	107.32	112.93	103.22	96.97	90.80	90.80	86.15	90.38	90.85	90.64	87.43	80.74
Suez Mix – Egypt	78.38	71.37	85.06	95.25	117.20	102.27	107.69	118.48	106.63	91.94	82.32	86.82	85.58	87.16	90.04	92.18	87.30	79.13
Minas – Indonesia	79.35	72.44	82.96	92.25	111.23	103.44	109.79	115.06	103.01	95.39	88.91	91.06	89.21	92.11	92.94	93.52	90.91	84.95
Urals – Russia	80.08	73.14	86.23	94.94	92.59	72.55	81.18	91.61	85.32	77.34	68.63	70.54	67.98	69.41	70.95	74.00	71.53	62.02
WTI – North America	79.11	71.87	83.16	91.70	108.52	101.77	109.86	114.36	100.25	91.57	84.00	87.26	84.15	87.60	89.14	88.39	84.02	78.84

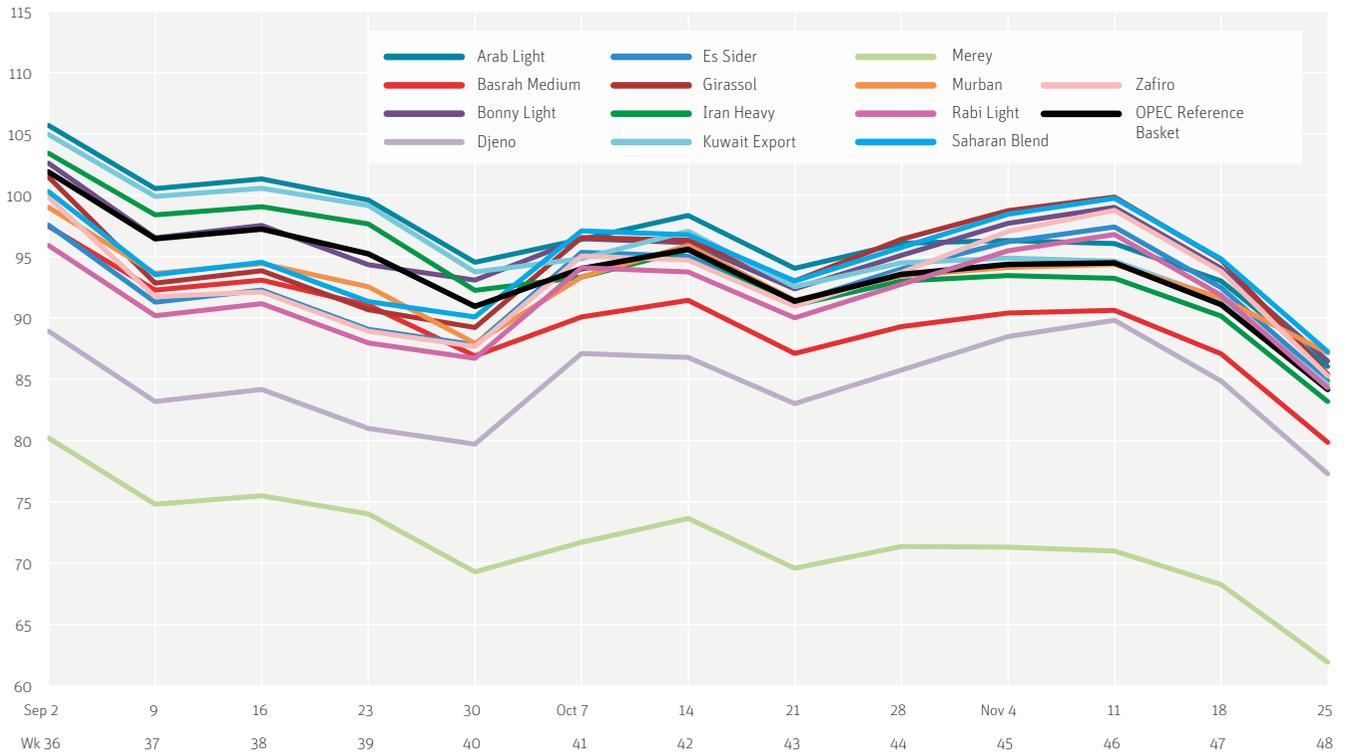
Notes:

