Energy Tidbits

May 23, 2021

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Supplemental Documents

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Executive summary

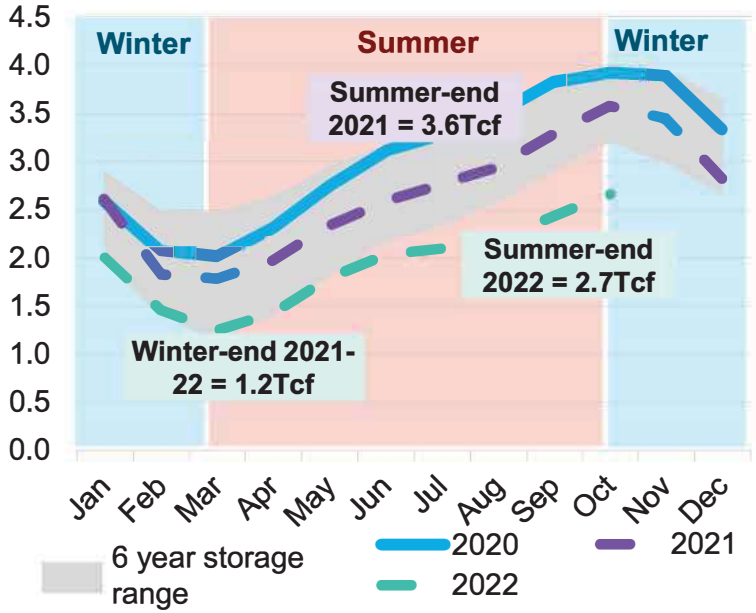
With crude prices over $65/bbl and gas prices recently crossing the $3/MMBtu mark, E&P companies have shown incredible restraint. However, that restraint cannot continue if the gas market wants sufficient supplies over the next 18 months. A higher futures curve might need to be the antidote.

- April and May 2021 should see smaller injections than in 2020. For April, this is predominantly due to the pandemic crushing demand a year ago, yet the month is actually loose on an adjusted basis. May, on the other hand, remains tight once adjusted for weather and Covid-19.
- BNEF expects production to remain flat this summer, around 92.4Bcf/d. About 50% of lower 48 gas production is hedged in the $2.6-$2.75/MMBtu range meaning there will be a delay before E&Ps receive the full benefit of higher gas prices currently on offer. BNEF believes gas production won't see meaningful growth till after the summer.
- Liquefied natural gas exports set a record in April, averaging over 11Bcf/d. Most terminals are expected to run close to 100% utilization for the next 12 months due to high profit margins. Further, BNEF expects very light maintenance related downtime.
- Coal generation's revival finds a ceiling next year as gas prices ease. Coal is expected to serve 36% of the thermal gap in the next two years, up from 30% in 2020. This means that gas generation (and therefore power burns) will find a floor.
  - Bloomberg's lower-48 production estimate tickers have been revised up to account for deviances in recent EIA reporting for Pennsylvania. This in turn increased our industrial demand estimates. Higher historical industrial demand caused our forecast to rise by 0.45Bcf/d, significantly reducing the storage forecast.

3.6Tcf	Expected summer-end 2021 storage level
1.2Tcf	Expected winter-end 2021-22 storage level
2.7Tcf	Expected summer-end 2022 storage level

Natural gas inventory forecast, 2021-22

Trillion cubic feet

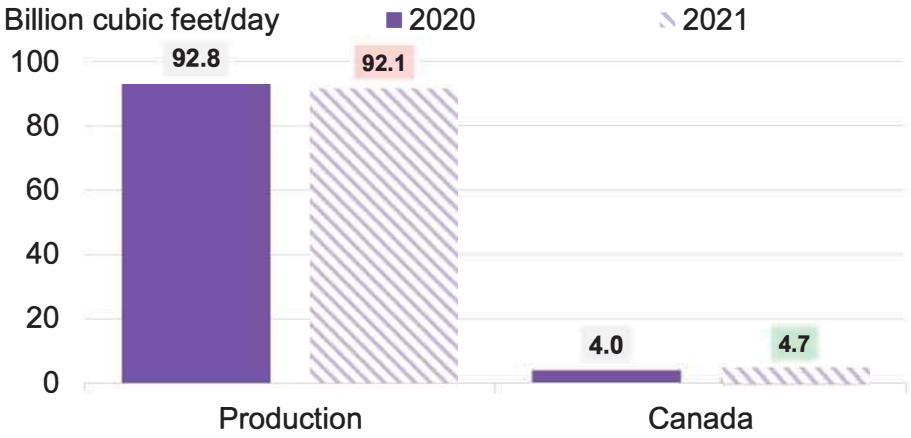


Source: BloombergNEF

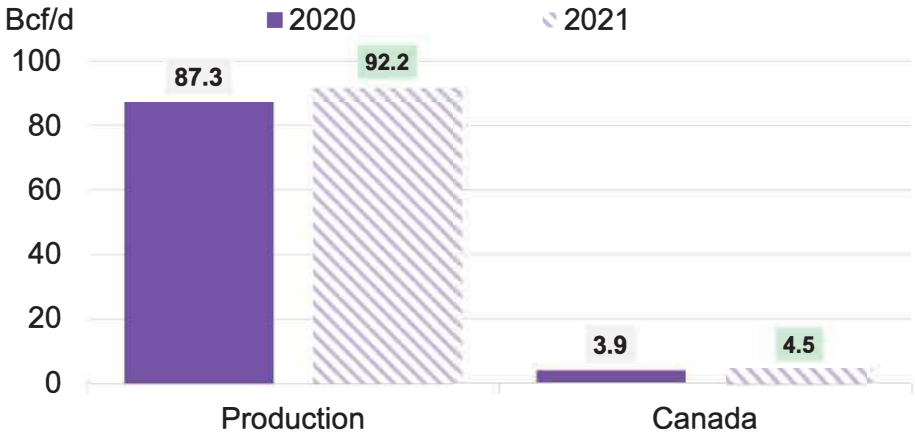
BloombergNEF

Supply and demand by component for April and May

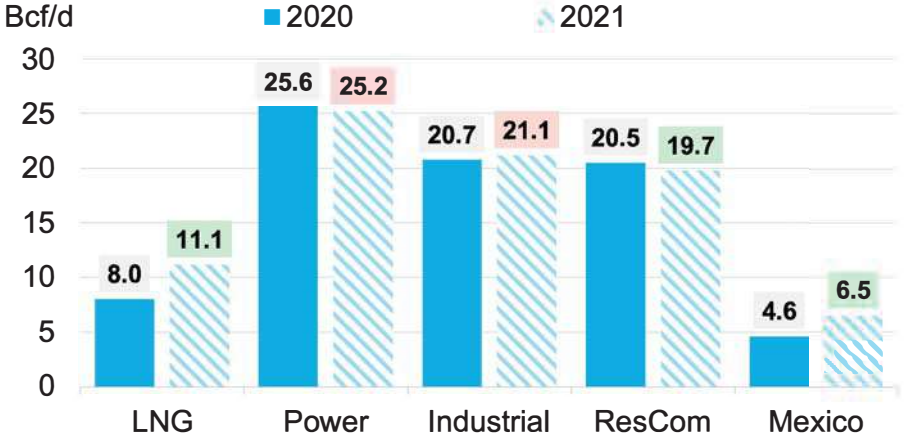
Supply by component for April 2021



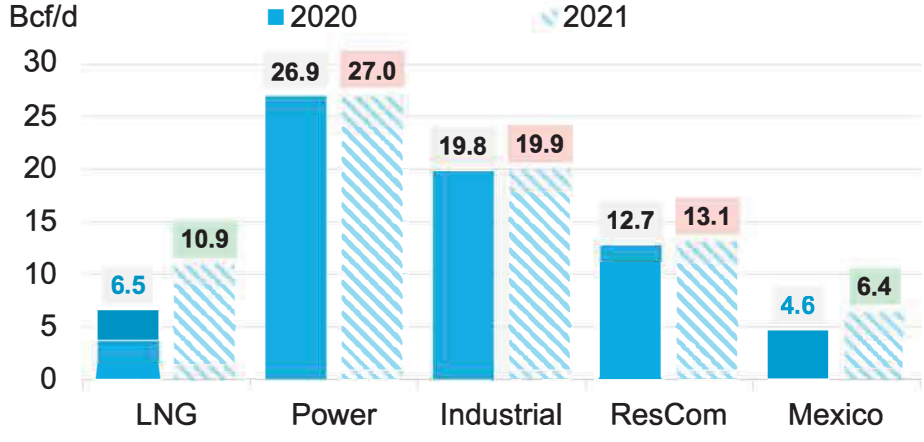
Supply by component for May 2021



Demand by component for April 2021



Demand by component for May 2021

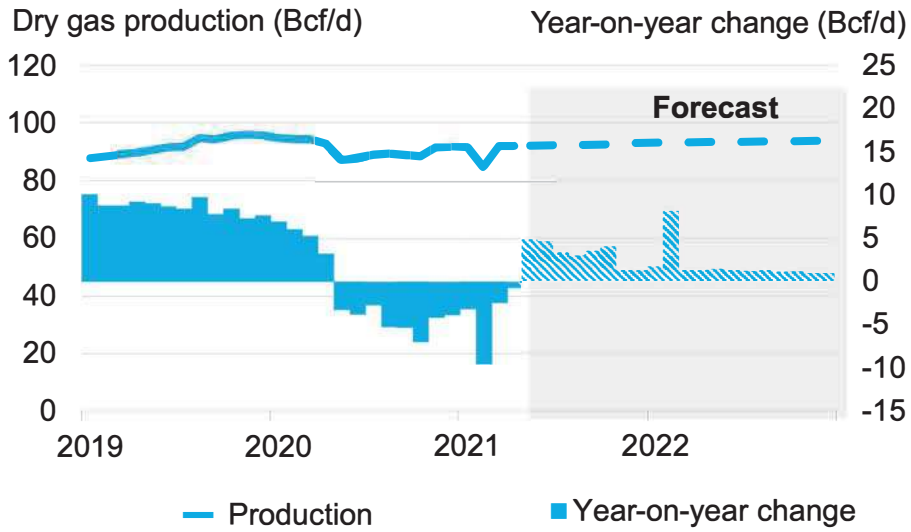


Source: BloombergNEF.

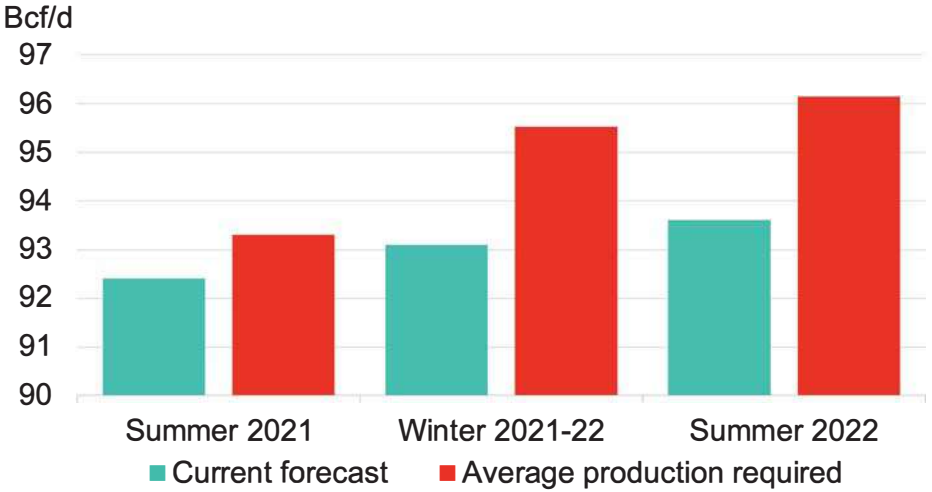
Production growth will come after the summer but too little too late

