Riches to Rags: Refining in the Oil & Gas "Perfect Storm"

ADI Analytics
OIL & GAS • ENERGY • CHEMICALS
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April 2020

Read our first "perfect storm" article to see how oil prices evolve going forward.

The refining panel session at the 2020 ADI Forum – our consulting firm's annual oil & gas conference – in January this year was brimming with justified optimism. After several years of questioning and cross-questioning, IMO 2020 – the International Maritime Organization's rule limiting sulfur in marine fuel oil – was finally here and refiners were getting ready for a strong year with robust diesel margins.

Production planners at many refineries had advanced maintenance into 2019 so they could operate throughout 2020 and take full advantage of the higher margins they were anticipating. Forecasting higher demand for low-sulfur diesel as blendstock for marine fuels, many refiners in the U.S. had also started tweaking their product mix to favor diesel over gasoline.

Coronavirus has interrupted this party in a brutal manner. Forget higher margins, refiners today are struggling to maintain operations, find storage for growing inventories, and service debt as refinery margins have plummeted.

Global fuel demand collapse

Read our second "perfect storm" article to learn how much oil demand will coronavirus destroy?

As illustrated in a prior note from ADI's on-going research on the oil & gas "perfect storm", nearly two-thirds of oil demand is in countries that are under lockdowns collapsing demand for refined products. In the U.S., the most recent weekly demand for gasoline was ~45% lower than normal demand of ~9.2 million bpd averaged over 2019.

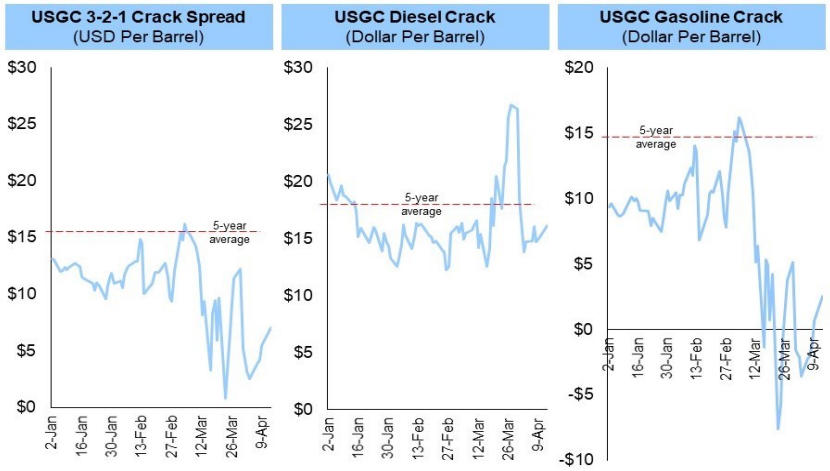
Inventories of fuels and oil, therefore, are now building quickly across the world to the point that in some places storage capacity is running out. India's Bharat Petroleum has disclosed storage capacity constraints as fuel demand has fallen dramatically in a lockdown that was recently extended again. Along with crude oil, fuel inventories in the U.S. too jumped and the market is finding creative solutions. Enterprise Products reported that it is storing gasoline and diesel in NGL wells and operating the Seaway pipeline in bidirectional model. Someone has also proposed using pipelines as short-term storage vessels.

Losing money on gasoline

ADI estimates that nearly 12.5 million barrels per day (bpd) i.e. almost 15% of global refining capacity has been cut over the past few weeks.

Refining margins have been decimated in this environment as we show in Exhibit 1. Demand destruction coupled with high inventories typical of this season put the gasoline crack spread into negative territory late March on the U.S. Gulf Coast and has just swung into positive territory below $5 a barrel this past week. Diesel margins have, however, jumped higher as its demand has been resilient and likely buoyant during COVID-19 lockdowns.

Exhibit 1. U.S. Gulf Coast refining crack spreads



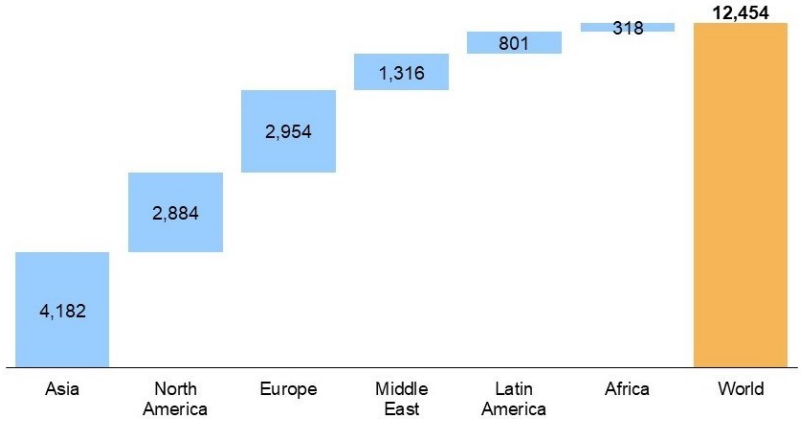
How are refiners coping?

Smaller refineries or those without access to export markets are at grave risk of permanent closure.

ADI's research and interviews with operators is showing a much deeper cut to operations than is being anticipated or fully appreciated. Based on a mix of primary and secondary research, ADI estimates that nearly 12.5 million barrels per day (bpd) i.e. almost 15% of global refining capacity has been cut over the past few weeks. Most of these refining cuts have occurred in Asia where operators have typically reduced utilization by 20% to 25% followed by nearly similar amounts of capacity reductions in North America – U.S. capacity cuts totaled 1.1 million bpd – and Europe as shown in Exhibit 2.

