APERC Oil Report 2019

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Foreword

This second edition of the APERC Oil Report builds on the inaugural edition released last year in exploring recent and emerging trends in APEC and global oil markets and their implications for policy makers around the region.

Global oil markets find themselves, as usual, in a state of uncertainty and flux. Traditional concerns for analysts, such as geopolitical instability in the Middle East, have met with newer dynamics, such as the continuing shale oil boom in the US, the Russia/OPEC alliance, and the political and socioeconomic crisis in Venezuela. Oil prices, in turn, have fluctuated extensively since the last edition of this report, with Brent Crude peaking at USD 84 a barrel in October 2018 before plummeting to USD 53 a barrel towards the end of last year.

This study analyses several key issues in the oil market over the past decade (2006-16) and provides a short-term outlook (for the next five years, 2017-21). In doing so, it seeks to highlight emerging threats and opportunities so that APEC members can integrate these early indications into policy strategies.

I hope that this edition of the APERC Oil Report 2019 will help policymakers across APEC in improving their understanding of the oil market and assist in their efforts to improve the sustainability, security and affordability of their energy systems.

I would like to express my sincere gratitude to the authors and contributors for their time and effort in writing and publishing this report.

Kazutomo IRIE
President
Asia Pacific Energy Research Centre

June 2019

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Editor

James M. Kendell

Abbreviation and acronyms

Abbreviation	
b/d	barrels per day
bbl	barrel
Mtoe	million tonnes of oil equivalent

Acronyms	
APEC	Asia-Pacific Economic Cooperation
APERC	Asia Pacific Energy Research Centre
EIA	Energy Information Administration
EU	European Union
IEA	International Energy Agency
IEEJ	Institute of Energy Economics Japan
USA	United States of America

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Summary and key trends

- APEC oil demand accounted for 52% of the world total demand of 4,557 Mtoe in 2016. This share has mostly been unchanged in a decade. In 2016, supported by lower oil prices since mid-2014, global annual demand increased by 82 Mtoe, which was the greatest growth in six years.
- Transportation has been both the dominant and growing sector in APEC during the period. Demand in the sector has increased by 1.3% per annum since 2007 and reached 1,282 Mtoe in 2016 or 54% of the total oil demand in the APEC region.
- Oil demand in the APEC region is projected to increase by 0.79% per annum to reach 2,455 Mtoe in 2021 led by China and southeast Asia.
- Global oil supply has been increasing slightly faster than demand with an annual growth rate of 1.1% since 2007. The APEC region including its largest oil producing economies like the USA and Russia accounted for 40% of global production. Particularly, the APEC region achieved faster growth in the second half of the decade (2012-2016) at 2.9% per annum.
- Within the APEC region, the USA and Russia were the largest producing economies with 560 and 550 Mtoe in 2016. These two economies produced as much as 61% in the APEC total. In terms of supply growth, the USA was by far the largest with an annual rate of 6.5% from 2007 to 2016. The incremental production increase in the USA since 2007 was 243 Mtoe, which was greater than the production of Canada or China.
- Oil supply in the APEC region is projected to increase by 2.0% per annum to reach 1,997 Mtoe in 2021. Most of the supply growth will come from North America.
- APEC's import dependency on crude oil has slightly declined over the years from 34% in 2007 to 31% in 2016, on the back of the indigenous production hike by the USA, Canada and Russia. In 2016, however, the dependency rate surged year-on-year for the first time in seven years because of a production decline in the USA and China along with low international oil prices.
- Refining capacity growth will affect the trade of oil products. Significant increases in new refining capacity are expected in China and other non-OECD Asia to catch up with surging oil demand in these regions.
- The US sanctions against Iran influenced oil trades in the APEC region. Iran's exports of crude oil and condensate plummeted to 0.9 mb/d in December 2018 from 2.7 mb/d in May and the flow to Korea nosedived to zero in July.
- The trade war between the USA and China also affected oil trades in APEC. The US crude exports to China, which had witnessed strong growth since 2017, plummeted to zero in August 2018 although they have since resumed. The imports by Japan, Korea, Chinese Taipei and Singapore from the USA, alternatively, hit a record high in the last half of 2018. The future of the trade war is a major uncertainty for the crude oil flows in the world in 2019.
- The remarkable hike in the US oil production has influenced the global demand-and-supply balance as well as international crude oil prices, and this will continue to be essential in the

future. The US crude oil production in December 2018 hit 11.8 mb/d, up by 1.8 mb/d year-on-year.

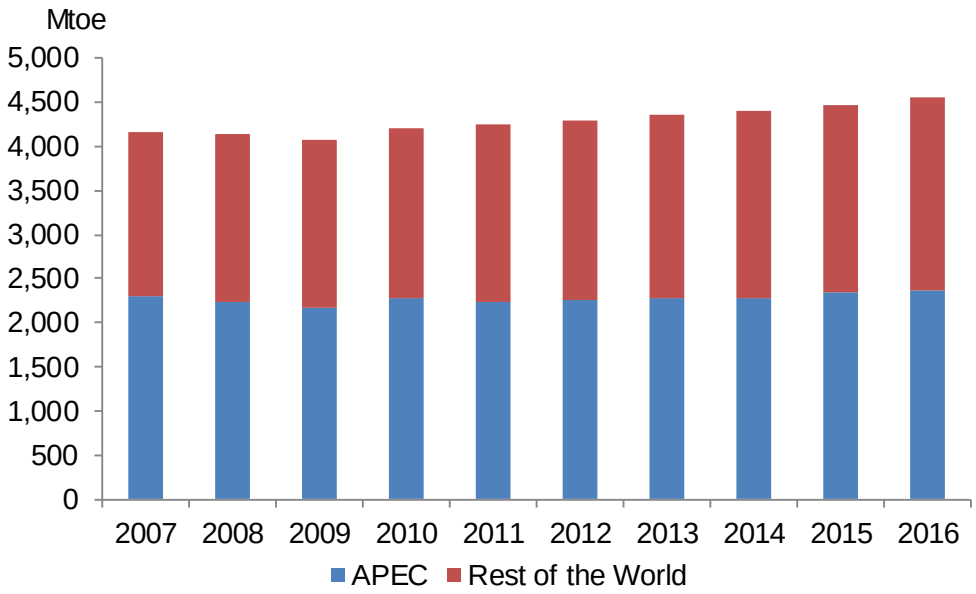
- On the supply side, the oil market in 2019 will be driven by several factors including: how Iranian exports will evolve after waivers expire in May, how low prices will impact US production growth, and whether OPEC+ will be able to keep a high compliance rate for their deeper production cut.
- Fuel quality standards adopted in APEC economies vary widely. Different quality may have hindered flexible trade of gasoline and diesel. Should this barrier be resolved, more dynamic trades of gasoline and diesel will strengthen APEC energy security. The ongoing development of refineries that can produce Euro 5 applicable fuels in southeast Asia such as Nghi Son in Vietnam and RAPID in Malaysia will hopefully contribute to a common standard.

Chapter 1: Demand

Global context (2007-2016)

Global oil consumption has been growing 1.0% per annum since 2007 and reached 4,557 Mtoe in 2016 (Figure 1.1). Although the APEC region kept pace with this growth by maintaining about 52-54% of the world oil demand throughout this period (52% in 2016), the annual growth in the APEC region for the past 10 years was 0.31%, which was lower than the rest of the world at 1.8%. This was mainly due to the demand decrease in the USA and Japan.

Figure 1.1: APEC and global oil demand, 2007-2016

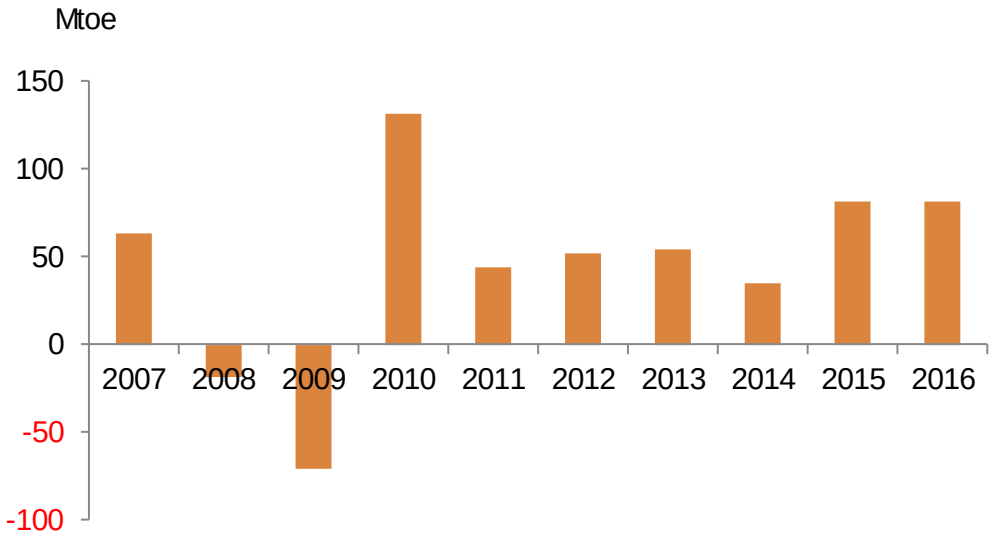


Source: APERC (2019), BP (2018)

In 2015 and 2016, supported by lower oil prices since mid-2014, global oil demand grew by 81 and 82 Mtoe, respectively, which were the greatest increases in the six years since 2011 (Figure 1.2). APEC growth accounted for 26% of the global growth in 2016 while the rest of the world outpaced the APEC region's growth in that year (Figure 1.3). The demand growth during the past decade from 2007-2016 was largely concentrated in China[1] and southeast Asia in comparison to the demand decline in the USA and Japan.