Explore the data: gas production tickers

Production forecast



Average production by season required to balance the market



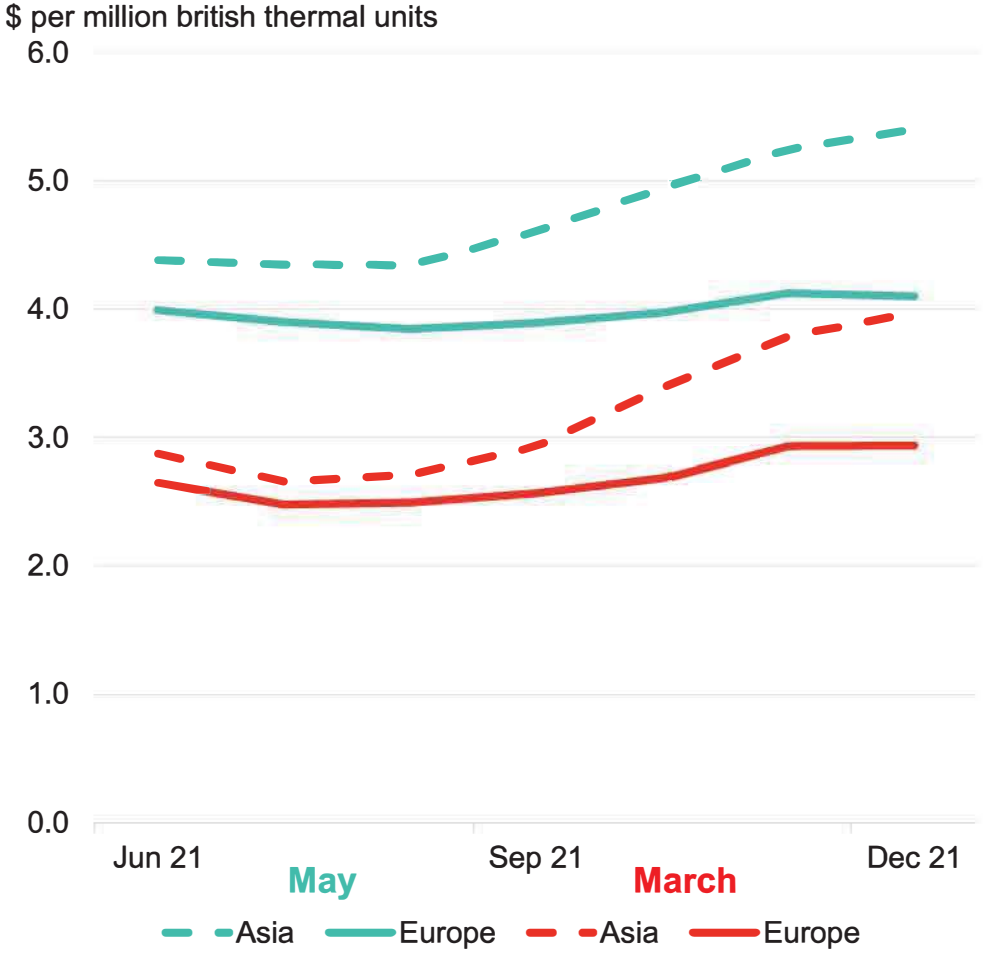
Source: BloombergNEF, Enervus (drillinginfo).

- BNEF forecasts domestic production to average 92.8Bcf/d over the next 12 months. This is only slightly above the previous forecast. Not much has changed from a crude perspective, with the front month WTI contract sitting at ~$65/bbl.
- Meanwhile, the gas curve has risen by 6% since March to average $3.07/MMBtu. With about 50% of domestic production hedged in the $2.6-2.75/MMBtu range, the full impact of the higher price environment won't be felt right away. Because producers continue to tout capital discipline in favor of reducing debt our production view remains flat for this summer, only including meaningful growth next season. For more details on gas hedging activity see: *Hedging Analysis for Gas Producers – LiveSheet (2.2)* (web | Terminal).
- Producers have a history of crushing bull runs in the gas market. In order to maintain this reputation, output needs to average 93.3Bcf/d this summer, 95.5Bcf/d over the winter and 96.1Bcf/d next summer. At these levels, inventories will finish each respective season at 5-year average levels. These levels of output seem out of reach at the moment.

All systems go for U.S. LNG

Explore the data: On-site LNG storage tickers

U.S. LNG export netbacks



Source: BloombergNEF. Note: LNG Netback Calculator (web | Terminal).

- U.S. LNG exports reached an all-time high, averaging 11.1Bcf/d in April. All terminals operated near 100% utilization for the duration of the month. Given the strength of netbacks (cargo export profitability), BNEF expects this trend of near 100% utilization to continue for the rest of 2021.
- Corpus Christi underwent an extremely light single day maintenance last month. BNEF expects these light maintenance events to become a theme this year, especially at the Cheniere facilities. More on the next slide.
- Netbacks to both Europe and Asia increased by over $1/MMBtu in some months versus March. A tight global LNG market means that Europe and Asia are effectively competing for cargoes. This provides ample incentive for U.S. exporters to ship as much of the fuel as possible over the next 12 months.
- Sabine Pass train 6 expected completion was moved forward to 1H 2022, meaning that it will likely start to consume feedgas by year-end. It joins the Calcasieu Pass facility that could also start in Q4 2021. Together, they represent the next phase of structural growth for U.S. LNG feedgas.

Severe tightness

U.S. L48 gas market supply-and-demand balance sheet

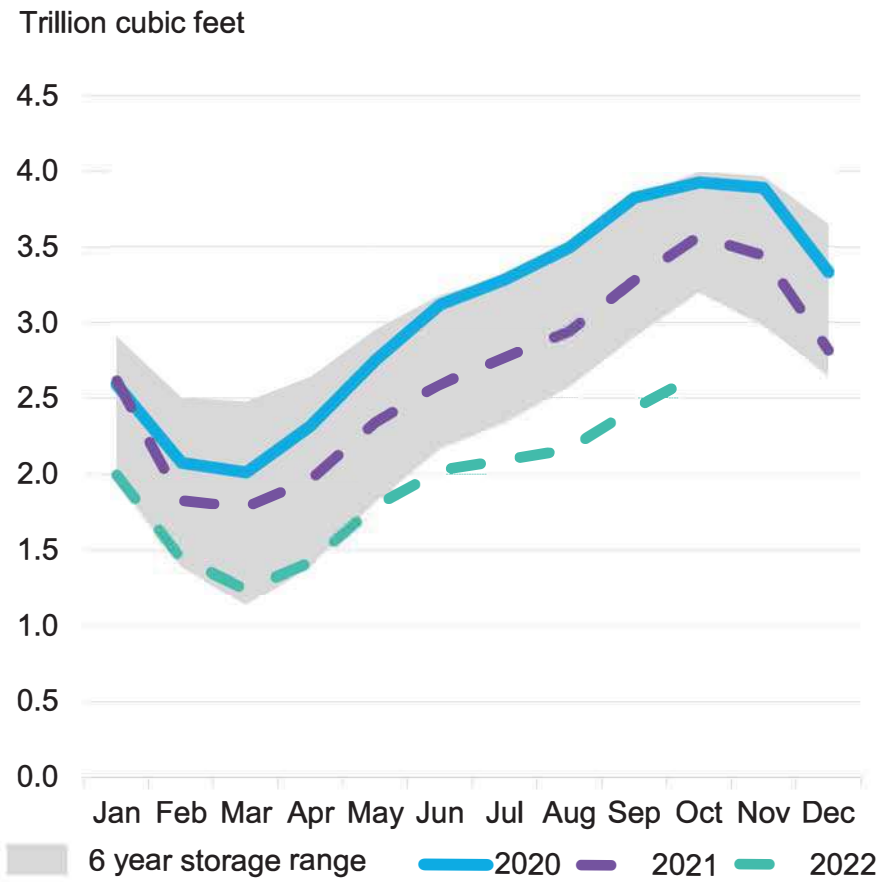
	Apr 21	May 21	Jun 21	Jul 21	Aug 21	Sep 21	Oct 21	Nov 21	Dec 21	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22
Dry production	92.1	92.2	92.3	92.4	92.5	92.5	92.6	93.0	93.1	93.2	92.9	93.2	93.4	93.6	93.6	93.5	93.7	93.6	93.7
Net imports from Canada	4.7	4.5	4.6	5.4	5.3	4.9	5.2	4.9	5.5	6.0	5.7	5.1	5.0	5.2	5.2	5.5	5.3	4.9	5.2
Total supply	**96.7**	**96.7**	**96.9**	**97.8**	**97.7**	**97.4**	**97.8**	**97.9**	**98.6**	**99.2**	**98.6**	**98.3**	**98.4**	**98.8**	**98.8**	**99.0**	**99.0**	**98.5**	**98.9**
Power consumption	25.2	27.0	34.4	37.6	37.8	32.5	27.5	25.1	26.1	25.9	23.7	23.8	23.9	26.5	33.3	39.0	39.1	33.5	28.4
Industrial consumption	21.1	19.9	20.2	21.9	21.8	21.5	22.7	24.2	25.5	25.4	24.8	23.4	22.2	21.8	22.0	22.3	22.2	21.7	22.8
Rescom consumption	19.7	13.1	9.7	7.8	7.8	8.5	14.3	27.6	40.6	46.8	42.6	31.0	19.7	11.7	8.7	7.8	7.8	8.5	14.3
Plant fuel	5.0	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4
Pipe losses	2.2	2.1	2.1	2.3	2.2	2.1	2.1	2.6	3.0	3.5	3.3	2.8	2.3	2.1	2.1	2.3	2.3	2.1	2.2
Exports to Mexico	6.5	6.4	6.3	6.4	6.5	6.5	6.4	6.4	6.2	6.3	6.3	6.7	6.8	6.7	6.7	6.7	6.8	6.8	6.8
LNG exports	11.1	10.9	10.5	11.0	10.9	9.8	10.1	11.0	12.0	12.3	12.3	11.9	12.3	12.5	12.8	13.3	13.3	11.4	11.9
Total demand	**90.9**	**84.6**	**88.4**	**92.2**	**92.2**	**86.2**	**88.5**	**102.2**	**118.7**	**125.6**	**118.2**	**104.9**	**92.5**	**86.7**	**91.0**	**96.8**	**96.8**	**89.5**	**91.7**
Balancing item	**-0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Average daily storage change last year	10.2	14.0	12.1	5.3	6.9	10.8	3.3	-1.1	-18.0	-23.0	-28.3	-1.3	6.2	12.1	8.5	5.6	5.5	11.3	9.4
Average daily storage change	6.2	12.1	8.5	5.6	5.5	11.3	9.4	-4.3	-20.1	-26.4	-19.6	-6.6	5.9	12.0	7.8	2.2	2.3	9.0	7.2
Total monthly storage change	187	374	254	174	171	338	290	-129	-623	-820	-549	-205	176	372	234	67	70	271	223
Storage level (Bcf)	**1,968**	**2,342**	**2,596**	**2,770**	**2,942**	**3,279**	**3,569**	**3,440**	**2,817**	**1,997**	**1,448**	**1,243**	**1,420**	**1,792**	**2,026**	**2,093**	**2,163**	**2,434**	**2,657**

Source: BloombergNEF. Note: Based on forward curve as of March 9, 2021. Green indicates tightness, the market is either withdrawing more or injecting less than for the same month a year prior.

Balances to end summer 2021 at 3,569Bcf

Read previous monthly: U.S. gas monthly: 'To the Moon?'

Natural gas inventory forecast, 2021-22



Source: BloombergNEF

Growth in industrial and LNG feedgas demand drive significant tightness in the gas market over the next three seasons. This has the potential to usher in a new era of higher gas prices.

Summer 2021

The current season ends with an inventory level of **3,569Bcf**, **352Bcf** lower than that of summer 2020. This tightness is almost entirely driven by LNG demand, which averages 5Bcf/d higher season-over-season. This cancels out the 3.2Bcf/d growth in production.

Winter 2021-22

The market ends next winter at **1,243Bcf, 538Bcf** lower than the level seen in March 2021. Industrial demand takes over from LNG to be the key driver, the sector will consume 2Bcf/d more in winter 2021-22 than a year earlier.

Summer 2022

LNG continues to grow next summer, this time through new trains at Sabine Pass and Calcasieu Pass. This further depletes inventories to just **2,657Bcf**, a massive 912Bcf below the forecasted level by summer 2021 end.