A key strategy has been to shift product mix in favor of diesel where demand destruction has been limited.

Exhibit 2. Cuts to global refining runs in thousand barrels per day as of early April 2020.



Advancing maintenance and turnarounds during these shutdowns would have been optimal but is limited by social distancing policies and skilled contract labor shortages.

Exhibit 3 lists a few of the refiners that have announced operational changes following COVID-19. In general, refiners have been cutting utilization rates by 15% to 20%. Although most players are reporting cuts to refinery runs, some refineries will shut down as well. For example, North Atlantic Refining's 130,000-bpd Come-by-Chance refinery is closing while API's 85,000-bpd Ancona refinery owned by APD in Italy is also shutting down. More shutdowns are expected, and, similar to the marginal stripper wells that are shutting in – see the first article of our oil & gas "perfect storm" series – smaller refineries or those without access to export markets are at grave risk of permanent closure. In the U.S., a lot of such refineries are in the Midwest, while overseas they are spread across Asia, Europe, and Latin America.

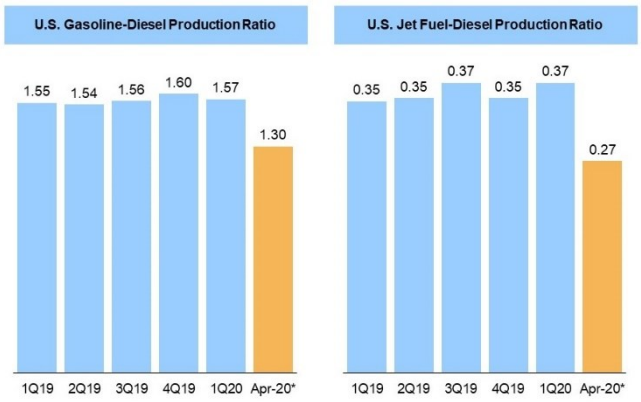
Traders have been stranded with off-spec product such as high-RVP gasoline from longstanding inventories that cannot be sold without waivers in the summer.

Exhibit 3. Non-comprehensive list of refiners that have announced cuts to their runs.

Country	Company	Run cuts	Discussion
China	Sinopec	10-20%	Announced refinery run cut by 600 kbpd
China	CNOOC	15-20%	Cut runs by 410 kbpd at Huizhou refinery
China	Petrochina	10-20%	Shut its 580 kbpd Gaungxi and Dalian refineries
India	BPCL	10-20%	BPCL operates 4 refineries with 750kbpd
India	Indian Oil	25-30%	Reduced rates across its refineries
South Korea	S.K. Energy, Thai Oil	15-20%	Reduced run rates across their refineries
Thailand	SPRC, PTT, and IRPC	10-20%	Reduced refinery run rates
Canada	Suncor Energy	10-15%	Reduced refinery run rates
U.S.	Phillips 66	15-20%	Reduced refinery rates at Bayway and Los Angeles refinery
U.S.	ExxonMobil	10-15%	Reduced refinery runs at Baton Rouge, Baytown, and Joliet refineries
U.S.	Valero	15-18%	Run cuts at Benicia, Wilmington, Memphis, St. Charles and other refineries
U.S.	Marathon	10-15%	Reduced refinery runs at Catlettsburg and Los Angeles refinery
U.S.	Chevron	15-20%	Reduced refinery runs at El Segundo refinery
U.S.	Par Pacific	20-25%	Reduced refinery runs at Hawaii refinery
U.S.	PBF Energy	15-20%	Reduced refinery runs at Torranec refinery
Germany	BP	15-20%	Shut down its Gelsenkirchen (Scholven) oil refinery
Britain	INEOS	15-20%	Shut down a crude unit at its Grangemouth refinery
France	ExxonMobil, Total	10-20%	Run rate cut at Gravenchon and Fos refinery, Grandpuits refinery restart postponed
Brazil	Petrobras	20-25%	Reducing run rates across its refineries
Italy	API		Temporary shut-downs of Ancona refinery
South Africa	Engen		Temporary shut down of Engen refinery
Canada	North Atlantic Oil		Temporary shut down of Come by Chance refinery in Newfoundland and Labrador

In addition to cutting runs and utilization, refiners are also exercising other options. A key strategy has been to shift product mix in favor of diesel where demand destruction has been limited. Refiners can tweak fluidized catalytic cracking (FCC) unit operations and severity to decrease gasoline output to a certain but limited extent. In addition, refiners have rapidly adjusted distillation cut points to move jet fuel volumes into the diesel pool. Exhibit 4 reflects this trend in the declining gasoline-diesel and jet fuel-diesel production ratios. Even so, there are limits to how much gasoline and jet fuel supply can be reduced with the latter already at historical lows.

Exhibit 4. U.S. refining industry's product mix changes



Given the difficult economic conditions, an optimal solution would have been to advance maintenance and turnarounds during these shutdowns. Social distancing policies and health impacts of COVID-19 have, however, impacted the availability of skilled contract labor for these activities. For examples, Delta Airlines' refinery in Trainer, PA has significantly reduced on-site staff by asking contractors and other personnel to leave the site.

