RYSTAD ENERGY

COVID-19 REPORT

12TH EDITION

GLOBAL OUTBREAK OVERVIEW AND ITS IMPACT ON THE ENERGY SECTOR

28 MAY 2020

PUBLIC VERSION

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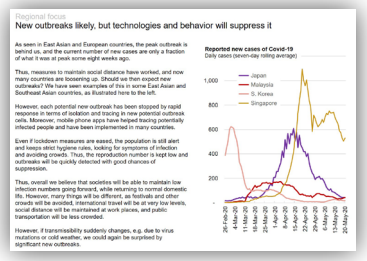
Time to conclude – lessons learned from the first wave of Covid-19

Just a few months ago the Covid-19 pandemic crashed over the globe like a squall, wreaking unexpected mayhem in both the global markets and in our personal lives. Countries are now contending with the sobering reality that the pandemic will not be so easily be quelled, and are taking measures to calm the currents that continue to batter society at large.

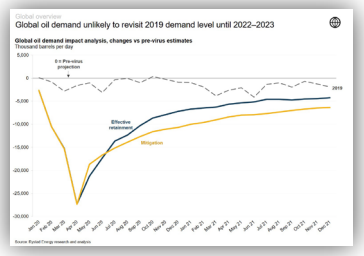
Based on three months of observing the pandemic, we at Rystad Energy have now condensed our findings into *nine key insights* that we will explore in the outbreak section of this edition.

In our *impact* section we have again looked at road traffic, aviation and other drivers of oil demand, and concluded that the recovery will take time, and that fourth quarter demand will most likely amount to only 92.5 million barrels per day.

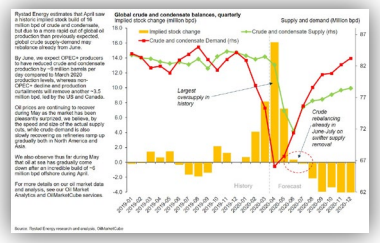
As week-to-week changes now appear less prominent, we have decided to change the frequency of this report from weekly to monthly editions. Weekly updates on the oil demand will still be available in our Oil Markets Weekly report. Forthcoming editions of the Covid-19 report will be in the second week of June and the second week of July.



New outbreak likely, page 9



Global oil demand outlook, page 13



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Time to conclude: Nine key insights to guide the near-term

Based on three months of observation, we at Rystad Energy have now condensed our findings into nine key insights:

- Herd immunity will not be achieved.
- The realistic strategy moving forward will be to “wait for a vaccine”, which will likely take 8 to 24 months.
- East Asia, Europe and North America have now successfully suppressed the spread of the virus. The epicenter has gone from north to *south*, i.e. South America, South Asia and South Africa.
- Inadequate governmental responses have led to, and will lead to, unnecessary deaths.
- New outbreaks are likely, but emerging technologies and adapted behavior will suppress them.
- Domestic activity will soon return to 90% of pre-pandemic levels, but crowds must be avoided.
- International travel will not fully normalize until a vaccination is deployed.
- The global economy is down 6% versus the pre-pandemic growth trend.
- New technologies and adapted behavior will have a structural impact on energy consumption.

In this section, we will explore these key insights using documentation developed over the last weeks and months.

1. Herd immunity will not be achieved

Despite 12 weeks of intense viral spread, and likely around 400,000 deaths, no regions globally are close to achieving herd immunity.

Antibody tests in the most intensely affected areas have shown that even these areas are not close to herd immunity. In the community of Morrisania in the Bronx, New York, 43% of the population tested positive for Covid-19 antibodies, while 20% of the population in New York City tested positive and 11% in Madrid. See the table to the right for antibody test results for other high-infection areas

In this regions, the suffering has been large with unnecessary losses of life. Now the virus appears under control, with a rapid decline in cases. Less than 2% percentage points are likely to be added in the next half year. Thus, with the exception of some neighborhoods in the Bronx, herd immunity will not be achieved even in these hardest hit areas.

Globally our estimate for the number of true infected cases is approximately 85 million people, or around 1.1% of the global population. Less than 2% of the population is infected in 80% of countries. Three continents have between 3% and 6% of the population infected (see table to the right).

Some* argue that herd immunity could be achieved after only 7% to 25% of the population is infected, due to population heterogeneity (ie. assuming “super-spreaders” are the first to be immune). Even if that is true, which is unlikely, herd immunity would not be within reach globally.

Result from antibody screening studies – regions with highest share of infected people globally

Region	Share infected
Bronx Morrisania	43.0 %
New York City	19.9 %
Long Island	11.4 %
Madrid	11.3 %
Geneva	9.7 %
Stockholm	7.3 %
Skåne (Sweden)	4.2 %
Hudson Valley (NYC)	3.0 %

Estimated true infected cases based on standard IFR used in Rystad Ebergy Covid-19 model

Continent	Share infected
Africa	0.3 %
North America	5.8 %
South America	3.0 %
Asia	0.2 %
Australia	0.1 %
Europe	3.5 %
Middle East	1.8 %
Russia	0.6 %
Grand Total	**1.1 %**

* Nicolas Lewis: “Why herd immunity to COVID-19 is reached much earlier than thought”;
Source: Northwell Health et al (NYC); Carlos III institute (Spain); HUG Hospital (Geneva); Folkhälsamyndigheten (Sweden); Rystad Energy Covid-19 model

2. The realistic strategy is to “wait for a vaccine,” which will likely take 8 to 24 months

As herd immunity will not be reached, or would be irresponsible to reach due to the unnecessary loss of lives, we must wait for a vaccine to be developed. This means any potential vaccine must be animal tested, human tested, produced and injected into billions of people before international travel and social interaction can be normalized.

Normally this process takes years. However, some producers aim to speed up the testing process by actively exposing test candidates to the virus, rather than waiting for natural exposure.

There are many competing vaccine development teams. Some are listed in the table to the right.

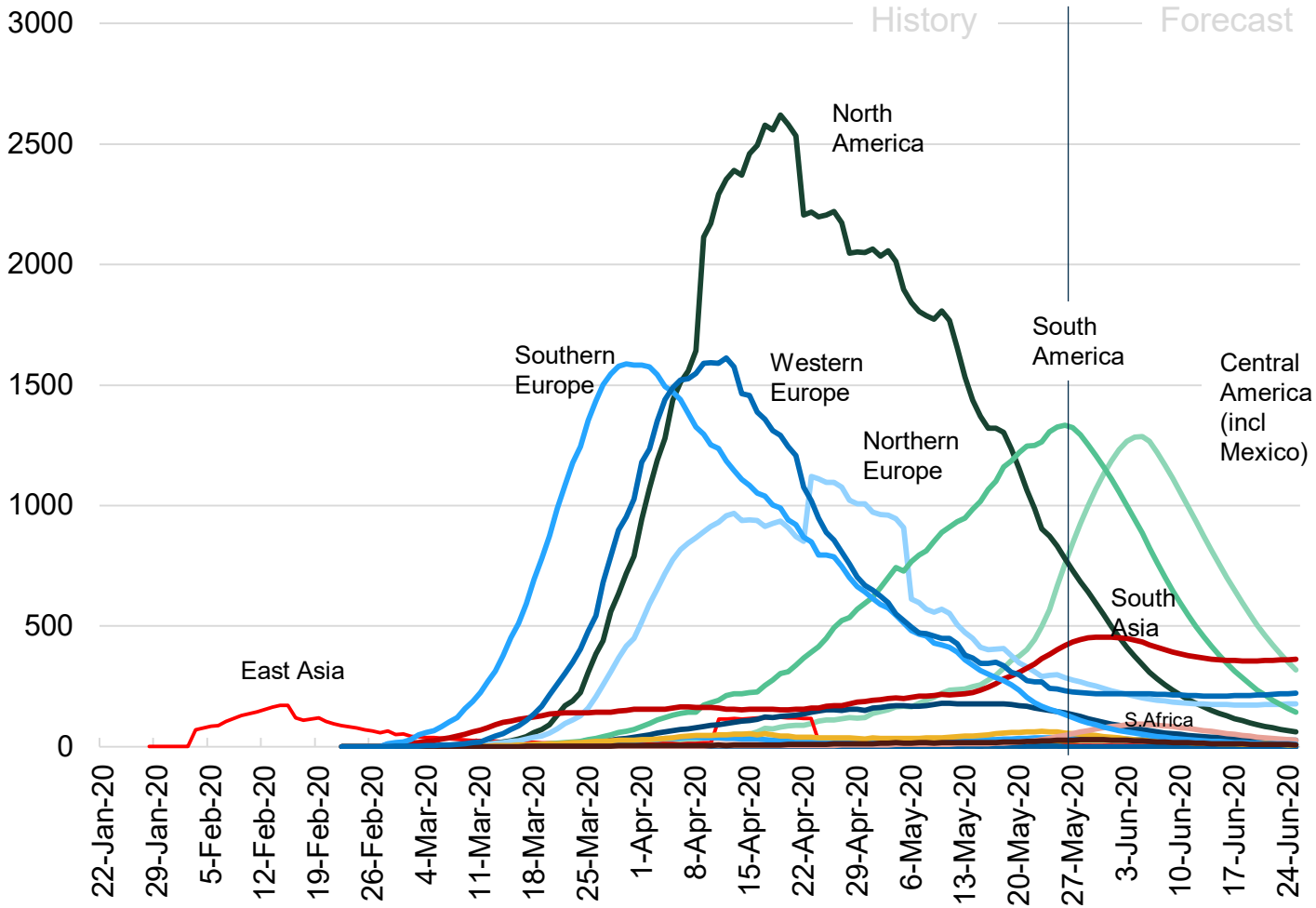
While some teams claim that a vaccine could be ready “within 8 months”, most experts expect that 12-18 months is more realistic. However, since this is a global phenomenon, the wait may be even longer for the entire global population to be vaccinated and for global interaction to normalize. For this reason, we are using 24 months as our high end of the range.

Moreover, there are also doubts regarding how long the vaccination might last, as documented cases of reinfection after an initial infection have occurred. Thus, vaccination efforts may become a permanent activity, meaning that even more time would be required before international interaction could be normalized.

Institution(s)	Vaccine	Ready for human testing	Ready for broad vaccination programs	Comment
Oxford/ AstraZeneca	AZD1222	sep.20	early 2021	Supported by UK and US governments. Seen as serious
Merck (bought Themis Bioscience)/Institute Pasteur	IAVI	"this year"	CEO Frazier: "doubt on the 12-18 months timeframe"	Funded by Coalition for Epidemic Preparedness Innovations (CEPI). Same technology as the Ebola vaccine ERVEBO.
Pfizer/ BioNTech	Covid-19 vaccine	May 2020	CEO Bourla: "think out of the box: get 20 million doses by end of 2020"	Pfizer will spend 1 billion in 2020, build four manufacturing plants for 100's of millions doses 2021
Sanofi/ GlaxoSmithKline	Covid-19 vaccine	2H 2020	"if successful, 2H 2021"	Two giants cooperate: Sanofi with its S-Protein antigen and GSK with adjuvant tech
Sinovac Biotech	CoronaVac	phase II in May 2020	"build plant for 100 mill doses annually"	Smaller Beijing company; Preclinical study show protection to rhesus macaque monkeys
Moderna Therapeutics	Covid-19 vaccine	2Q 2020	Late 2020/ early 2021	Small company, experts sceptical, little documentation

3. Suppression in East Asia, Europe and N. America, epicenter now in S. America and S. Asia

Number of reported daily deaths
Reported deaths (14 days rolling average)



Source: Rystad Energy Covid-19 research and analysis; Worldometer

Covid-19 has successfully been suppressed in East Asia, Europe and North America through lockdown measures.

The current epicenter seems to be Central and South America and South Asia, regions which are expected to peak in late May and early June.

South Africa and the Middle East are also growing exponentially as of now, but overall fatality figures are small, thanks in part to young populations in these areas.

For further details please see our Covid-19 dashboard at rystadenergy.com.