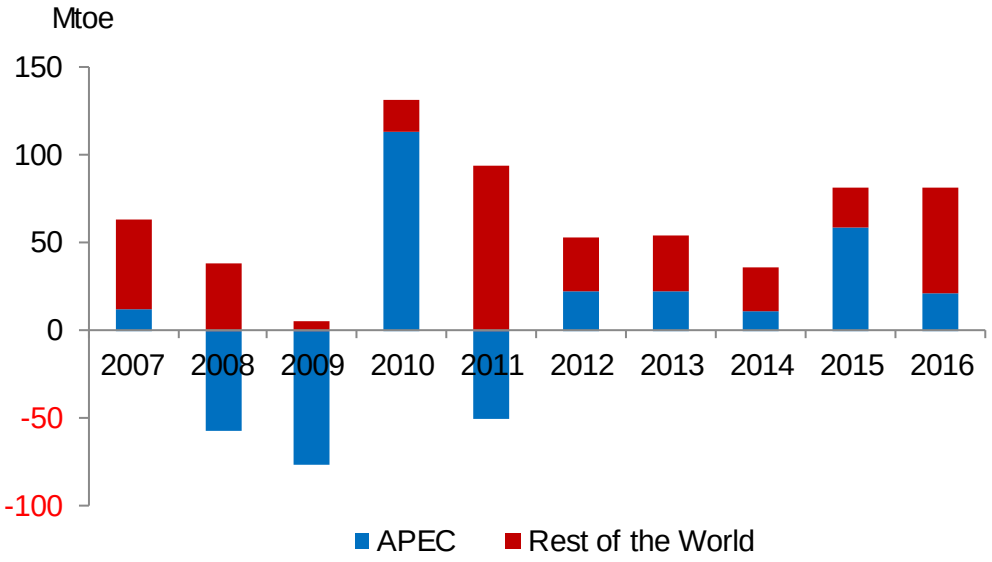
[1] In this report, "China" includes Hong Kong, China

Figure 1.2: Global oil demand change, 2007-2016



Source: BP (2018)

Figure 1.3: APEC and global year-on-year oil demand change, 2007-2016



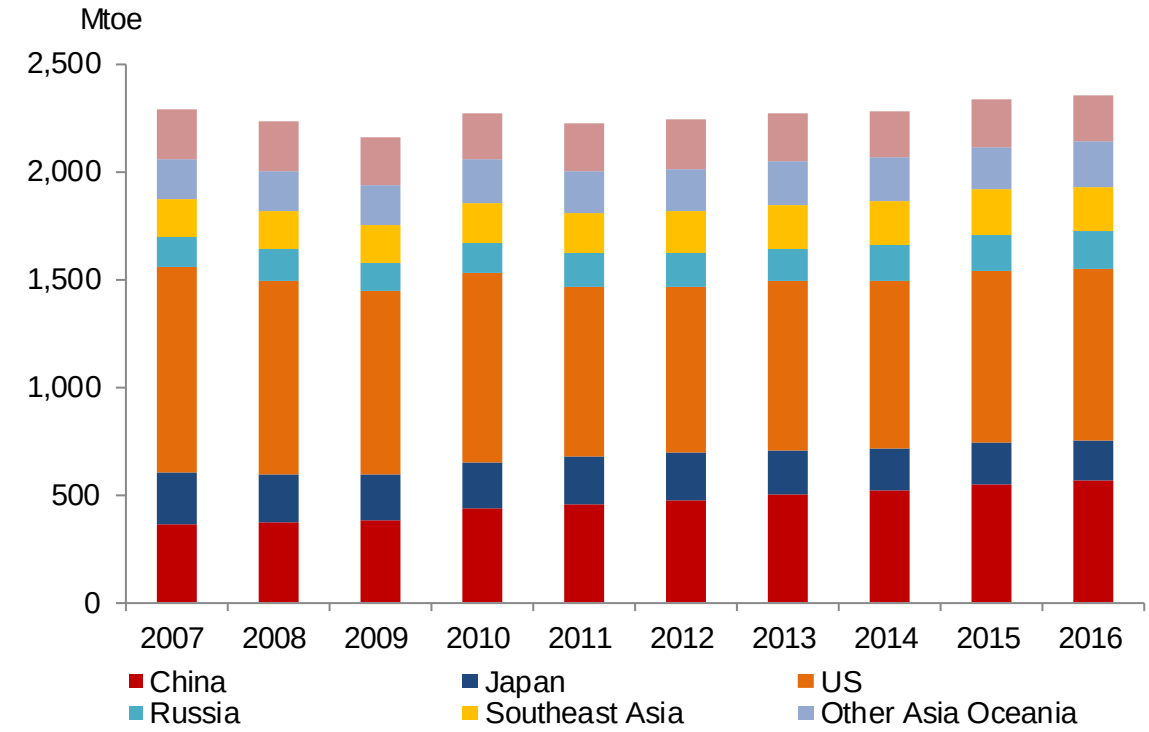
Source: APERC (2019), BP (2018)

Demand trends in APEC (2007-2016)

Within the APEC region, the USA remained by far the largest oil consuming economy with 798 Mtoe or 34% of the APEC total demand in 2016 (Figure 1.4). China was the second largest with 561 Mtoe or 24% of the region's demand. These two economies accounted for as much as 58% of the APEC total. Although these two economies have accounted for 56-58% of total APEC demand since 2007, the mix has been somewhat different; i.e., China's share increased from 16% to 24% while the US share decreased from 42% to 34%. China had been one of the fastest growing oil consuming economies on the globe with an annual growth rate of 5.0%. In fact, China increased its demand by more than 50% (201 Mtoe) during this period, which was more than Japan's annual demand (the third largest consuming economy with 188 Mtoe demand in 2016). On the contrary, US demand decreased by 2.0% per annum from 961 Mtoe in 2007 to 798 Mtoe in 2016 resulting in the consumption ratio of USA:China[2] at 164% in 2007 shifting down to 41% in 2016 and the trend continues. In the same manner, Japan has steadily decreased its demand at an annual rate of 2.6% over the past 10 years. Japan's share in APEC total demand dropped from 10% in 2007 to 8% in 2016. On the other hand, southeast Asia was another region with solid growth and reached 211 Mtoe in 2016. Its demand increase of 2.3% per annum, together with that in Russia, was the second highest in the APEC region after China during this period. Other Asia/Oceania (Australia, Korea, New Zealand, Papua New Guinea and Chinese Taipei) have also showed solid demand growth at 1.1% per annum since 2007, respectively. Demand in Other Americas, namely, Canada, Chile, Mexico and Peru, decreased by 15 Mtoe to 219 Mtoe during the same period.

[2] Calculated as follows: {(US oil demand / China's oil demand) - 1}*100 [%]

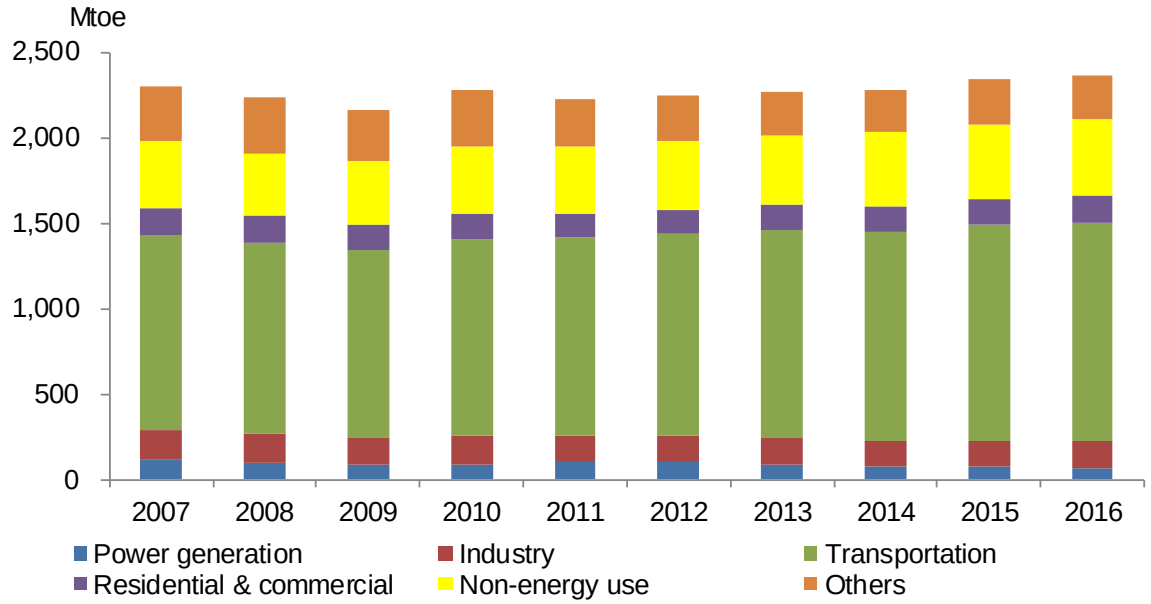
Figure 1.4: Oil demand in APEC, 2007-2016



Note: Other Asia Oceania includes Australia, Republic of Korea, New Zealand, Papua New Guinea and Chinese Taipei
Source: APERC (2019)

Figure 1.5 represents APEC's oil demand by sector since 2007. Transportation has been both the dominant and growing sector during the period. Demand in transportation sector has increased by 1.3% per annum since 2007 and reached 1,282 Mtoe in 2016 or 54% of the total oil demand in the APEC region. Non-energy use, mainly feedstock for petrochemicals, is the second largest demand sector with 445 Mtoe. Backed by strong growing demand for petrochemical products in the APEC region, oil use at petrochemical plants has increased by 1.6% per annum. On the other hand, oil consumption for power generation, which was historically the smallest oil-consuming sector in the region, decreased by 6.2% per annum. During 2007-2016, the industry and residential sectors have had stable annual demand of around 160 Mtoe and 150 Mtoe, respectively.