Refining's challenges today are transmitting down through the value chain. Refined product pipeline and terminal companies, traders, and wholesale and retail fuel outlets are all struggling with rapid demand declines. Refined product pipelines such as Colonial Pipeline have announced plans to cut capacity. Traders have been stranded with off-spec product such as high-RVP gasoline from longstanding inventories that cannot be sold without waivers in the summer. Finally, wholesale and retail distribution channels are suffering significant revenue losses not just from lost fuel sales but also diminished pull-through revenue.

We anticipate significant changes in the scale and scope of capital and operating spending going forward.

So what?

In the wake of a very difficult business landscape that has hobbled the global refining industry, we look for strategic insights and implications for the c-suite's consideration. A few of them are discussed below:

1. Refiners highly dependent on export markets such as those on the U.S. Gulf Coast need to carefully track and monitor how various global markets recover post-COVID. Recovery paths will vary globally impacting fuel demand recoveries as well. A scenario-based approach to the recovery of these fuel markets will be critical, and is part of ADI's new study focused on oil & gas navigating the "perfect storm".

2. Recovery in a post-COVID world will be highly heterogenous and refiners with diverse assets and robust supply chain and maintenance and turnaround programs will be better positioned. ADI anticipates significant bottlenecks around the availability of craft and maintenance labor, technical and optimization consulting services from licensors and OEMs, and catalyst and refinery chemical vendors.

3. Large capital projects will certainly be delayed but some sustaining capital investments will also face delays that could impact reliability and utilization rates in the longer run unless they are addressed proactively as recovery gains momentum.

4. Dramatic declines in fuel demand will impact regulatory compliance strategies such as ethanol volumes that will have to

be blended into gasoline. The U.S. Environmental Protection Agency is reportedly considering suspending blending mandates although it will not be easy in an election year. Even so, commercial trading teams at refiners need to monitor these developments to identify opportunities in a rapidly changing environment.

5. Refiners that will struggle in this environment are likely disadvantaged in a peak-demand environment going forward. These will include refiners with low complexity indices (i.e. limited conversion capacity and diversity), assets in landlocked regions without access to water, and, therefore, export markets, and dated automation and process control systems.

Refiners highly dependent on export markets such as those on the U.S. Gulf Coast need to carefully track and monitor how various global markets recover post-COVID.

6. A record number of refineries are now available for sale, and their performance in this distressed environment will shed significant light on their valuations and prospects. In addition, smaller refineries may shut down and some of them may be permanent closures.

7. Finally, understanding the new normal will be critical for the entire refining industry including equipment, chemical, and service vendors serving this market. We anticipate significant changes in the scale and scope of capital and operating spending – as our new study explains in greater detail – that will be geared toward improving preparedness for such events including investments in product yield flexibility, automation, remote operations, and digital and virtual capabilities.

ADI has a new study about navigating oil & gas through this "perfect storm". The report includes granular forecasts for upstream (shale and offshore), midstream (gas processing, NGLs, and pipelines), LNG, refining, and petrochemicals. Learn more by downloading the study prospectus and contact us at info@adi-analytics.com or +1 (832) 768-8806 to learn more.

Oil & Gas in the Perfect Storm: Navigating COVID-19 and the Price Crash

Multi-Client Study Prospectus

April 2020

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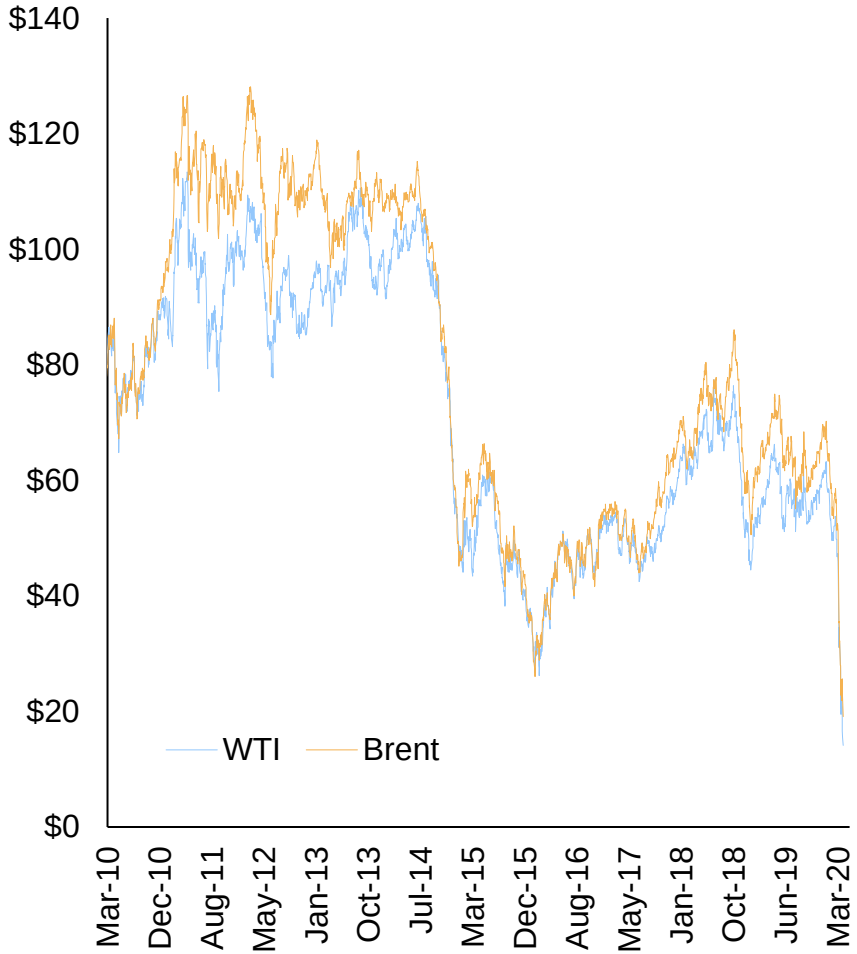
Oil and gas after the price crash is in uncharted waters and the entire industry is grappling with several key questions