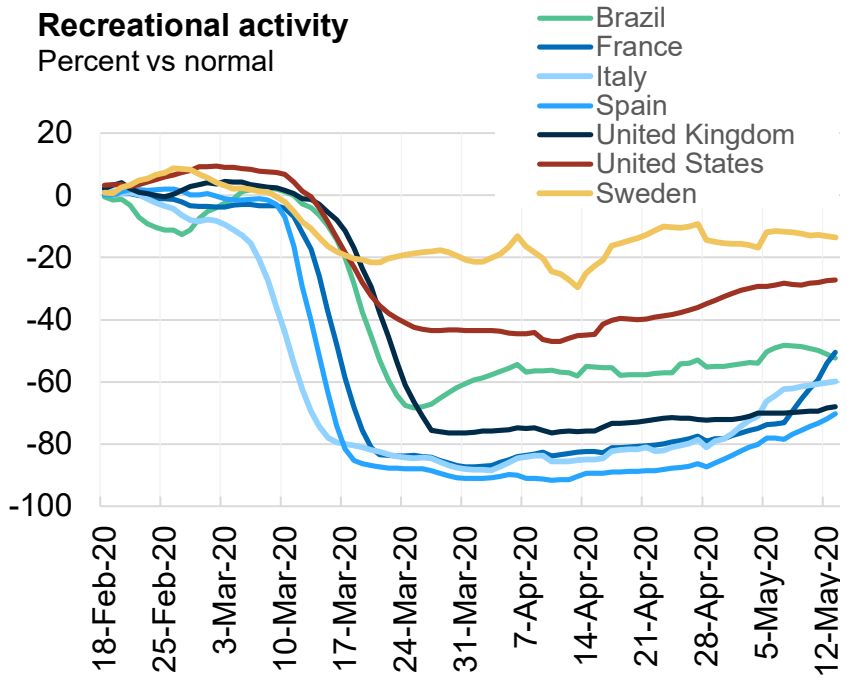
4. Inadequate governmental response has led to, and will lead to, unnecessary deaths

We have previously estimated the infection fatality rates (IFR) per age group and sex based on published scientific studies and figures from geographies with extraordinary high testing and low prevalence, like Iceland and New Zealand. The IFR was 0.7% to 1.1% in mature societies with old populations, and 0.4% globally due to a young global population.

We have repeated this study now, ending up with the same conclusion, the methodology for which can be found on the following slide. However, further evidence has been gathered through antibody studies. These studies partly confirm our IFR figure as above, but in Spain and New York, a higher IFR is found. We believe that this could be related to a temporary overload of the health care system some weeks in March/April.

Thus, from parts of New York and Spain (and probably also Italy and some other regions), we have learned that if too many people are getting seriously ill of Covid-19 at the same time, there is a risk of unnecessary loss of life, since the treatment capacity will not be sufficient. In the graph to the right, we see how the UK, US, Sweden and Brazil reacted more slowly and with less impact versus e.g. France and Italy. In the table to the right we see how in four regions with slower/smaller reaction, fatality rates based on antibody studies are higher than in regions with sufficient treatment capacity.

Given this, it is a moral imperative for governments to introduce timely and effective measures. Some countries have still not been exposed to this situation, and have time to introduce measures to avoid this situation, including countries in Central and South America.



Region	Model IFR	Observed IFR	Deaths above modelled IFR
New York State	0.67 %	0.82 %	122 %
Stockholm	0.81 %	1.14 %	140 %
United Kingdom	0.77 %	1.16 %	151 %
Spain	0.86 %	1.22 %	141 %
Germany, Gangelt	0.91 %	0.37 %	40 %
Switzerland, Geneva	0.80 %	0.56 %	70 %
Norway, Oslo	0.70 %	0.34 %	48 %

Source: Rystad Energy Covid-19 research and analysis; Worldometer; Antibody studies; Google mobility

5. New outbreaks likely, but emerging technologies and adapted behavior will suppress them

As seen in East Asian and European countries, the peak of the outbreak is behind us, and the current number of new cases is only a fraction of what was seen at peak some eight weeks ago.

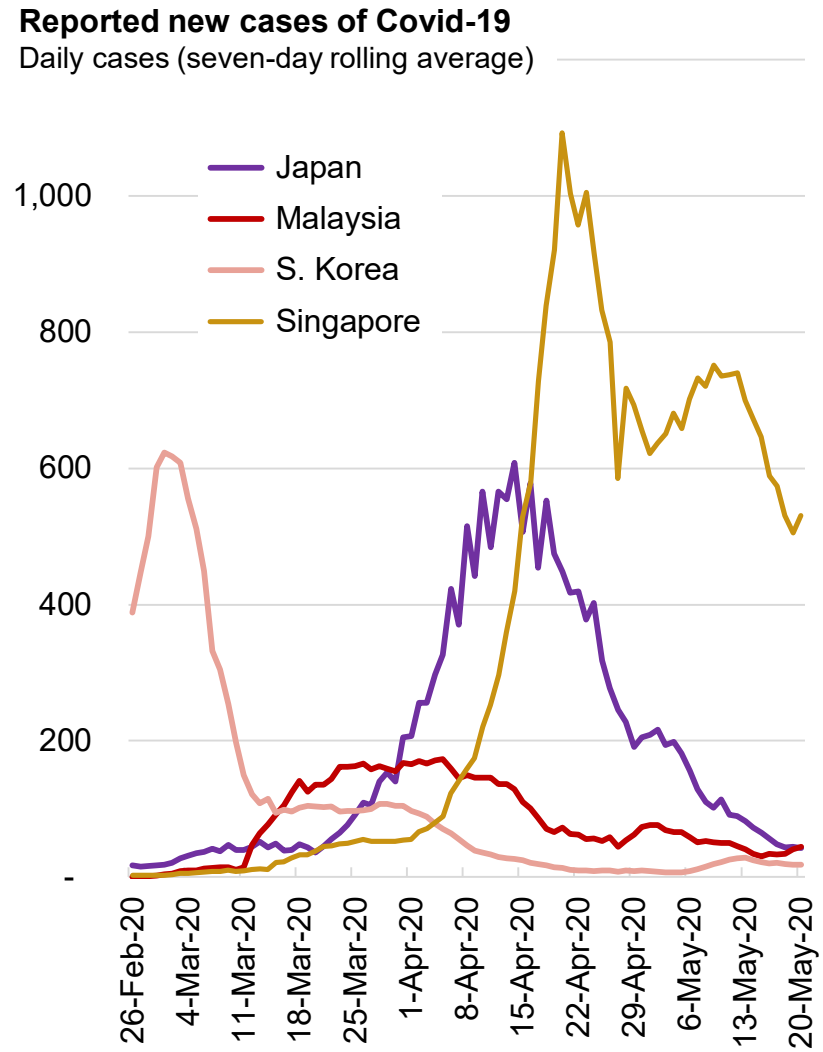
Thus, measures to maintain social distance have worked, and now many countries are loosening measures. Should we then expect new outbreaks? We have seen examples of this in some East Asian and Southeast Asian countries, as illustrated to the left.

However, each potential new outbreak has been stopped by rapid responses in terms of isolation and tracing new potential outbreak cells. Moreover, mobile phone apps have helped tracing potentially infected people, and have been implemented in many countries.

Even if lockdown measures are eased, populations remain alert and are maintaining strict hygiene rules, looking for symptoms of infection and avoiding crowds. Thus, the reproduction number appears is likely to remain low and outbreaks will be quickly detected with a good chance of suppression.

Thus, overall, we believe that societies will be able to maintain low infection numbers going forward, while returning to a relatively normal domestic life. However, many things will still be different, as festivals and other crowds must be avoided, international travel will remain at very low levels, social distance will be maintained at work places, and public transportation will be less crowded.

However, if transmissibility suddenly changes, e.g. due to virus mutations or cold weather, we could again be surprised by significant new outbreaks.



6. Domestic activity will return to 90% of pre-pandemic levels, but crowds must be avoided

We have reviewed activity levels in April and May for eight countries which saw a rapid reduction in the number of infected cases and fatalities through successful suppression strategies.

In the following pages, we compare these activity levels with that of Sweden, which has not seen any reduction in the number of infected cases. A preliminary conclusion could be that public transportation should remain 30% below normal levels and work place activity should remain 20% below normal activity, while car traffic and activities in parks could return to normal levels without risking large new outbreaks.

In smaller cities, reduced public transportation may be substituted by the increased use of cars. In bigger cities, reduced public transportation could be substituted *by bicycles* and work from home policies.

Our findings suggest that global growth will most likely be down 6% versus the pre-pandemic growth trend, and we then assume that businesses driven by global growth will see a 6% decline versus pre-pandemic activity. International tourism will be very limited, but domestic tourism will grow. Still, a net negative effect is likely, probably at -5% to -50% depending on the area.

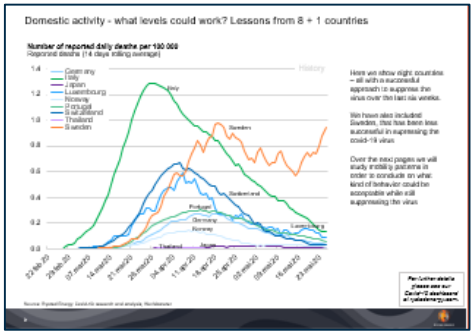
Business and cultural arrangements creating crowds will have to be cancelled.

Exposure for these effects will vary significantly from region to region, but on average we estimate that these effects will reduce domestic activity by 10%. I.e. domestic activities could come back at 90% of previous levels.

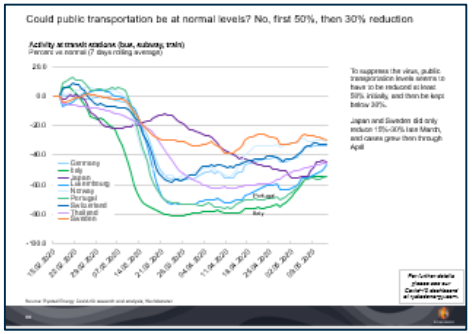
These new behavioral patterns will likley be maintained through the summer with warm weather and the summer holiday season. The challenge will come in late-fall, when colder weather makes biking less convenient, potentially increasing transmissibility while people begin to “forget” about the pandemic.

Thus, efforts must be kept in place to avoid another large outbreak in the fall of 2020, when vaccination will still be unavailable. The spanish flu in 1918 had its second large outbreak in the fall, when October 1918 was the deadliest month. This time, we must learn from history.

To continue reducing fatality rates...

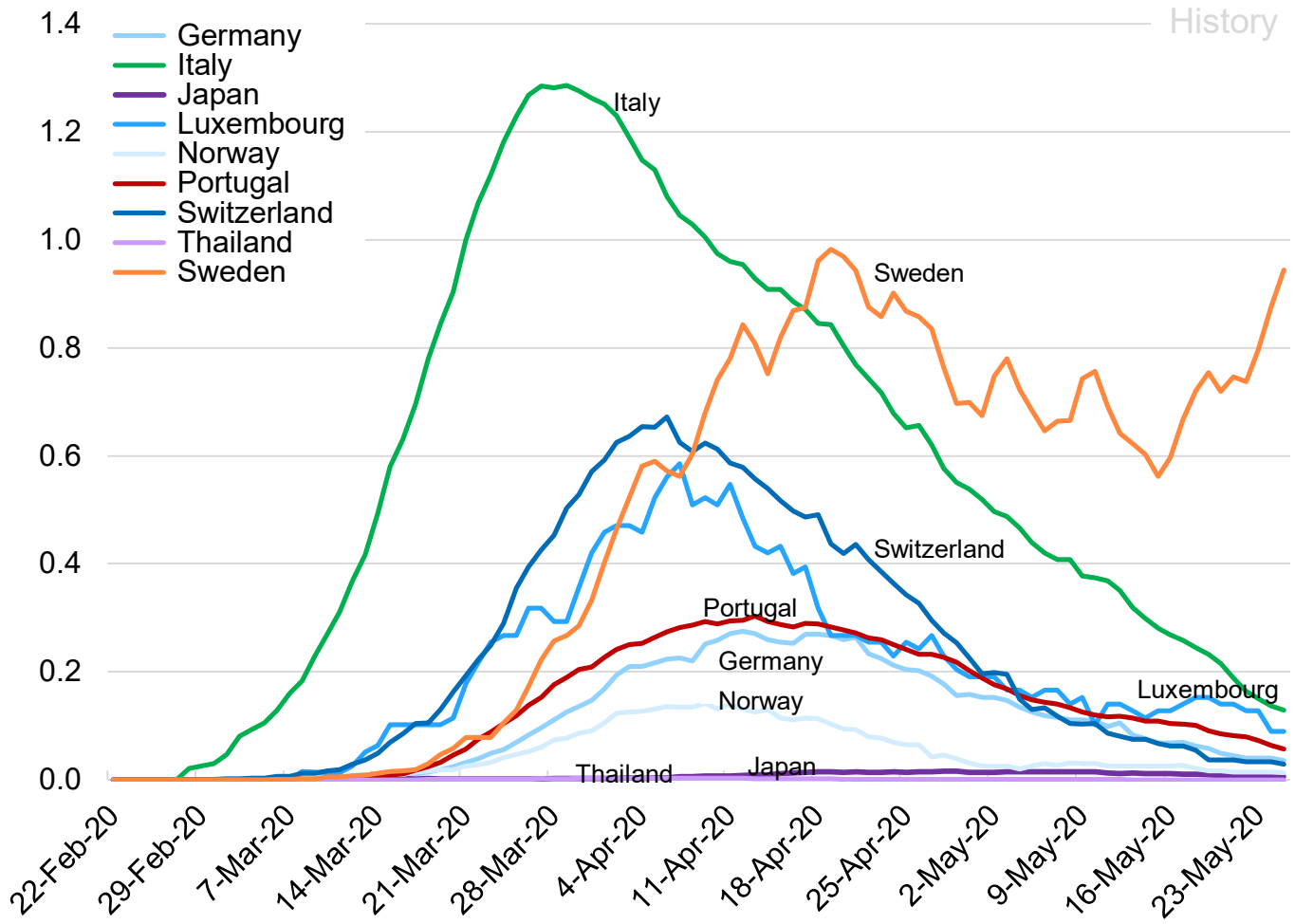


... we must understand what activity levels are sustainable.