Figure 1.5: Oil demand in APEC by sector, 2007-2016

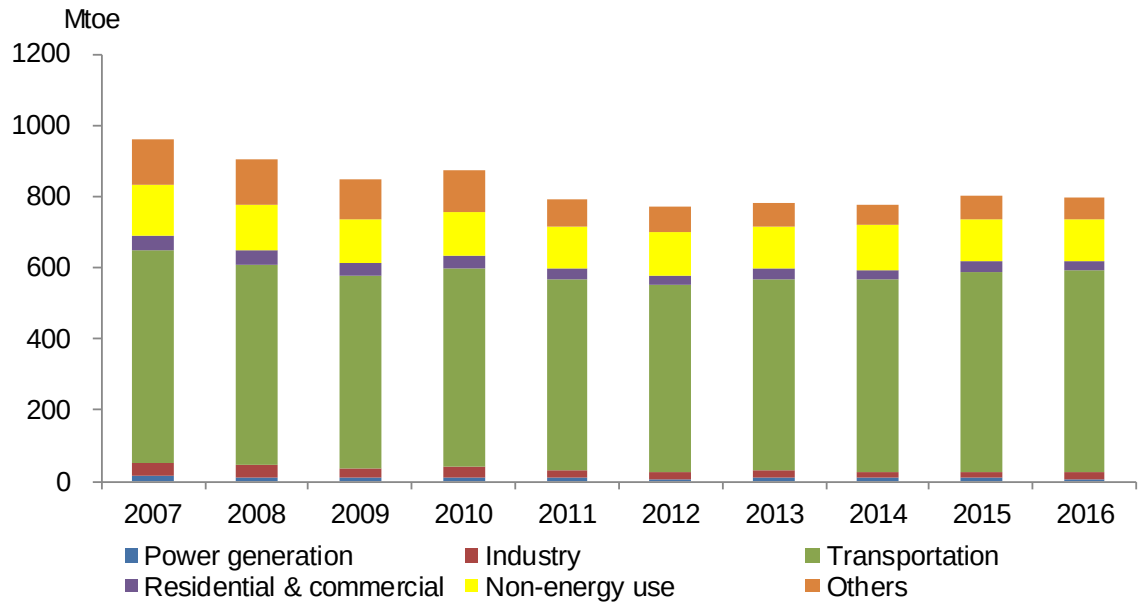


Source: APERC (2019)

The USA and China are the two largest oil-consuming economies in APEC region. However, their demand as well as market structures are very different.

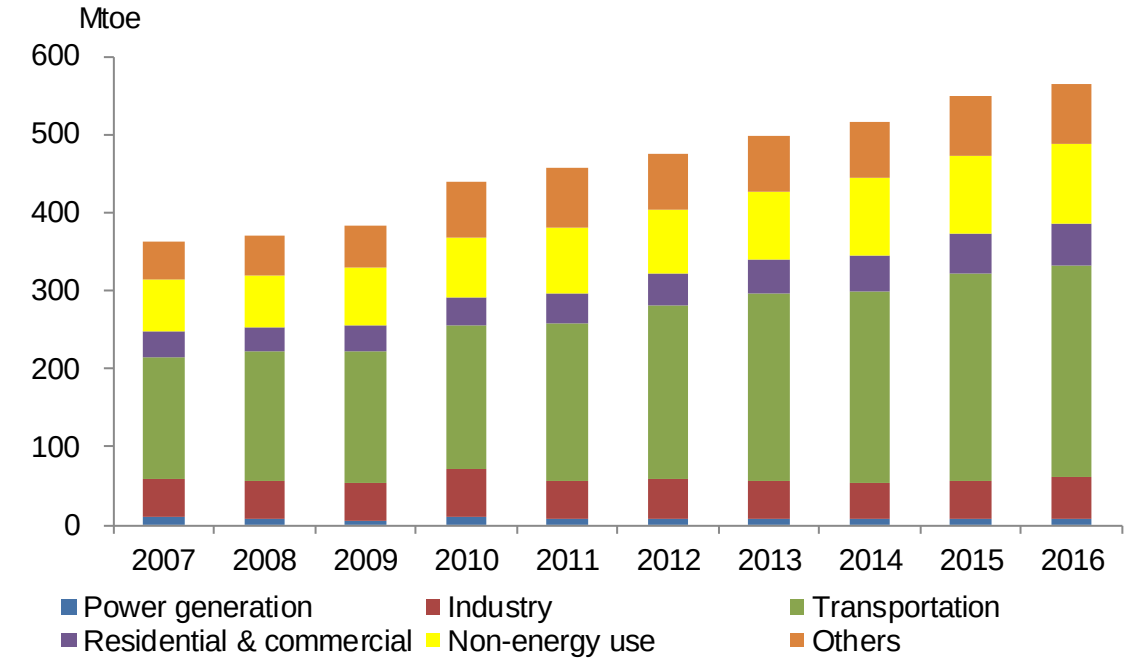
US demand has come down year-by-year and fell below 800 Mtoe in 2011. Since then, it has maintained demand in the range of 770 to 800 Mtoe. On the other hand, China has been growing and increased its demand from 363 Mtoe in 2007 to 565 Mtoe in 2016. In the USA, oil consumption is heavily concentrated in the transportation sector and increased from 62% in 2007 to 71% in 2016 (Figure 1.6). China's oil utilisation is more diversified as shown in Figure 1.7. Although the transportation sector consumes the largest portion of the demand in China, oil consumption in this sector has been less than half of China's total demand (42 to 45% in 2007-2011 and 47 to 48% in 2012-2016). China's second largest consuming sector is non-energy use, which is mainly used to produce a variety of petrochemical products. In China, demand in transportation and non-energy use increased by 6.4% per annum and 5.1% per annum, respectively for the past 10 years while industry sector increased by 1.0% annually. In both the USA and China, oil demand for power generation is very limited (0.94% of the total demand in the USA and 1.3% in China in 2016).

Figure 1.6: Oil demand in the USA by sector, 2007-2016



Source: APERC (2019)

Figure 1.7: Oil demand in China by sector, 2007-2016

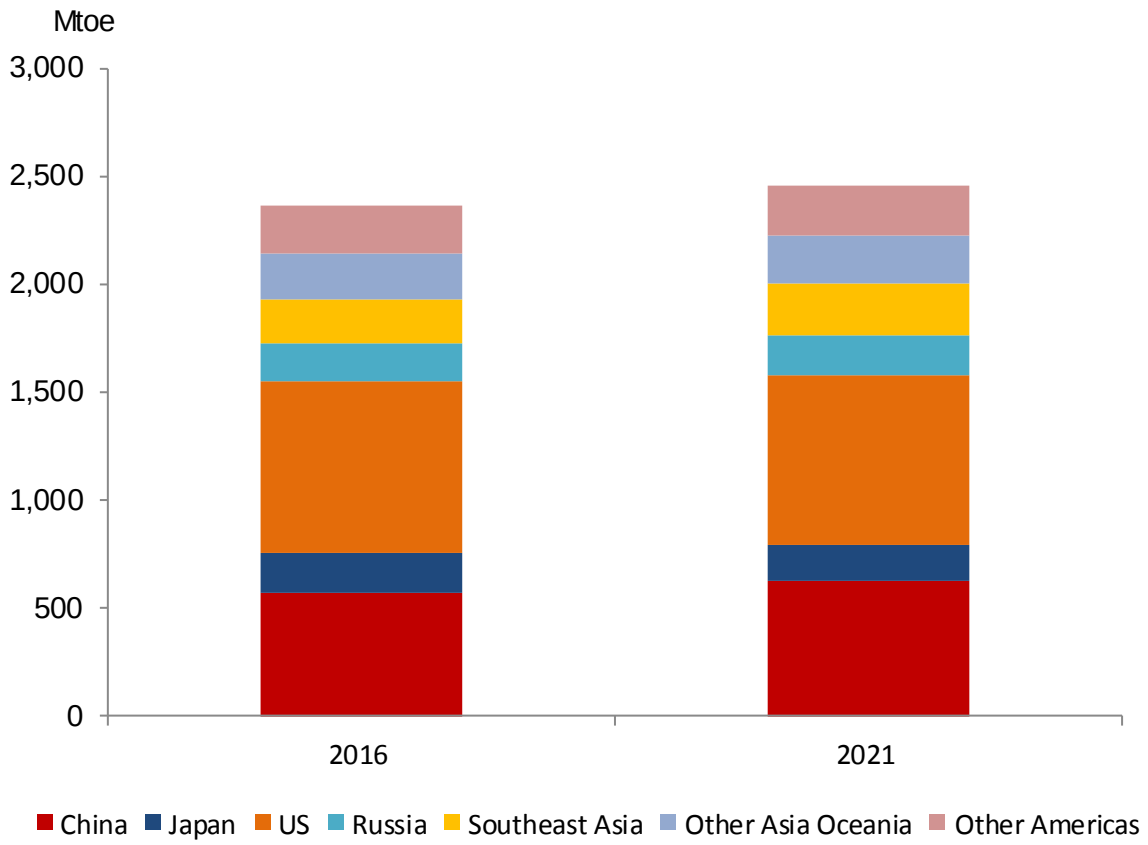


Source: APERC (2019)

Demand outlook

Within the APEC region, oil demand is forecasted to increase by 0.79% per annum to reach 2,455 Mtoe in 2021. China's growth (58 Mtoe or 2.0% per annum) will be by far the largest among the member economies in the five years from 2016 to 2021. Another growth engine is southeast Asia where total growth of the seven member economies will increase by 35 Mtoe or 3.1% per annum during the same period. On the other hand, the demand in Japan is likely to decline by 23 Mtoe or 2.6% per annum for the same period while demand growth in other regions averages 0.35% per annum. As a result, the share of China and southeast Asia demand in the APEC region will expand, albeit moderately, from 24% and 9% in 2016 to 25% and 10% in 2021, respectively. It is likely therefore that the share of APEC oil demand will shift slightly to Asia in the coming years.

