



**Joint IEA-IEF-OPEC Report**

**On the**

**Seventh Symposium on Energy Outlooks**

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## 1. Introduction

This joint report provides a summary of the Seventh IEA-IEF-OPEC Symposium on Energy Outlooks. Key Findings from the Symposium are highlighted separately with highlights from the recent IEA and OPEC Energy Outlooks. Substantive details of the session discussions are highlighted in the main text of this summary record. Full presentations and IEF Dialogue Insights are retrievable on the IEF website at [www.ief.org](http://www.ief.org).

The International Energy Agency (IEA) and the Organization of the Petroleum Exporting Countries (OPEC) each year publish energy market outlooks based on the rigorous analysis of available statistical data, market fundamentals, macroeconomic developments, policy trends and assumptions. In addition, on the occasion of the biennial International Energy Forum (IEF) Ministerial meetings and other key IEF dialogue events, both organisations present focussed findings that they derive from their analysis and outlooks.

The Joint Symposium on Energy Outlooks is part of a wider trilateral work programme undertaken by the IEA, IEF and OPEC that was endorsed by Energy Ministers at the 12<sup>th</sup> IEF Ministerial Meeting held in Cancún, Mexico 29-31 March 2010, as referenced in Attachment Two of the Cancún Declaration. In addition to the Joint IEA-IEF-OPEC Symposia on Energy Outlooks, the joint collaboration involves High-Level Workshops on Physical and Financial Energy Market Interactions, and Gas and Coal Market Outlooks.

In their communiqués concluding the 1<sup>st</sup> G20 Energy Ministers Meeting in Istanbul, Turkey on 2 October 2015 and the 2<sup>nd</sup> G20 Energy Ministers Meeting in China on 29-30 June 2016, Ministers welcomed the joint work of the IEA, IEF and OPEC to further understand energy outlooks and the interaction between physical and financial markets encouraging the IEA, IEF and OPEC to continue their fruitful collaboration on market

transparency as a critical prerequisite for energy security and investment, acknowledging the importance of timely and high-quality market-related information on all energy resources.

As part of this on-going, shared effort to enhance dialogue among related market actors, the IEA, IEF and OPEC jointly hosted the Seventh Symposium on Energy Outlooks at the IEF Secretariat in Riyadh on 15 February 2017. The Symposium gathered more than 100 experts from industry, government and academia including ministers and other high-level representatives. Participants considered the findings of the comparative analysis of the IEA and OPEC outlooks based on the IEF-Resources for the Future Introductory Paper prior to the Symposium's convening. This included an assessment of the progress made in joint efforts to advance the comparability of energy outlooks and improve understanding of differences in historical baseline data during ongoing joint expert meetings. Experts exchanged views on data collection methods with a view to ease baseline discrepancies, and agreed that the comparison of IEA and OPEC outlooks will become more meaningful overtime when differences in historical baseline data are accounted for. Participants commended the improved comparability of energy outlooks and took note of available options to make further advances. Following presentations by the IEA and OPEC on short-, medium-, and long-term outlooks, senior industry experts presented their perspectives on future market trends in view of on recent market and policy developments, under the chairmanship of HE Sheikh Mohammed bin Khalifa Al Khalifa, Minister of Oil of Bahrain. In the concluding session, chaired by HE Mohamed Zayed Awad Mousa, Minister of Petroleum of Sudan, the Symposium devoted special attention to transport sector and how changing energy market and technology developments are likely to affect future development. Sessions were governed by the Chatham House Rule to ensure a constructive, open discussion.

## 2. Key Findings from the Seventh IEA-IEF-OPEC Symposium on Energy Outlooks and Highlights from Recent IEA and OPEC Outlooks

Continued efforts over the past years have successfully established the Joint IEA-IEF-OPEC Symposium on Energy Outlooks as a unique and valuable platform for producer-consumer dialogue on energy outlooks. The high level and broad regional diversity of Symposium participants reflected that the interest of producers and consumers to deepen market transparency through enhanced dialogue has steadily grown over the past years. Rising uncertainty about how energy demand and supply balances will evolve on policy, technology, and demographic trends that appear to show growing variability over short-, medium-, and long-, term projection periods, has increased the interest in improving collective understanding of future energy market dynamics to overcome market turbulence and other hurdles to investment, reduce unwarranted market imbalances, and ensure secure and sustainable energy market functioning that is efficient and equitable to the benefit of both producers and consumers.