6.1 Domestic activity - what levels are sustainable? Lessons from 8 (+ 1) countries

Number of reported daily deaths per 100,000
Reported deaths (14 days rolling average)



Here we show eight countries which all took successful measures to suppress the virus over the last six weeks.

We have also included Sweden, a country which has been less successful in suppressing the Covid-19 virus

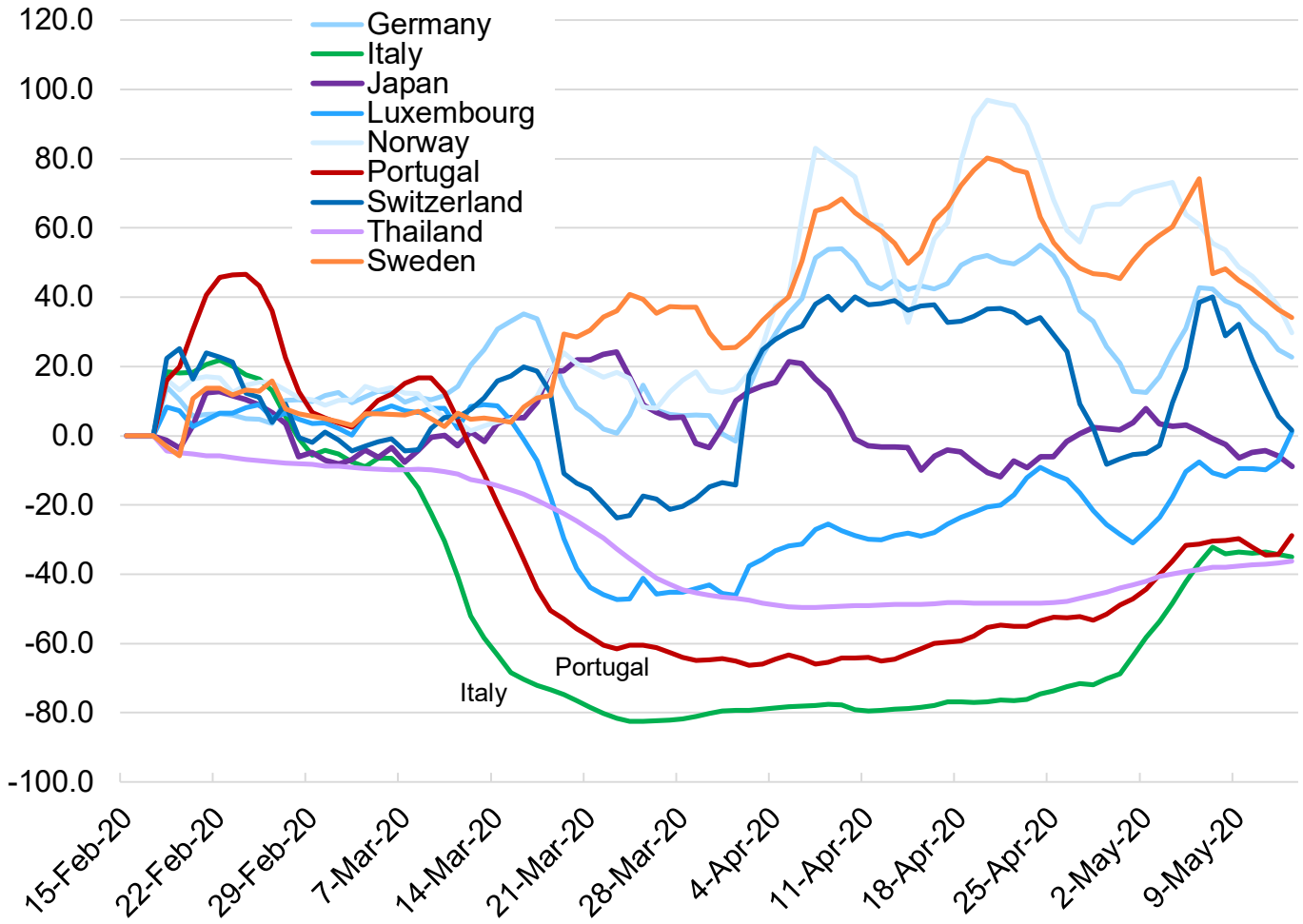
Over the next few pages we will study mobility patterns in order to draw a few preliminary conclusions regarding the kind of behavior that could be acceptable while still suppressing the virus.

For further details please see our Covid-19 dashboard at rystadenergy.com.

Source: Rystad Energy Covid-19 research and analysis; Worldometer

6.3 Could park activity be sustainable? Yes!

Activity in parks
Percent vs normal (7 days rolling average)



Switzerland, Norway, Japan and Germany have had normal or higher activity in parks since mid March, and still show a rapid decline of cases in May.

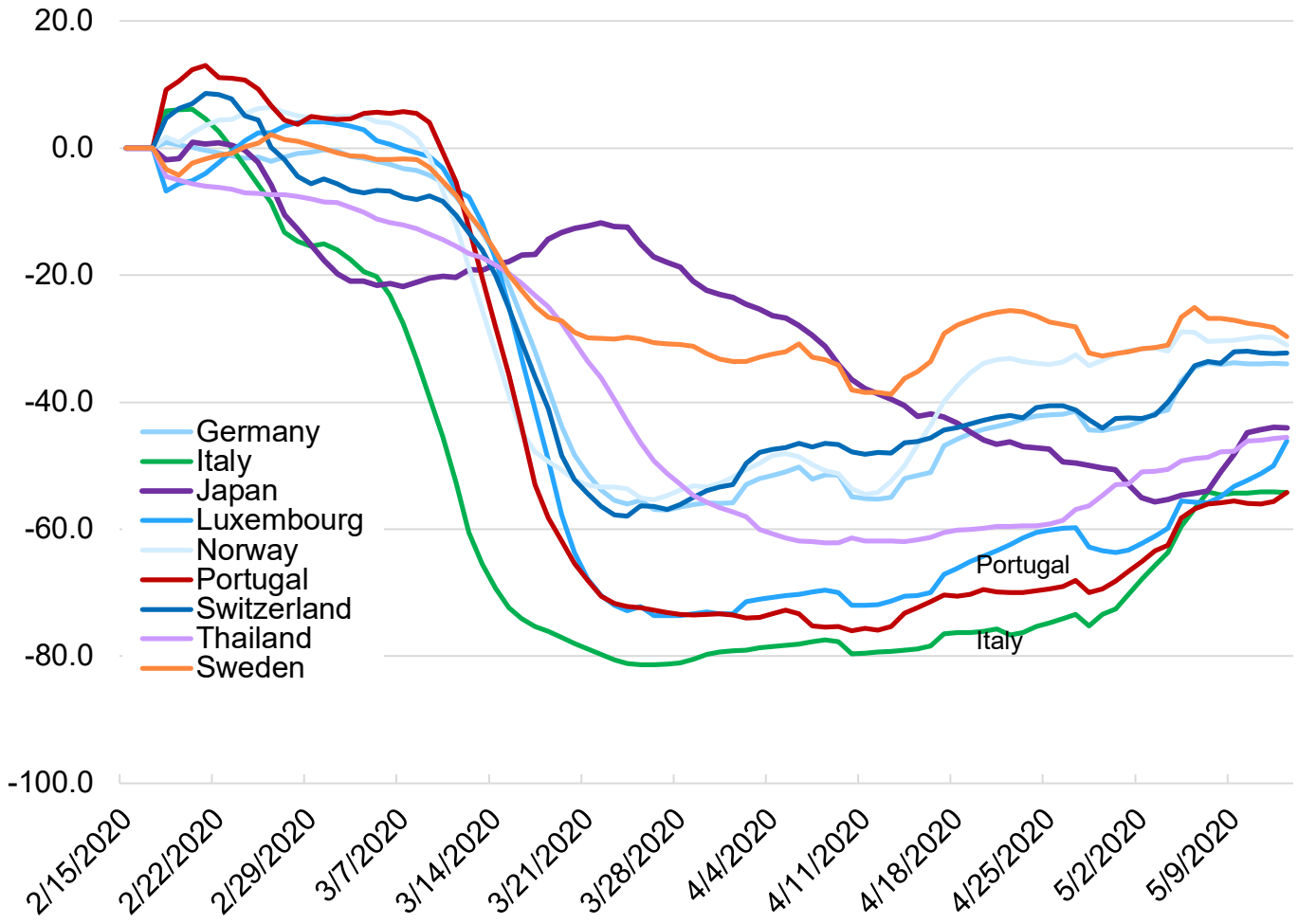
Thus, it seem park activity can be a part of a successful suppression strategy; Norway had even higher park activity than Sweden.

For further details please see our Covid-19 dashboard at rystadenergy.com.

Source: Rystad Energy Covid-19 research and analysis; Worldometer

6.4 Could public transportation be sustained at normal levels? No, first 50%, then a 30% reduction

Activity at transit stations (bus, subway, train)
Percent vs normal (7 days rolling average)



To suppress the virus, it appears that public transportation levels must be reduced, initially by at least 50%, and then must be kept below -30% of normal.

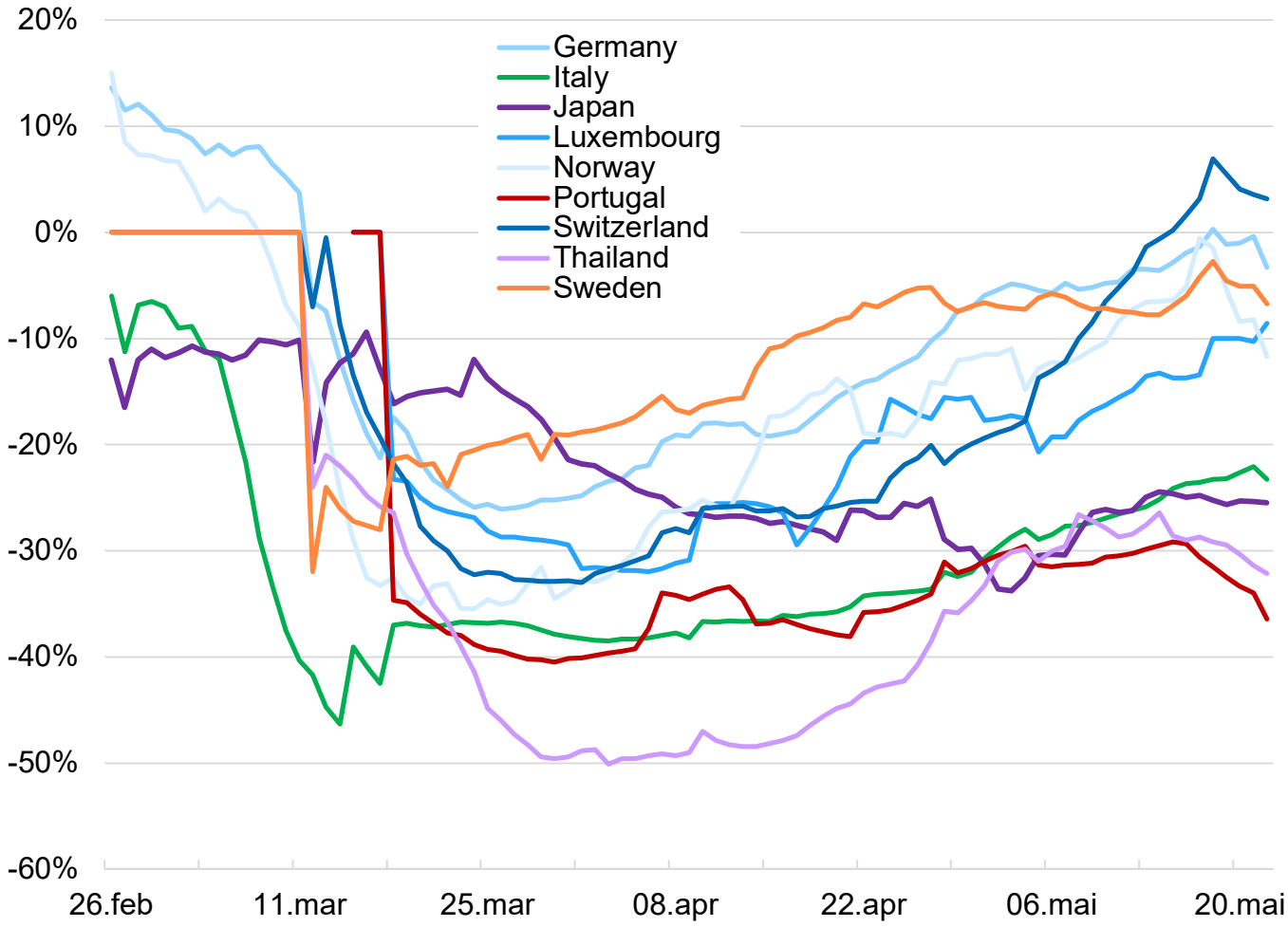
Japan and Sweden only reduced public transportation levels by 15% to 30% in late March, and cases then grew through April.