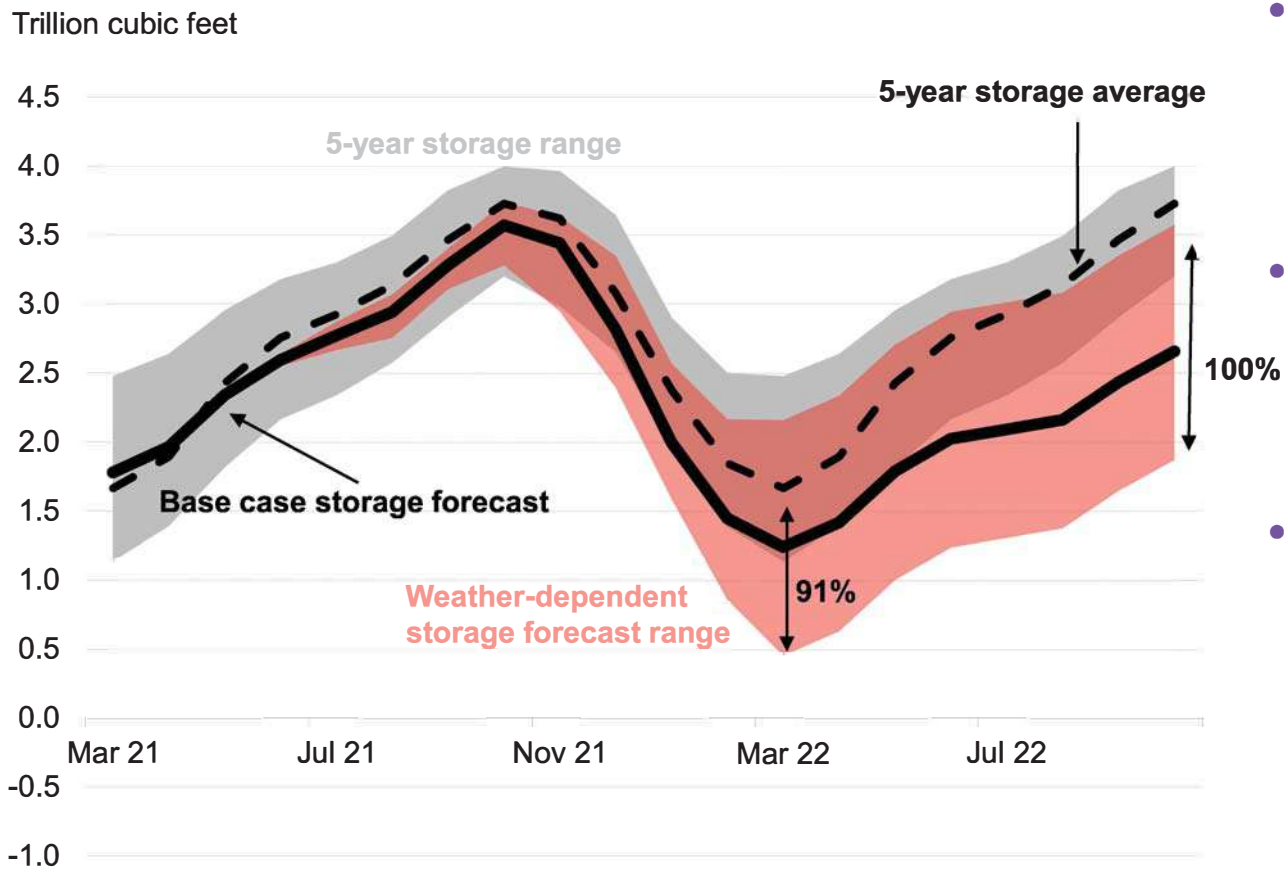
Year-on-year changes in major fundamental sectors

Sector	Summer 2021 (Bcf/d)	Winter 2021-22(Bcf/d)	Summer 2022 (Bcf/d)
Production	3.2	2.7	1.2
Power burns	-2.2	-2.1	0.2
ResCom	-0.1	0.8	-0.3
Industrial	0.4	2.0	0.9
LNG	5.0	1.9	1.9

91% probability storage ends summer 2021 below average

Read previous monthly: U.S. gas monthly: 'To the Moon?'

Weather-dependent gas storage forecast range versus 5-year historical storage levels



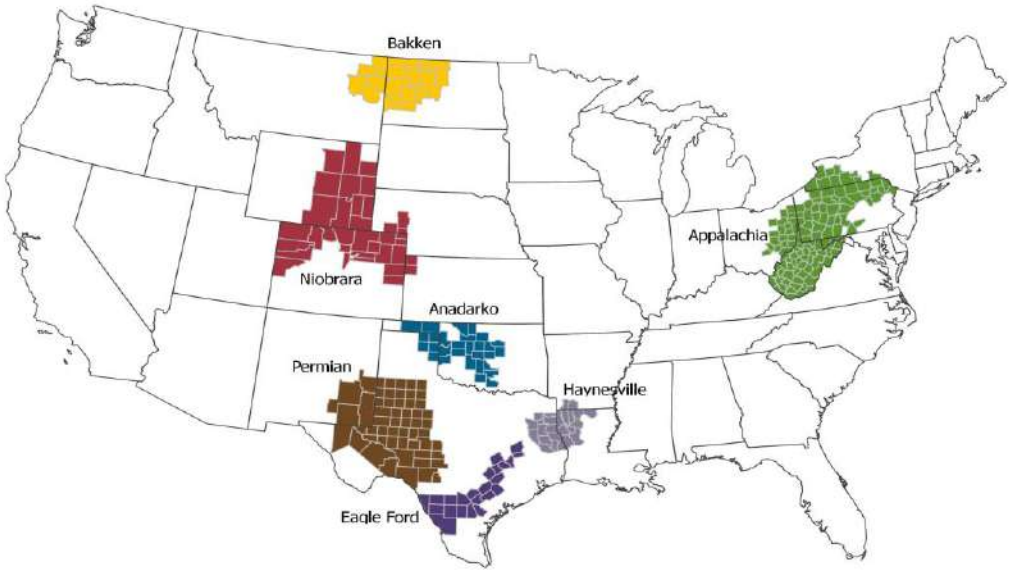
- This chart compares the five-year historical storage range (gray) with the weather variability (red translucent) of the base-case storage forecast. Weather variability is calculated by running the storage model under weather scenarios from 2010-2020.
- BNEF calculates **1,702Bcf** of storage level variability attributable to weather between now and summer-end 2022. This range is set by the cold period from May 2013-October 2014 and the much hotter May 2015-October 2016.
- There is a 91% chance that inventories will finish below the five-year average level at the end of summer 2021. This is because weather from only one out of 11 modeled years produced end-of-season balances above the average value of 3,726Bcf. This number is 73% for next winter and 100% for the following summer.

Source: BloombergNEF. Note: Weather modeling only varies Canadian imports, heating (ResCom) demand, industrial consumption and power burns. Other sectors are static.

Independent Statistics & Analysis
U.S. Energy Information Administration
May 2021

Drilling Productivity Report

For key tight oil and shale gas regions



Note:

The DPR rig productivity metric *new-well oil/gas production per rig* can become unstable during periods of rapid decreases or increases in the number of active rigs and well completions. The metric uses a fixed ratio of estimated total production from new wells divided by the region's monthly rig count, lagged by two months. The metric does not represent new-well oil/natural gas production per newly completed well.

The DPR metric *legacy oil/gas production change* can become unstable during periods of rapid decreases or increases in the volume of well production curtailments or shut-ins. This effect has been observed during winter weather freeze-offs, extreme flooding events, and the 2020 global oil demand contraction. The DPR methodology involves applying smoothing techniques to most of the data series because of inherent noise in the data.

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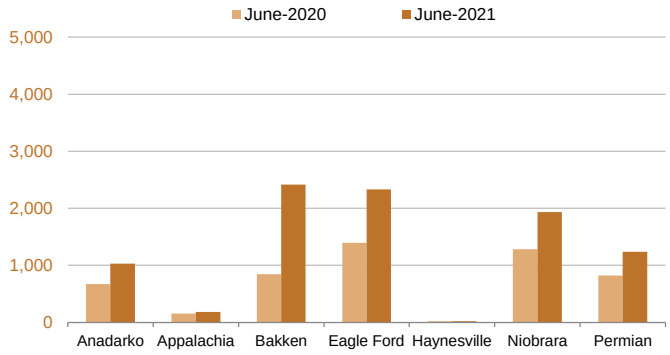
Year-over-year summary

May 2021

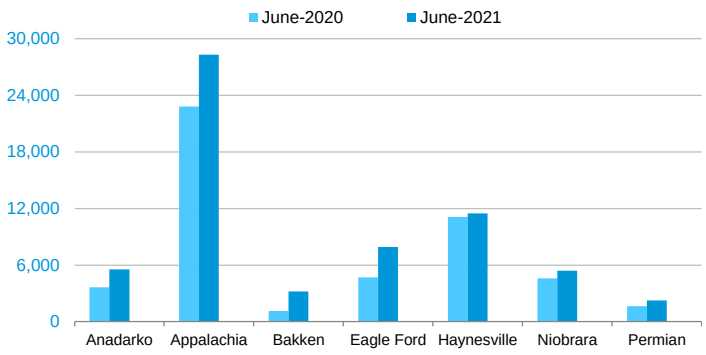
Drilling Productivity Report

drilling data through April
projected production through June

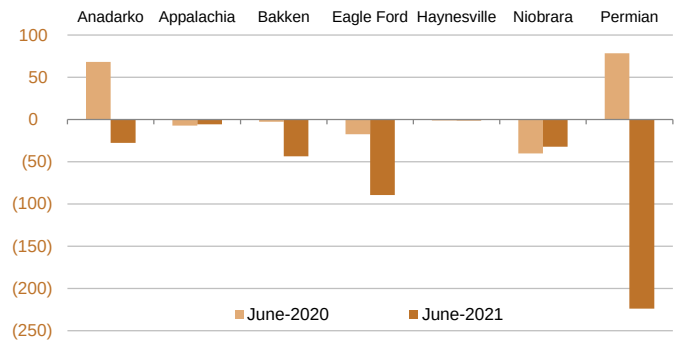
New-well oil production per rig
barrels/day



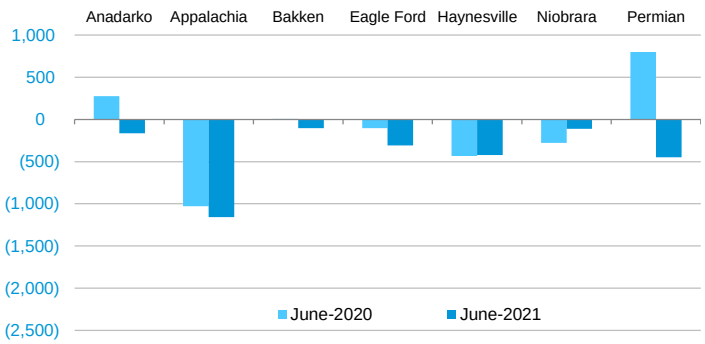
New-well gas production per rig
thousand cubic feet/day



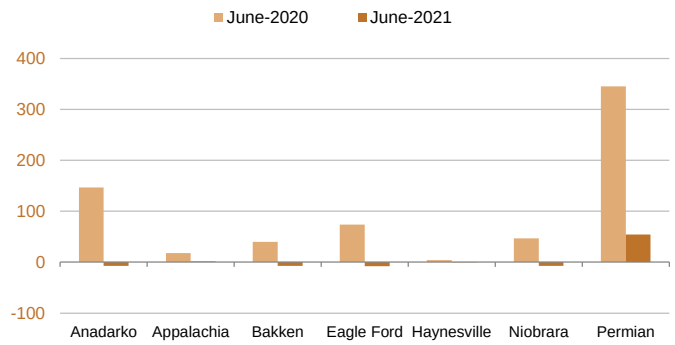
Legacy oil production change
thousand barrels/day



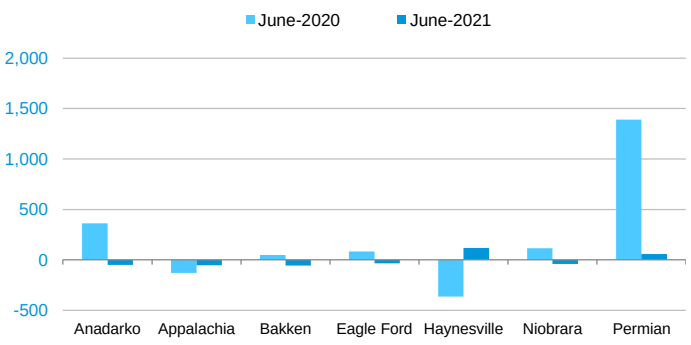
Legacy gas production change
million cubic feet/day



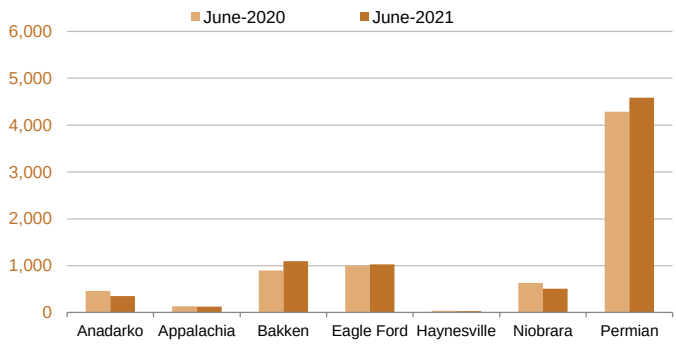
Indicated monthly change in oil production (Jun vs. May)
thousand barrels/day



