SUMMARY FINDINGS FROM A COMPARISON OF DATA AND FORECASTS ON THE OIL MARKET BY THE INTERNATIONAL ENERGY AGENCY (IEA) AND ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES (OPEC).

FEATURING A COMPARATIVE ANALYSIS OF OIL INVENTORY DATA REPORTED BY JODI, THE IEA, OPEC AND SECONDARY SOURCES IN COLLABORATION WITH THE RAPIDAN ENERGY GROUP.

1. NOTE BY THE SECRETARY GENERAL  2
2. KEY POINTS  3
   2.1 DEMAND  3
   2.2 SUPPLY  3
   2.3 STOCKS  3
   2.4 SNAPSHOT (mb/d)  4
3. GLOBAL ANALYSIS  5
   3.1 DEMAND DATA  5
   3.2 SUPPLY DATA  6
   3.3 STOCK DATA  8
   3.3.1. GLOBAL STOCK ANALYSIS  9
1. NOTE BY THE SECRETARY GENERAL

The IEF conducts a comprehensive comparative analysis of the short-, medium-, and long-term energy outlooks of the IEA and OPEC, to inform the IEA-IEF-OPEC Symposium on Energy Outlooks that the IEF hosts in Riyadh as part of the trilateral work programme on a yearly basis.

To inform IEF stakeholders on how perspectives on the oil market of both organisations evolve over time more regularly, this monthly summary provides:

- Key findings and a snapshot overview of data points gained from comparing basic historical data and short-term forecasts of the IEA Oil Market Report and the OPEC Monthly Oil Market Report
- Features a comparative analysis of oil inventory data reported by JODI, the IEA, OPEC, and secondary sources in collaboration with the Rapidan Energy Group

Moreover, international developments this month that will have an impact oil market balances are as follows:

Growing Oil Supply
- Growing supply in the US due to pipeline expansions coupled with rising production from Saudi Arabia and Russia has put downward pressure on oil prices.

Canadian Crude
- Increasing oil production and the lack of pipeline capacity has Canadian crude selling at unprecedented low prices.

Iran Sanctions
- The US granted temporary waivers to eight countries, including China and India, the biggest purchasers of Iran’s oil, that will allow them to purchase Iranian crude for the time being.

I trust this month’s analysis helps to sharpen focus on evolving short-term market perspectives.

Dr Sun Xiansheng
Secretary General
International Energy Forum
2. KEY POINTS

2.1 DEMAND

- **OPEC revised its world demand growth numbers down for the second consecutive month while the IEA saw a slight increase.** The IEA revised up its growth figure by 30 kb/d while OPEC growth is lowered by 40 kb/d from last month’s assessment leading to a 190 kb/d difference in growth between the two organisations. The IEA world demand growth projection amounts to **1.31 mb/d** in 2018. OPEC’s demand growth stands at **1.50 mb/d** – OPEC’s lowest growth reported for 2018. The IEA and OPEC estimates for absolute world demand for November are **99.19 mb/d** and **98.79 mb/d**, respectively.

- **The IEA and OPEC demand growth forecasts for Non-OECD countries dip further in November and are at their lowest point this year.** The decline is attributable to the IEA’s revision in Non-OECD Middle East demand growth to -0.08 mb/d that compares to -0.03 mb/d last month. This has brought the IEA’s Non-OECD growth assessment for October down to **0.95 mb/d**. OPEC Non-OECD demand growth projection is also revised down slightly by 90 kb/d for a total growth of **1.06 mb/d**. The IEA reports OECD growth at **0.36 mb/d** up by 60 kb/d. OPEC’s OECD demand growth projection slightly increases to **0.44 mb/d**. The IEA and OPEC now differ in their assessments on OECD demand growth by 80 kb/d.

2.2 SUPPLY

- **The IEA and OPEC’s Non-OPEC supply growth continues to soar and now is at its highest level.** The IEA’s November assessment for Non-OPEC growth is up by 160 kb/d for a total growth of **2.35 mb/d**. OPEC’s assessment for Non-OPEC growth is not far off and up by 90 kb/d for total growth of **2.31 mb/d**. In absolute values OPEC and the IEA estimate non-OPEC supply at **60.32mb/d** and **59.86 mb/d** respectively. The US, Russia and Canada remain the top Non-OPEC producing jurisdictions. According to the IEA and OPEC, US production is set to grow at 2.1 mb/d in 2018 and 1.3 mb/d and 1.7 mb/d respectively in 2019.