For further details please see our Covid-19 dashboard at rystadenergy.com.

Source: Rystad Energy Covid-19 research and analysis; Worldometer

6.7 Could car traffic return to normal levels? Almost, a 10% reduction seems possible

Car traffic levels
Percent vs normal (7 days rolling average)



Traffic levels in Sweden dropped suddenly in March, but returned to levels that were higher than in any other country.

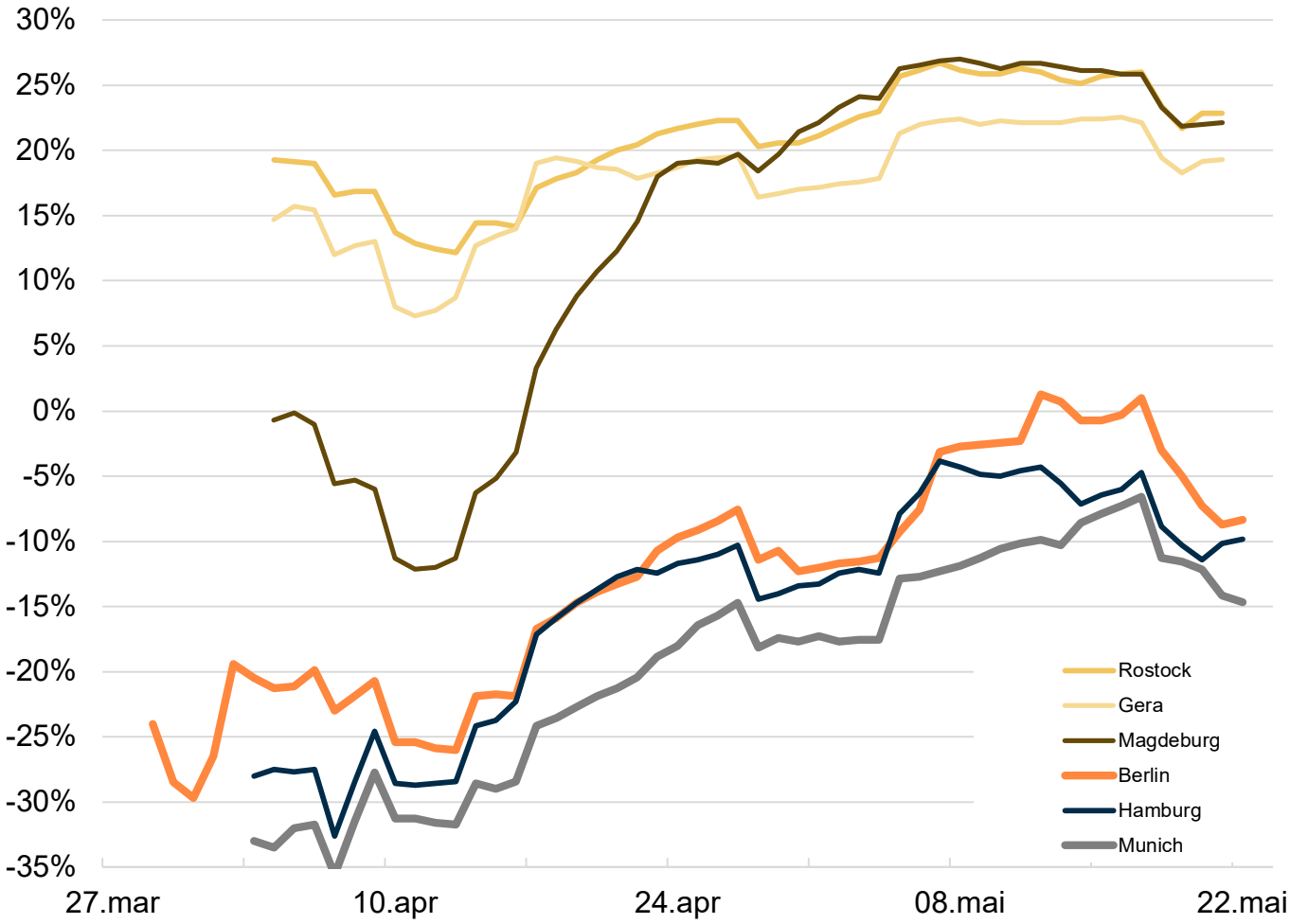
Other countries also dropped quickly and have now remained at levels 20% to 50% below normal for seven weeks.

Now traffic levels are back at - 10% to + 5% vs normal in Northern Europe, while traffic levels in Southern Europe, Thailand and Japan remain 25% to 35% below normal levels.

Source: Rystad Energy Covid-19 research and analysis; Worldometer

6.7.3 Germany: Many smaller cities above normal since April, big cities still below

Car traffic levels
Percent vs normal (7 days rolling average)



In the smaller cities Rostock (210,000), Gera (100,000) and Magdeburg (240,000), traffic levels have been up to 25% above normal levels.

In megacities Berlin, Hamburg and Munich, traffic levels were initially at -25% and -33%, and are now back at -5% and -15% respectively.

Most other cities in Germany are between these extremes.

Source: Rystad Energy Covid-19 research and analysis; Worldometer

6.8 Cycling is booming during the coronavirus pandemic

Commuters are turning to cycling to minimize their exposure to Covid-19, and cities across the world are adjusting their road dispositions.

	**Demand for bike-sharing services has surged dramatically**	- **New York City**: demand for bike sharing increased by 67% in March 2020 compared to the previous year. - **Chicago** and **Philadelphia**: ridership in bikeshare programs nearly doubled during March.
	**Major cities are converting their roads into cycling paths**	- **Paris**: 50 km of lanes normally used by cars will be reserved for bicycles. - **Brussels**: 40 km of car lanes and parking spaces have been turned into cycle paths. - **Milan**: 35 km of streets will be permanently transformed for biking use over the summer. - **Berlin**: has doubled the width of its cycling tracks to respond to the increasing bicycle traffic. In Germany, “pop-up” cycle lanes were established for the duration of the Covid-19 lockdown. - **Bogota**: 76 km of cycling paths have already been created. - **Mexico City**: plans for 130 km of temporary bike infrastructure have been presented.

Source: Rystad Energy research and analysis

7. International travel will not fully normalize until wide-spread vaccination is implemented

Almost all countries globally have issued clear advisories against any international travel, and have, to some degree, implemented travel bans from some specific destinations (see far right).

Countries where the economy is very dependent on international tourism have been the first to reopen, and even then, only for selected countries. Greece is one example, as illustrated here.

As of 26 May, the number of people in the infectious stage, from day 3 to 8 after onset, is still growing and likely amounts to 8 million people. Of these, 5.6 million are in the Americas, 0.8 million in South Asia, 0.7 million in Africa and 0.6 in the Middle East. It will take at least ten weeks before the pandemic is under control in these regions, and travels from many countries will be banned until at least August 2020.

People travelling cross borders take the risk of being trapped in quarantines. We believe that the situation for international travel will remain uncertain until a vaccine is available, except from within certain protected pools of countries, like within the Baltic countries or within parts of the EU.

Direct international flights to tourist destinations in Greece will gradually resume from **July 1.**

The reopening of Greece to international tourism will only apply to countries that meet certain epidemiological criteria with regards to COVID-19 – meaning countries where the spread of the coronavirus has been contained to low levels.

The list of countries from which tourists will be able to freely travel to Greece from June 15 remains to be finalized, with the minister of tourism Harry Theocharis recently stating that this is expected before the end of the month. He stressed that the final decision would be determined by the criteria set by health officials.

However, **according to reports in the Greek media**, the first countries expected to be able to send tourists to Greece include Germany, Cyprus, Israel, China, Japan, Australia, Norway, Denmark, Austria, Bulgaria, Serbia, Romania, Albania, North Macedonia, Bosnia, Croatia, Poland, Hungary, Slovakia, and the Czech Republic.

Restrictions will almost certainly continue to apply for some time to travel from countries with continued extensive spread of COVID-19. These include major tourism markets for Greece such as the USA, the UK and Russia.

Article | Last updated: 30/04/2020

Government.no

The Ministry of Foreign Affairs is maintaining its travel advice of 14 March cautioning against non-essential travel to all countries. The reason is the increased spread of the

BY ALISON FOX | MAY 26, 2020

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President Donald Trump banned travel from Brazil over the weekend, restricting entry to any foreign nationals who spent time in Brazil 14 days before planning to come to the U.S., according to the White House.

Global Level 4 Health Advisory – Do Not Travel

Global Health Advisory
March 31, 2020

Level 4: Do Not Travel

The Department of State advises U.S. citizens to avoid all international travel due to the global impact of COVID-19. In countries

Source: Rystad Energy Covid-19 research and analysis; Greece-is.com; government.no; US dep of state;

8. The global economy is down 6% versus the pre-pandemic growth trend

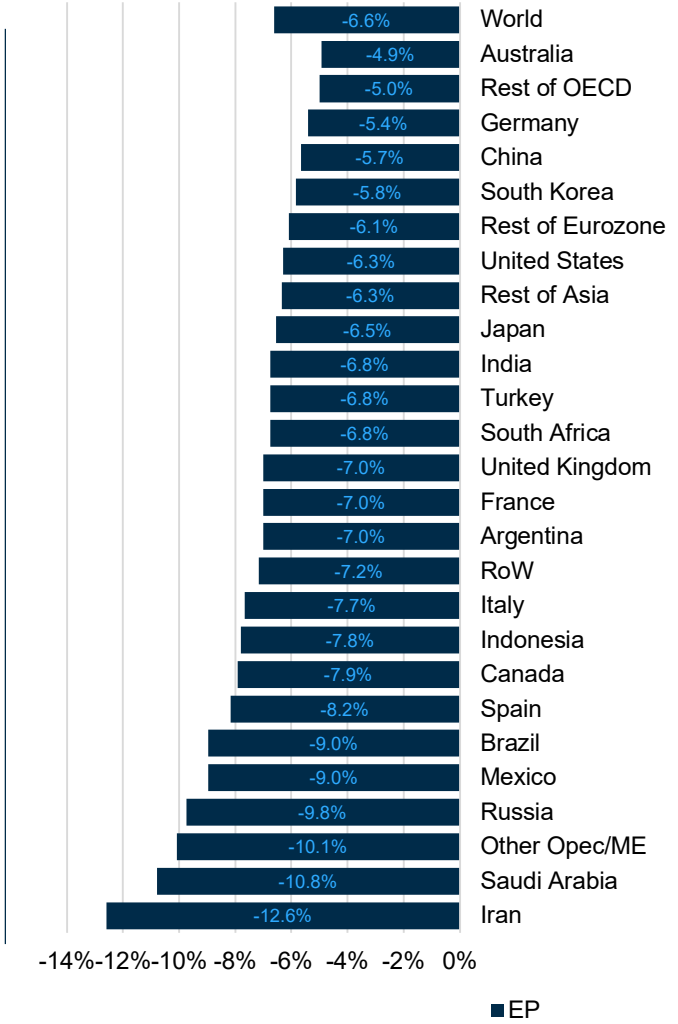
The global economy has, on average, doubled every 20 years since the 1970's, such that global growth has been on average 3.53% (since $1.0353^{20} = 2.00$).

However, some years have seen stronger growth, such as in 2007 (6.0%) and 2018 (5.8%), while some years have been much weaker, such as in 2009 (2.0%).

Based on a country by country assessment, as shown to the right, we see a potential deviation from the growth trend, amounting -6.5% growth in 2020, or an economic contraction of 3% from 87 trillion to 84 trillion dollars. Oil producing nations will be among the countries with largest decreases. Unlike the situation in 2015 and 2016 however, all nations will see a contraction in 2020 – not just oil producing nations.

With this, global trade, global industrial production and global consumer goods purchases will contract, all reducing energy demand in general, and therefore also oil demand.