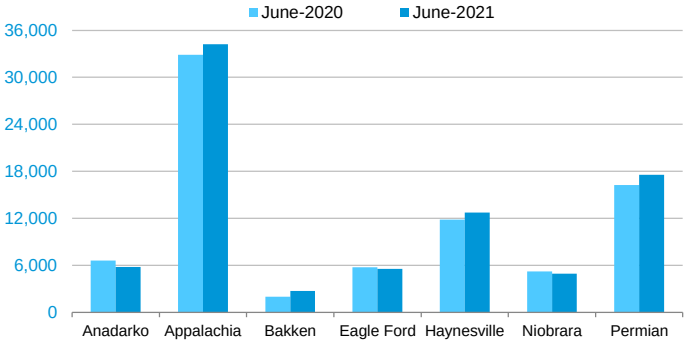
Indicated monthly change in gas production (Jun vs. May)
million cubic feet/day



Oil production
thousand barrels/day



Natural gas production
million cubic feet/day



Anadarko Region

Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil -2
barrels/day
month over month

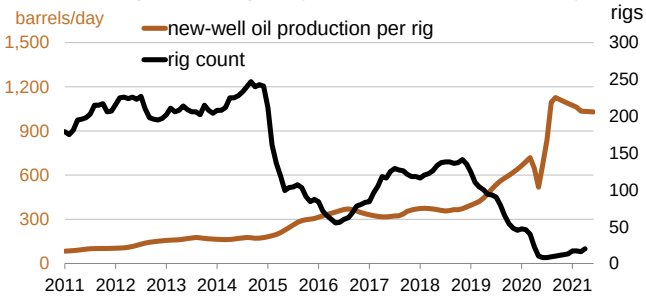
1,029 *June*
1,031 *May*
barrels/day

Monthly additions from one average rig

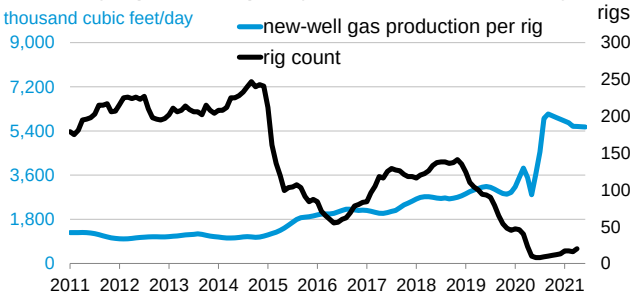
June **5,564**
May **5,575**
thousand cubic feet/day

Gas -11
thousand cubic feet/day
month over month

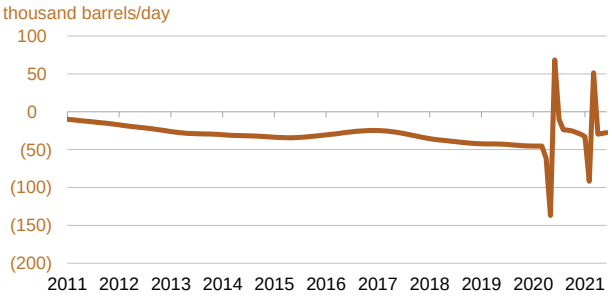
Anadarko Region
New-well oil production per rig



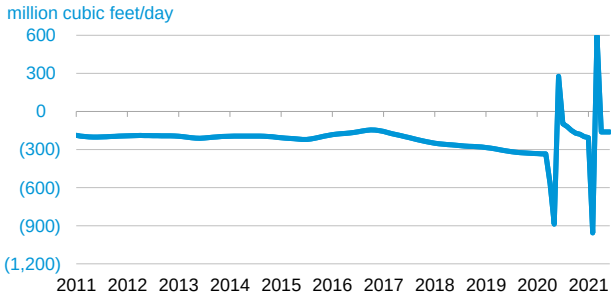
Anadarko Region
New-well gas production per rig



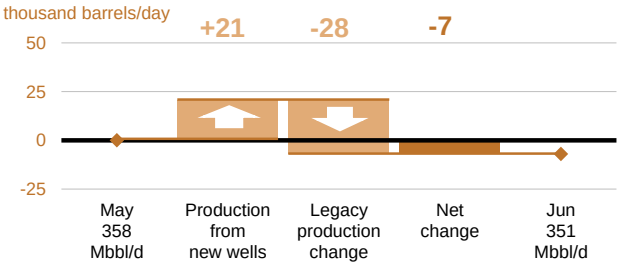
Anadarko Region
Legacy oil production change



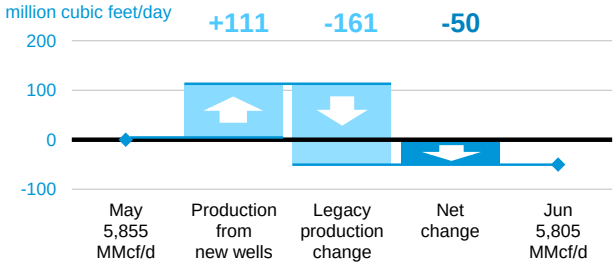
Anadarko Region
Legacy gas production change



Anadarko Region
Indicated change in oil production (Jun vs. May)

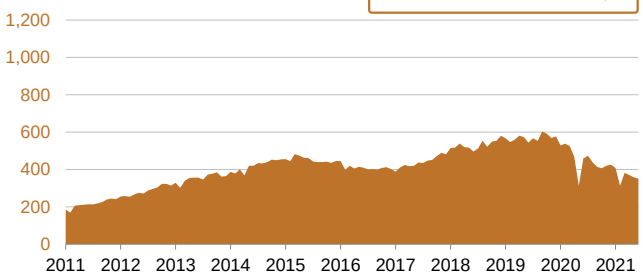


Anadarko Region
Indicated change in natural gas production (Jun vs. May)



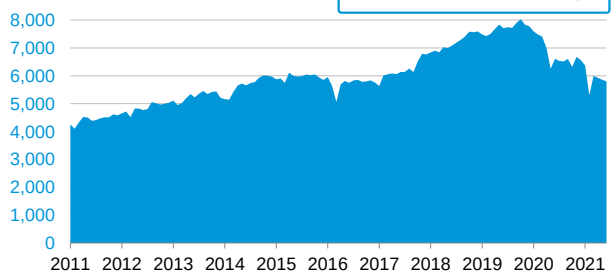
Anadarko Region
Oil production

Oil -7
thousand barrels/day
month over month



Anadarko Region
Natural gas production

Gas -50
million cubic feet/day
month over month



Appalachia Region
Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil +2
barrels/day
month over month

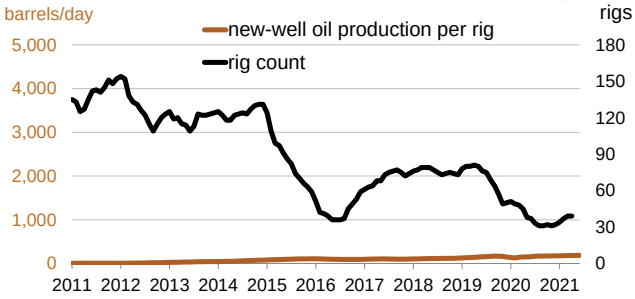
186 *June*
184 *May*
barrels/day

Monthly additions from one average rig

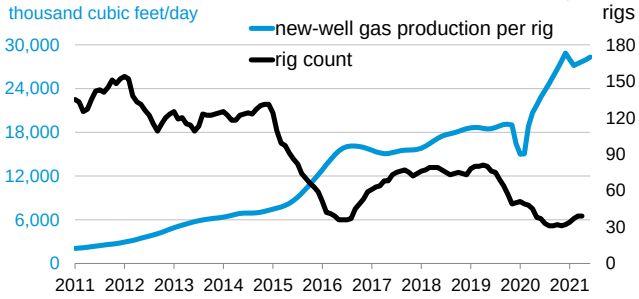
June **28,335**
May **27,985**
thousand cubic feet/day

Gas +350
thousand cubic feet/day
month over month

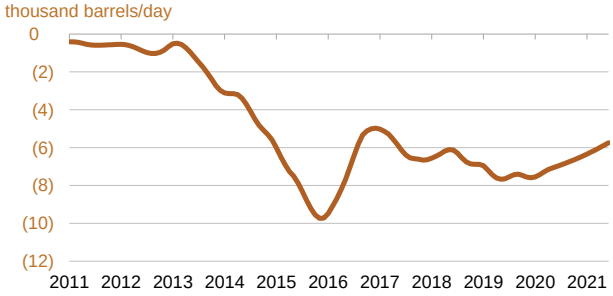
Appalachia Region
New-well oil production per rig



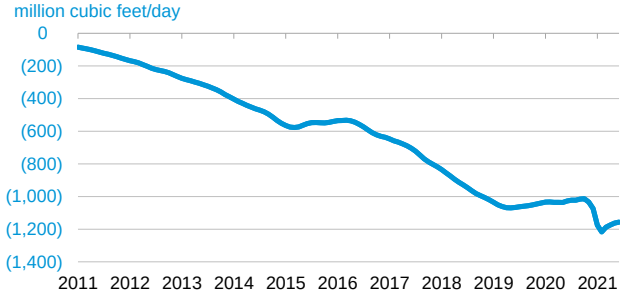
Appalachia Region
New-well gas production per rig



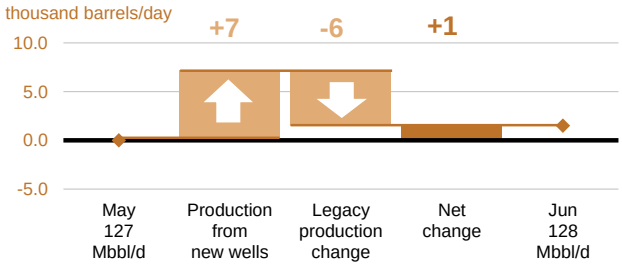
Appalachia Region
Legacy oil production change



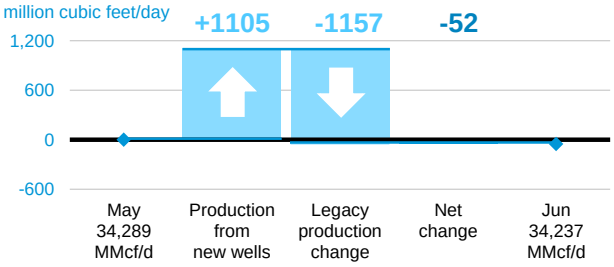
Appalachia Region
Legacy gas production change



Appalachia Region
Indicated change in oil production (Jun vs. May)

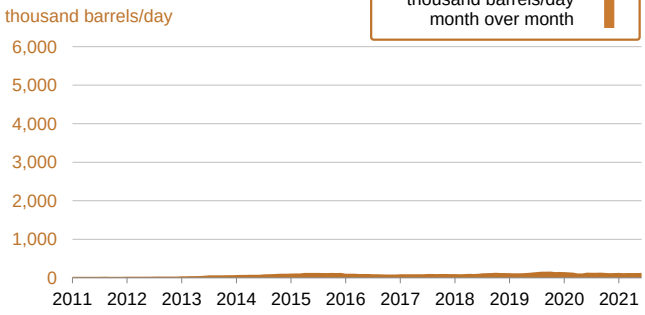


Appalachia Region
Indicated change in natural gas production (Jun vs. May)



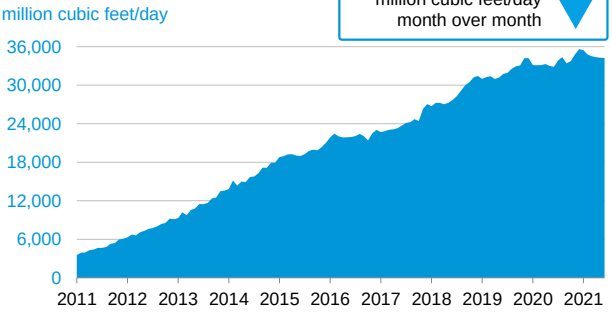
Appalachia Region
Oil production

Oil +1
thousand barrels/day
month over month



Appalachia Region
Natural gas production

Gas -52
million cubic feet/day
month over month



Bakken Region
Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil -10
barrels/day
month over month