Figure 1.8: Oil demand outlook in APEC, 2016 and 2021



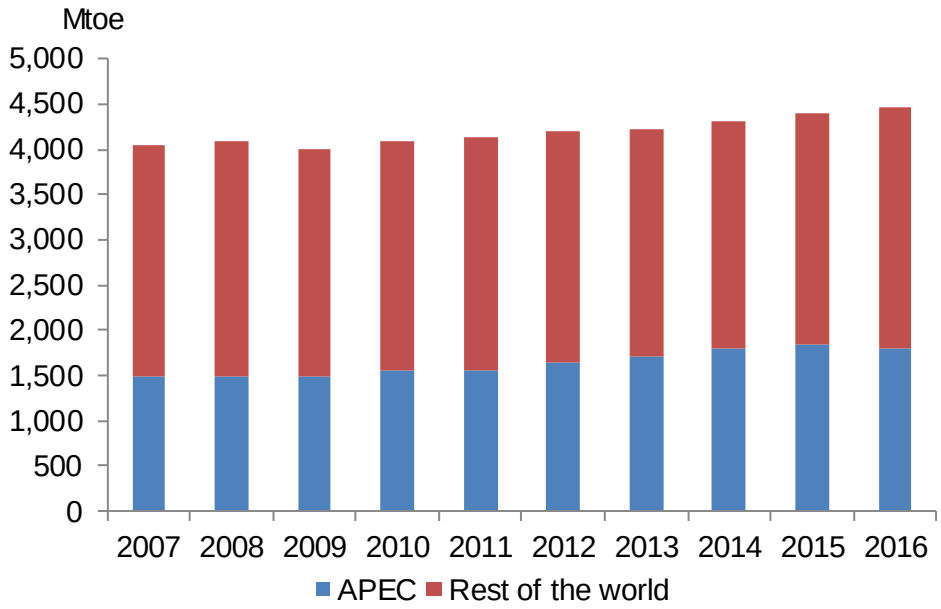
Source: APERC (2019)

Chapter 2: Supply

Global context (2007-2016)

Global oil supply has been increasing slightly faster than demand with an annual growth rate of 1.1% since 2007 (Figure 2.1). The global supply in 2016 was 4,473 Mtoe. The APEC region including its largest oil producing economies like the USA and Russia accounted for 40% of global production. Comparing the production increase in the first half in the decade (2007-2016) with that of the second half, the APEC region achieved faster growth in the second half (2007-2011: 0.93% per annum vs. 2012-2016: 2.9% per annum). The rest of the world recorded a production decrease in the first half but an increase in the second half (2007-2011: -0.21% per annum vs. 2012-2016: 0.80% per annum). Over the past 10 years, the APEC region surpassed the rest of the world in production growth because of the contribution from the USA, Canada and Russia. This boosted APEC's production share in the global market from 37% in 2007 to 40% in 2016.

Figure 2.1: APEC and global oil production, 2007-2016

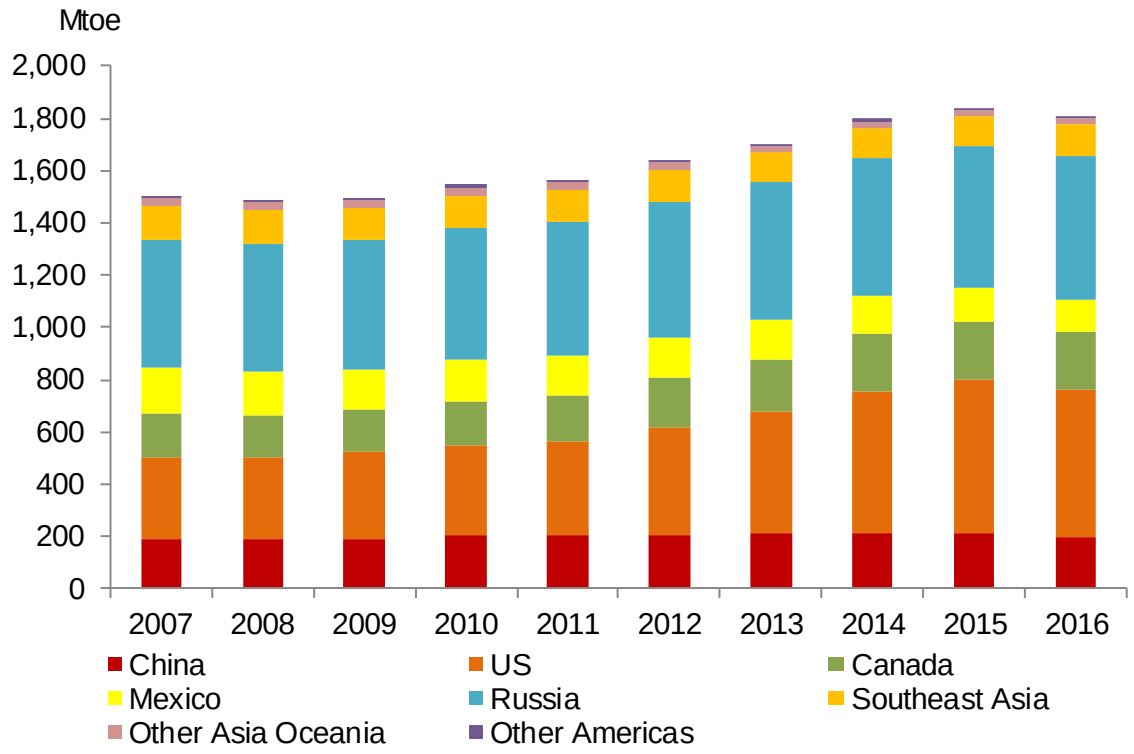


Source: APERC (2019) IEA (2018a)

Supply trends in APEC (2007-2016)

Within the APEC region, the USA and Russia were the largest producing economies with 560 and 550 Mtoe in 2016, respectively (Figure 2.2). These two economies had a production share of as much as 61% in the APEC region in 2016. In terms of supply growth, the USA was by far the largest with an annual rate of 6.5% from 2007 to 2016. The incremental production increase in the USA since 2007 was 243 Mtoe, which was greater than the production of Canada (224 Mtoe) and China (200 Mtoe). Other regions and economies generally showed declining trends. In 2016, Mexico, the fifth largest producing economy in the APEC region, produced 125 Mtoe in 2016, which was 30% lower than its production in 2007.

Figure 2.2: Oil production in APEC region, 2007-2016



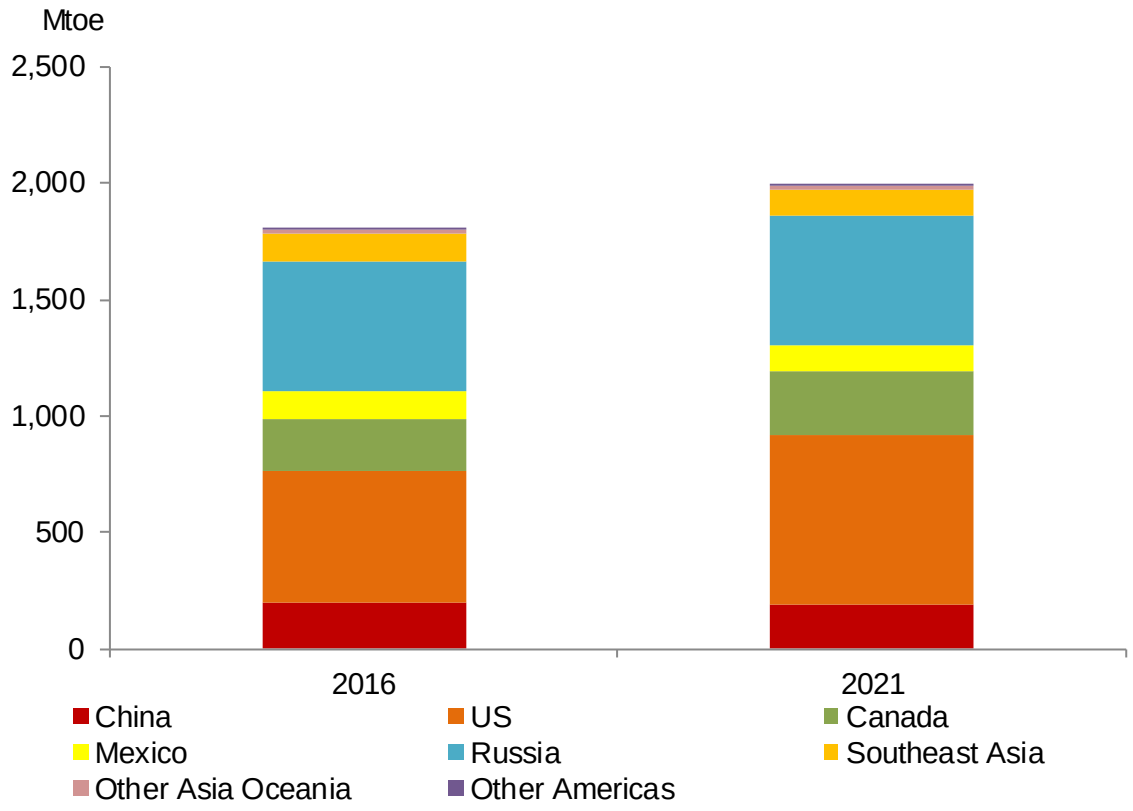
Source: APERC (2019)

Supply outlook

Oil supply in the APEC region is projected to grow by 2.0% per annum from 2016 to reach 1997 Mtoe in 2021, while the annual growth rate of demand among the APEC member economies is as small as 0.79% during the same period. Only three economies, the USA (5.5% per annum), Canada (3.7% per annum) and Peru (8.7% per annum) will achieve higher growth rates than the APEC

region's average in the five years from 2016 to 2021 while the other economies will sustain or decrease their production. On a production share basis in the APEC region, the top three producers, the USA, Russia and Canada, will supply around three quarters of the region's total production and maintain their dominant positions until 2021. However, while the USA and Canada will increase their shares respectively from 31% and 12% in 2016 to 37% and 13% in 2021, Russia will decrease from 30% in 2016 to 28% in 2021. Production increases in North America will be boosted by the development of unconventional oil resources although the lack of transportation infrastructure such as pipelines and less investment in oil sand assets restrict growth in Canada. Meanwhile, China, Mexico, southeast Asia, and other Asia/Oceania will show a decline of 33 Mtoe altogether for the same period. As a result, unlike demand, the supply centre in the APEC region will shift more to North America in the future.

Figure 2.3: Oil production in APEC region, 2016 and 2021



Source: APERC (2019)

Chapter 3: International trade

This chapter discusses international oil trade in the APEC region. APEC's oil import dependency as well as intra-APEC trade flows are affected by demand growth, indigenous production and diplomatic tensions. In this section, first, the trends in APEC import dependency of crude oil and oil products are examined. Then, key factors that will influence oil trades, the US sanctions against Iran and the US-China trade war, are explored.

Other important factors affecting global oil trade, specifically the significant increase in US tight oil production, supply cuts by OPEC and its non-OPEC allies, and fuel specification standards, are presented in detail in Chapter 5.

