# Foreword

This year's World Oil Outlook (WOO) is the tenth edition of the publication, a significant milestone for OPEC's flagship publication. The WOO 2016 once again provides OPEC's analysis and views of the medium- and long-term outlook, and marks the conclusion of a challenging twelve months.

Since the publication last December of the WOO 2015, oil producers, consumers and investors have faced an oil market that has continued to readjust to the changing industry landscape – something that started in mid-2014. During 2016, the market has shown signs that fundamentals are gradually rebalancing. However, despite non-OPEC supply contracting considerably, global demand remaining robust and the pace of the stock build decelerating, it is clear that instability and volatility remain.

In January of this year, the OPEC Reference Basket (ORB) price fell to $22.48/barrel. It means that between June 2014 and January 2016 the ORB price fell by 80%. This is the largest percentage drop in the five episodes of sharp price declines that the market has experienced over the past three decades. Since then, however, prices mostly saw an upward trend until May, with the ORB price then settling above $40/b in the third quarter of this year.

Meanwhile, stock levels have recently levelled out, but remain well-above their five-year average. And while global spending on exploration and production by oil and gas producers is expected to fall slightly less this year, the combined amount over the two years still equates to a loss of more than $300 billion. This will impact not only new projects coming onstream, but new discoveries too.

The WOO 2016 takes these various shifting dynamics on board in its analysis and considers developments in the global economy, in oil supply and demand, both in the upstream and downstream, as well as various other drivers, challenges and uncertainties. These include policies, technology, the changing energy mix and sustainable development concerns, all of which contribute to the future outlook. The consideration of these factors helps to provide a detailed analysis that includes a breakdown by region, sector and timeframe.

In regards to the global economy, last year's WOO anticipated that medium-term global economic growth would average 3.6% per annum (p.a.) in the period 2014–2020. This year it has been revised down slightly to 3.4% p.a. for the timeframe of 2015–2021. This revised growth rate reflects the fact that there have been some marginal downward revisions in the medium-term growth outlook for some regions this year, particularly China and Latin America. However, the outlook remains optimistic concerning long-term global economic growth rates, which are the same as those in the WOO 2015, averaging 3.5% p.a. in the period to 2040.

On the demand side, it is important to highlight that the medium-term outlook to 2021 is 99.2 million barrels a day (mb/d), which is 1 mb/d higher than that assumed in last year's outlook. This is the result of a lower medium-term oil price assumption, which is expected to have a stronger influence than assumptions of lower medium-term economic growth and expanded energy efficiency policies. In the long-term, however, additional energy efficiency measures and the potential for new technological developments – such as alternative fuel vehicles – have led to oil demand in 2040 dropping slightly to 109.4 mb/d, a downward revision of 0.4 mb/d compared to last year.

In terms of supply, the lower oil price environment is expected to see overall non-OPEC supply decline in the period 2016–2017, before slowly rising again to 2021. It is expected to rise from 56.9 mb/d in 2015 to 58.6 mb/d in 2021, an increase of 1.7 mb/d. In the long-term, non-OPEC supply again rises steadily, but it is expected to peak at 61.4 mb/d in 2027, before dropping to 58.9 mb/d in 2040. However, uncertainties remain, and these are explored in the outlook through downside and upside non-OPEC supply scenarios.

It all means that OPEC will be required to meet most of the additional long-term oil demand. In terms of crude, it is expected that OPEC will have to supply an additional 8.9 mb/d between 2015 and 2040. For all OPEC liquids, the figure is 12.6 mb/d. The share of OPEC crude in the global liquids supply is also expected to increase from around 34% today to around 37% by 2040.

In the downstream sector, lower oil prices have also impacted the medium-term outlook. A number of investors have deferred refining projects from the 2016–2018 timeframe to 2019–2021. The latter period is now the one that is expected to see an excess of refining capacity emerging, hence increased competition, which could lead to reduced margins and, potentially, closures.

Further downstream capacity rationalization is expected in the longer term to 2040, particularly if refining regions are to maintain utilization rates of at least 80%, with closures in Europe leading the way. Moreover, slowing global demand growth and rising non-crude supplies see the pace of required refinery capacity additions decelerating in the long-term, although regions with growing demand will still see strong growth. Additions are led by the Asia-Pacific and the Middle East regions which, when combined, are expected to see almost 13 mb/d of the total 19.5 mb/d of global capacity additions needed by 2040.