- **The IEA and OPEC report a slight drop in Non-OECD supply growth and show their closest alignment this year.** IEA growth figures decreased 40 kb/d and OPEC decreased 20 kb/d to reach **0.08 mb/d** and **0.07 mb/d**, respectively with a difference of 10 kb/d.

2.3 STOCKS

- **The IEA and OPEC continue to report strong alignment on stock figures.** The IEA reports **2875 mb** in OECD stock that is 8mb below the five-year average. OPEC’s assessment is not far off with **2858 mb** in OECD stock that is 25 mb below the five-year average. The divergence between OPEC and the IEA stands at 17 mb for November. Total US crude inventories (excluding SPR) in November amount to about 451 mb according to the US Energy Information Administration (EIA). EIA reports U.S. crude oil inventories are about 7 percent above the five-year average for this time of year. OPEC reports US stock above the five-year average by about 10 mb based on September data.
2.4 SNAPSHOT (mb/d)

<table>
<thead>
<tr>
<th>Demand</th>
<th>OECD</th>
<th>Growth</th>
<th>Δ m/m</th>
<th>Non-OECD</th>
<th>Growth</th>
<th>Δ m/m</th>
<th>Non-OPEC</th>
<th>Growth</th>
<th>Δ m/m</th>
<th>World</th>
<th>Growth</th>
<th>Δ m/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEA</td>
<td>47.78</td>
<td>0.36</td>
<td>+0.06</td>
<td>51.41</td>
<td>0.95</td>
<td>-0.04</td>
<td>99.19</td>
<td>1.31</td>
<td>+0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPEC</td>
<td>47.86</td>
<td>0.44</td>
<td>+0.05</td>
<td>50.92</td>
<td>1.06</td>
<td>-0.09</td>
<td>98.79</td>
<td>1.50</td>
<td>-0.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>0.08</td>
<td>0.08</td>
<td>0.01</td>
<td>0.49</td>
<td>0.11</td>
<td>0.05</td>
<td>0.40</td>
<td>0.19</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply</th>
<th>OECD</th>
<th>Growth</th>
<th>Δ m/m</th>
<th>Non-OECD</th>
<th>Growth</th>
<th>Δ m/m</th>
<th>Non-OPEC</th>
<th>Growth</th>
<th>Δ m/m</th>
<th>OPEC</th>
<th>Growth</th>
<th>Δ m/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEA</td>
<td>26.36</td>
<td>2.16</td>
<td>+0.21</td>
<td>29.08</td>
<td>0.08</td>
<td>-0.04</td>
<td>60.32</td>
<td>2.35</td>
<td>+0.16</td>
<td>32.99</td>
<td>0.20</td>
<td>+0.10</td>
</tr>
<tr>
<td>OPEC</td>
<td>27.92</td>
<td>2.20</td>
<td>+0.11</td>
<td>29.70</td>
<td>0.07</td>
<td>-0.02</td>
<td>59.86</td>
<td>2.31</td>
<td>+0.09</td>
<td>32.90</td>
<td>0.13</td>
<td>-0.15</td>
</tr>
<tr>
<td>Difference</td>
<td>1.56</td>
<td>0.04</td>
<td>0.10</td>
<td>0.62</td>
<td>0.01</td>
<td>0.02</td>
<td>0.46</td>
<td>0.04</td>
<td>0.07</td>
<td>0.09</td>
<td>0.07</td>
<td>0.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stocks (mb)</th>
<th>OECD</th>
<th>US</th>
<th>OECD to 5-Year Average</th>
<th>US to 5-Year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEA</td>
<td>2875</td>
<td>-</td>
<td>-8 mb</td>
<td>-</td>
</tr>
<tr>
<td>OPEC</td>
<td>2858</td>
<td>432</td>
<td>-25 mb</td>
<td>+9.7</td>
</tr>
<tr>
<td>EIA</td>
<td>451</td>
<td>-</td>
<td>7% above</td>
<td></td>
</tr>
</tbody>
</table>