APEC import dependency

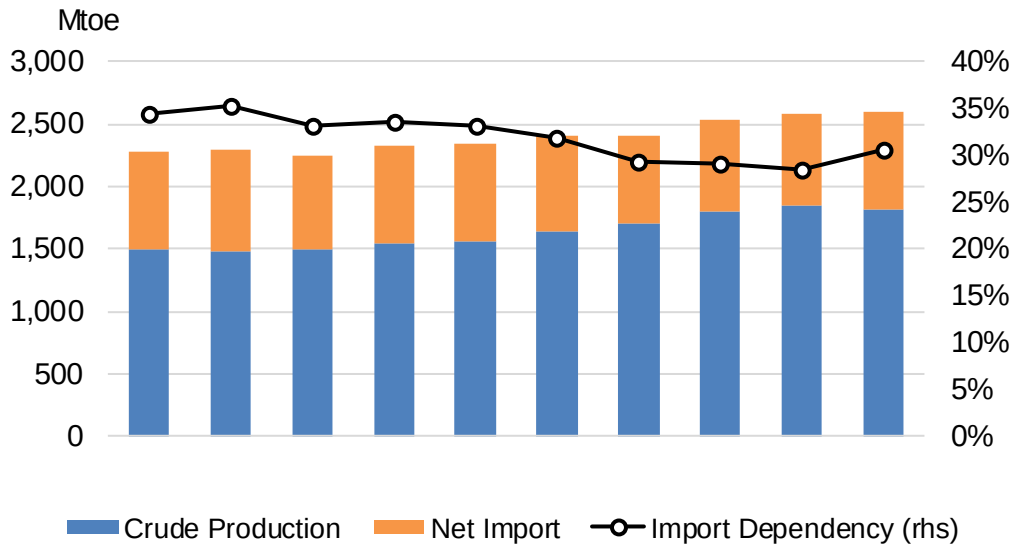
APEC's import dependency[3] on crude oil has slightly declined over the years from 34% in 2007 to 31% in 2016, as shown in Figure 3.1, on the back of the indigenous production increase by the USA, Canada and Russia. However, in 2016, the dependency rate surged year-on-year for the first time in seven years because of production declines in the USA and China along with low international oil prices.

The USA, APEC's largest oil consumer, accounted for 45% of total APEC crude imports in 2007. However, the economy's increased output of tight oil has mitigated its dependence on imports, and its share of crude imports in APEC decreased to 31% in 2016.

Unlike the decreasing US share in APEC crude imports, China's share climbed to 27% in 2016 from 12% in 2007 as its oil demand soared at an annual average rate of 5.0% in line with the strong economic growth.

[3] Calculated as follows: import dependency = net import / (production + net import). In case of oil products, production refers to the output from refineries.

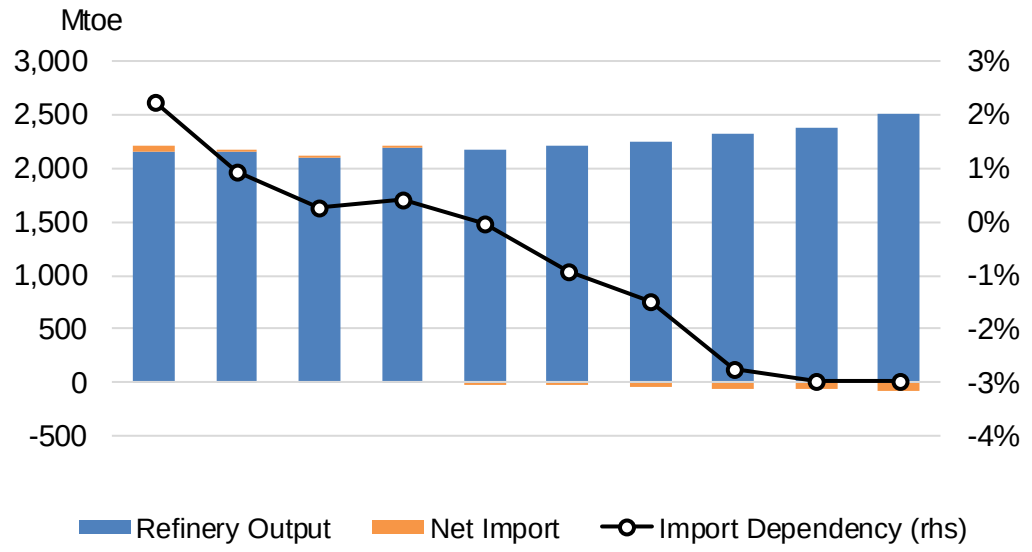
Figure 3.1: APEC crude oil import dependency, 2007-2016



Note: "Net Import" includes intra-APEC trades
Source: APEC (2018), APERC (2019)

In contrast to crude oil, APEC has been self-sufficient and a net-exporter in oil products since 2011, as shown in Figure 3.2. Looked at by economy, on the one hand, massive crude producers like the USA and Russia, and economies with substantial refining capacity like Korea are primarily net oil-exporters. On the other hand, economies without sufficient refineries like Australia and Mexico highly depend on imports. Malaysia, a net-exporter in 2007, has become a net-importer to cope with the steady demand growth.

Figure 3.2: APEC oil products import dependency, 2007-2016



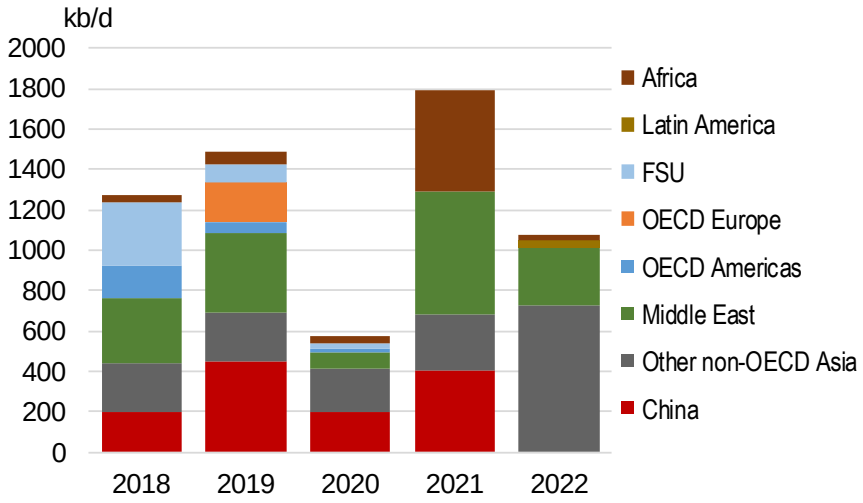
Note: "Net Import" includes intra-APEC trades
Source: APEC (2018)

Refining capacity growth will affect the trade of oil products. Significant increase in new refining capacity is expected in China and other non-OECD Asia as well as the Middle East to catch up with surging oil demand in these regions, as presented in Figure 3.3. China, the world's largest crude importer, is expected to continue to increase capacity by 1 000 kb/d in three years from 2019. Of the total increase in non-OECD Asia from 2018 to 2022, southeast Asia accounts for 65% (IEA, 2018b), striving to be self-sufficient in oil by using its own refineries instead of depending on imports. It is also noteworthy that major national oil companies in the Middle East like Saudi Aramco and KPC have increased focus on the downstream in APEC economies.

With the second largest throughput capacity in the world, China has already increased oil-products exports such as gasoline and diesel oil mainly to the Asian market. The expected capacity growth will result in more products exported in the future. Specifically, increased diesel oil outflows from China could play a key role in the Asian market, which is expected to change drastically because of the 2020 IMO sulphur regulation.[4]

[4] Wood Mackenzie, *IMO aims to halve global shipping emissions – but what will it cost?*, April 12 2018, https://www.woodmac.com/ja/news/editorial/imo-aims-to-halve-global-shipping-emissions--but-what-will-it-cost/

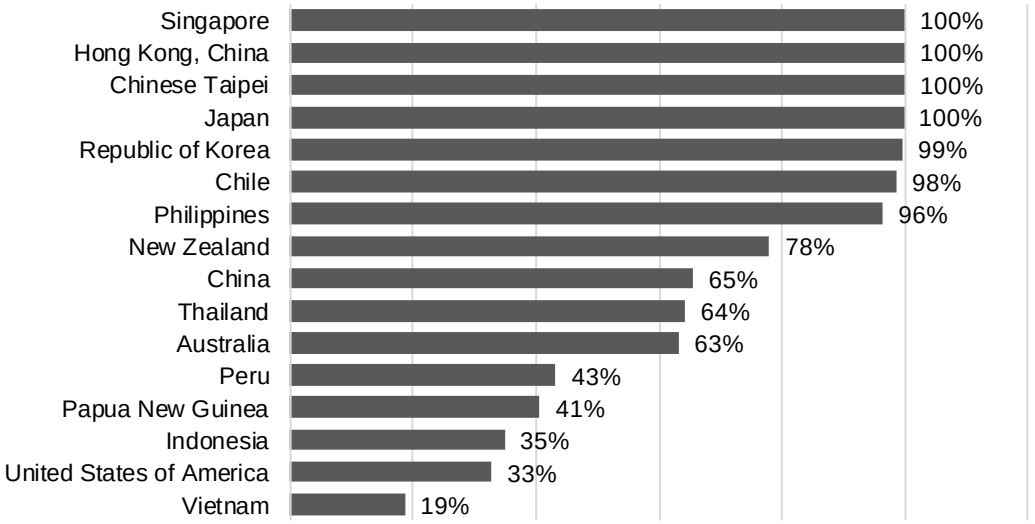
Figure 3.3: World refinery capacity additions, 2018-2022



Source: IEA (2018b)

As indicated before, the status of oil import dependency in APEC varies among economies. Some east and southeast Asian economies have relied almost entirely on imports for their oil use, as provided in Figure 3.4, because of the lack of domestic crude production. China's dependency in 2016 stood at 65%, up from 50% in 2007, driven by a considerable demand surge and relatively stable domestic production. The increase in oil dependency drove the economy's growing focus on overseas upstream investment. The USA, on the other hand, has experienced improvement in self-sufficiency: import dependency has halved in the 10 years to 33% in 2016. Five economies in APEC, namely Brunei, Canada, Malaysia, Mexico and Russia maintained their oil self-sufficiency status during 2007-2016.