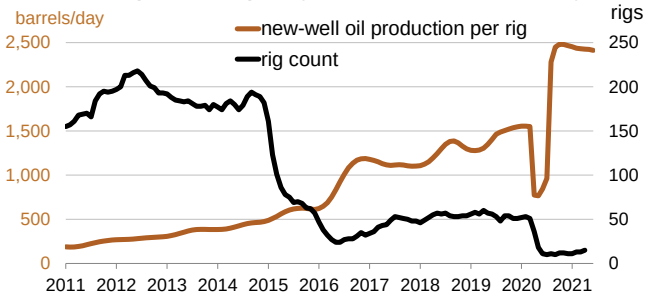
2,413 *June*
2,423 *May*
barrels/day

Monthly additions from one average rig

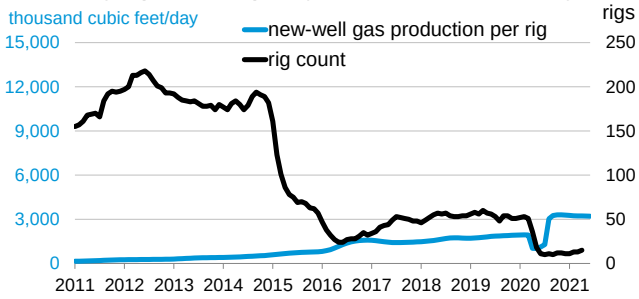
June **3,210**
May **3,223**
thousand cubic feet/day

Gas -13
thousand cubic feet/day
month over month

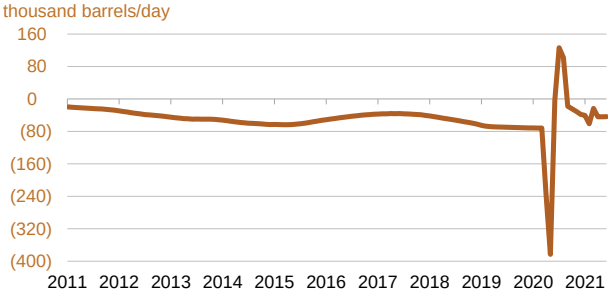
Bakken Region
New-well oil production per rig



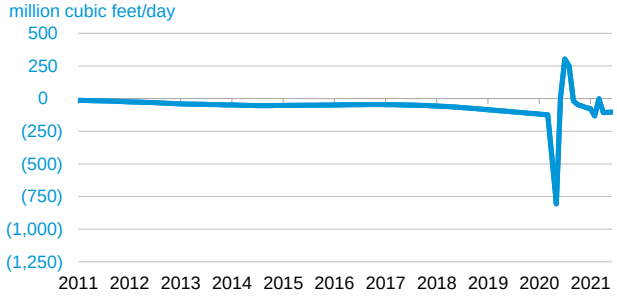
Bakken Region
New-well gas production per rig



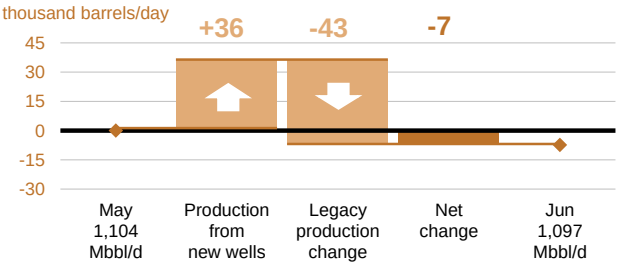
Bakken Region
Legacy oil production change



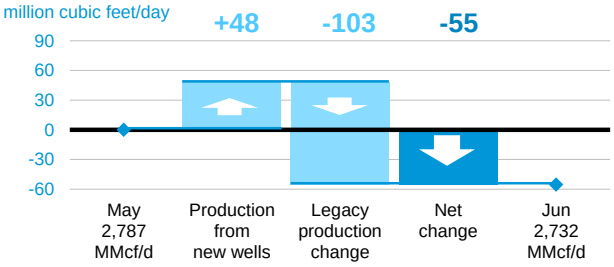
Bakken Region
Legacy gas production change



Bakken Region
Indicated change in oil production (Jun vs. May)

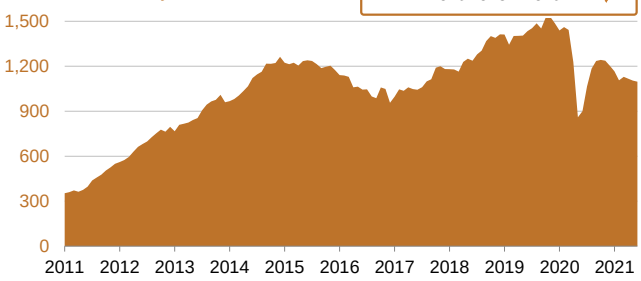


Bakken Region
Indicated change in natural gas production (Jun vs. May)



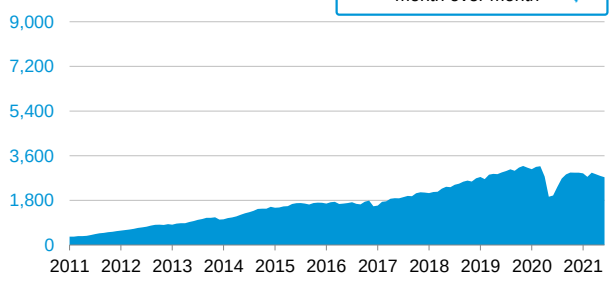
Bakken Region
Oil production

Oil -7
thousand barrels/day
month over month



Bakken Region
Natural gas production

Gas -55
million cubic feet/day
month over month



Eagle Ford Region

Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil +3
barrels/day
month over month

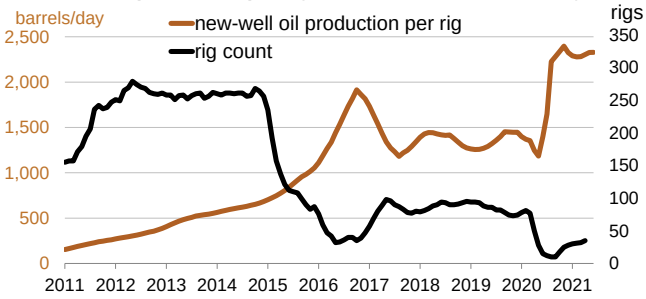
2,329 *June*
2,326 *May*
barrels/day

Monthly additions from one average rig

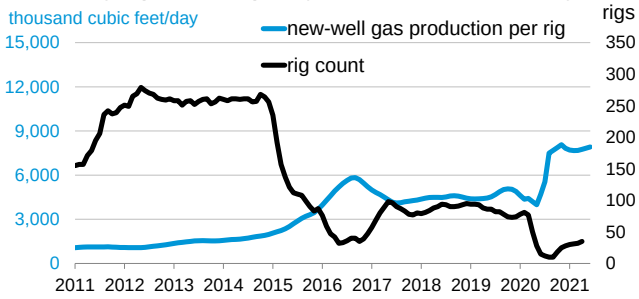
June **7,911**
May **7,832**
thousand cubic feet/day

Gas +79
thousand cubic feet/day
month over month

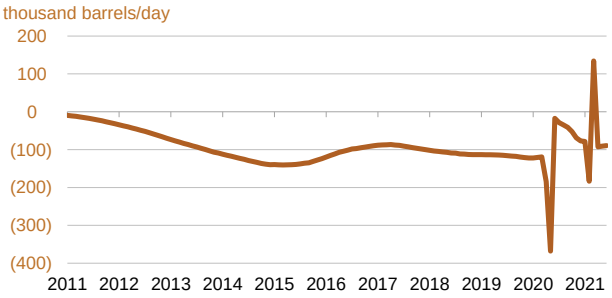
Eagle Ford Region
New-well oil production per rig



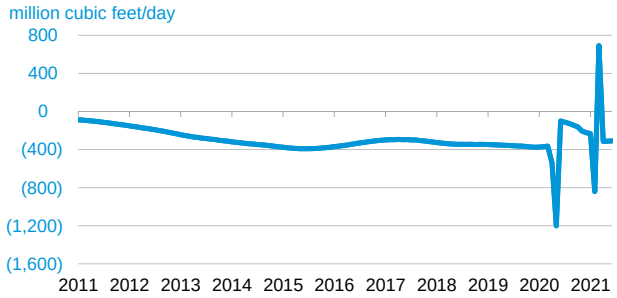
Eagle Ford Region
New-well gas production per rig



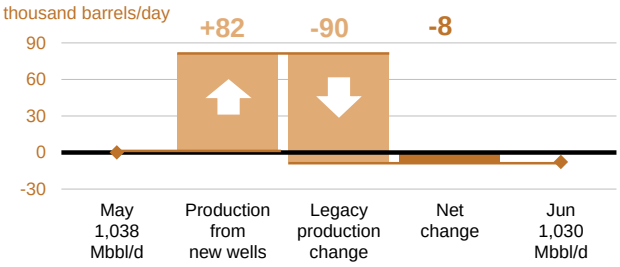
Eagle Ford Region
Legacy oil production change



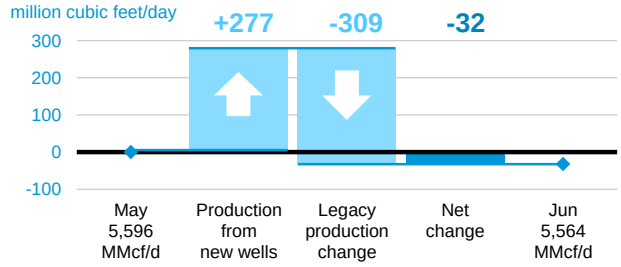
Eagle Ford Region
Legacy gas production change



Eagle Ford Region
Indicated change in oil production (Jun vs. May)

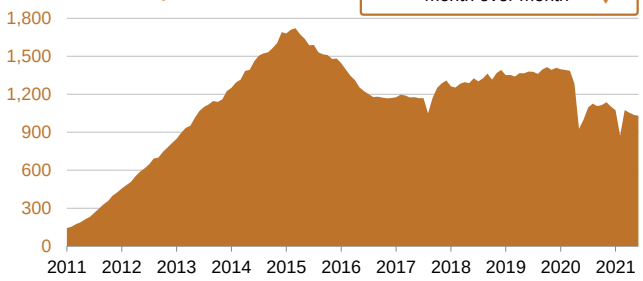


Eagle Ford Region
Indicated change in natural gas production (Jun vs. May)



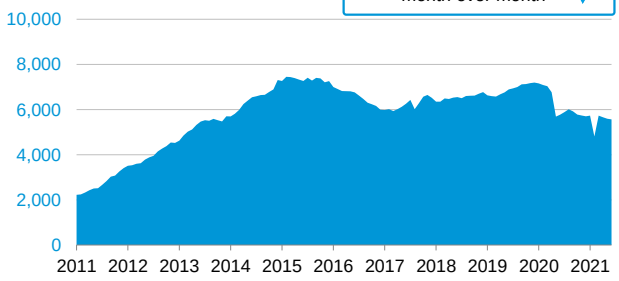
Eagle Ford Region
Oil production

Oil -8
thousand barrels/day
month over month



Eagle Ford Region
Natural gas production

Gas -32
million cubic feet/day
month over month



Haynesville Region

Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil 0
barrels/day
month over month

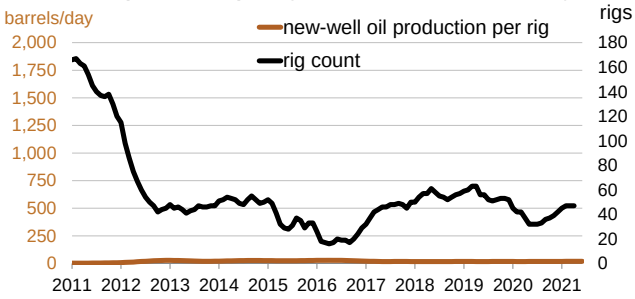
19 *June*
19 *May*
barrels/day

Monthly additions from one average rig

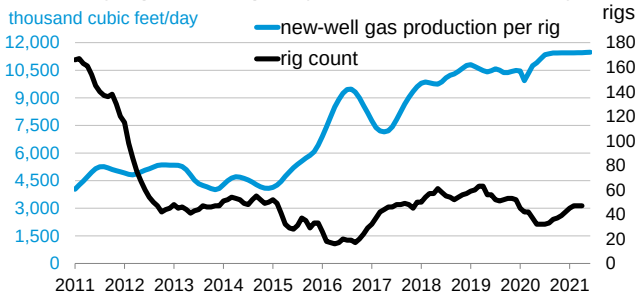
June **11,479**
May **11,468**
thousand cubic feet/day