*Totals in table may not exactly reflect content due to independent rounding.*
3. GLOBAL ANALYSIS

According to the IEA, the outlook for the global economy has been revised downwards since the last report given trade growth is expected to decline due to weakening global economic activity and rising trade tensions. The IEA quotes the IMF’s October 2018 outlook, in which the Fund revised world economic growth from 3.9 percent to 3.7 percent for both 2018 and 2019. Meanwhile, OPEC’s global economic growth forecast for 2018 remains unchanged at 3.7 percent, while the 2019 forecast was revised down slightly to 3.5 percent. The revision was due to a slowing dynamic amid rising trade tensions, monetary tightening, particularly in the US, and challenges in emerging markets and developing economies.

3.1 DEMAND DATA

Absolute Demand

The IEA’s estimate for global demand growth in November stands at 1.31 mb/d up by 30 kb/d from 1.31 mb/d in last month’s report for an absolute demand of 99.19 mb/d in 2018. The outlook for global oil demand growth is largely unchanged since last month’s report, at 1.3 mb/d in 2018 and 1.4 mb/d in 2019 as a deteriorating outlook for the global economy is largely offset by the fall in Brent crude oil prices.

OPEC’s global demand outlook has also decreased to 1.50 mb/d down by 40 kb/d compared to last month’s projections due to weaker-than-expected oil demand data from the Middle East and, to a lesser extent, China during 3Q18. This leads to a projected total global consumption of around 98.79 mb/d for the month of November. OPEC-IEA divergence in overall world demand stands at 0.40 mb/d up from 0.37 mb/d in October.

OECD Demand

The IEA continues to see robust OECD oil demand growth at 0.36 mb/d, up slightly from last month’s figure of 0.30, anticipating total OECD consumption for 2018 at 47.78 mb/d. OPEC marginally revised up its growth projection for the OECD region to 0.44 mb/d from 0.39 mb/d. OPEC total OECD demand now stands at 47.86 mb/d. The divergence of OECD oil demand growth between the IEA and OPEC now stands at 0.08 mb/d. The IEA reports a 0.07 mb/d upward revision in OECD Americas demand growth from 0.37 mb/d in last month’s report to 0.44 mb/d, while OPEC’s estimate rose by 0.05 mb/d to 0.40 mb/d from 0.35 mb/d. OECD Europe demand growth remains unchanged at -0.01 mb/d according to IEA data. OPEC’s OECD Europe growth figure is also unchanged at 0.05 mb/d. The IEA’s and OPEC’s assessments for demand growth and absolute demand differ by 0.08 mb/d.

Non-OECD Demand

Both, the IEA and OPEC anticipate continued growth in non-OECD demand for this year at 0.95 mb/d and 1.06 mb/d respectively, with total non-OECD demand forecasts averaging 51.41 mb/d and 50.92 mb/d respectively. The IEA’s and OPEC’s assessments for 2018 non-OECD demand growth and absolute demand now differs by 0.11 mb/d and 0.49 mb/d, respectively.

The IEA’s regional demand growth adjustments in 2018 reflect a decreased pace of demand growth for China reported at 0.50 mb/d year-on-year (y-o-y) compared to 0.53 mb/d last month. Although a strong aviation sector has increased kerosene demand, the fall of car sales in September and October by 12 percent and 13 percent, respectively compounded by the end of government tax rebates, new credit restrictions, growing used car sales and weakening consumer confidence are key reasons for the fall in demand. OPEC’s Chinese demand growth was also revised downwards to 0.39 from 0.42 mb/d last
month and echoing the same decline in car sales as a major factor along with trade concerns with the U.S. The potential of growth in alternative vehicles and general efficiencies are also cited.

The IEA’s Indian demand growth for 2018 remains unchanged at 0.26 mb/d to reach 4.83 mb/d in 2018. Although the government is encouraging the replacement of kerosene in the residential sector, a booming aviation industry is keeping demand at stable levels. Meanwhile, OPEC’s Indian demand growth assessment also remains unchanged at 0.22 mb/d for total consumption to reach 4.75 mb/d in 2018. Rising average income levels, a continuously improving road network and firm and expanding vehicle sales are factors behind the growth in oil as it pertains to transportation. Projections for non-OECD Asia, as a whole, show growth at 0.83 mb/d according to OPEC and 0.90 mb/d according to the IEA.