Figure 3.4: APEC oil import dependency by economy, 2016



Note: Economies not listed are net-exporters of oil: Brunei (-1,746%), Russia (-190%), Canada (-127%), Mexico (-34%) and Malaysia (-8%)
Source: APEC (2018), APERC (2019)

US sanctions against Iran and the consequences

The USA announced on May 8, 2018, its withdrawal from the Iran nuclear deal sealed with the P5+1[5] economies in July 2015 and reimposed significant economic sanctions against Iran. The USA asked the other economies to completely halt oil imports from Iran in 180 days. Iran, OPEC's third largest crude oil producer, exported 2.7 mb/d of crude oil and condensate in May (SHANA, 2018) and some APEC economies, namely China, Japan, Korea and Chinese Taipei, were the primary destinations. All economies, to various degrees, reduced imports and outflows from Iran fell to 0.9 mb/d in December 2018 and in the fourth quarter of 2018, as presented in Figure 3.5. The flow to Korea nosedived to zero in July and crudes from the USA and Russia seemed to compensate the decline.

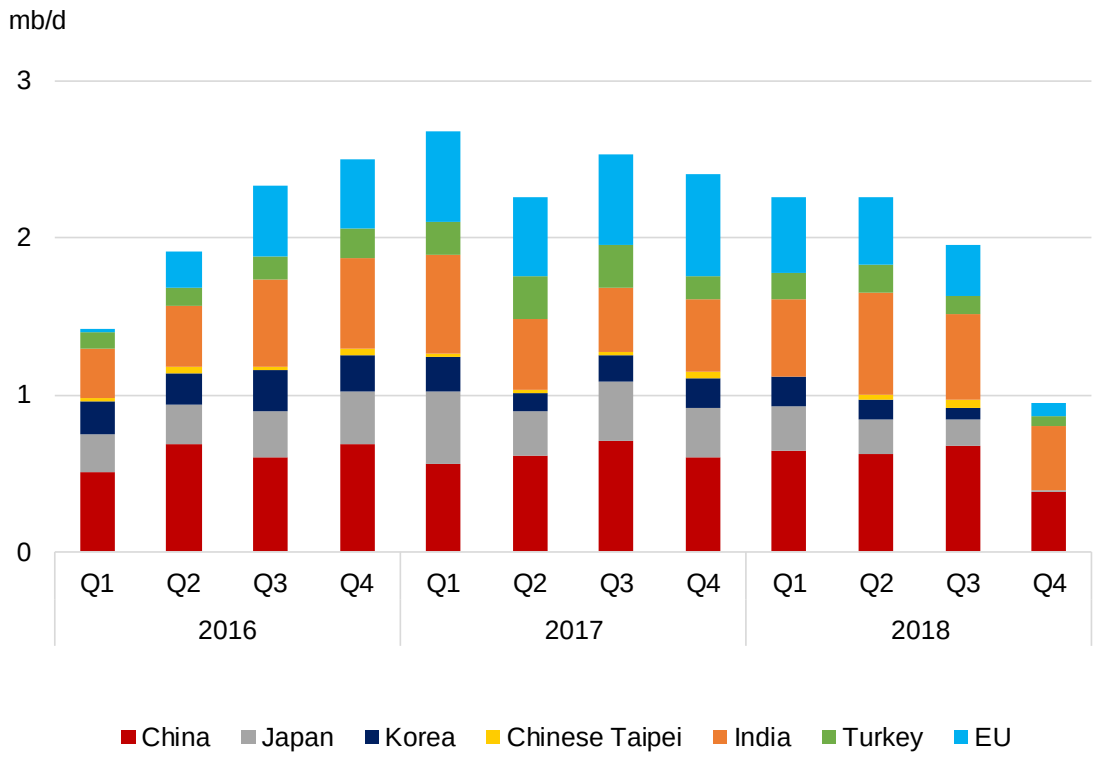
On November 5, the USA gave temporary waivers to four APEC economies – China, Japan, Korea and Chinese Taipei, and four non-APEC economies to mitigate the impact on those economies. The waivers enabled continuing imports from Iran for the next six months, preventing a sharp drop of Iran's exports.[6] Getting close to the expiration date, on April 22 2019, the USA announced that the

[5] China, France, Russia, the UK and the USA (P5) plus Germany

[6] US Department of State, *"Press Availability With Secretary of Treasury Steven T. Mnuchin"*, November 5 2018, https://www.state.gov/e/eb/tfs/spi/iran/index.htm

grace period ends on May 1 and there will be no waivers beyond May 2.[7] The USA intends to ultimately reduce Iran's crude exports to zero. Should that be the case, with Venezuela's continued production decrease, the oil market could be undersupplied in the second half of 2019.

Figure 3.5: Imports of Iranian crude and condensate, 2016-2018



Source: National import statistics, MEES (2018) and MEES (2019)

The effect of the trade war between the USA and China

The year 2018 saw the escalation of the trade war between the USA and China, and certain impacts on oil trade. On July 6 2018, the USA imposed a 25% tariff on $34 billion worth of imports from China in light of alleged intellectual property theft and trade deficits. In response to the imposition, China immediately levied the same amount of counter tariffs on 545 US products. In August, China imposed a 25% tariff on oil products. The conflict escalated until the beginning of December, when

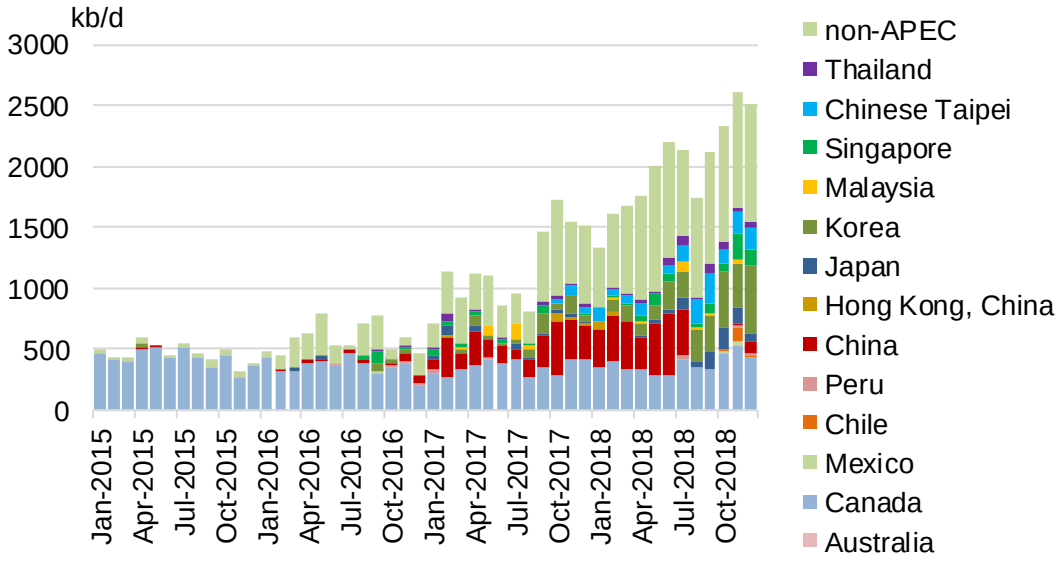
[7] US Department of State, *"Decision on Imports of Iranian Oil"*, April 22 2019, https://www.state.gov/secretary/remarks/2019/04/291272.htm

the two economies agreed at a post-G20 meeting in Argentina to pause new trade tariffs for 90 days. However, on May 10 2019, the USA raised tariffs to 25% from 10% on $200 billion worth of Chinese goods.[8]

The escalated trade war could slow down global economic growth and tariff-driven higher prices of consumer goods could cause an oil demand decline through the reduction of household purchasing power. In January 2019, the International Monetary Fund downgraded the global growth outlook for 2019 to 3.5% from 3.7%, warning the trade war may damage global trade.

The dispute has changed the destination of US crude exports. US crude exports to China, as shown in Figure 3.6, which had witnessed strong growth since 2017, plummeted to zero in August 2018 although they have since resumed. The imports by Japan, Korea, Chinese Taipei and Singapore from the USA, alternatively, hit a record high in the last half of 2018. The future of the trade war is a major uncertainty for the crude oil flows in the world in 2019.

Figure 3.6: US monthly crude exports, 2015-2018



Source: EIA (2018a) and EIA (2019a)

[8] Bloomberg, *"U.S. hikes tariffs on $200B of Chinese goods. China says it will retaliate"*, May 10 2019, https://www.bloomberg.com/news/articles/2019-05-10/u-s-hikes-tariffs-as-china-talks-are-poised-for-a-second-day

Chapter 4: Price

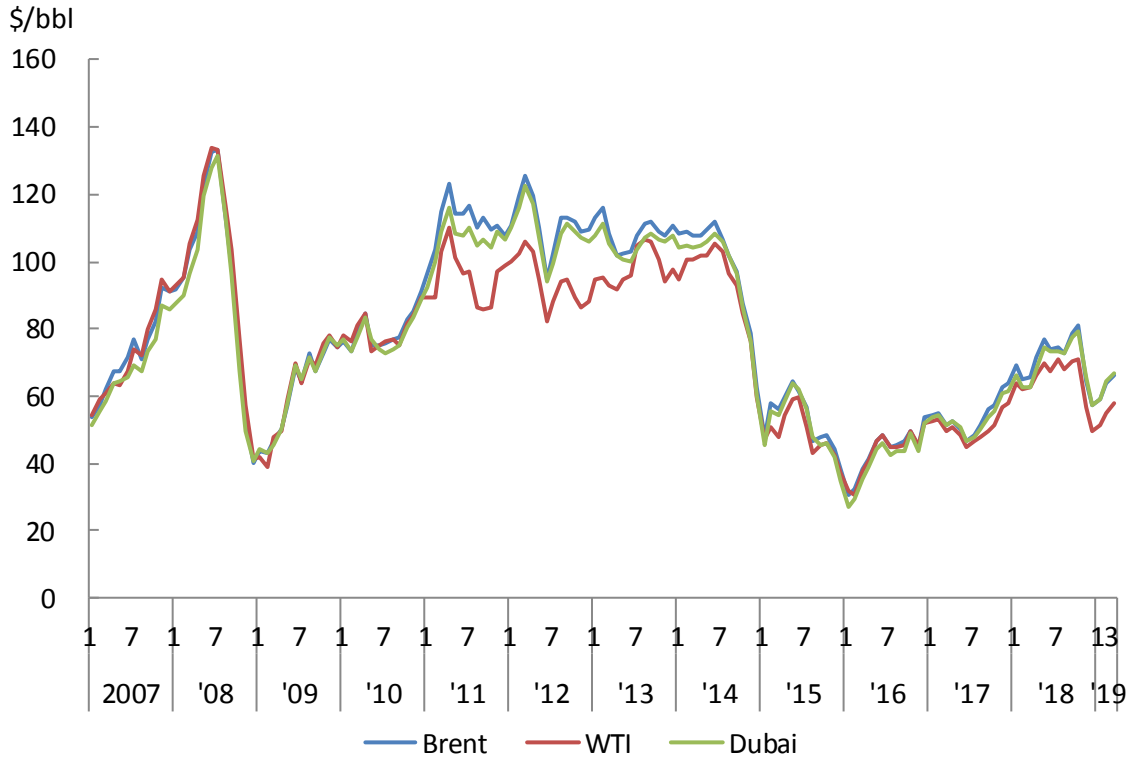
Crude oil prices have fluctuated widely since 2007 as shown in Figure 4.1. After hitting an all-time high of $147/bbl in July 2008, the WTI price nosedived to $33/bbl in February 2009 because of the global economic downturn triggered by the bankruptcy of Lehman Brothers. In the subsequent five years, economic recovery together with heightened geopolitical tensions supported prices. Prices were relatively stable in the range of $80-120 between 2011 and the first half of 2014. This period of stable high prices witnessed rise of US shale oil, which became very competitive thanks to significant efficiency improvement.