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, 2022

\$/b



Graph 2: Evolution of selected spot crude prices, 2022

\$/b

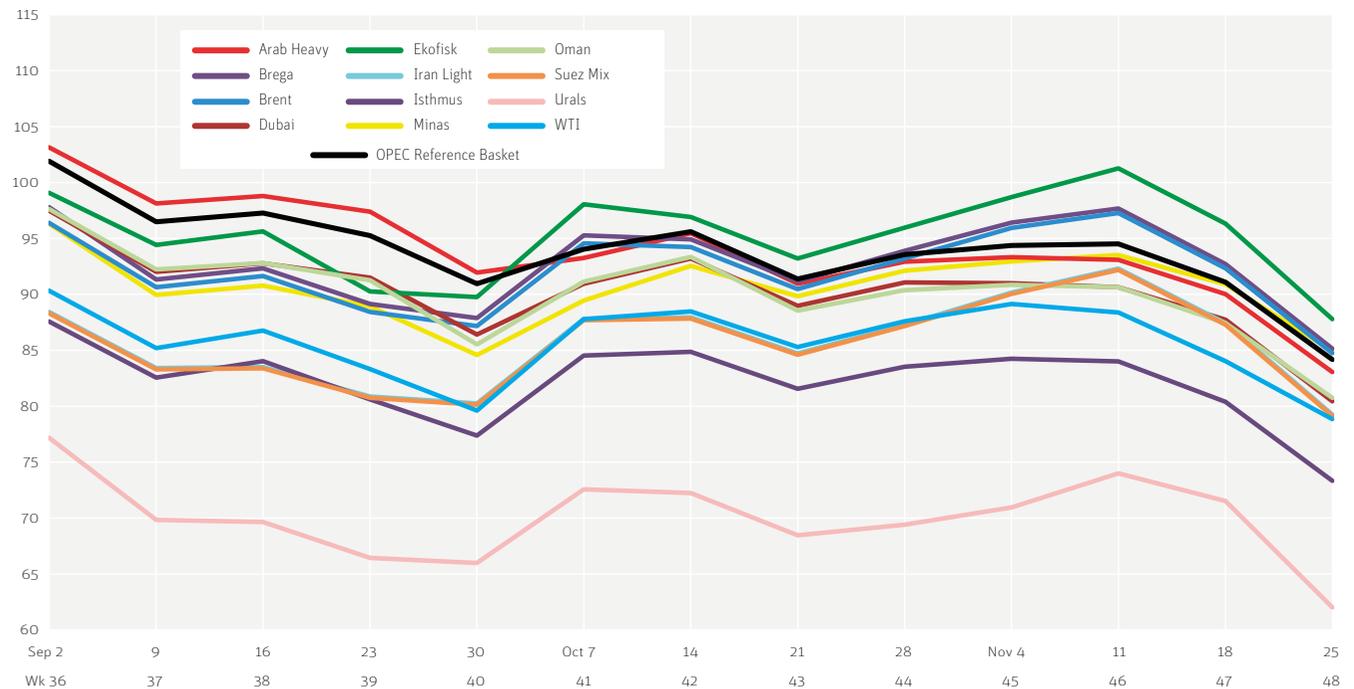


Table and Graph 3: North European market – spot barges, fob Rotterdam

\$/b

	naphtha	regular gasoline unleaded	diesel ultra light	jet kero	fuel oil 1 per cent S	fuel oil 3.5 per cent S
2021 November	81.41	100.77	91.26	92.83	77.65	65.40
December	77.40	90.49	86.20	86.38	73.64	62.52
2022 January	85.91	102.47	101.51	101.18	82.97	73.18
February	95.37	114.12	110.60	112.77	90.83	78.59
March	111.98	134.95	152.33	156.48	109.70	95.07
April	100.31	133.44	156.07	151.46	97.60	89.20
May	98.23	166.14	160.81	152.37	100.66	95.41
June	88.76	188.54	178.57	179.29	100.23	89.69
July	84.65	158.02	147.64	153.29	89.26	70.77
August	72.98	137.45	143.04	143.00	90.31	75.00
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