Welcoming Symposium participants to Riyadh, the seat of the International Energy Forum, HE Khalid Al-Falih, Minister of Energy, Industry, and Mineral Resources of Saudi Arabia noted that as energy markets are governed by more complexity, enhancing dialogue on probable energy pathways improves market transparency and brings us closer to achieve goals together. Dr Sun Xiansheng, Secretary General of the IEF, emphasised that global energy security depends, more than ever, on enhancing commitment, reliability and trust and that this can only be achieved by a vibrant energy dialogue on a global level. HE Mohammed Sanusi Barkindo, Secretary General of OPEC, emphasized that OPEC's Outlook is one of the tools that contributes to enhancement of data transparency in the market and that through this, contributes to a deeper knowledge of oil market complexities, both in the upstream and the downstream. Dr Kamel Ben Naceur, Director, Sustainability, Technology, and Outlooks of the IEA re-emphasised its commitment to continued collaboration aimed at providing transparency

on the model assumptions underlying the energy outlooks and looked forward to continued discussions with the other partners and stakeholders on the implications of the different scenarios. In a special address, HE Shamshad Akhtar, Under Secretary General of the United Nations and Executive Secretary of the Economic and Social Commission for Asia and the Pacific underlined that the role of energy outlooks in supporting decision making is greater than perhaps ever before, against the backdrop of multiple objectives, and ongoing uncertainty and variability.

Delegates noted the key achievements in enhancing the comparability of energy outlooks such as through letting publication dates, baseline years, and projection period time frames coincide as much as possible. They encouraged further efforts to reduce remaining differences in world liquids demand and supply baselines that this year stood at 1.7mb/d and 1.4 mb/d respectively for 2015 and to arrive at a more consistent classification of liquid fuels at regional and global level in respect of maritime and aviation fuels, as well as to align biofuels classification units.

## **2.1 Short-term Outlooks**

The IEA and OPEC both provide short-term 18 month projections of oil supply and demand based on the latest monthly oil market reports, global and regional GDP growth forecast, and other key economic indicators. Both the IEA and OPEC had revised their 2016 economic growth forecast downwards in their latest December report, compared to assessments made a year ago, but each project stronger growth for 2017 at 3.4% and 3.2% respectively. While for 2017, OPEC projects slightly lower GDP growth in India, the United States, and the Euro Area, it is more bullish on GDP growth in Japan, compared to regional GDP projections of the IEA.

The IEA and OPEC projected 2016 world liquids demand to reach 96.3 mb/d and 94.4 mb/d differing by 1.9 mb/d. For 2017 the IEA and OPEC had similar world liquids

demand growth estimates with the IEA projecting growth at 1.3 mb/d and OPEC at estimating growth at 1.2 over 2017 reaching 97.6 mb/d and 95.6 mb/d respectively marking a growing difference of 2 mb/d. While both organisations concurred that the non-OECD region will lead oil demand growth, IEA was more bullish about demand growth in non-OECD-Asia, Europe and the FSU, while OPEC estimated stronger demand growth in the OECD Americas region.

The IEA and OPEC projected 2016 world liquids supply to grow by 1.4 mb/d and 1.2 mb/d amounting to 96.3 mb/d and 94.4 mb/d respectively, differing by 1.9 mb/d. The IEA and OPEC projections for 2017 liquids supply growth correspondingly stood at 1.3 mb/d and 1.2 mb/d in turn amounting to 97.6 mb/d and 95.6 mb/d differing by 2.0 mb/d. Delegates noted that non-OPEC liquid supply growth declined in 2016 by 0.8 mb/d to 0.7 mb/d according to forecasts of the IEA and OPEC but were in turn expected to recover in 2017 by 0.2 mb/d and 0.3 mb/d due to the resiliency of unconventional oil production in the OECD Americas region. Delegates took note that from 2008 to 2016 non-OPEC supply had increased by more than 7 mb/d compared to an increase in OPEC production by a little less than 2 mb/d over the same period.