Dealing with the shale expansion, OPEC decided to end its production adjustment in November 2014 to regain market share. The result was another nosedive of crude prices, which eventually fell below $30 in February 2016. OPEC once again returned to production cuts in November 2016, this time with some non-OPEC economies including Russia. OPEC/non-OPEC (OPEC+) joint production cuts rebalanced the market and concern about Iranian oil export declines because of US sanctions pushed up prices. Brent surged to above $86/bbl in early October 2018 for the first time since October 2014.

However, the market seems to have turned into another downturn cycle since October 2018. The USA granted waivers to eight countries including APEC economies like China, Japan and Korea to allow oil imports from Iran for an additional 180 days. US production surged more than the market expected. A weak stock market worsened investor sentiment. Brent fell around 40% in about three months to $50.47/bbl on December 24, 2018.

Since the beginning of 2019, the market moved back into upward trend. OPEC+'s new production cut of 1.2 mb/d for six months started January and OPEC's output in March hit a four-year low as Saudi reduced the output to a level below their quota. The USA announced in late April that there would be no additional waivers for Iranian oil imports to eight countries after May 2, and the announcement sent Brent to new highs for the year, $74.57/bbl on April 24. Venezuela's output continues to slide and hit a long-term low of 0.87 mb/d in March amid the country's crisis. These factors could result in a bearish market and this sentiment could continue in 2019.

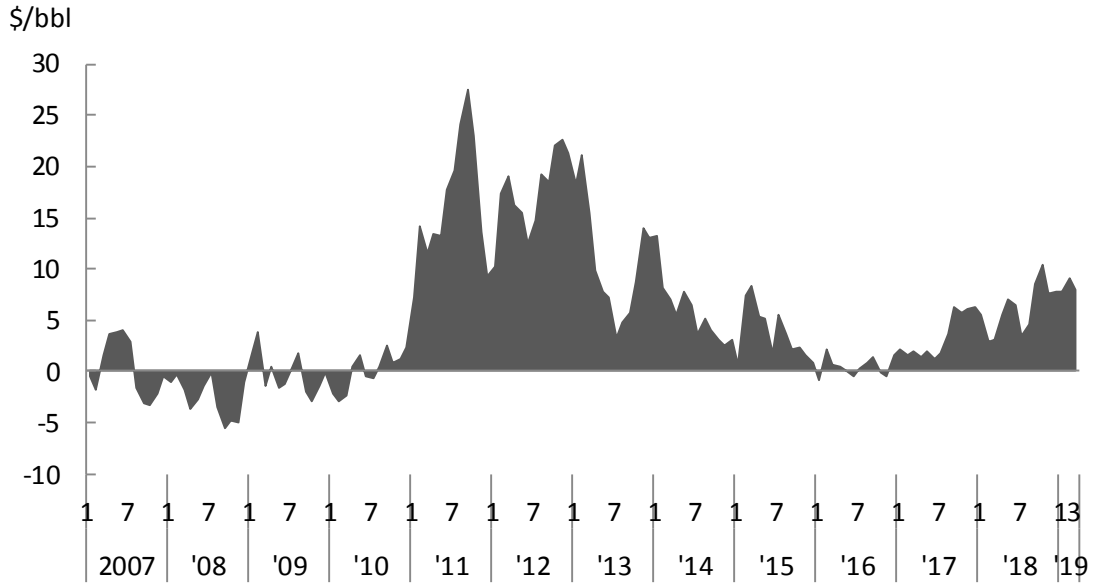
Figure 4.1: Crude oil prices, 2007-2018



Source: IEA (2018c) and IEA (2019)

Meanwhile, the spread between Brent and WTI has varied substantially since 2011 as presented in Figure 4.2. The unprecedented spread in 2011-2013 is largely explained by a build-up of crude oil stocks in the USA due to the shale revolution and limited takeaway capacity, and the so-called Arab Spring – the former suppressed WTI and the latter inflated Brent. The spread once again has widened since mid-2017 because of a shortage of pipelines to carry oil out of the Permian basin in West Texas, the USA.

Figure 4.2: Brent-WTI spread, 2007-2018



Source: IEA (2018c) and IEA (2019)

Table 4.1 presents oil price assumptions by APERC, IEA and EIA. Although there is a discrepancy in terms of the referred price between IEA (average import price) and APERC/EIA (both Brent), prices are in a similar range towards 2030. These three organizations forecast price increases towards 2030, although the extent is slightly different. While no detailed explanation is offered for these assumptions, price increases are expected to stem from a tightening market balance (i.e. robust demand and slower supply growth) that will eventually require high-cost supply sources over time.

Table 4.1: Oil price assumptions by APERC, IEA and EIA

(2017 $/bbl)

	2017	2020	2025	2030
APERC (Brent)	54	-	-	95
IEA (Weighted average import price among IEA member countries)	52	-	88	96
EIA (Brent)	52	70	86	93

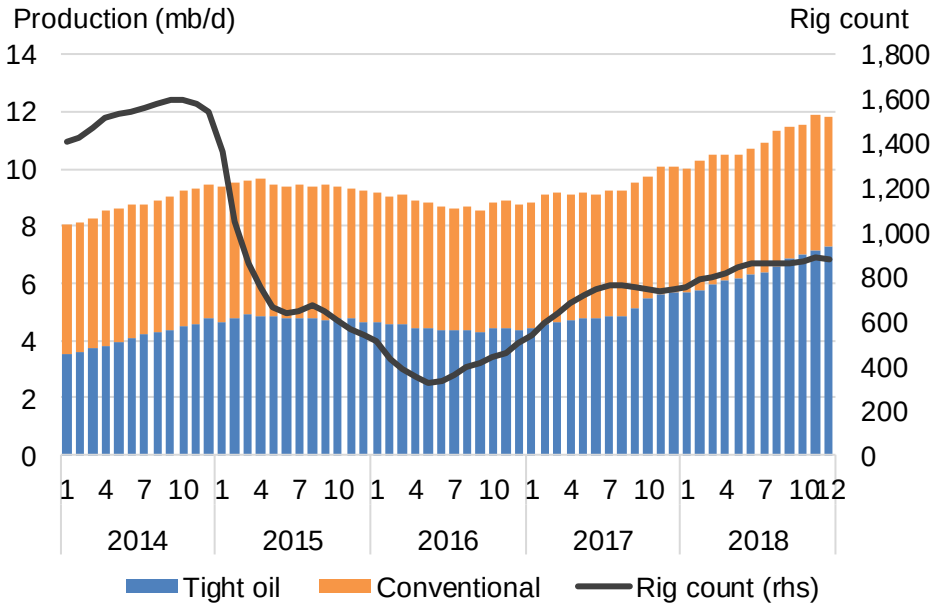
Note: APERC does not assume 2020 and 2025 price. Nor IEA does assume a 2020 price.
Source: APERC (2019), IEA (2018d), EIA (2018b).

Chapter 5: Highlights

Production growth of US tight oil and supply cuts by the OPEC+

It is well reported that the remarkable production growth in the US oil production has influenced the global demand-and-supply balance as well as international crude oil prices, and that role will continue to be essential in the future. US crude oil production as of December 2018 hit 11.8 mb/d, up by 1.8 mb/d year-on-year. Tight oil production, which once slipped in 2016 because of lower oil prices, grew steadily and accounted for 87% of the production growth in the USA. The sheer increase drove the Obama administration to lift a 40-year-old ban on crude oil exports in 2015. The exports quintupled in December 2018 to 2.5 mb/d from 0.47 mb/d in 2015 and almost 60% of them headed to APEC economies (Figure 3.6)[9]. Oil prices surged from mid-2017 to October 2018 on the back of the oil market rebalance led by the OPEC+ production cut, US sanctions on Iranian crude exports, and other factors that supported the US crude output boost. The increased exports have in part compensated for Iran's export losses in the wake of the sanctions.

Figure 5.1: Crude production and rig count in the USA, 2014-2018



Sources: EIA (2018c), EIA (2018d), EIA (2019b) and Baker Hughes (2018).

[9] Destinations of USA crudes among APEC economies have changed due to US-China trade war. See Chapter 3.