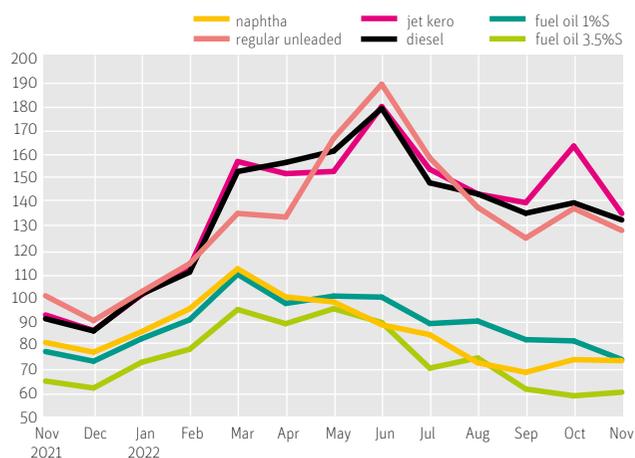


Table and Graph 4: South European market – spot cargoes, fob Italy

\$/b

	naphtha	premium gasoline 50ppm	diesel ultra light	fuel oil 1 per cent S	fuel oil 3.5 per cent S
2021 November	80.76	92.83	93.15	79.64	64.50
December	75.50	86.82	87.05	75.70	61.24
2022 January	84.89	98.09	101.29	85.58	72.09
February	93.90	109.76	112.16	92.31	77.06
March	110.29	130.57	155.32	114.69	93.45
April	97.78	128.46	150.56	104.14	87.17
May	94.86	151.69	151.88	106.96	91.99
June	83.67	173.11	177.45	107.04	85.70
July	82.14	141.78	145.03	95.58	70.58
August	70.39	114.86	135.92	96.88	71.03
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

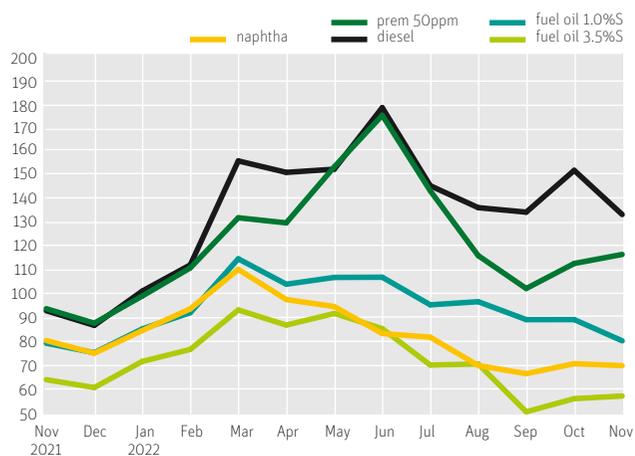
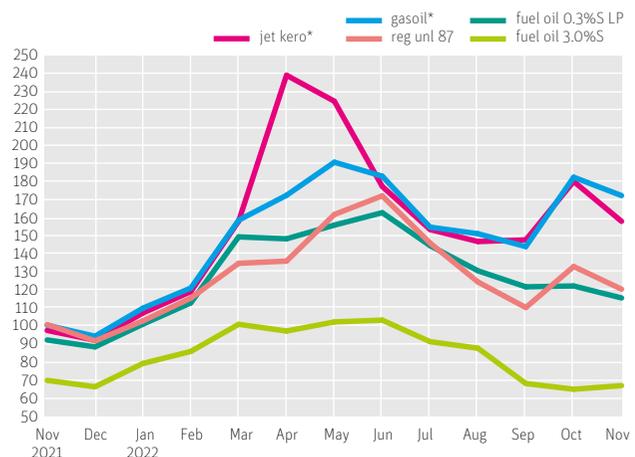


Table and Graph 5: US East Coast market – spot cargoes, New York

\$/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
2021 November	100.78	100.43	97.55	92.28	69.91
December	91.80	94.33	92.12	88.45	66.37
2022 January	102.81	109.86	107.23	101.02	79.27
February	115.43	121.00	119.03	112.79	85.91
March	134.68	158.55	158.01	149.32	100.95
April	135.92	172.32	238.78	148.24	97.19
May	161.70	190.63	224.38	155.83	102.26
June	172.02	182.90	177.23	162.70	103.26
July	145.90	154.69	153.38	144.45	91.34
August	124.36	151.06	146.74	130.55	87.69
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



* 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
2021							
November	84.21	95.01	92.15	90.84	90.65	89.09	68.76
December	77.82	87.92	85.79	84.94	84.50	83.47	63.75
2022							
January	84.56	98.04	96.18	97.84	97.43	95.78	72.97
February	95.75	110.72	108.26	109.91	109.24	106.17	79.78
March	111.42	131.07	127.47	138.51	136.25	134.32	97.61
April	97.75	126.73	123.45	139.18	137.21	134.35	102.47
May	95.76	146.88	140.99	145.08	143.96	142.90	96.91
June	85.72	155.10	148.86	168.61	168.56	164.40	91.26
July	82.70	121.56	116.35	136.82	136.22	134.90	72.69
August	72.64	110.57	107.25	134.09	133.62	132.39	73.78
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