Symposium participants noted that overall oil market sentiment had improved due to the declaration of cooperation between OPEC and some non-OPEC member countries, and that for the fifth consecutive month, OECD stocks showed a declining trend. Although at the time of the Symposium's convening, stock levels remained high, and, in 2015, had increased by 1.7 mb/d and 2.0 mb/d according to the IEA and OPEC, IEA noted that global oil supplies plunged in January and that initial compliance with the joint cooperation on production adjustment was at a record high. OPEC expected that forward curves might switch into backwardation by the third quarter of 2017 delegates noted.

## 2.2 Medium-term Outlooks

The IEA's and OPEC's medium-term projections both used 2015 as base year and extended to 2021 but were published with a nine-month interval that contribute to differences for instance in economic growth assessments delegates noted. Oil price and economic growth assumptions underlying these projections varied in methodology and outcome but showed similar trends. While the IEA based its assumptions on oil price developments over the medium-term on an average import price in combination with market information derived from the Brent futures curve, and OPEC uses the OPEC Reference Basket price together with estimates on the cost of supplying the marginal barrel, both projected that the oil price curve would steadily trend upwards from present day levels, pointing at a gradual market rebalancing delegates noted. Similarly, the IEA and OPEC projected steady economic growth increases over the medium-term despite distinct methods. The IEA was consistently more bullish on both oil price and economic growth projections participants observed, however.

The IEA and OPEC both project strong liquids demand growth reaching 101.7 mb/d and 99.2 mb/d in 2021 respectively. OPEC's forecast of 1.1 mb/d is somewhat more conservative when compared to the 1.2 mb/d annual growth in oil demand to 2021 that IEA forecast. Historical baseline, market uncertainties and variation in economic growth and price assumptions reveal a growing gap between liquid demand projections. These differ by 2.5 mb/d in 2021 compared to 1.7 mb/d for 2020 in medium term projections made in 2015. While both the IEA and OPEC noted a modest decline in OECD liquids demand that OPEC projects to reach 45.7 mb/d in 2021, marginally higher than the 45.2 mb/d the IEA estimates for OECD liquids demand that year, non-OECD liquids demand growth rates vary over the projection period amounting to a difference in non-OECD demand growth of 3 mb/d by 2021. Symposium participants discussed the impact of market and policy developments in OECD, and non-OECD countries on medium-term liquids demand noting that more stringent fossil fuel efficiency standards, technology



advances, and economic rebalancing taken together are likely to moderate liquids fuels demand in transport and industry, but may have less of an effect on liquids demand in the petrochemical industry.

The IEA and OPEC projected world liquids supply to grow, on average, by 0.9 mb/d and 0.7 mb/d annually, reaching 101.7 mb/d and 99.4 mb/d in 2021 respectively. The difference of 2.3 mb/d in 2021 can be largely attributed to the substantially larger estimate of the IEA for the OECD's contribution to supply growth and most importantly that OECD Americas when compared to the somewhat more conservative estimates of OPEC. Symposium participants focussed attention on the return in growth of non-OPEC liquids supply over the projection period. After a return to growth in the course of 2017, OPEC is marginally more optimistic on the contribution of Latin America to non-OPEC supply growth than the IEA that placed OECD Americas in the lead. On the other hand, OPEC and IEA differed in their assessments on the contribution of the United States and Canada to supply growth over the projection period. The IEA projected more rapid growth as of 2018 amounting to 19.4 mb/d by 2021 while OPEC forecast of 18.2 mb/d in 2021 (both excluding biofuels) resulted in a difference of 1.2 mb/d between the two projections participants noted.