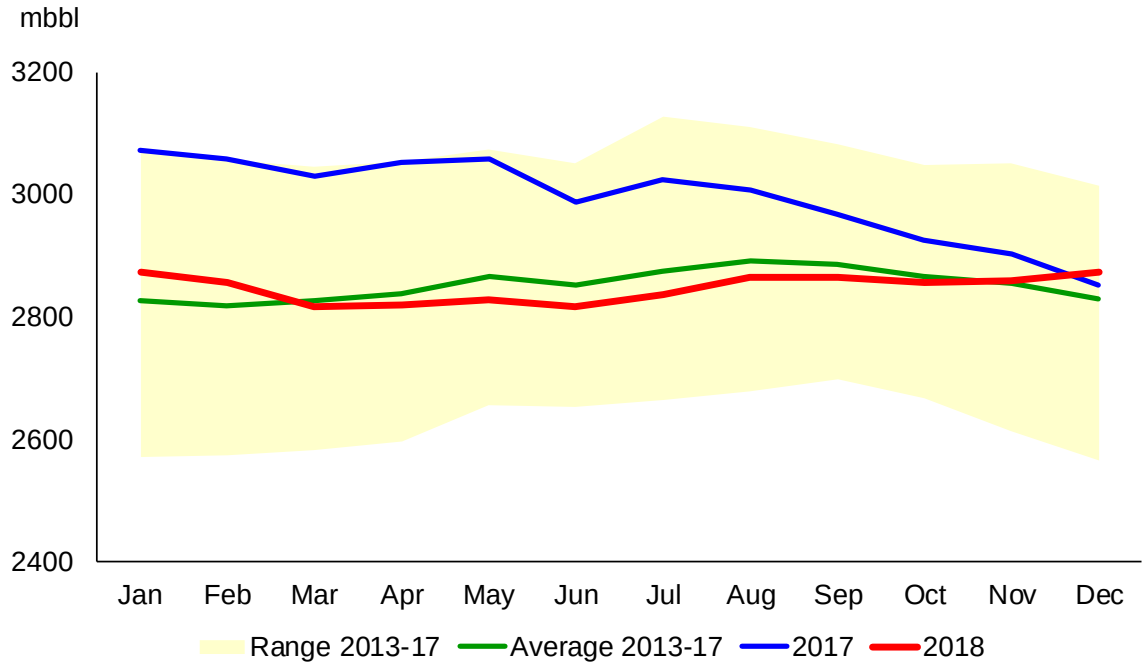
Meanwhile, OPEC, which had aimed at maximizing market share since 2014, was forced back to its old strategy of production cuts in November 2016. This policy change was almost single-handedly driven by the output expansion in the USA. Joint production cuts by OPEC and non-OPEC producers (OPEC+) since January 2017 rebalanced the market in March 2018, when OECD commercial stock was finally below the five-year average as shown in Figure 5.2. During the rebalancing process, OPEC countries reduced more than they agreed. The compliance rate was well over 100% till May 2018.

The second and third quarters of 2018, however, saw mixed signals from OPEC+. The USA withdrew from the JCPOA (Joint Comprehensive Plan of Action) about Iran's nuclear program in May 2018 and pressured oil importers to halt oil imports from Iran within 180 days (i.e. by November 4). With growing concerns over Iranian output, OPEC+ agreed in June 2018 to ease production cuts, whereby the production level was re-confirmed as the original agreement signed in November 2016. Output increase in Saudi Arabia and UAE resulted in a gradual decrease of the compliance rate.

However, the market was quickly becoming oversupplied since the OPEC+ agreement in June. The US production increase accelerated to almost unprecedented extent especially in the third quarter. In November, the USA granted waivers for Iranian oil imports to eight countries for 180 days. OECD commercial stock levels increased once again above the five-year average level in November. Alarmed by the oversupplied market and weak prices, in December 2018, OPEC+ again agreed a new production cut scheme, this time -1.2 mb/d for six months, starting January 2019. The market was not convinced, and prices crashed in December.

It is now likely that the battle between OPEC+ and US tight oil has entered the next phase. The low price since October 2018 was significantly based on growing concerns about the world economy. Strong demand growth is increasingly questioned. On the supply side, there are uncertainties about whether Iranian exports will hit zero after the expiration of waivers after May 2, how oil prices will affect the US production growth, whether the US limited crude takeaway capacity in the Permian will be expanded as expected, and whether OPEC+ will be able to keep a high compliance rate for their deeper production cut. The oil market will be driven mainly by these factors in 2019. The USA, with estimated crude production of 13.0 mb/d in 2020, up by 0.7 mb/d year-on-year (EIA, 2019c), is likely to remain the place supplying the demand increase in coming years.

Figure 5.2: OECD commercial oil stocks, 2013-2018



Sources: IEA (2018c) and IEA (2019).

Fuel quality regulations in the APEC region

Exhaust gases emitted from vehicles like carbon monoxide (CO), particulate matter (PM), nitrogen oxides (NOx) and hydrocarbons (HC) harm human health as well as the environment. With an aim to alleviate the undesirable side effects of automobile utilisation, almost every APEC economy has adopted fuel quality standards on gasoline and diesel, which set emission limits for those car pollutants. Table 5.1 and Table 5.2 present passenger-car's emissions standards in European Union named "Euro-X" emissions standards, which are virtually a global standard and adopted in most APEC economies.[10] Since Euro 1 in 1992, EU countries gradually tightened emission limits to address air pollution as well as global warming.

[10] Some APEC economies such as China, Japan and the US set their original standards, but the standards correspond substantially to the Euro standards. Therefore, in this section, the regulations are discussed based on the Euro standards.

Table 5.1 European emission standards for gasoline passenger cars, 1992-present

	Year of implementation	Emission limits						
		CO (g/km)	HC+NOx (g/km)	HC (g/km)	NMHC (g/km)	PM (g/km)	NOx (g/km)	PN (#/km)
Euro 1	1992	2.72	0.97	-	-	-	-	-
Euro 2	1996	2.2	0.5	-	-	-	-	-
Euro 3	2000	2.3	-	0.2	-	-	0.15	-
Euro 4	2005	1.0	-	0.1	-	-	0.08	-
Euro 5	2009	1.0	-	0.1	0.068	0.005	0.06	-
Euro 6	2014	1.0	-	0.1	0.068	0.005	0.06	6.0×10^{11}

Note: NMHC is non-methane hydrocarbons; PN is particulate number.
Sources: RAC (2018).

Table 5.2 European emission standards for diesel passenger cars, 1992-present

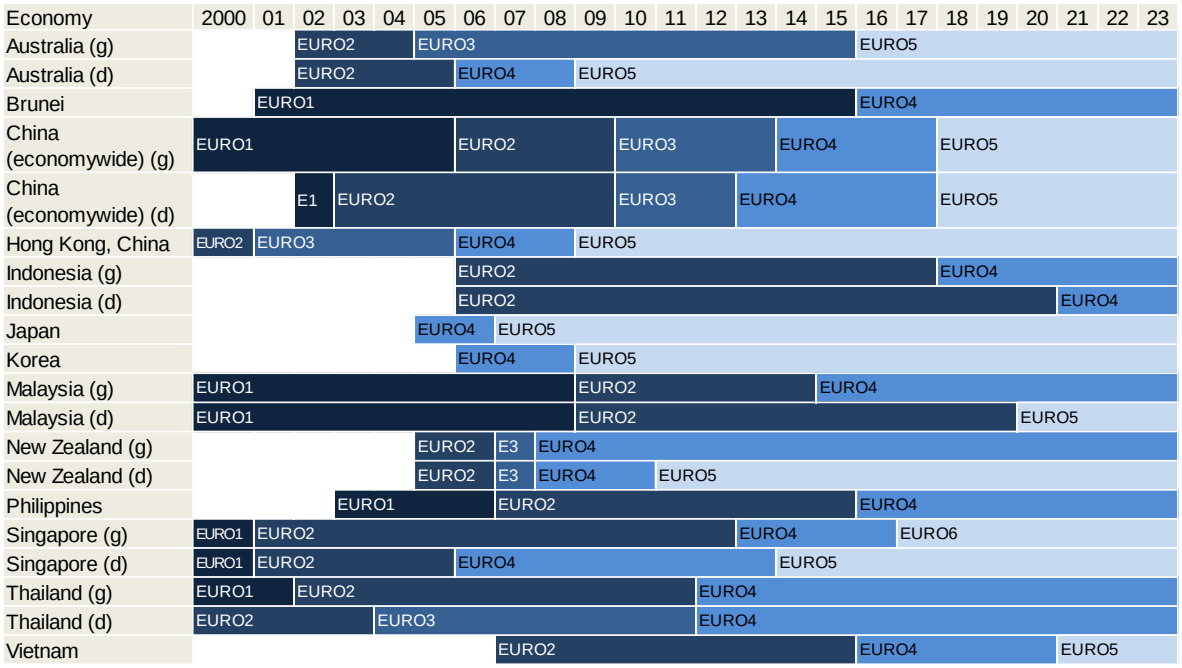
	Year of implementation	Emission limits				
		CO (g/km)	HC+NOx (g/km)	PM (g/km)	NOx (g/km)	PN (#/km)
Euro 1	1992	2.72	0.97	0.14	-	-
Euro 2	1996	1.00	0.70	0.08	-	-
Euro 3	2000	0.66	0.56	0.05	0.50	-
Euro 4	2005	0.50	0.30	0.025	0.25	-
Euro 5	2009	0.50	0.23	0.005	0.18	6.0×10^{11}
Euro 6	2014	0.50	0.17	0.005	0.08	6.0×10^{11}

Sources: RAC (2018).

Meanwhile, the regulation levels adopted in some APEC economies are generally behind that in Europe and widely vary among economies, as presented in Figure 5.3. Passenger cars in Australia, China, Hong Kong, Japan, Korea and Singapore are already subject to strict Euro 5 regulation, while other southeast Asian economies have adopted Euro 2 or Euro 4. Indonesia moved to Euro 4 for gasoline vehicles in October 2018 and plans to for diesel in 2021.

Utilising fuels with common standards in APEC will contribute to flexible product trades. The differences in gasoline and diesel quality may have hindered their active trades. Should this barrier be resolved, more dynamic trades of gasoline and diesel will strengthen APEC energy security. This is particularly true to southeast Asia, with significant intra-product trade and yet different quality standards in the region. The ongoing development of refineries that can produce Euro 5 applicable fuels in southeast Asia such as Nghi Son in Vietnam and RAPID in Malaysia could contribute to a common standard.

Figure 5.3: Fuel quality standards in APEC Asia-and-Oceania



Note: (g) represents gasoline, (d) refers to diesel. China imposes stricter regulations to cities such as Beijing, Shanghai and Guangzhou.

Sources: PTIT (2016), European Environment Agency (2015)

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