Crude Oil Prices
(U.S. Dollar Per Barrel)

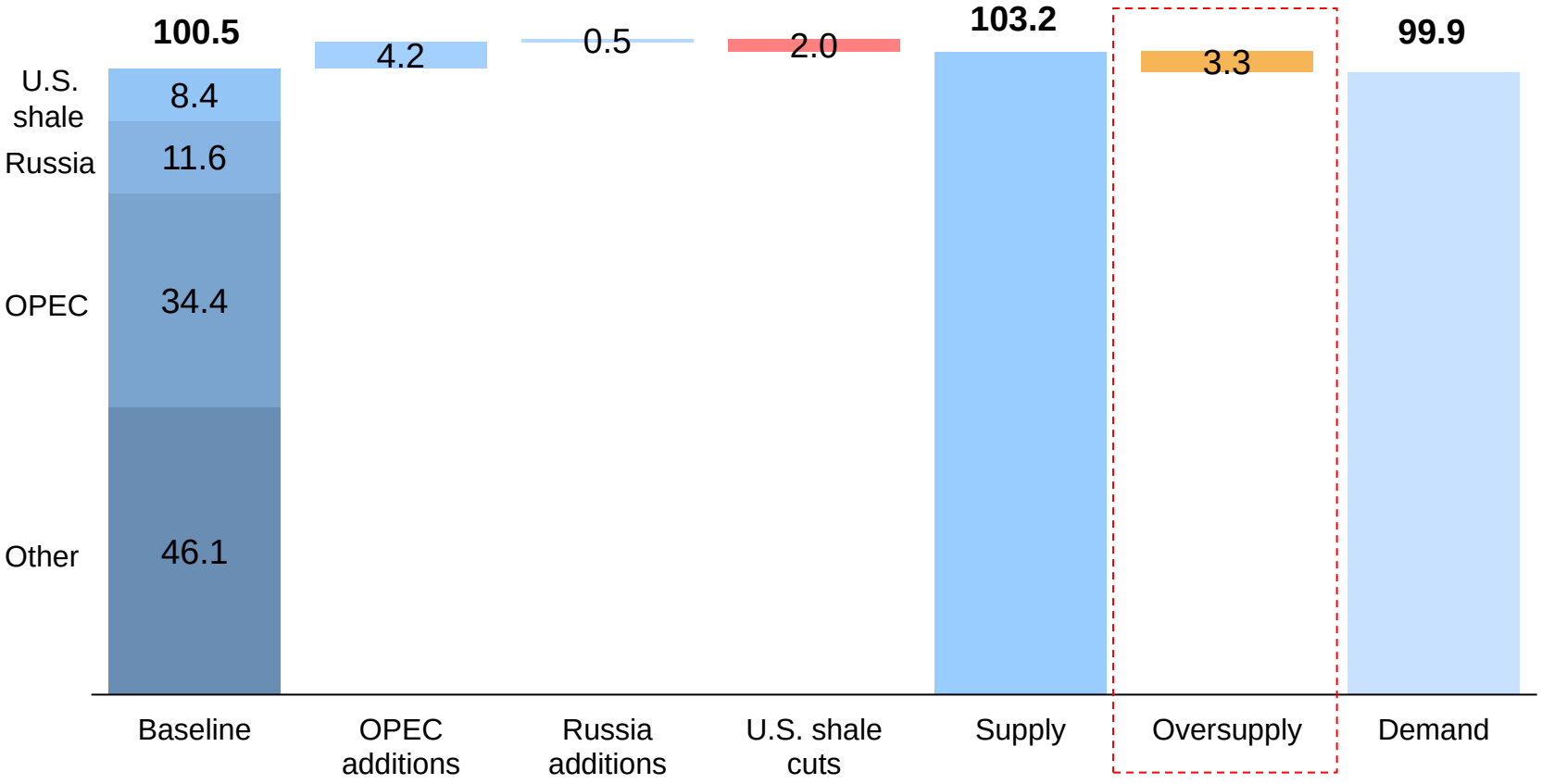


Key Questions

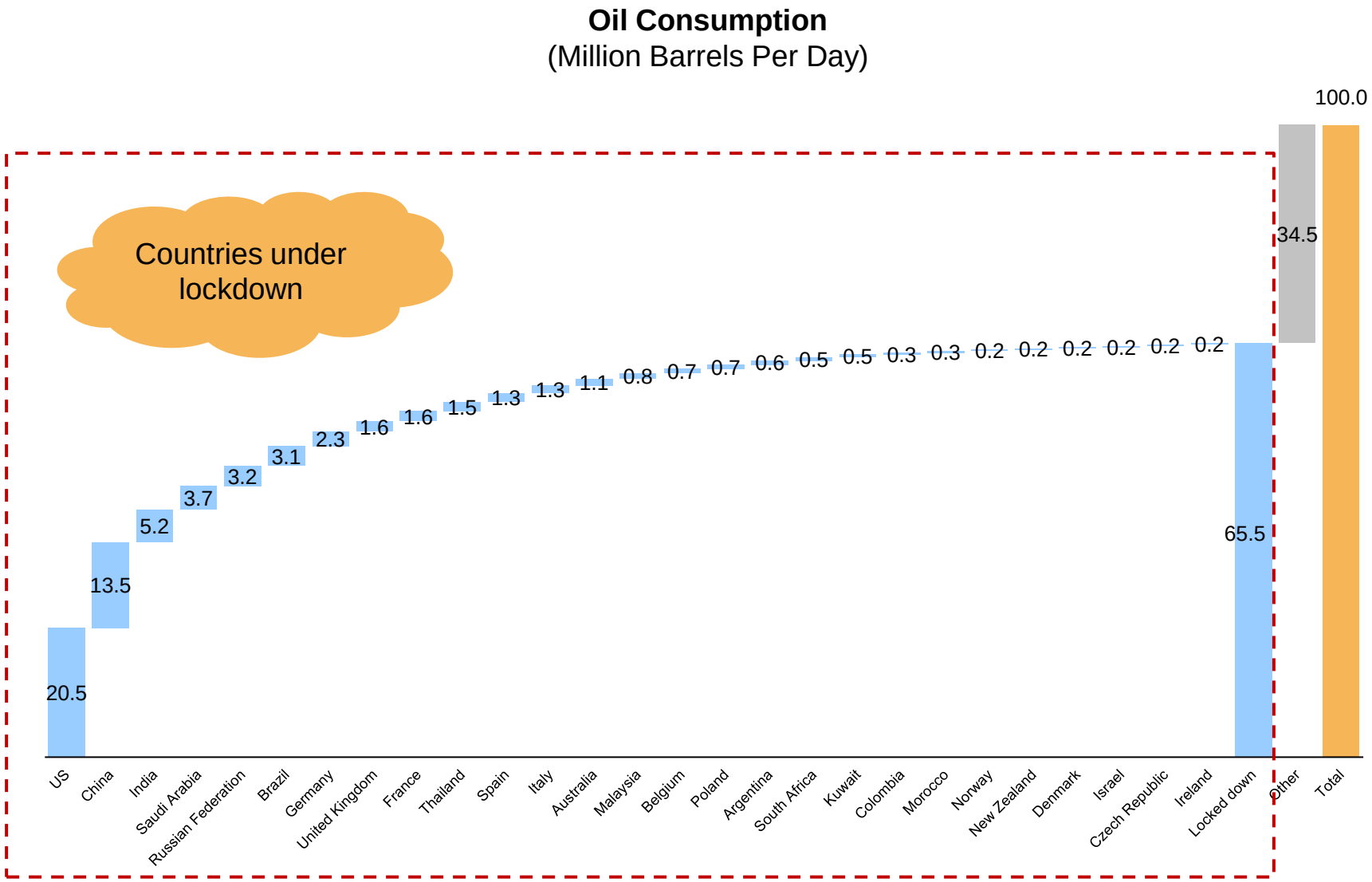
- What is the outlook for oil prices now?
- Will there be a resolution between Russia and Saudi Arabia? How will U.S. intervene?
- Which shale plays will be disrupted? Why?
- Is there a role for offshore in the near future?
- How will midstream and NGLs be impacted?
- What options do refiners have going forward?
- Where will LNG export projects make money?
- Which oilfield service, EPC, OEM, and suppliers survive in this environment?
- Which oil and gas operators are better positioned to survive and who will struggle?
- When will oil demand recover? How soon?
- What is CAPEX and OPEX forecast now?

At the same time, ADI anticipates the oil and gas market oversupplied with the extent varying in multiple scenarios