### **2.3 Long-term Outlooks**

Symposium participants took note of the presentations on the longer-term energy outlooks of the IEA and OPEC that extended to 2040. Both organisations had used 2014 historical baseline data for primary energy demand, and 2015 baseline for oil to improve comparability of their distinct perspectives on longer term energy market developments in accordance with the key scenarios compared, namely the IEA Current, and New Policies Scenario and the Reference Case of OPEC. Other scenarios such as IEA's 450 Scenario and the additional scenarios provided in OPEC's long-term energy outlook to modulate full adoption of announced climate policies, as well as faster development and

deployment of technology, in contrast with assessments on a more limited implementation of climate policy, were part of the discussion among Symposium participants as well. Different oil price assumptions, global economic growth, and demographic developments contributed to the variation in perspectives on energy demand as well and oil supply and demand trends over the longer-term. Variations in oil price assumptions were large, differing by as much as US\$54/bbl across scenarios while regional economic growth forecasts were more consistent participant learned from presentations on the comparative analysis of energy outlooks.

Delegates took note of the fact that in OPEC's reference case primary energy demand would reach 382 mboe/d in 2040 growing by more than 40% on account of non-OECD demand growth at 2.1% per year, while primary energy demand in the OECD region would grow by a modest 0.1 % and could well peak in 2030. The Current Policy, and New Policy Scenario of the IEA estimate primary energy demand to reach 396 mboe/d and 361 mboe/d in 2040. Though the overarching trends in global energy consumption to 2040 are largely the same Symposium participants found it noteworthy that these 2016 assessments are lower than those published previously, and show slower growth rates than before. While a shift from fossil fuels to renewables continues, the majority of energy demand growth continues to come from gas followed by oil. Though, in contrast to gas, oil demand growth will slow over the projection period, both fossil fuels are expected to still satisfy 53% and 52% of world energy demand in 2040 according to the long-term energy outlooks of OPEC and the IEA. According to OPEC one third of total oil demand will come from the road transportation sector, as the number of passenger cars is expected to double up to 2.1 billion, with developing countries adding 916 million cars by 2040, even when vehicles with new engine technologies are expected to represent 22% of the car fleet.

The share of the Middle East in global oil production has reached a 40-year record high as consequence of two consecutive years of investment restraint the IEA noted. Some

Symposium participants referred to the supply resilience of US unconventional production, others highlighted that tight oil could not be relied upon to cover an investment shortfall in conventional oil that takes longer time and more resources to develop to meet both rising demand and substitute for depletion rates in existing production over the medium-term. OPEC also projects that non-OPEC liquids supplies will gradually recover from declines suffered in 2016. Subsequent growth will remain fairly flat until decline sets in post 2030 while oil sands and biofuels will take over from tight oil, peaking at around 10 mb/d by 2029, as the main engine of supply growth over the projection period. The share of OPEC crude is expected to rise from 33% in 2015 to 34% to 37% in 2040, according to the long-term scenarios of the IEA and OPEC, delegates noted. However, as was also apparent from the wider diversity of the long-term scenarios presented for discussion at the Symposium, the IEA and OPEC both highlighted that policy choices are likely to determine future trajectories.

### **3. Views on Short-, Medium- and Long-term Energy Outlooks from Industry and Academia**

Symposium participants elaborated on the main themes laid out in the preceding session informed by five in depth presentations on short-, medium-, and long-term energy outlooks from senior industry and academic experts. Discussants focused on key market shifts and those policy and technology developments that are likely to have a significant impact on the evolution of energy demand and supply balances. Symposium participants debated the impact of price and related service cost reductions on oil and gas investment in both conventional and unconventional resources, the drivers and impacts of technology shifts in the transport sector, as well as new trends in consumer behaviour in response to the growing availability of new energy technologies, demographic trends, urbanisation and the need to reduce greenhouse gas emissions.

On the supply side participants acknowledged that unconventional resources, the return of key producers, and greater competition to diversify markets in Asia and other non-OECD regions have pushed the dynamics of supply balance. Notwithstanding the resiliency of tight oil production, a considerable supply side adjustment by integrated companies is slowly working its way through the energy market system as a consequence. Capital expenditures have fallen significantly over the past two years leading to an already sizable reduction in conventional production. This however will take time to tighten oil and gas market balances. Investment by integrated companies on average takes at least two-year period to mature. So, these capex reductions will only start to become more apparent when shorter cycle unconventional production reaches plateau as a drop in OECD inventories would show. Discussants agreed that oil balances were likely to tighten further aided by the OPEC–Non OPEC Declaration of cooperation concluded in Vienna in December 2016, and a moderately more upbeat outlook on oil demand growth.