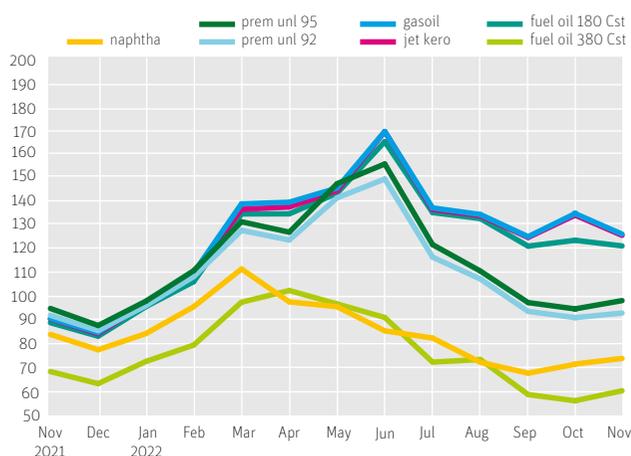
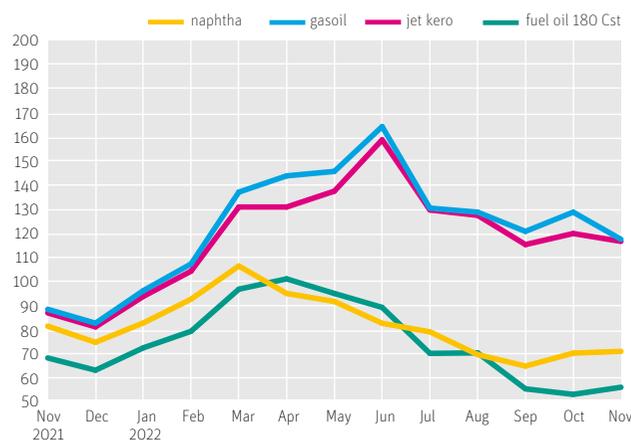


Table and Graph 7: Middle East Gulf market – spot cargoes, fob

\$/b

	naphtha	gasoil	jet kero	fuel oil 180 Cst
2021				
November	81.38	88.36	86.86	68.20
December	74.69	82.60	81.08	63.13
2022				
January	82.69	96.06	93.69	72.39
February	92.53	107.14	104.15	79.25
March	106.28	136.88	130.70	96.67
April	94.92	143.61	130.70	100.96
May	91.59	145.46	137.27	94.91
June	82.56	164.03	158.55	89.14
July	79.01	130.25	129.49	70.09
August	69.59	128.58	127.26	70.31
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

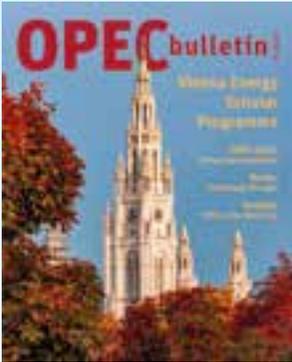


Source: Argus. Prices are average of available days.

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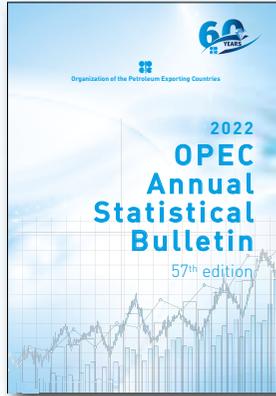
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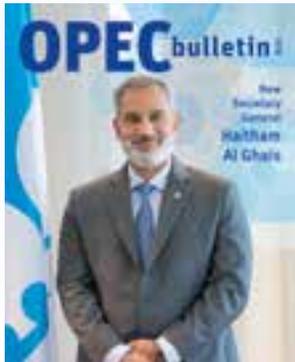
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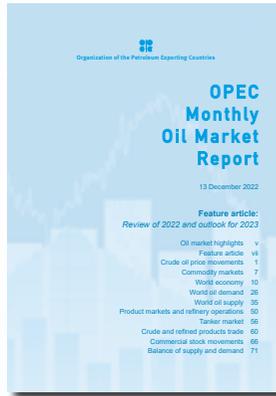
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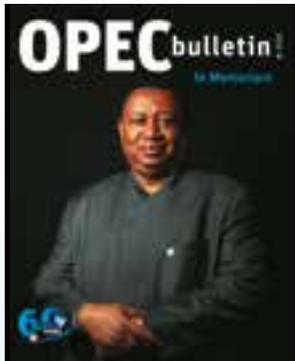
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