Given the demand and supply outlook, there is a need for significant investments across the entire industry. Overall, the outlook sees oil-related investment requirements of around $10 trillion over the period to 2040. In this regard, it is important to remember that the short-, medium- and long-term timeframes are all linked.

One question that needs to be asked is whether the recent lower oil price environment is putting this future outlook at risk, particularly given the drop-off in investments seen over the past two years. While the recent oil market environment has been one of oversupply, it is vital that the industry ensures that a lack of investments today does not lead to a shortage of supply in the future.

Let me stress that OPEC Member Countries remain committed to investing in new capacity and necessary infrastructure as they have always done as reliable suppliers of crude oil and products. But it is essential to ensure that investment projects have the right enabling environment, with a focus on sustainable market stability. If the right signals are not forthcoming, there is the possibility that innovation will dry up, that technological breakthroughs will not materialize, and that not enough new capacity and infrastructure will be in place in time to meet future demand levels.

Market stability, balanced fundamentals and ensuring that the necessary future investments are made were central to the recent decision taken at the 170$^{th}$ (Extraordinary) Meeting of the OPEC Conference in Algiers, when the Conference opted for an OPEC-14 production target ranging between 32.5 and 33 mb/d, in order to accelerate the ongoing drawdown of the stock overhang and bring the rebalancing further forward.

The WOO 2016 also explores a number of other issues that are likely to have an impact on how the future oil market and energy mix evolve. One example is future energy policies, with a major focus on last year's COP21 Paris Agreement, which aims to stabilize the increase in global average temperature and limit greenhouse gas emissions. OPEC welcomes this agreement, its Member Countries played a role in drafting it, and they will also play a role in helping to implement it.

The impact of the increased focus on climate change mitigation measures can already be seen in this year's Reference Case energy mix. In the power generation sector, for example, there is a shift to renewables and away from coal, in particular, and gas to a lesser extent. While gas does see a drop in expected demand by 2040 compared to last year's outlook, it should be noted that it still sees the largest growth by far in absolute terms. And oil and gas are still anticipated to meet 53% of the world's energy needs by 2040. In percentage terms, other renewables, mainly wind, solar and geothermal, see the largest average annual growth at 6.6% p.a. However, given their low initial base, the overall share in the energy mix is anticipated to be only 4.7% by 2040.

The Paris Agreement also provides a context in which the objectives of achieving sustainable development and eradicating poverty can be pursued. It is essential to appreciate, however, that sustainable development and its three dimensions or 'pillars' – economic, environmental and social – mean different things to different people. In addition, the energy dimension in this is sometimes overlooked. It is thus important to recall that one of the United Nation's Sustainable Development Goals focuses specifically on energy and calls for nations to ensure universal access to affordable, reliable and modern energy services. Today there are around 2.7 billion people worldwide who still rely on biomass for their basic needs, and 1.3 billion who have no access to electricity. It is critical that this energy poverty be addressed.

The outlook also considers the possible impact of technology in areas such as renewable energies, alternative fuel vehicles, and clean or low-carbon energy processes, such as carbon capture and storage, and many others. At OPEC, we recognize the importance of continually looking to advance the environmental credentials of oil, both in production and use.

As always, the aim of the WOO is to serve as an important and informative reference tool, with the hope that it contributes to a better and more enhanced understanding of the global oil and energy markets. It aims to share the Organization's views on the global oil market – specifically, in the medium- and long-term – and to provide an overall assessment of the future prospects for the entire global energy mix.

I should also like to take this opportunity to praise the hard work of the dedicated team of experts and staff at the OPEC Secretariat that put together this publication. Their commitment to research, comprehensive analysis, data transparency and to providing a detailed breakdown of the key issues needs to be recognized. Their work is also an expression of the broader, ongoing commitment of the Organization to further discussions on energy outlooks and widen engagement with other energy stakeholders. Such a steadfast commitment supports and reinforces one of the main tenets of our organizational mission: to foster dialogue and encourage cooperation in order to help ensure market stability in the short-, medium- and long-term.

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