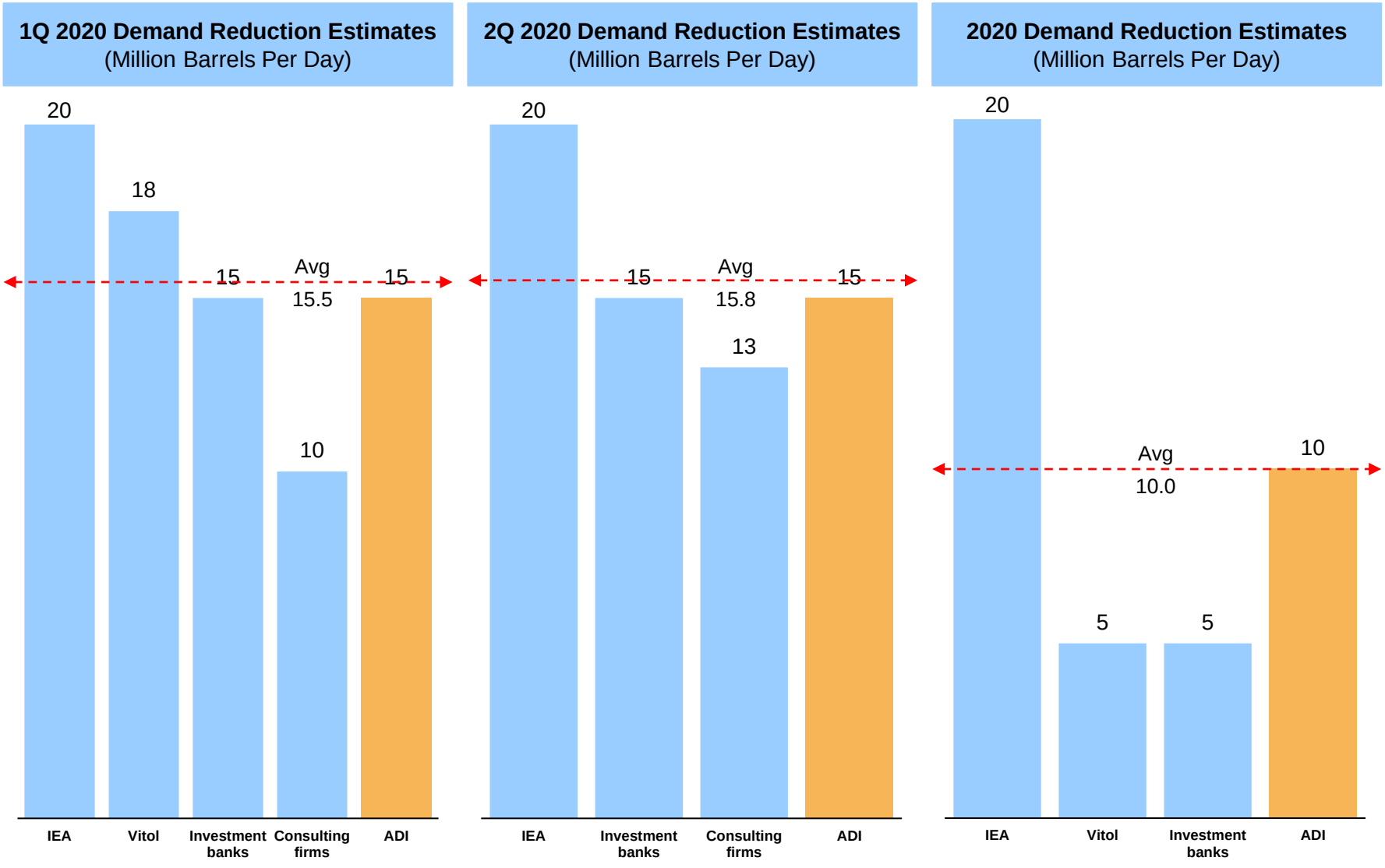
ADI Scenarios for Global Crude Oil Supply and Demand
(Million Barrels Per Day)



COVID-19 has led to lockdowns in nearly 30 countries collectively impacting two-thirds of oil consumption



Collectively, ADI estimates COVID-19 leading to dramatic oil demand destruction in 1H 2020 and for the entire year as well



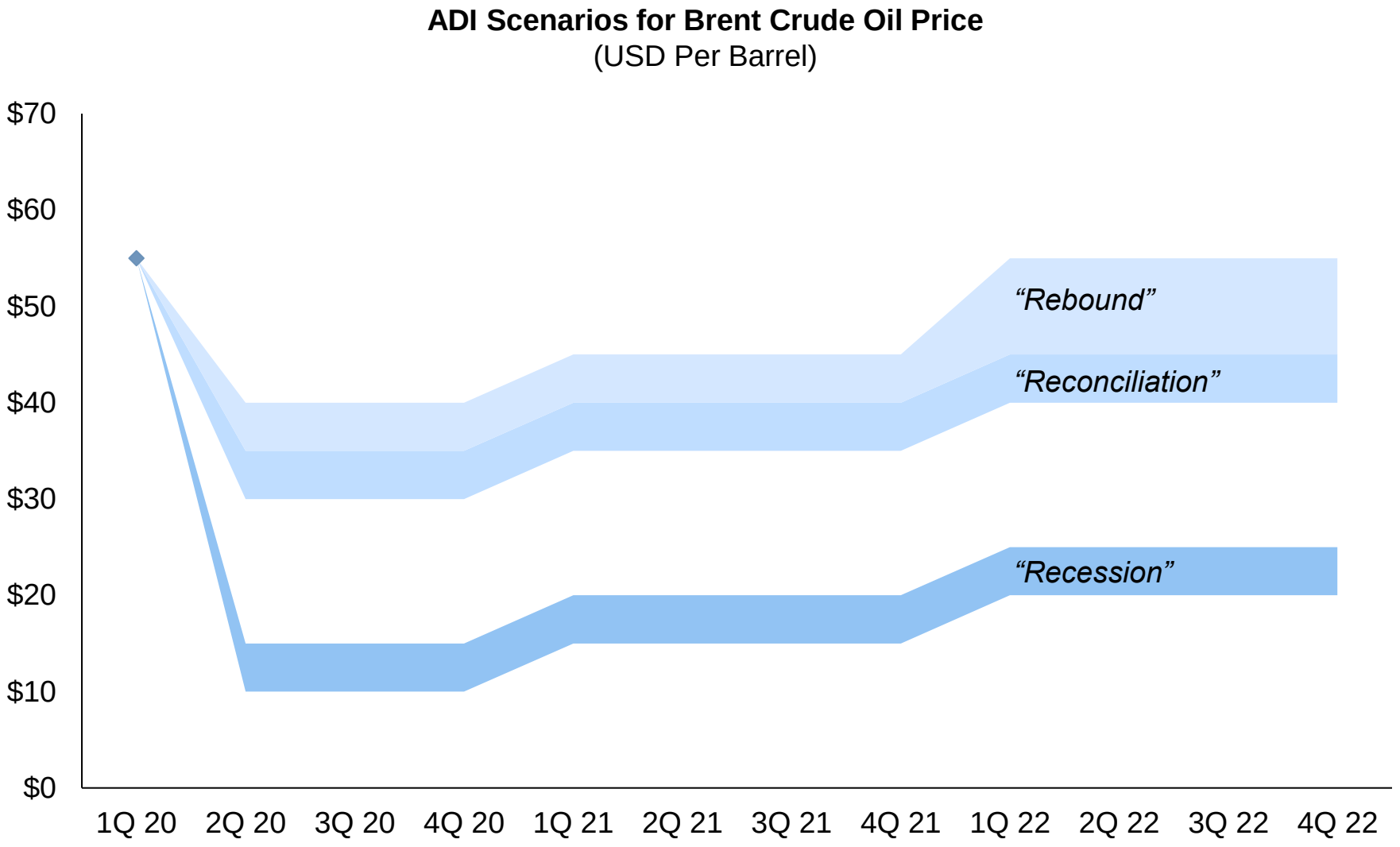
ADI research teams are working on a new study to assess impacts of oil price crash and COVID-19 on oil & gas industry