Global GDP growth in 2020 versus the long term growth trend of 3.5%



Source: Rystad Energy Covid-19 research and analysis; Worldometer

9. New technologies and adapted behavior will have structural impact on energy consumption

Many behavioral patterns have been essentially forced into sudden change over the last three months. Some of these changes may be lasting, as people may enjoy the change or see the economic and environmental benefit. These changes could include:

- Videoconferences to substitute domestic and international business meetings
- Home office accepted as both convenient and efficient
- Biking or driving as a substitute for public transportation
- Biking as a substitute for car driving in cities, opening up roads exclusively for bikes
- Domestic rather than international holidays – learning to enjoy your own backyard
- Sports and wildlife boom - rediscovery of adjacent nature
- Crowd paranoia – preference for smaller-scale events rather than huge arrangements
- Preference for domestic services and goods – security of supply back on the agenda
- Preference for online shopping rather than shopping centers
- Enhanced home cooking and gourmet skills – less need to visit expensive restaurants
- Increased interest in the stock market; furloughs and increased time at home creates space for day trading while interest rates are at 0% and the betting market offers no return

Some of these changes in preferences and behavior could create lasting changes in energy consumption. We may never return to where we once were.

Source: Rystad Energy Covid-19 research and analysis; Worldometer

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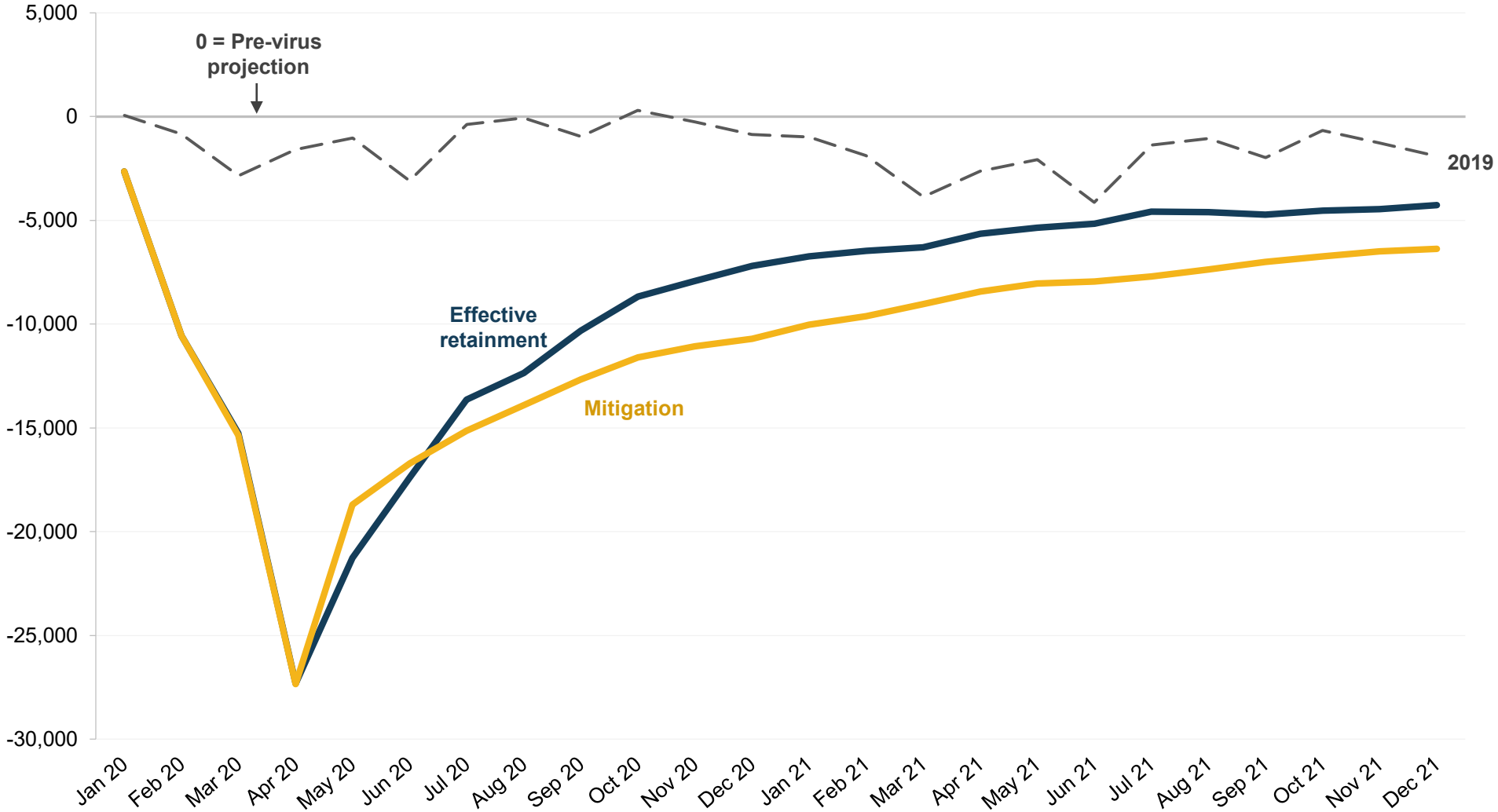
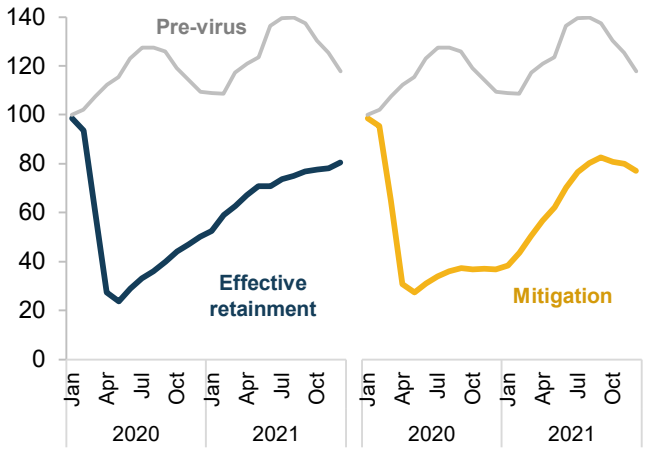
Global oil demand unlikely to revisit 2019 demand level until 2022–2023

Global oil demand impact analysis, changes vs pre-virus estimates
Thousand barrels per day

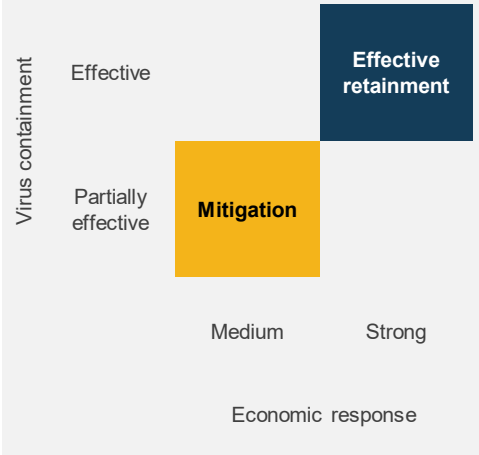


Source: Rystad Energy research and analysis

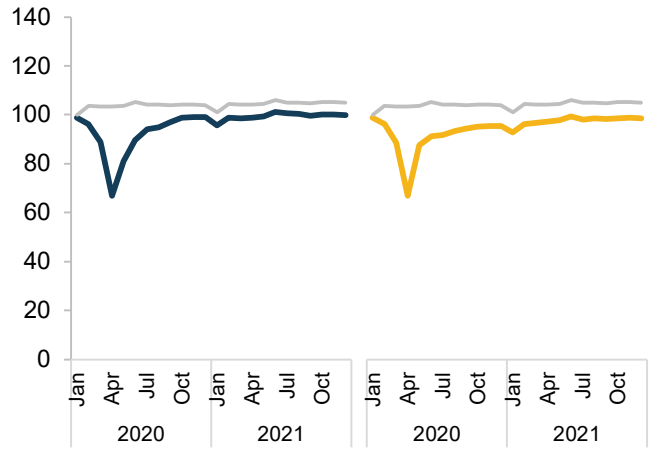
Two main recovery profiles: *effective retainment* and *mitigation scenario*



Jet fuel demand levels 2020-2021



Demand scenarios



Road fuel demand levels 2020-2021

Effective retainment

V-shaped recovery:
- Stabilize at a new normal in 3Q20
- Follow previous year's trend for the rest of 2021 with moderate growth

Key assumptions:
- Gradual opening of borders as government lockdown eases for 2Q20
- Business travel is expected to recover faster
- Consumer confidence increases and short-haul and leisure travel starts to recover

V-shaped recovery:
- Demand hits bottom in April 2020, followed by a strong rebound in June and July
- Demand impact lasts into 2021, with 2019 levels reached towards the end of year

Key assumptions:
- Governments easing measures and unemployment staying at manageable levels
- People preferring personal vehicles over public transport, with 15%–20% of workforce in developed countries working from home.
- Heavy-duty vehicle traffic down 5%–7% in 2020 and 2021.

Mitigation

U-shaped recovery:
- Stabilize at a new normal in 2Q21
- Follow previous year's trend for rest of 2021 with low growth

Key assumptions:
- Slow opening of borders with risk of second wave; majority of borders closed through 3Q20
- Consumer confidence remains low with short-haul and leisure travel slowly recovering
- Business travel is still expected to recover at a faster pace than leisure travel

L-shaped recovery:
- Demand hits bottom in April 2020, with a weaker recovery period where road fuel remains below 2019 levels through 2022

Key assumptions:
- Work-from-home policies continuing into 2021
- Unemployment rates cause reduced commuter demand and less personal vehicle use
- Heavy-duty vehicle traffic heavily affected by demand shock, with reductions of 8%–12% versus pre-virus estimates in 2020–2022.

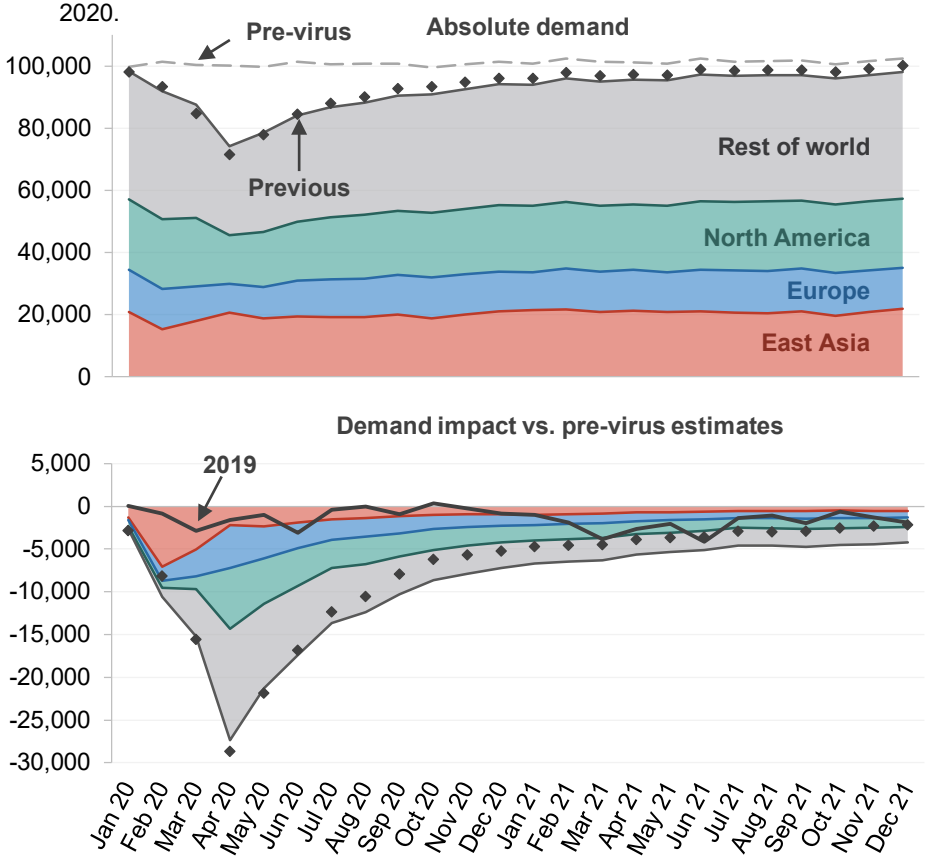
Source: Rystad Energy research and analysis

Global oil demand recovering by 4 million to 6 million bpd every month in May–July