On the demand side participants observed that demand has responded stronger than expected to lower oil prices. Consumer behaviour, economic recovery, demographic growth and urbanisation foretell that demand for oil will remain robust, notwithstanding a shift towards renewables and new transport modes. Participants discussed the influence emerging patterns in mobility would have on oil demand across various industry and academic scenarios and noted that the share of oil and gas in total oil and gas consumption would range between 51% and 46% in 2035 if transition accelerated. Other discussants noted that as the share of gas and renewables grows and electricity demand increases in all scenarios differences in the electricity generation fuel mix are likely to increase.

#### 4. Perspectives on the transportation sector: The impact of changing energy markets and technology

Building on the discussions on transport in the afore going session, Symposium participants focussed further attention on how the transport sector is likely to be effected by demographic growth, urbanisation and changing energy markets dynamics as a consequence of the deployment of new technologies and policies to reduce greenhouse gas emissions. Discussants focussed on developments in Asia. Home to 60% of the world population and the largest and fastest growing economy that is projected to grow by 5.7% for the next 2 years, transport and energy needs are increasing rapidly. Participants noted the enormous challenges Asian governments face to expand transport and energy sectors while at the same time inequalities must be overcome by focusing on equitable access to sustainable options. Transport sector energy demand will show the fastest growth in Asia that will account for a third of all passenger transport demand and surpass the OECD representing 25% of the total by 2050. A cross sectorial approach in which urban planning, supply chain management, smart grids as well as enhancing the efficiency of the existing fleet and new vehicle technologies, feature prominently will on one hand lower transport energy demand and costs and on the other hand enhance health, safety, and environmental standards in Asia, participants noted.

Industry representatives highlighted the challenges in the deployment of new vehicle technologies to achieve a zero-emission transport sector that assumes a rapid transformation of internal combustion powertrain technologies towards hybrid-, plug in hybrid-, fuel cell-, and electric vehicles while increasing fuel efficiency and reducing production cost. Symposium participants exchanged views on the viability of each of these technologies noting that in contrast to the passenger car fleet heavy duty vehicles remain reliant on fossil fuel solutions. Though LNG, natural-, and green gas have increased their market share in both passenger and heavy duty vehicles, including the

maritime sector, aviation remains, for all practical purposes exclusively dependent on oil notwithstanding successful experiments with solar powered flight.

Acknowledging that the fuel demand from the transport sector has driven oil demand and shaped the industry from the very outset, discussants agreed that transport fuel demand would become non-OECD focussed and contribute less to oil demand growth over projection periods as a consequence of rising fuel efficiency standards, new engine technologies and shifts in urban planning and consumer behaviour.

## 5. Conclusions

The IEA-IEF-OPEC Symposia on Energy Outlooks continue to provide a unique opportunity to share perspectives on energy market developments and deepen collective understanding of future energy outlooks. Against the background of major energy policy and market shifts, the Seventh IEA-IEF-OPEC Symposium enabled senior government stakeholders and industry experts to compare various assumptions and exchange views on their energy supply and demand projections. The Symposium offered a timely and unique opportunity to further strengthen the producer-consumer dialogue with new perspectives from new demand and supply centers, now energy markets are at a critical juncture. Though current market developments may adversely affect investment and fuel further market volatility on the short-, to medium term, and long-term market fundamentals remain largely unchanged. These are expected to balance markets in line with the evolving policy requirements of producer and consumer countries. The rapid rise of renewables and natural gas is likely to pose new challenges to energy security, trade flows, and system resiliency. New energy technology deployment in transport, and other key sector, as well as changing producer-, and consumer preferences, point at the importance of dialogue and energy data transparency to improve understanding and help address stakeholder concerns.