Research Goals	Select Insights
1 Conduct in-depth review of 2020 oil price crash and COVID-19 on oil & gas industry	▪ Crude oil supply / demand balances ▪ Breakeven prices and marginal costs ▪ Geopolitical drivers and developments ▪ COVID-19 demand destruction impacts
2 Develop scenario planning-based forecasts for oil & gas industry through 2025	▪ Three crude oil price scenarios with … ▪ … Supply/demand balances for each ▪ Signposts and milestones for scenarios
3 Build granular impact assessments for upstream, midstream, refining, and petchem segments and sub-segments	▪ Upstream (conventional, shale, offshore) ▪ Midstream (gas proc, pipelines, NGL, LNG) ▪ Refining ▪ Petrochemicals
4 Synthesize strategic implications for oil & gas operators, suppliers, investors, and other stakeholders	▪ Implications by segment for each scenario ▪ Capital and operating spend impacts ▪ Likely winners and losers ▪ Policy and other implications

Going forward, ADI sees three likely scenarios for oil & gas …

	I **RECESSION** *Protracted oil demand slump as economy slips into a recession*	II **RECONCILIATION** *Pain lasts thru 2Q 2020 driving Russia - OPEC reconciliation*	III **REBOUND** *COVID-19 resolves quickly driving oil demand rebound*
BRENT OIL PRICE, $/B			
2020	$10 - $15	$30 - $35	$35 - $40
2021	$15 - $20	$35 - $40	$40 - $45
2022	$20 - $25	$40 - $45	$45 - $55
OIL DEMAND			
COVID-19	Expands to a global lockdown thru summer	Limited further precautions and travel with limited improvement	Limited regional lockdowns and virus blows over thru spring
Govt. stimuli	Fails to avoid a recession	Barely avoids a recession	Helps with economic rebound
OIL SUPPLY			
Balance	Oversupply of 4+ mm bpd with inventory >500 mm bbl	Oversupply of 1–2 mm bpd with inventory of 500 mm bbl	Oversupply of <1 mm bpd with inventory of <300 mm bbl
Russia-OPEC deal	Irrelevant	Occurs in the summer	Occurs in early 2Q 2020
Shale supply	Drops 2.5+ mm bpd	Drops 1 mm bpd	Drops <0.5 mm bpd

… Each offering a distinct set of oil price implications



The new ADI report's Table of Contents shows the in-depth coverage of issues as oil & gas navigates this "perfect storm"

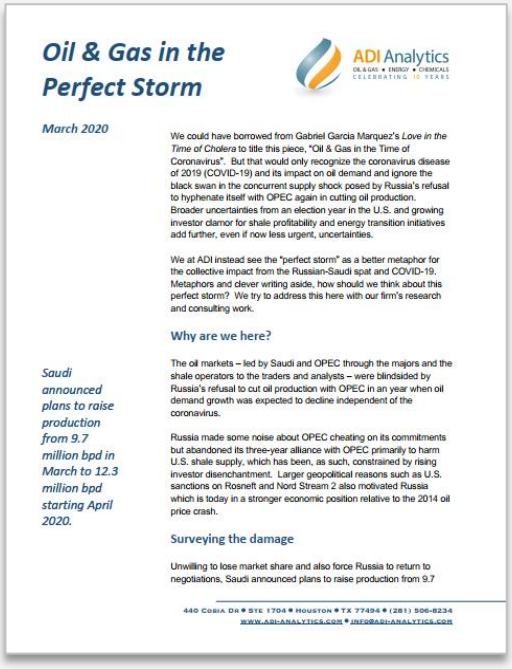
The study -- available early April 2020 -- includes a report, underlying data, and a review call with client teams

	Deliverable	Format
1	Executive summary	Slide deck
2	Final report	Slide deck
3	Market data and analytics	Spreadsheet
4	Report review workshop	Interactive conference call

Call Uday Turaga +1 (832) 768-8806 or
e-mail info@adi-analytics.com to subscribe.