Gas +11
thousand cubic feet/day
month over month

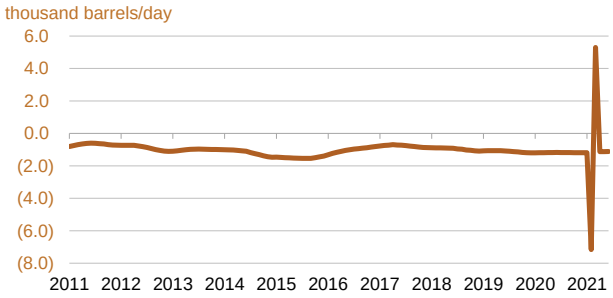
Haynesville Region
New-well oil production per rig



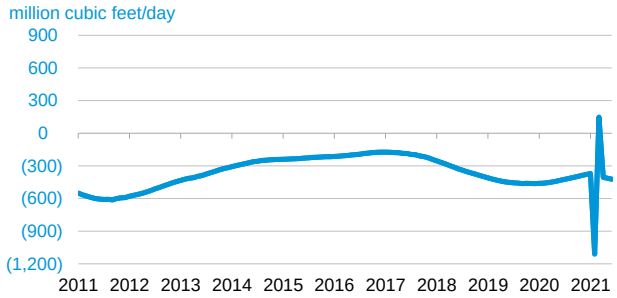
Haynesville Region
New-well gas production per rig



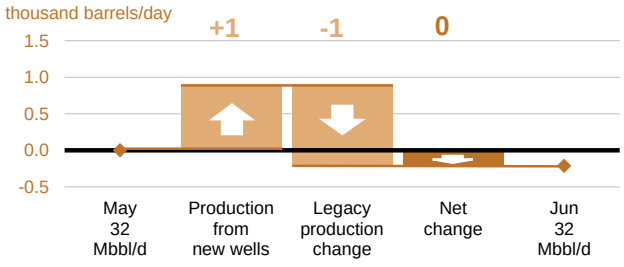
Haynesville Region
Legacy oil production change



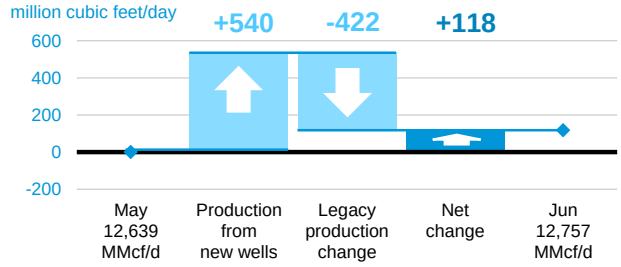
Haynesville Region
Legacy gas production change



Haynesville Region
Indicated change in oil production (Jun vs. May)

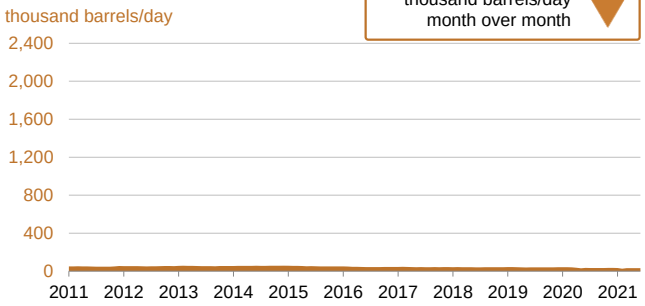


Haynesville Region
Indicated change in natural gas production (Jun vs. May)



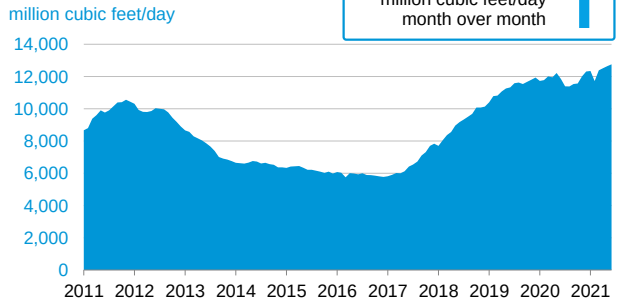
Haynesville Region
Oil production

Oil 0
thousand barrels/day
month over month



Haynesville Region
Natural gas production

Gas +118
million cubic feet/day
month over month



Niobrara Region

Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil -1
barrels/day
month over month

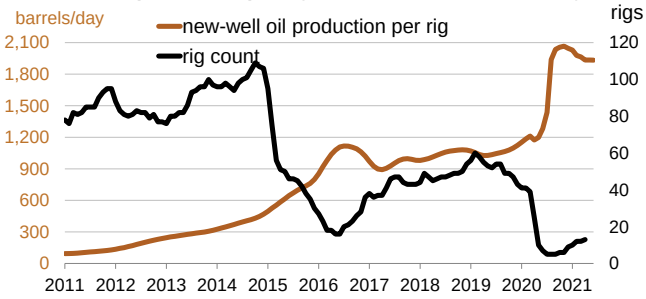
1,933 *June*
1,934 *May*
barrels/day

Monthly additions from one average rig

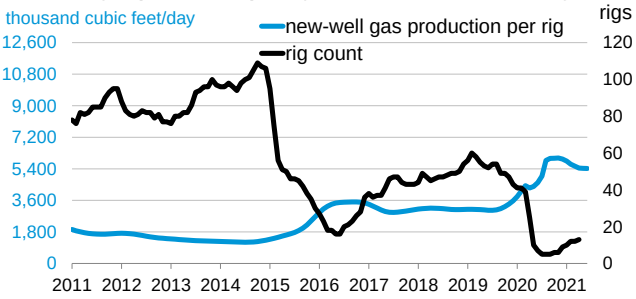
June **5,418**
May **5,429**
thousand cubic feet/day

Gas -11
thousand cubic feet/day
month over month

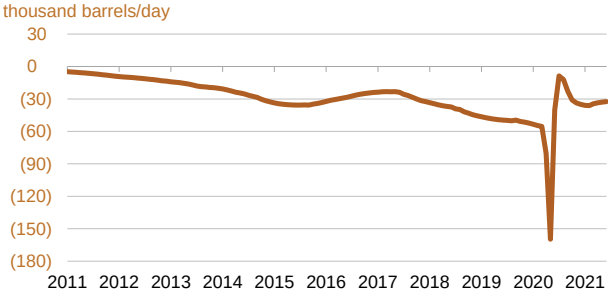
Niobrara Region
New-well oil production per rig



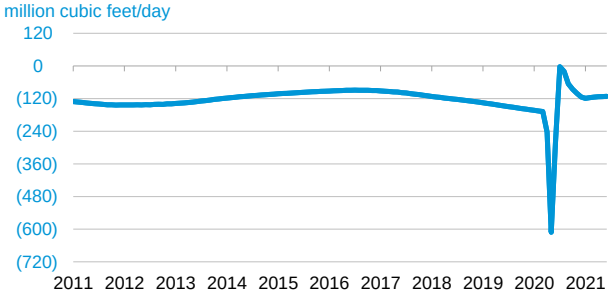
Niobrara Region
New-well gas production per rig



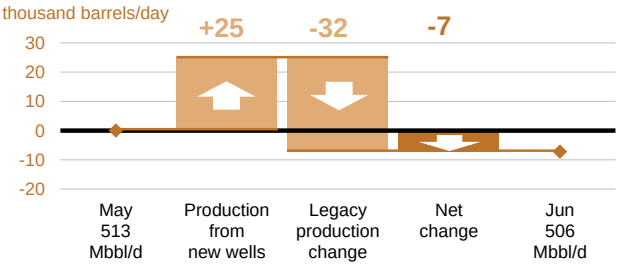
Niobrara Region
Legacy oil production change



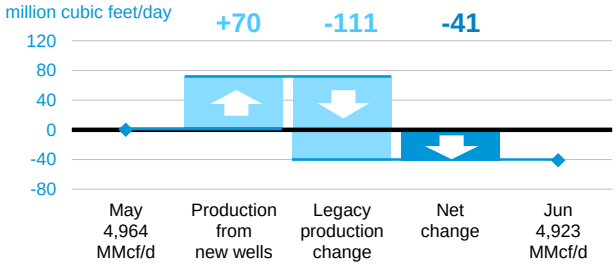
Niobrara Region
Legacy gas production change



Niobrara Region
Indicated change in oil production (Jun vs. May)

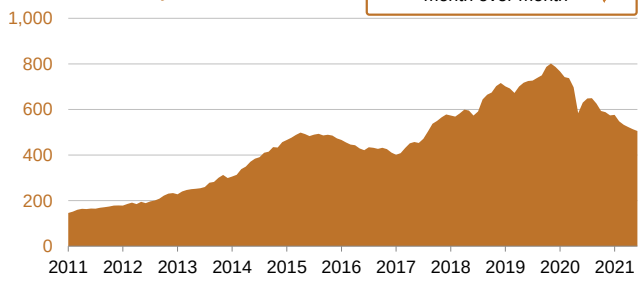


Niobrara Region
Indicated change in natural gas production (Jun vs. May)



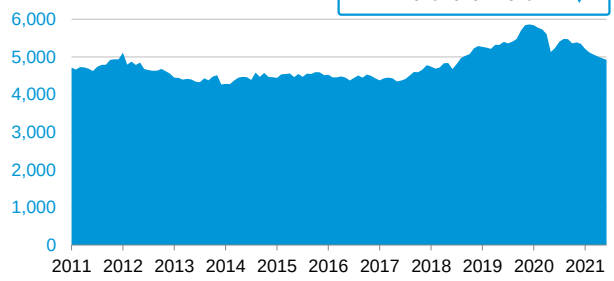
Niobrara Region
Oil production

Oil -7
thousand barrels/day
month over month



Niobrara Region
Natural gas production

Gas -41
million cubic feet/day
month over month



Permian Region

Drilling Productivity Report

May 2021

drilling data through April
projected production through June

Oil -12 barrels/day month over month

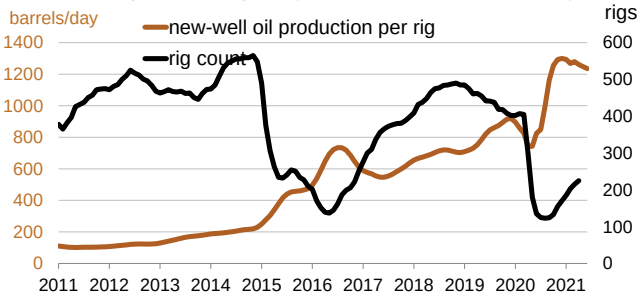
1,236 *June*
1,248 *May*
barrels/day

Monthly additions from one average rig

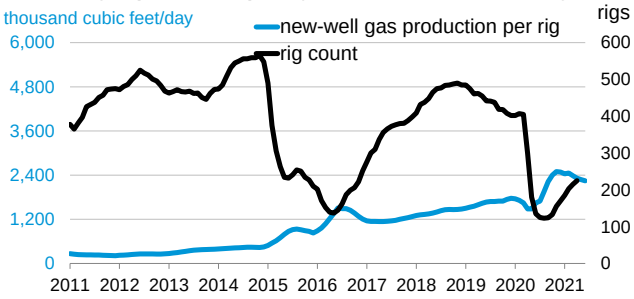
June **2,244**
May **2,279**
thousand cubic feet/day

Gas -35 thousand cubic feet/day month over month

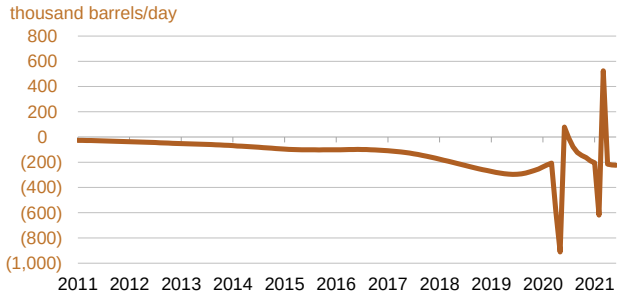
Permian Region
New-well oil production per rig



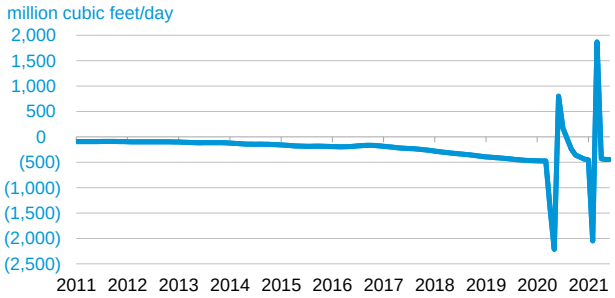
Permian Region
New-well gas production per rig