Oil demand impact by region in effective retainment scenario

Thousand barrels per day

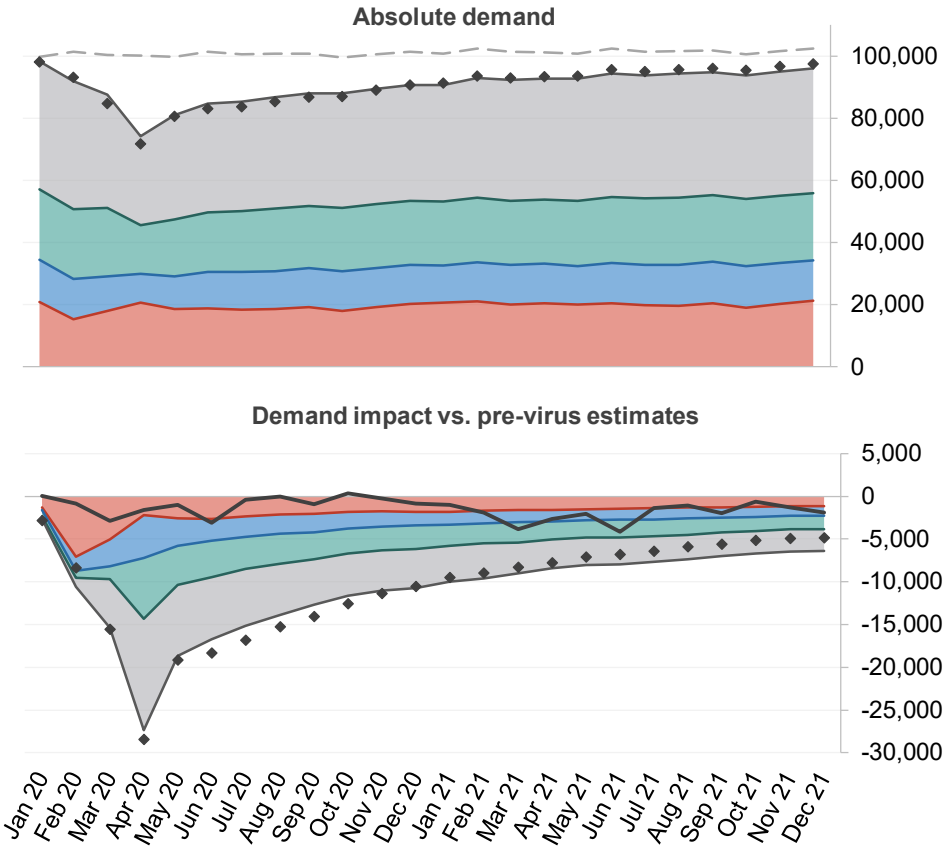
- Rystad Energy's effective retainment scenario includes an absolute oil demand of 88 million bpd for 2020 and 96 million bpd for 2021.
- Demand destruction is seen at 12.9 million bpd in 2020, and 5.2 million bpd in 2021 when compared to our pre-virus projection.
- The quickest recovery is seen in East Asia, while the slowest recovery is expected from Rest of world where we see an impact of 5.3 million bpd for 2020.



Oil demand impact by region in mitigation scenario

Thousand barrels per day

- In our mitigation scenario, we expect total oil demand of 87 million bpd in 2020 and 93 million to 94 million bpd for 2021.
- Demand impact vs. pre-virus estimates is seen at 13.9 million bpd for 2020, and 7.9 million bpd for 2021.
- Total demand is expected to stay well below 2019 levels until 2022–2023.



Source: Rystad Energy research and analysis

Commercial flights for 2020 forecasted to be down 54% y/y, averaging at 49,000 daily flights

The chart shows the total number of commercial flights (passenger and cargo). Percentages indicate y/y growth.

There are major downward revisions in the number of daily flights as we consider the latest communications from aircraft manufacturers and airlines.

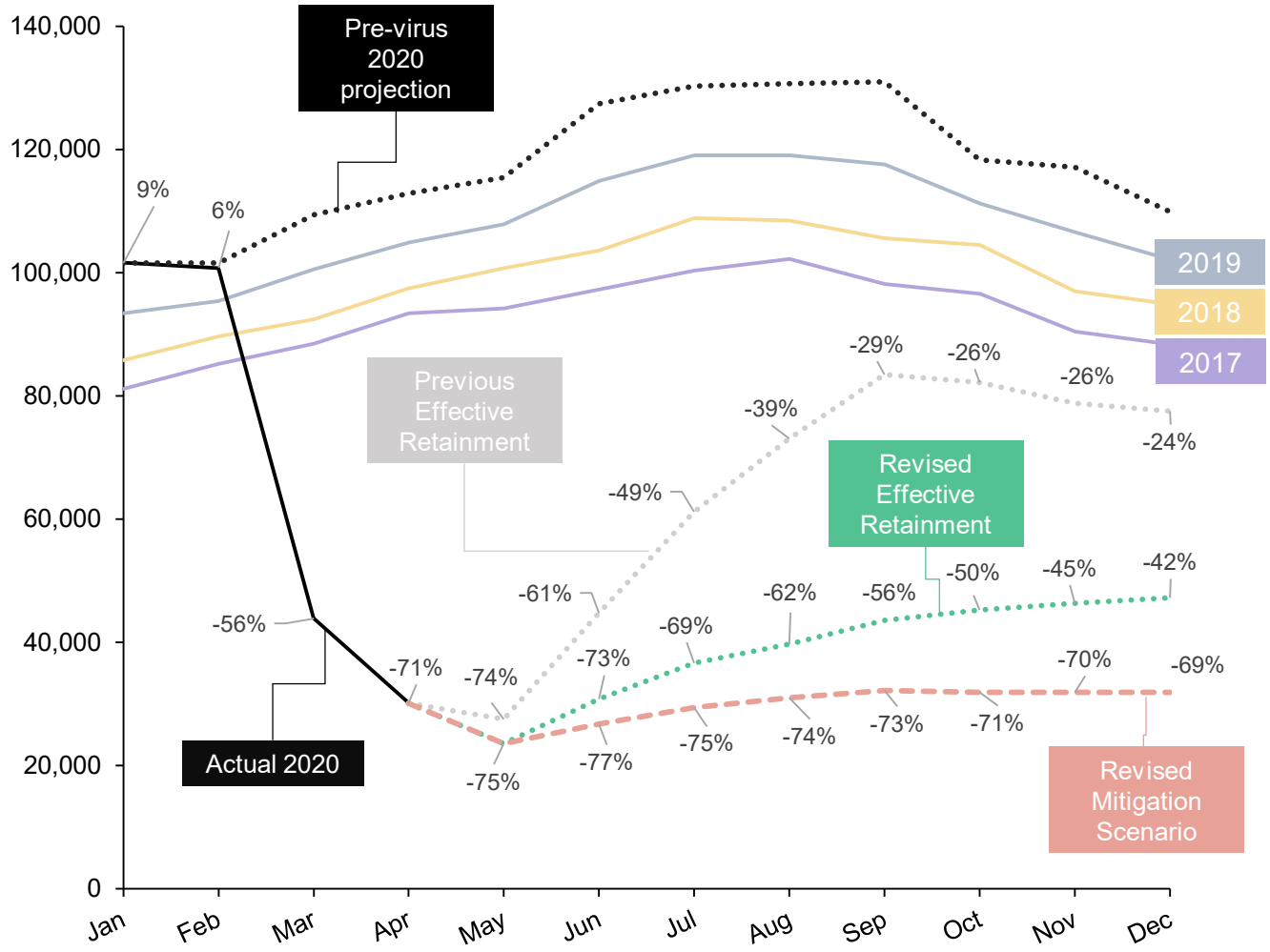
The main driver behind the revision is that airlines are accelerating retirement of their air fleet while postponing expansion, as demand for air travel remains low.

The number of daily flights under the effective retainment scenario is estimated to be 49,000 for 2020, down from 67,000 in our previous report.

The number of daily flights under the mitigation scenario is estimated to be 43,000 for 2020, due to the possible extension of quarantine measures and closed borders.

We forecast that the y/y impact on the number of daily flights for 2020 will be -54% under the effective retainment scenario, and -60% under the mitigation scenario.

Daily number of commercial passenger flights (passenger and cargo), monthly average
Number of flights



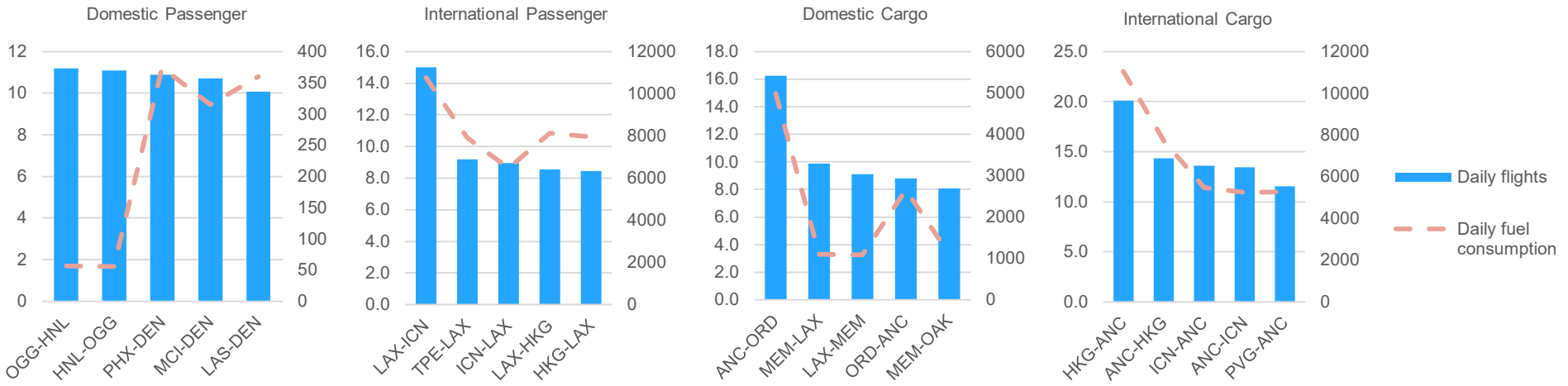
*Forecast is based on previous year's growth patterns. Effective retainment and mitigation scenarios are based on different quarantine regimes for regions, airline communication and airport flight schedules.
Sources: Flightradar24; OAG; company reporting; ICF; IATA; ICAO; Rystad Energy research and analysis

Deep dive into the US: ANC the world's busiest airport in May-20

- Anchorage Ted Stevens International Airport has taken the throne as the world's busiest airport due to the high number of cargo flights. The domestic route from Alaska to Chicago (ANC-ORD) had 16 daily flights in May-20.
- ANC figures in all of the top five routes for international cargo flights, with a total of 73 daily flights and a fuel consumption of 35,000 barrels on a daily basis.
- The 160 km route between Kahului and Honolulu (OGG-HNL) in Hawaii occupies the top two spots for the busiest domestic routes in the US, consuming only 50 barrels per day. Meanwhile, Denver International Airport is the most active mainland arrival airport.
- LAX dominates international flights as departure and arrival airport. The route from Los Angeles to Seoul (LAX-ICN) had 15 daily flights in May-20, contributing to a demand of over 10,000 barrels of jet fuel on a daily basis.

Airport code (ICAO)	Airport name
ANC	Anchorage Ted Stevens International Airport
DEN	Denver International Airport
HKG	Hong Kong International Airport
HNL	Honolulu International Airport
ICN	Seoul Incheon International Airport
LAS	Las Vegas McCarran International Airport
LAX	Los Angeles International Airport
MCI	Kansas City International Airport
MEM	Memphis International Airport
OAK	Oakland International Airport
OGG	Kahului Airport
ORD	Chicago O'Hare International Airport
PHX	Phoenix Sky Harbor International Airport
PVG	Shanghai Pudong International Airport
TPE	Taiwan Taoyuan International Airport

Daily number of flights (bars on left axis) and fuel consumption in barrels (line on right axis) for May-20