Meanwhile, please download articles based on research for this study from the ADI team

Oil & Gas in the Perfect Storm



Oil & Gas in the Perfect Storm

ADI Analytics

March 2020

We could have borrowed from Gabriel Garcia Marquez's *Love in the Time of Cholera* to title this piece, "Oil & Gas in the Time of Coronavirus". But that would only recognize the coronavirus disease of 2019 (COVID-19) and its impact on oil demand and ignore the black swan in the concurrent supply shock posed by Russia's refusal to hyphenate itself with OPEC again in cutting oil production. Broader uncertainties from an election year in the U.S. and growing investor clamor for shale profitability and energy transition initiatives add further, even if now less urgent, uncertainties.

We at ADI instead see the "perfect storm" as a better metaphor for the collective impact from the Russian-Saudi spat and COVID-19. Metaphors and clever writing aside, how should we think about this perfect storm? We try to address this here with our firm's research and consulting work.

Saudi announced plans to raise production from 9.7 million bpd in March to 12.3 million bpd starting April 2020.

Why are we here?

The oil markets – led by Saudi and OPEC through the majors and the shale operators to the traders and analysts – were blindsided by Russia's refusal to cut oil production with OPEC in an year when oil demand growth was expected to decline independent of the coronavirus.

Russia made some noise about OPEC cheating on its commitments but abandoned its three-year alliance with OPEC primarily to harm U.S. shale supply, which has been, as such, constrained by rising investor disenchantment. Larger geopolitical reasons such as U.S. sanctions on Rosneft and Nord Stream 2 also motivated Russia which is today in a stronger economic position relative to the 2014 oil price crash.

Surveying the damage

Unwilling to lose market share and also force Russia to return to negotiations, Saudi announced plans to raise production from 9.7

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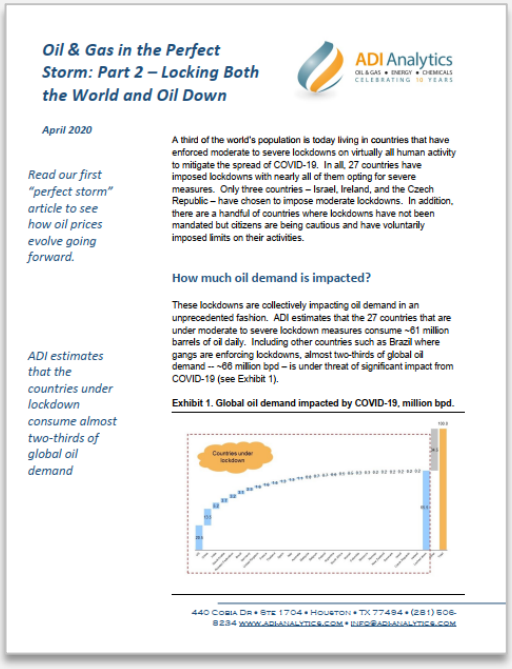
Locking Both the World and Oil Down



Oil & Gas in the Perfect Storm: Part 2 – Locking Both the World and Oil Down

ADI Analytics

April 2020

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A third of the world's population is today living in countries that have enforced moderate to severe lockdowns on virtually all human activity to mitigate the spread of COVID-19. In all, 27 countries have imposed lockdowns with nearly all of them opting for severe measures. Only three countries – Israel, Ireland, and the Czech Republic – have chosen to impose moderate lockdowns. In addition, there are a handful of countries where lockdowns have not been mandated but citizens are being cautious and have voluntarily imposed limits on their activities.

How much oil demand is impacted?

ADI estimates that the countries under lockdown consume almost two-thirds of global oil demand

These lockdowns are collectively impacting oil demand in an unprecedented fashion. ADI estimates that the 27 countries that are under moderate to severe lockdown measures consume ~61 million barrels of oil daily. Including other countries such as Brazil where gangs are enforcing lockdowns, almost two-thirds of global oil demand – ~66 million bpd – is under threat of significant impact from COVID-19 (see Exhibit 1).

Exhibit 1. Global oil demand impacted by COVID-19, million bpd.

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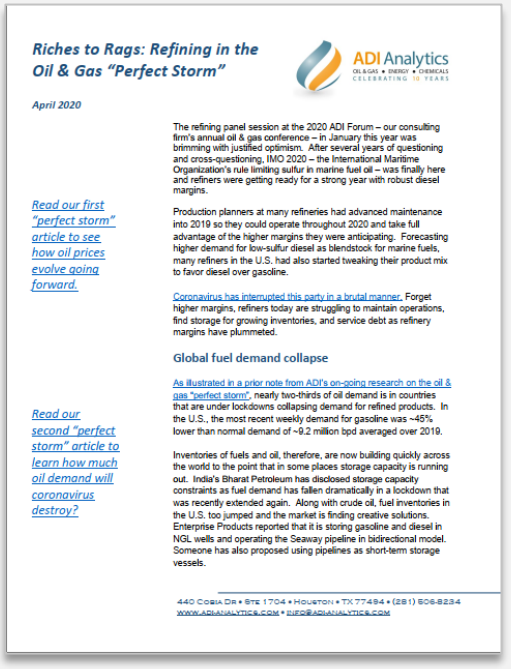
Riches to Rags: Downstream O&G in Perfect Storm



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