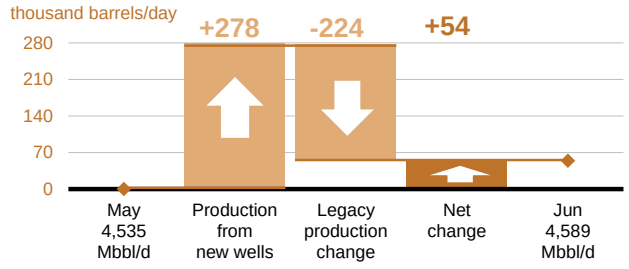
Permian Region
Legacy oil production change



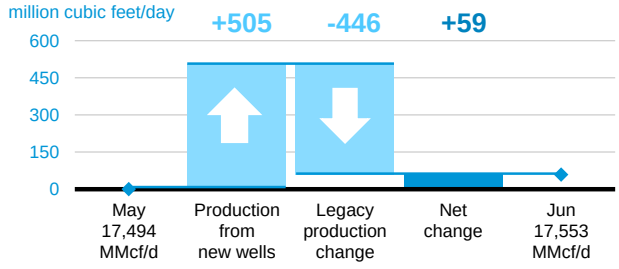
Permian Region
Legacy gas production change



Permian Region
Indicated change in oil production (Jun vs. May)

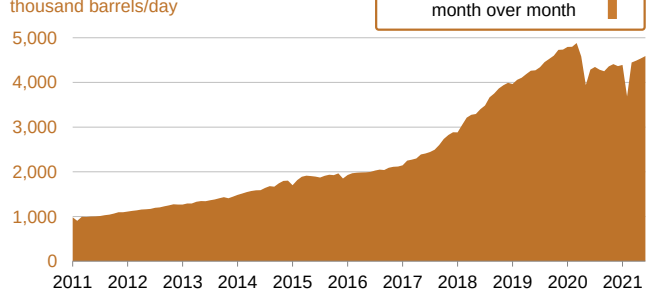


Permian Region
Indicated change in natural gas production (Jun vs. May)



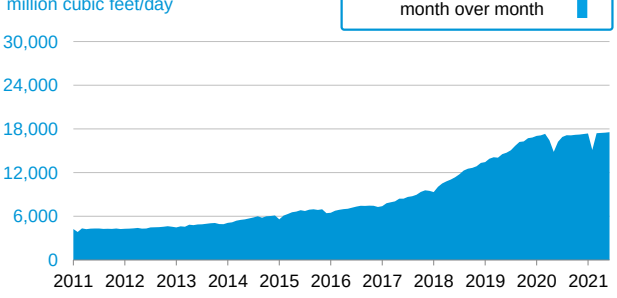
Permian Region
Oil production

Oil +54 thousand barrels/day month over month



Permian Region
Natural gas production

Gas +59 million cubic feet/day month over month



The Drilling Productivity Report uses recent data on the total number of drilling rigs in operation along with estimates of drilling productivity and estimated changes in production from existing oil and natural gas wells to provide estimated changes in oil[1] and natural gas[2] production for seven key regions. EIA's approach does not distinguish between oil-directed rigs and gas-directed rigs because once a well is completed it may produce both oil and gas; more than half of the wells do that.

Monthly additions from one average rig
Monthly additions from one average rig represent EIA's estimate of an average rig's[3] contribution to production of oil and natural gas from new wells.[4] The estimation of new-well production per rig uses several months of recent historical data on total production from new wells for each field divided by the region's monthly rig count, lagged by two months.[5] Current- and next-month values are listed on the top header. The month-over-month change is listed alongside, with +/- signs and color-coded arrows to highlight the growth or decline in oil (brown) or natural gas (blue).

New-well oil/gas production per rig
Charts present historical estimated monthly additions from one average rig coupled with the number of total drilling rigs as reported by Baker Hughes.

Legacy oil and natural gas production change
Charts present EIA's estimates of total oil and gas production changes from all the wells other than the new wells. The trend is dominated by the well depletion rates, but other circumstances can influence the direction of the change. For example, well freeze-offs or hurricanes can cause production to significantly decline in any given month, resulting in a production increase the next month when production simply returns to normal levels.

Projected change in monthly oil/gas production
Charts present the combined effects of new-well production and changes to legacy production. Total new-well production is offset by the anticipated change in legacy production to derive the net change in production. The estimated change in production does not reflect external circumstances that can affect the actual rates, such as infrastructure constraints, bad weather, or shut-ins based on environmental or economic issues.

Oil/gas production
Charts present all oil and natural gas production from both new and legacy wells since 2007. This production is based on all wells reported to the state oil and gas agencies. Where state data are not immediately available, EIA estimates the production based on estimated changes in new-well oil/gas production and the corresponding legacy change.

Footnotes:
1. Oil production represents both crude and condensate production from all formations in the region. Production is not limited to tight formations. The regions are defined by all selected counties, which include areas outside of tight oil formations.
2. Gas production represents gross (before processing) gas production from all formations in the region. Production is not limited to shale formations. The regions are defined by all selected counties, which include areas outside of shale formations.
3. The monthly average rig count used in this report is calculated from weekly data on total oil and gas rigs reported by Baker Hughes.
4. A new well is defined as one that began producing for the first time in the previous month. Each well belongs to the new-well category for only one month. Reworked and recompleted wells are excluded from the calculation.
5. Rig count data lag production data because EIA has observed that the best predictor of the number of new wells beginning production in a given month is the count of rigs in operation two months earlier.

The data used in the preparation of this report come from the following sources. EIA is solely responsible for the analysis, calculations, and conclusions.

Drilling Info (http://www.drillinginfo.com) Source of production, permit, and spud data for counties associated with this report. Source of real-time rig location to estimate new wells spudded and completed throughout the United States.

Baker Hughes (http://www.bakerhughes.com) Source of rig and well counts by county, state, and basin.

North Dakota Oil and Gas Division (https://www.dmr.nd.gov/oilgas) Source of well production, permit, and completion data in the counties associated with this report in North Dakota

Railroad Commission of Texas (http://www.rrc.state.tx.us) Source of well production, permit, and completion data in the counties associated with this report in Texas

Pennsylvania Department of Environmental Protection (https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Welcome/Welcome.aspx) Source of well production, permit, and completion data in the counties associated with this report in Pennsylvania

West Virginia Department of Environmental Protection (http://www.dep.wv.gov/oil-and-gas/Pages/default.aspx) Source of well production, permit, and completion data in the counties associated with this report in West Virginia

Colorado Oil and Gas Conservation Commission (http://cogcc.state.co.us) Source of well production, permit, and completion data in the counties associated with this report in Colorado

Wyoming Oil and Conservation Commission (http://wogcc.state.wy.us) Source of well production, permit, and completion data in the counties associated with this report in Wyoming

Louisiana Department of Natural Resources (http://dnr.louisiana.gov) Source of well production, permit, and completion data in the counties associated with this report in Louisiana

Ohio Department of Natural Resources (http://oilandgas.ohiodnr.gov) Source of well production, permit, and completion data in the counties associated with this report in Ohio

Oklahoma Corporation Commission (http://www.occeweb.com/og/oghome.htm) Source of well production, permit, and completion data in the counties associated with this report in Oklahoma

https://rbnenergy.com/big-gun-part-2-why-natural-gas-production-took-off-in-british-columbias-montney-region

Big Gun, Part 2 - Why Natural Gas Production Took Off In British Columbia's Montney Region

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Published by: Martin King

The Montney Formation in British Columbia and Alberta is exclusively responsible for the turnaround in Western Canada's natural gas production in the past decade. Gas production in the Montney — a vast area with extraordinary reserves — has doubled in that time, with most of that growth coming from the BC side of the formation. This phenomenal growth story stems from a few key factors, including steadily improving gas well performance and increasing wellbore length, coupled with access to an established network of gas pipelines. Today, we delve into what has made BC's portion of the Montney such as standout.

After the acclaimed oil sands of Alberta, the Montney Formation is probably the most talked about geologic play in Western Canada in the past 20 years. Mostly known for its immense reserves and growing production of natural gas, the Montney has risen to prominence in the context of both the Canadian and broader North American gas markets. Within a few years, its reserves will also begin feeding the currently under construction LNG Canada liquefaction plant and export terminal on the BC coast, extending the access of Montney gas to overseas markets.

In Part 1 of this series, we said that the immense Montney Formation straddles the provincial boundary between BC and Alberta (yellow-outlined region in Figure 1) and covers about 50,000 square miles (~130,000 square kilometers), making it about two-thirds the size of the Permian Basin in Texas and New Mexico. Joint studies between the Canada Energy Regulator (CER) and the provincial energy agencies of BC and Alberta have estimated remaining recoverable reserves for the Montney at 567 Tcf, with about 342 Tcf in BC and 224 Tcf in Alberta. We noted that the Montney is sandwiched between the Duvernay Formation and the Alberta Deep Basin, areas that also have considerable hydrocarbon reserves.

Last time, we also discussed what has been the incorrect tendency the hang the moniker of "shale" on the Montney. It primarily consists of tightly packed siltstone and some sandstone, with only modest amounts of shale on its easternmost edge, making it more of a tight gas play. Nevertheless, the nature of this geology (just like a shale play) places the Montney in the category of unconventional gas, meaning that its reserves have to be unlocked via horizontal drilling in combination with multi-stage hydraulic fracturing to allow for the release of hydrocarbons such as natural gas. It has been the rapid application of this drilling and completion approach that has resulted in Montney gas production rising from zero in 2005 to more than 40% of all the natural gas produced in Western Canada as of February 2021.

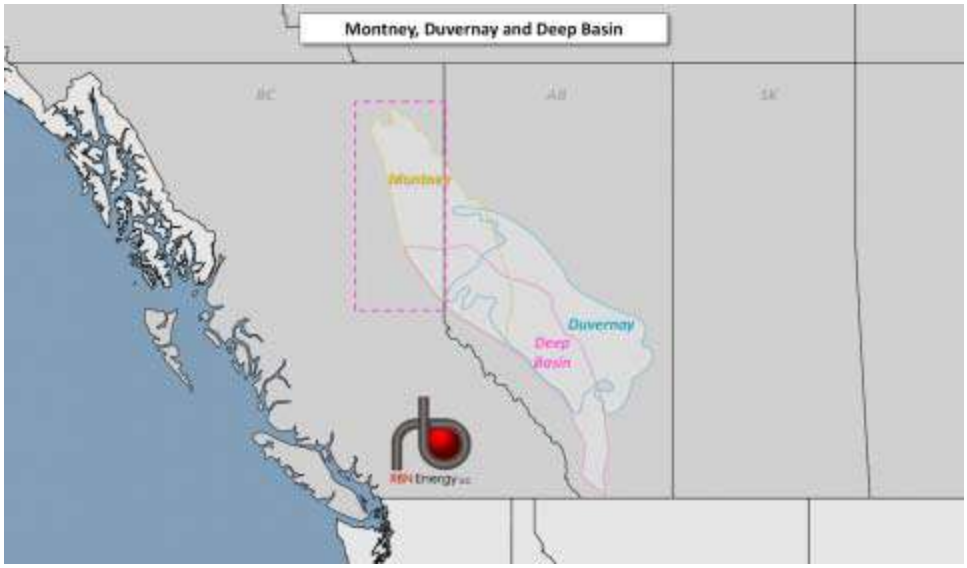


Figure 1. Montney, Duvernay and Deep Basin. Source: RBN

Today, in Part 2, we are focusing on the BC side of the formation (dashed pink rectangle in Figure 1) to get some sense for how fast and how far gas production has risen in the past 15 years in Canada's westernmost province. Later, in Part 3 of this series, we will jump over the provincial boundary and look at Alberta's experience with the Montney.

As shown in Figure 2 below, gas production in what we'll refer to as the BC Montney (blue bar segments and left axis) has increased from zero in 2005 to 5.0 Bcf/d in February 2021, while non-Montney production in BC (red bar segments and left axis) has decreased from 2.5 Bcf/d to about 0.5 Bcf/d over the same period. As a result, BC Montney production now accounts for about 90% of total BC gas production (black line and right axis) and 32% of gas production in the Western Canadian Sedimentary Basin (WCSB; green line and right axis). This phenomenal growth in BC Montney production is partly a function of the layout of the geology that just happens to lie more on the BC side of the provincial boundary and favors more dry gas reserves and production. There also happens to be a significant amount of gas pipeline takeaway capacity in eastern BC via the Westcoast Pipeline and Alliance Pipeline systems and portions of TC Energy's Nova Gas Transmission Limited (NGTL) system (more on this in Part 3). As a group, these pipelines have been able to accommodate BC Montney production growth as other sources in the province declined in importance.