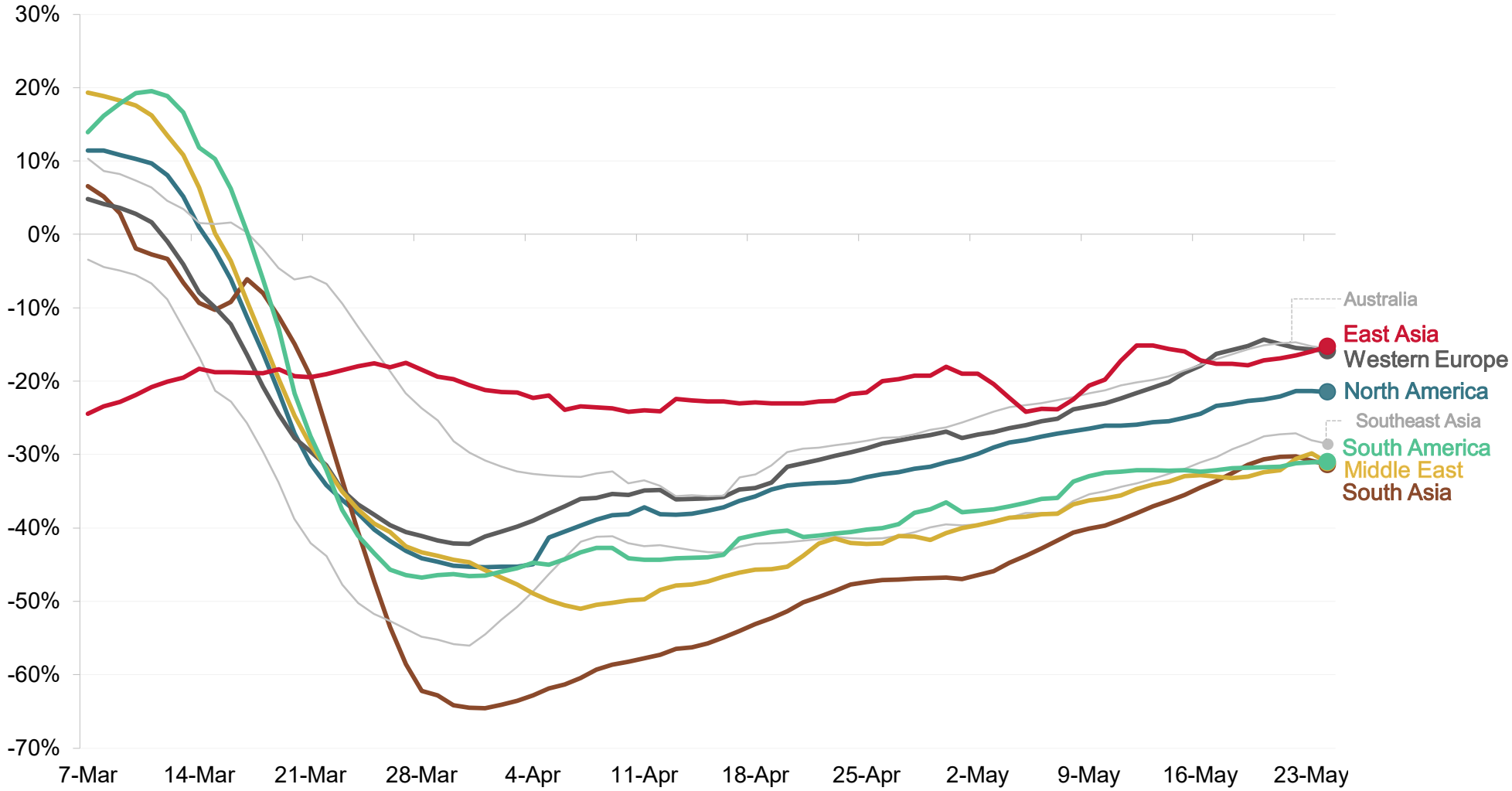
Source: IATA, ICAO, Flightradar24, Rystad Energy research and analysis

Road traffic globally looking to recover from bottom in April

Rystad Energy Global City Traffic Database covers road traffic in 1,500+ cities and 150+ countries

Road traffic reduction* versus normal levels

Percent difference from normal levels, 7-day moving average, 7 March to 24 May

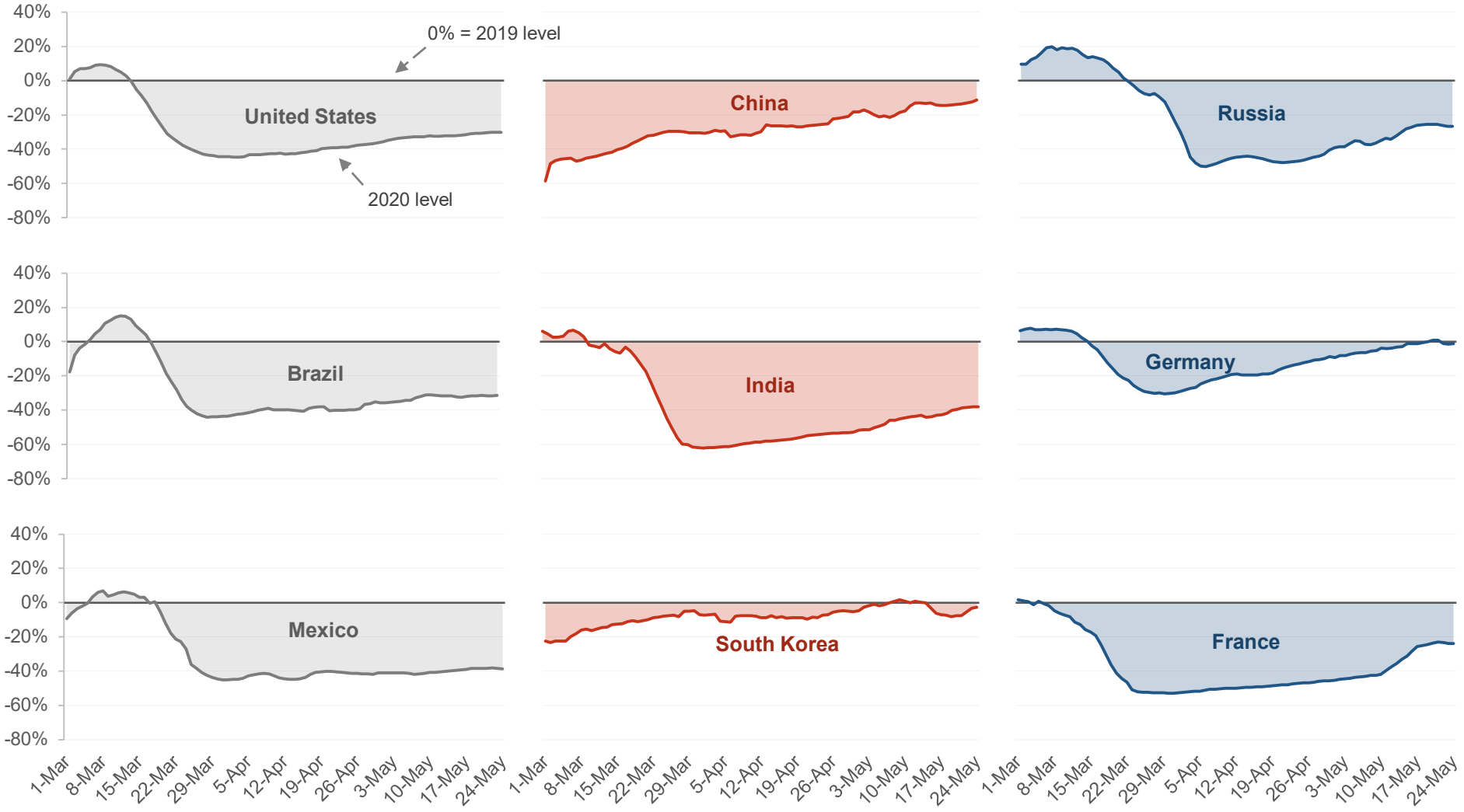


*Population-weighted within each region and based on an hour-by-hour road traffic database with more than 150 countries.

Source: TomTom Traffic Index; Google Maps; Baidu; Korea Expressway Corporation; Rystad Energy Global City Traffic Database

Road traffic levels among top oil consumers looking to recover from bottom

Road traffic levels versus normal, 1 March to 24 May
7-day moving average, percent difference versus mean of traffic during same weekday in same month for 2019



Source: TomTom Traffic Index; Google Maps; Baidu; Korea Expressway Corporation; Rystad Energy Global City Traffic Database

Summary data table for total liquids demand after Covid-19 “effective retention” case

	Million bpd										Change year-on-year								
				2020				2020 Q1					2020				2020 Q1		
	2019	2020	2021	1Q	2Q	3Q	4Q	April	May	June	2020	2021	1Q	2Q	3Q	4Q	April	May	June
Global	**99.5**	**88.1**	**96.3**	**92.6**	**78.9**	**88.5**	**92.5**	**74.2**	**78.5**	**84.0**	**-11.5%**	**9.2%**	**-6.7%**	**-19.9%**	**-11.6%**	**-7.6%**	**-24.7%**	**-20.5%**	**-14.5%**
Road	47.4	42.7	46.0	43.8	37.0	44.2	45.9	31.8	37.6	41.5	-9.9%	7.8%	-6.1%	-22.0%	-7.8%	-3.5%	-32.8%	-20.8%	-12.5%
Aviation	7.2	4.3	6.2	6.5	2.9	3.5	4.1	3.0	2.8	3.1	-40.8%	44.7%	-6.1%	-59.4%	-53.9%	-42.0%	-57.8%	-61.6%	-58.8%
Other	44.9	41.1	44.1	42.2	39.0	40.9	42.5	39.3	38.2	39.5	-8.4%	7.1%	-7.5%	-11.1%	-8.5%	-6.5%	-10.7%	-13.5%	-9.2%
United States	**20.5**	**18.1**	**19.4**	**19.7**	**15.5**	**18.1**	**18.8**	**13.9**	**15.7**	**16.9**	**-11.8%**	**7.5%**	**-2.7%**	**-23.7%**	**-12.3%**	**-8.4%**	**-30.8%**	**-22.6%**	**-17.8%**
Road	11.2	10.1	10.6	10.7	8.6	10.6	10.6	6.9	9.0	9.9	-9.8%	4.4%	-2.6%	-24.7%	-6.8%	-4.6%	-39.0%	-20.5%	-15.1%
Aviation	1.7	1.0	1.4	1.6	0.6	0.7	0.9	0.7	0.6	0.7	-45.1%	51.3%	-2.3%	-64.4%	-61.3%	-49.2%	-62.5%	-69.0%	-61.7%
Other	7.5	7.0	7.4	7.4	6.3	6.8	7.3	6.4	6.1	6.4	-7.0%	6.2%	-3.0%	-11.8%	-8.8%	-4.7%	-9.9%	-14.3%	-11.3%
China*	**15.1**	**14.4**	**15.5**	**13.5**	**15.0**	**14.5**	**14.5**	**16.0**	**14.2**	**14.8**	**-4.7%**	**8.1%**	**-10.7%**	**1.3%**	**-3.7%**	**-5.4%**	**10.7%**	**-8.5%**	**2.4%**
Road	6.1	5.9	6.6	4.7	6.1	6.3	6.4	6.2	5.9	6.3	-3.3%	11.5%	-23.2%	3.3%	1.6%	5.5%	7.4%	-6.0%	9.3%
Aviation	0.9	0.7	0.9	0.9	0.6	0.7	0.7	0.7	0.6	0.6	-18.3%	23.3%	6.9%	-27.9%	-28.5%	-21.9%	-20.0%	-29.3%	-33.5%
Other	8.1	7.7	8.1	7.8	8.3	7.5	7.3	9.2	7.7	7.9	-4.1%	4.0%	-3.2%	3.1%	-4.8%	-11.5%	16.3%	-8.2%	1.8%
Europe	**14.2**	**12.0**	**13.2**	**12.5**	**10.3**	**12.4**	**12.9**	**9.2**	**10.2**	**11.5**	**-15.6%**	**10.1%**	**-11.0%**	**-27.6%**	**-14.9%**	**-8.6%**	**-36.2%**	**-27.3%**	**-19.1%**
Road	7.0	6.2	6.6	6.5	5.0	6.5	6.7	4.1	5.0	6.0	-11.8%	6.0%	-4.1%	-28.3%	-9.7%	-4.8%	-42.7%	-27.2%	-14.8%
Aviation	1.5	0.8	1.2	1.2	0.5	0.7	0.7	0.5	0.4	0.5	-47.4%	50.4%	-10.3%	-68.9%	-57.5%	-47.9%	-69.9%	-70.5%	-66.4%
Other	5.7	5.0	5.5	4.8	4.8	5.2	5.4	4.7	4.7	4.9	-12.0%	9.0%	-19.2%	-15.7%	-9.4%	-3.7%	-19.6%	-16.1%	-11.0%

*Includes mainland China, Hong Kong and Taiwan
Source: Rystad Energy research and analysis

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Crude balances are improving quickly, led by large supply cuts and improving demand

Rystad Energy estimates that April saw a historic implied stock build of 16 million bpd of crude and condensate, but due to a more rapid cut of global oil production than previously expected, global crude supply-demand may rebalance already from June.