See the following graph for the monthly revisions of IEA and OPEC annual estimates for 2017 and new estimates for 2018 demand.

**IEA and OPEC see slight decrease in Non-OECD demand growth**

**IEA and OPEC OECD demand growth shows slight increase**

3.2 SUPPLY DATA

Non-OPEC Supply

OPEC’s November assessment of total non-OPEC supply for 2018 stands at **59.86 mb/d**. Supply growth has been revised up 0.09 mb/d to **2.31 mb/d** driven by expected growth in the US (2.06 mb/d), Canada (0.29 mb/d) and Kazakhstan (0.09 mb/d). Growing output from these countries is offset by declining production from Mexico (-0.14 mb/d), Norway (-0.11 mb/d) and Vietnam (-0.03 mb/d). US tight crude for 2018 is forecast to grow by 1.48 mb/d y-o-y to average 6.19 mb/d, revised up by 0.16 mb/d from last month’s assessment with the Permian accounting for about 61 percent share of US tight crude growth in 2018.

The IEA forecasts a non-OPEC supply of **60.32 mb/d** with a year-on-year growth of **2.35 mb/d** with...
the US being the catalyst for non-OPEC supply growth at 2.12 mb/d. While infrastructure bottlenecks were expected to slow-down US production, pipeline expansion plans to increase off-take capacity has had the opposite effect. Although Canadian production is robust with a growth of 0.27 mb/d, the future remains uncertain due to the lack of evacuation capacity that results in Canadian oil to be traded at steep discounts relative to the WTI benchmark. The recent halt in construction of the Keystone XL pipeline exacerbates the situation. Russian production also continues to rise with a growth of 0.19 mb/d for 2018 and could rise next year unless production cuts are ordered by the government.

OECD Supply

OPEC and the IEA both forecast OECD growth at **2.20 mb/d** and **2.16 mb/d** with total supply reaching **27.92 mb/d** and **26.36 mb/d** respectively. The IEA’s data shows OECD Americas liquids supply growth at 2.26 mb/d to reach 22.58 mb/d total supply while OPEC reports slightly lower growth at 2.21 mb/d with total liquids supply at 23.71 mb/d for 2018. Growth within the region is led by the US for which OPEC revised its liquid supply forecast up to 2.06 mb/d to 16.46 mb/d while the IEA projects a higher US growth by 2.12 mb/d to amount to 15.39 mb/d. OPEC reports a decline in OECD Europe supply growth of -0.03 mb/d for total production of 3.80 mb/d in 2018. The IEA reports less OECD Europe supply at 3.38 mb/d for a decline in yearly growth of 0.11 mb/d. Both the IEA and OPEC see the UK as the primary driver of OECD Europe supply.

OPEC Supply

According to secondary sources, total OPEC-15 preliminary crude oil production averaged **32.90 mb/d** in October, an increase of 127 kb/d over the previous month. Increases were reported in the UAE, Saudi Arabia, Libya and Angola, while production declined in Iran, Venezuela, Kuwait and Nigeria. The IEA reports that record production from the UAE and Saudi Arabia in October raised OPEC crude output by 200 kb/d to **32.99 mb/d**, more than compensating for production losses from Iran.

See the graph below for the monthly revisions of IEA and OPEC annual estimates for 2017 and new estimates for 2018 supply, and the tables for annual estimates for total supply:

IEA and OPEC supply see rising Non-OPEC supply growth
IEA and OPEC continue to see strong convergence on OECD/Non-OPEC growth

---

**IEA** (OECD)  **OPEC** (OECD)  **IEA** (Total Non-OPEC Supply)  **OPEC** (Total Non-OPEC Supply)

IEF comparative analysis of IEA and OPEC Monthly Reports on the Oil Market November 2018

*monthly estimates rounded to the nearest barrel.
3.3 STOCK DATA

OECD commercial stocks rose counter-seasonally by 12.1 mb month-on-month (m-o-m) in September to **2,875 mb**. Inventories were just 8 mb below the average at the end of September. According to OPEC, preliminary data for September showed that total OECD commercial oil stocks rose by 5.5 mb m-o-m to stand at **2,858 mb**. This was 111 mb lower than the same time one year ago, and 25.3 mb below the latest five-year average. While both organizations report closely aligned data on OECD stocks due to a continuous and reliable data stream and data harmonization efforts, comprehensive data on stock developments for non-OECD countries is still work in progress.