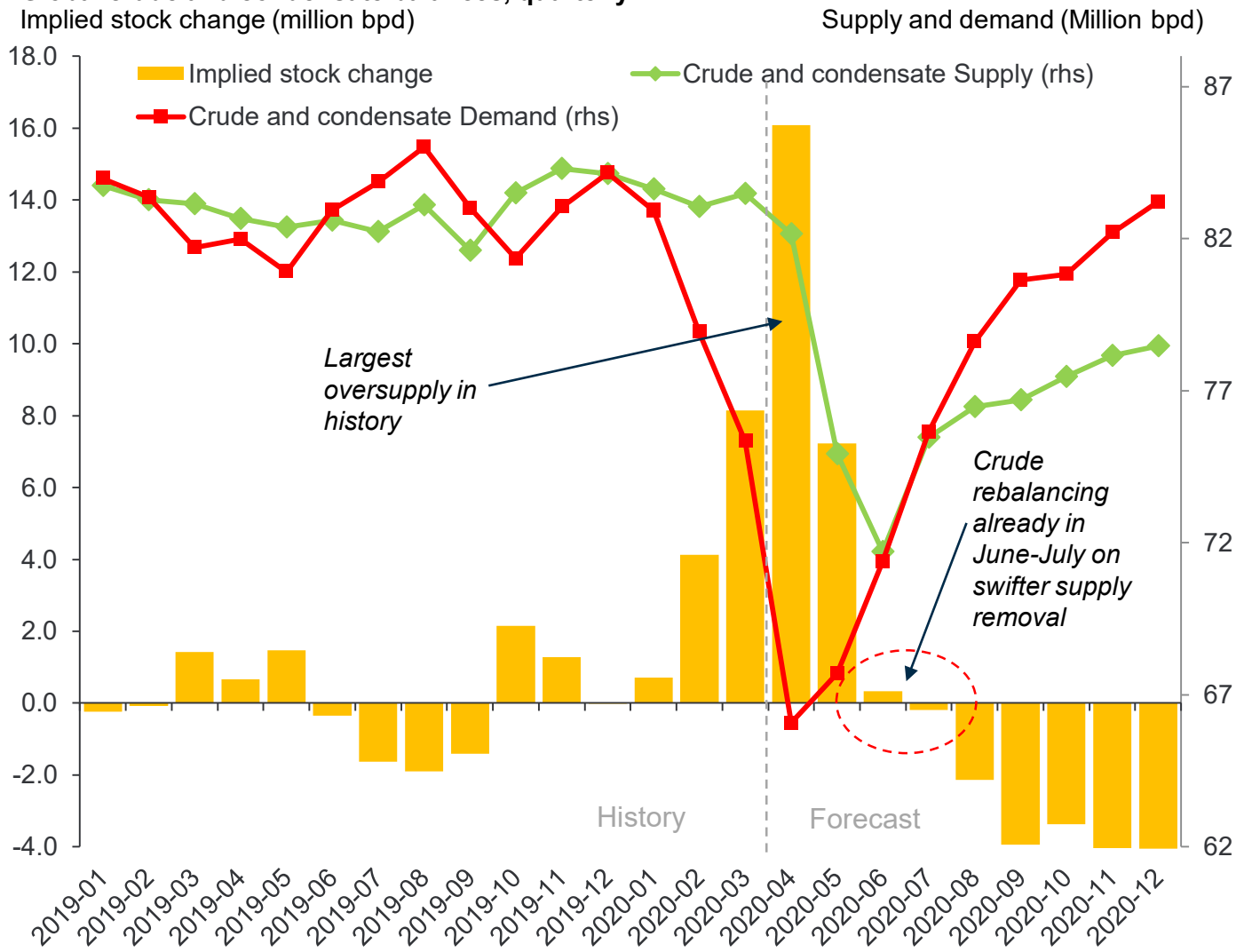
By June, we expect OPEC+ producers to have reduced crude and condensate production by ~9 million barrels per day compared to March 2020 production levels, whereas non-OPEC+ decline and production curtailments will remove another ~3.5 million bpd, led by the US and Canada.

Oil prices are continuing to recover during May as the market has been pleasantly surprized, we believe, by the speed and size of the actual supply cuts, while crude demand is also slowly recovering as refineries ramp up gradually both in North America and Asia.

We also observe thus far during May that oil at sea has gradually come down after an incredible build of ~6 million bpd offshore during April.

For more details on our oil market data and analysis, see our Oil Market Analytics and OilMarketCube services.

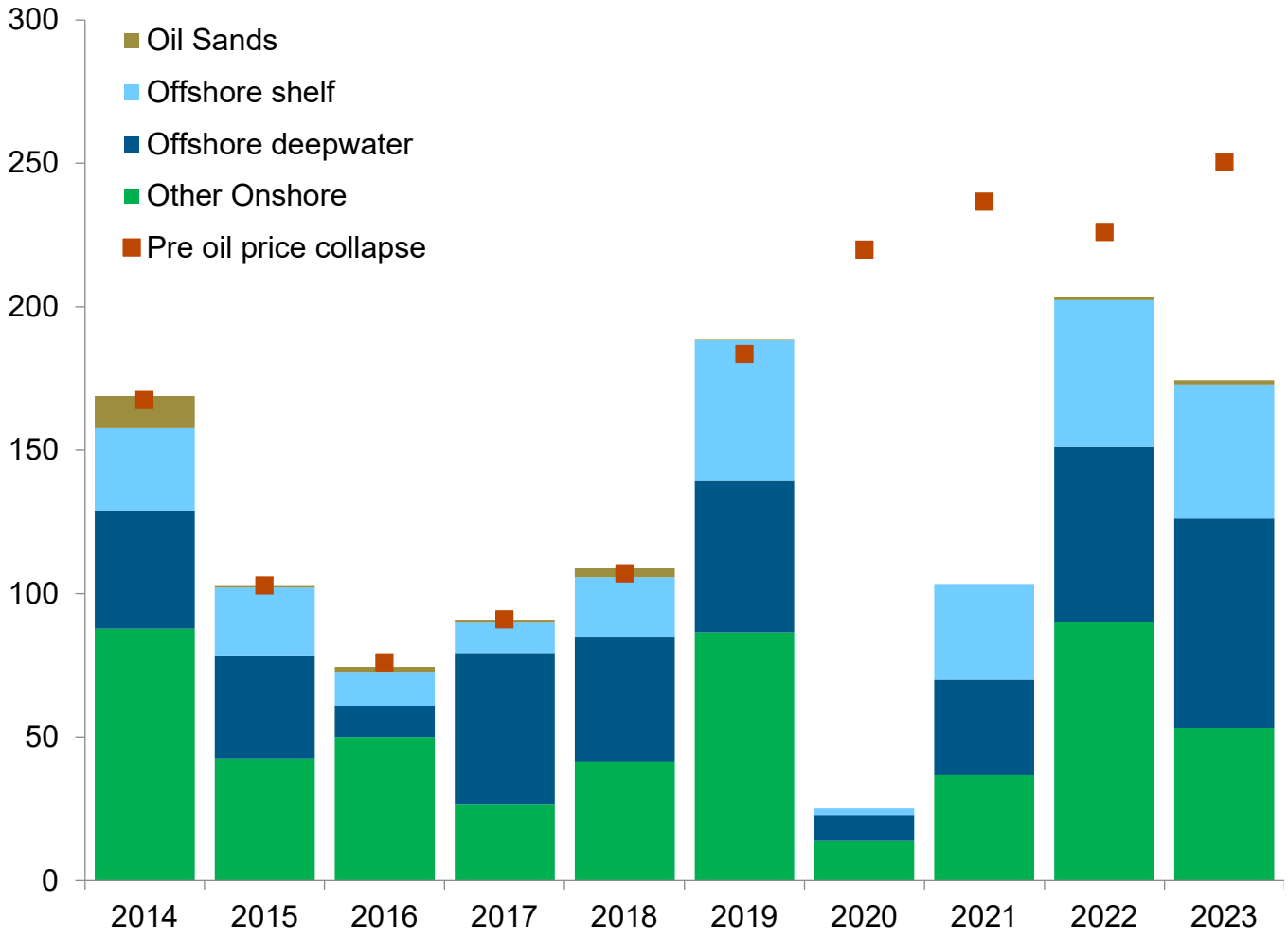
Global crude and condensate balances, quarterly



Source: Rystad Energy research and analysis, OilMarketCube

Global FID activity to slip significantly

Total conventional greenfield investments sanctioned/ to be sanctioned
Billion USD



Source: Rystad Energy UCube

The outbreak of Covid-19 and the drop in oil prices has caused E&P companies to cut back on investments.

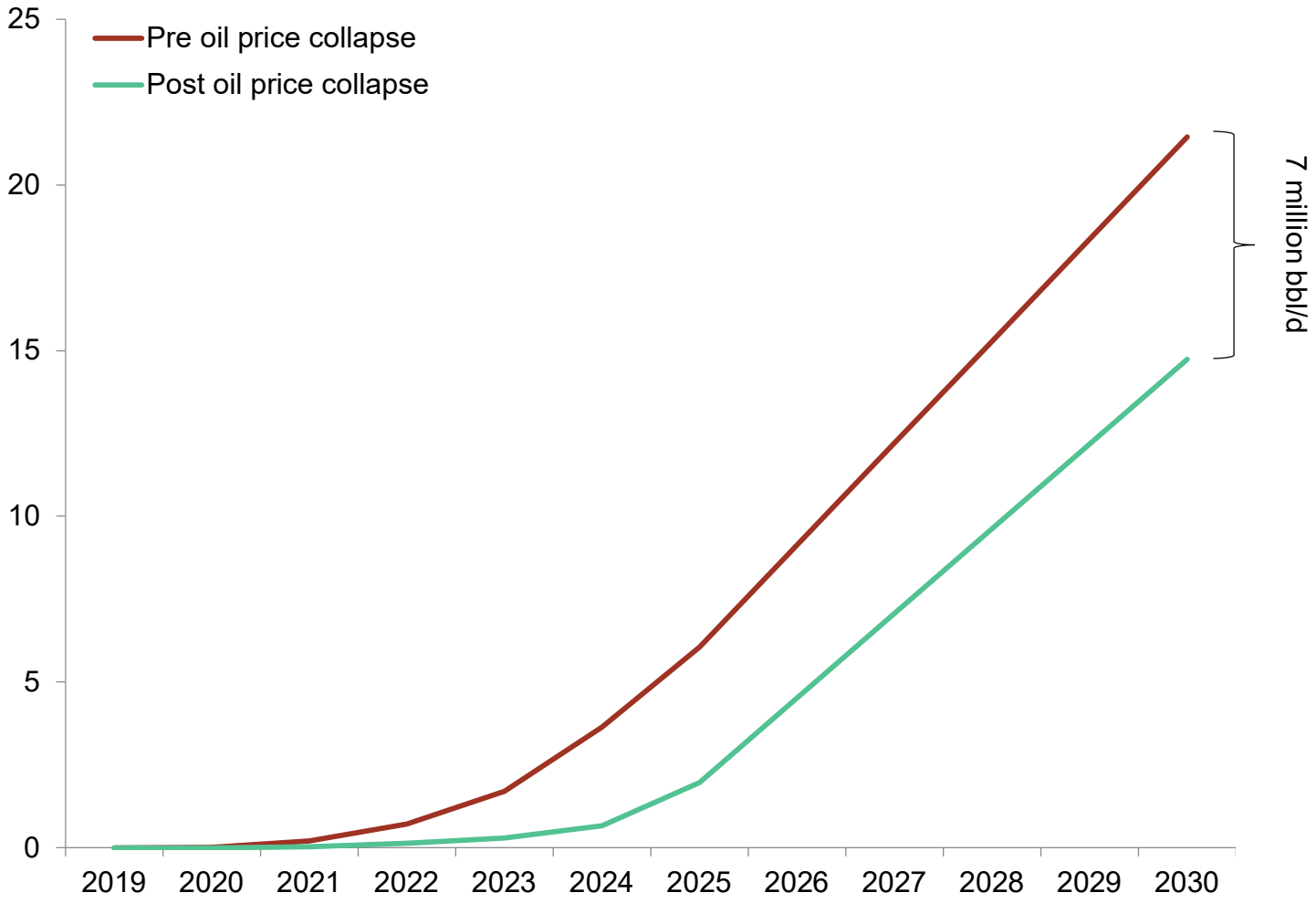
This is especially the case for approvals of new investments. The chart shows total conventional greenfield investments by approval year. If we sum up all the initial investments for projects approved last year, the value becomes close to $190 billion.

For 2020 the corresponding tally is expected to fall to only $25 billion

This will be the lowest activity level since the 1970s.

Lower activity now, will remove considerable volumes in the future

Total conventional liquid production from not-yet-sanctioned projects pre and post oil price collapse
Million bpd



The historical low approval activity in 2020 will have long term implications.

Based on the delays in approval activity, Rystad Energy has lowered its 2030 liquid production forecast for not-yet-sanctioned conventional projects by almost 7 million bpd.

The impact of prevailing low oil prices is that the oil market will tighten considerably in the long term.

Source: Rystad Energy UCube

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- Oil demand impact in two **COVID-19 mitigation scenarios**
- Impact of oil demand in **aviation, ground transportation and road fuels**

OIL MARKET WEEKLY – *Balances report:*

- A weekly **Commentary** with the latest oil market observations
- A weekly **Executive Summary** on the oil market balances, oil supply and demand, and the overall oil market view

OIL MARKET DASHBOARDS and Excel data on:

- **Oil demand analysis dashboard:** split by country, transport type, aviation
- **COVID-19 dashboard:** oil demand impacting two COVID-19 mitigation scenarios

RYSTAD ENERGY

Rystad Energy is an independent energy consulting services and business intelligence data firm offering global databases, strategy advisory and research products for energy companies and suppliers, investors, investment banks, organizations, and governments. Rystad Energy's headquarters are located in Oslo, Norway.

Headquarters
Rystad Energy
Fjordalléen 16, 0250 Oslo, Norway

Americas +1 (281)-231-2600
EMEA +47 908 87 700
Asia Pacific +65 690 93 715

Email: support@rystadenergy.com