*See the graphs below for monthly estimates of OECD total commercial oil stocks for 2017 and 2018.*

**IEA and OPEC data shows convergence on OECD stock draws**

**Comprehensive non-OECD stock data remains missing**
**3.3.1 GLOBAL STOCK ANALYSIS**

OECD and JODI non-OECD crude and product inventory data show a net 1.8 mb draw in September

- IEA data show OECD commercial inventories grew counter-seasonally in September by 12.1 mb to 2,875 mb. The agency estimates 3Q18 stocks grew by 58.1 mb (the largest quarterly increase since 2015). Likewise, OPEC shows OECD stocks rose by 5.5 mb in September to 2,858 mb.

- JODI non-OECD* data for September imply crude stocks dropped by 11.1 mb and product stocks fell by 1.6 mb. The largest crude and product draws occurred in Nigeria (-3.2 mb and -10.2 mb, respectively).

- Together, IEA OECD inventory data and JODI non-OECD data imply global crude and product stocks drew by a marginal 1.8 mb in September and rose by 39.1 mb during 3Q18. OECD product inventories grew by a massive 93.4 mb in 3Q18 driven by a 52.7 mb increase in the US. The data implies inventories have increased by a net 64.3 mb since the beginning of 2018. This estimate falls squarely between IEA and OPEC’s diverging 2018 global oil balances. IEA’s balance implies global inventories rose by 144.7 mb between 1Q18 and 3Q18, while OPEC’s balance implies a 12.8 mb draw.

* Non-OECD data is the aggregate of country-level data through JODI. Not all non-OECD countries report inventory data and the countries in the aggregate may vary monthly depending on regularity of individual country reporting.

<table>
<thead>
<tr>
<th>Global Inventory Changes</th>
<th>September 2018</th>
<th>3Q18</th>
<th>1Q18-3Q18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crude</td>
<td>Products</td>
<td>Total</td>
</tr>
<tr>
<td>OECD Commercial (IEA)</td>
<td>-10.7</td>
<td>22.9</td>
<td>12.2</td>
</tr>
<tr>
<td>OECD SPR (IEA)</td>
<td>-0.8</td>
<td>-0.5</td>
<td>-1.3</td>
</tr>
<tr>
<td>Available JODI Non-OECD Data*</td>
<td>-11.1</td>
<td>-1.6</td>
<td>-12.7</td>
</tr>
<tr>
<td>Total</td>
<td>-22.6</td>
<td>20.7</td>
<td>-1.8</td>
</tr>
<tr>
<td>IEA’s Implied Global Supply Surplus</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OPEC’s Implied Global Supply Surplus</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Aggregate of all non-OECD data available through JODI. Not all non-OECD countries report inventory data and the countries in the aggregate may vary monthly depending on regularity of individual country reporting.

Source: IEA, JODI, OPEC, Platts, Rapidan Energy Group
COMPARATIVE ANALYSIS OF MONTHLY REPORTS ON THE OIL MARKET | RIYADH, SAUDI ARABIA | NOVEMBER 2018

Monthly Change in OECD and Non-OECD* Crude + Product Inventories

* Aggregate of all non-OECD data available through JODI. Not all non-OECD countries report inventory data and the countries in the aggregate may vary monthly depending on the regularity of individual country reporting.

Source: IEA, JODI, Rapidan Energy Group

Accumulative OECD and Non-OECD* Crude + Product Builds Since End-2014

* Aggregate of all non-OECD data available through JODI. Not all non-OECD countries report inventory data and the countries in the aggregate may vary monthly depending on the regularity of individual country reporting.

Source: IEA, JODI, Rapidan Energy Group