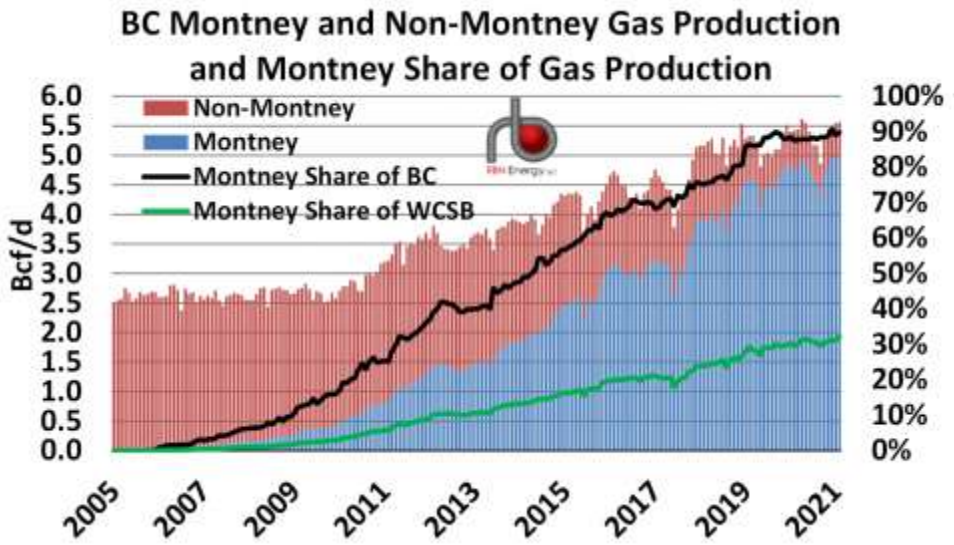


Figure 2. BC Montney and Non-Montney Gas Production and BC Montney's Share of BC and WCSB Gas Production. Sources: BC Oil and Gas Commission (BCOCG), RBN's Canadian NATGAS Billboard.

The potential productivity of BC Montney's geology becomes evident when you consider the average peak production of Montney gas wells in eastern BC. By sorting gas wells by the month and year in which first gas production began, production results can be determined by averaging across all wells in their first full month of production, followed by all wells in their second month of production, etc. As you can see, wells typically reach their peak output within three to four months after first coming into production. And though these volumes aren't nearly as large as typical wells from the big gassy plays in the U.S. — Haynesville and Appalachia — you can see that there has been a clear and unmistakable upward trend in the average well peak productivity since 2005 (colored dots within dashed pink oval in Figure 3). Highlighting well performance at five-year intervals, average peak production rose from 0.91 MMcf/d in 2005 (light blue arrow and dot), to 2.70 MMcf/d in 2010 (light green arrow and dot), followed by 3.20 MMcf/d in 2015 (dark green arrow and dot), and finally reaching 4.33 MMcf/d in 2020 (orange arrow and dot). Put another way, 2020's results show an average peak rate that is more than four times greater than the wells brought into production in 2005.

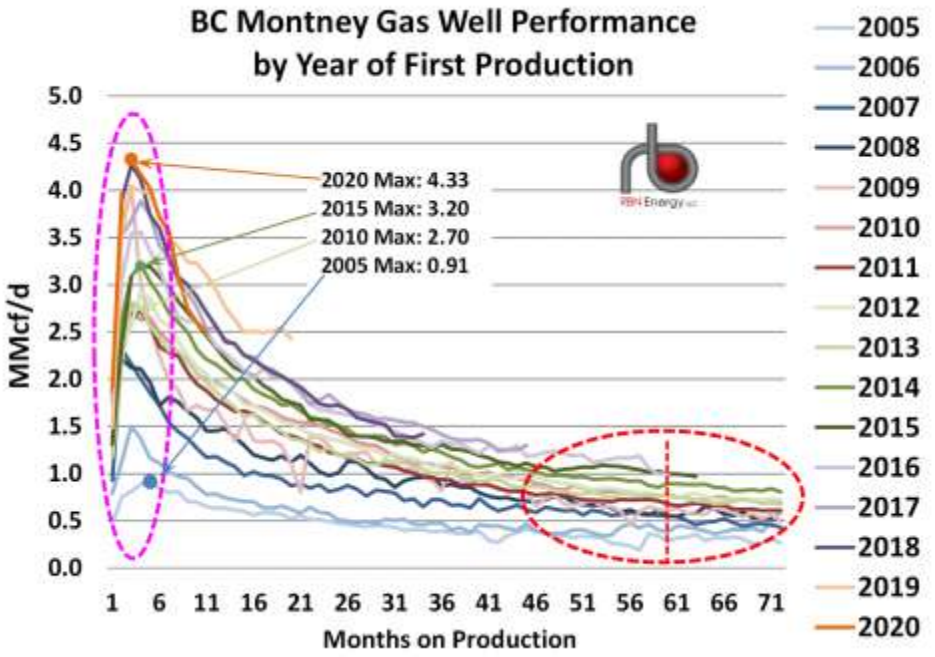


Figure 3. BC Montney Gas Well Performance by Year of First Production. Source: BCOCG

Focusing on each year's peak production rate, it is also clear that there was an initial sharp increase in peak rates, from under 1 MMcf/d in 2005 into a relatively stable range between 2 and 3 MMcf/d for about the next 10 years (red bars in left graph in Figure 4). However, in the last five or six years producers have further refined their approach to these wells, achieving peak rates that now average more than 4 MMcf/d. Note that 2020 production results are the last year for which we have at least one full year of data for some of the wells that were brought into production in that year. Though based on only a couple of months of data, preliminary indications are that 2021 wells could have an average peak production that is even higher: near 5.0 MMcf/d.

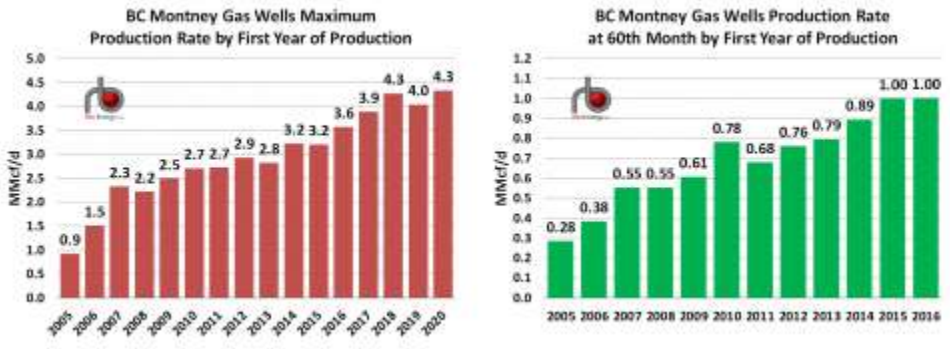


Figure 4. BC Montney Gas Wells' Peak Production and 60th-Month Production Rates. Source: BCOCG

In addition to wells peaking at steadily higher rates and bringing more gas into production per well, what also helps to explain the remarkable and more sustained production gains in the BC Montney is the enduring nature of the wells' production. Much like the trend of increasing peak production rates, the level of production for wells after 36 to 72 months of operation has also been rising steadily year after year (dashed red oval in Figure 3). This means that each successive year of wells are more productive over a much longer timespan than wells in prior years. This not only adds to overall production for longer, but increases the estimated ultimate recovery (EUR) per gas well, further improving well economics.

By again sorting on wells by the month and year in which they first entered production, we can average the production rates for wells after a period of time. In this case, we have chosen 60 months (or five years) from initial production (dashed red vertical line in Figure 3) to compare how wells are performing over time. Average out these wells on their 60th month of production and the result is that rates have more than tripled (green bars in right graph in Figure 4). Since 2005, per-well production rates at 60 months have risen from 0.28 MMcf/d to 1.00 MMcf/d in 2016, the last year for which we have a full 60 months of history. Indications are that later vintage wells from 2017 and 2018 could have 60th month production rates that could be 10% to 15% higher than those in 2016 once all the data comes in. Again, all of this enhances wellhead economics,

with more gas production for a longer period of time, recovering more reserves, which ultimately lowers the implied per-unit cost of production.

These remarkable production improvements over time not only reflect a better understanding of the BC Montney's geologic nature and improved drilling technologies, but also the sheer length (literally) to which producers have been going to increase wellhead productivity and lower costs. In this case, the application of longer horizontal wells in the BC Montney is likely tied to the increases in both peak and longer-dated production rates in recent years.

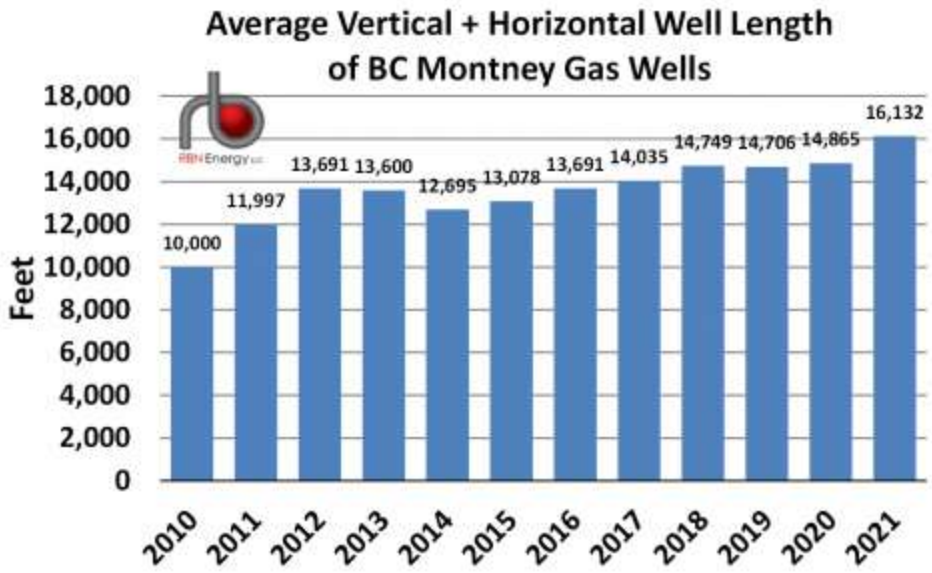


Figure 5. Average Vertical + Horizontal Well Length of BC Montney Gas Wells. Source: BCOGC

The average total length — vertical plus horizontal distance — of BC Montney gas wells has increased by 60% since 2010, when it was 10,000 feet (~3,050 meters), to just over 16,000 feet (~4,920 meters) in the first three months of 2021 (blue bars in Figure 5). That is more than an extra mile of reservoir, on average, that is being accessed by the longer well bores. The simple end result is more gas at the beginning and the steadily higher production rates we have discussed. Anecdotally, there also appear to be more fracs taking place per unit of wellbore distance in these more recent wells based on reports from producers. (Check out our blog Faster Horses for how these trends stack up in the U.S.) Unfortunately, the public dataset from the BC Oil and Gas Commission does not have this specific data, but this is likely another part of the rising production story for the BC Montney gas wells.

With our brief survey of BC's portion of the Montney Formation concluded, you should now have a good sense for how Montney-sourced gas production has come to completely dominate the natural gas picture in the province. In Part 3 of this series, we'll look at Alberta's experience with Montney gas production, as well as what the growing reliance on the Montney might mean for overall gas supply growth in Western Canada.

"Big Gun" was written by Malcolm Young, Angus Young, and Brian Johnson. Performed by AC/DC, it appears as the first track on the *Last Action Hero: Music from the Original Motion Picture* soundtrack album, released in June 1993. "Big Gun" was the first single from the LP, released in May 1993 to coincide with the movie's release. The film starred Arnold Schwarzenegger, who is also in the video for the song, which features AC/DC performing the tune at a mock concert setting. (Interestingly, the band has never performed the song live in a concert setting since.) The Rick Rubin-produced single went to #1 on the Billboard Mainstream Rock chart and #65 on the Billboard Hot 100 Singles chart. Personnel on the record were: Brian Johnson (lead vocals), Angus Young (lead guitar), Malcolm Young (rhythm guitar, backing vocals), Cliff Williams (bass, backing vocals), and Chris Slade (drums). "Big Gun" would later appear in the AC/DC boxset, *Backtracks.*

AC/DC is an Australian rock and roll band formed in Sydney in 1973 by brothers Angus and Malcolm Young. The band has released 17 studio albums, three live albums, two soundtrack albums, one EP, and 47 singles. They have sold over 200 million records worldwide, and have won one Grammy Award. 21 members have passed through the ranks of AC/DC since its formation. Bon Scott died in 1980 and Malcolm Young in 2017. The band continues to record and tour. In a side note, Chris Slade, whose last duties with AC/DC as a drummer was the "Big Gun" single and video, is now back in the drummer throne after long-time drummer Phil Rudd has decided not to tour with the band.

Highlights for the month

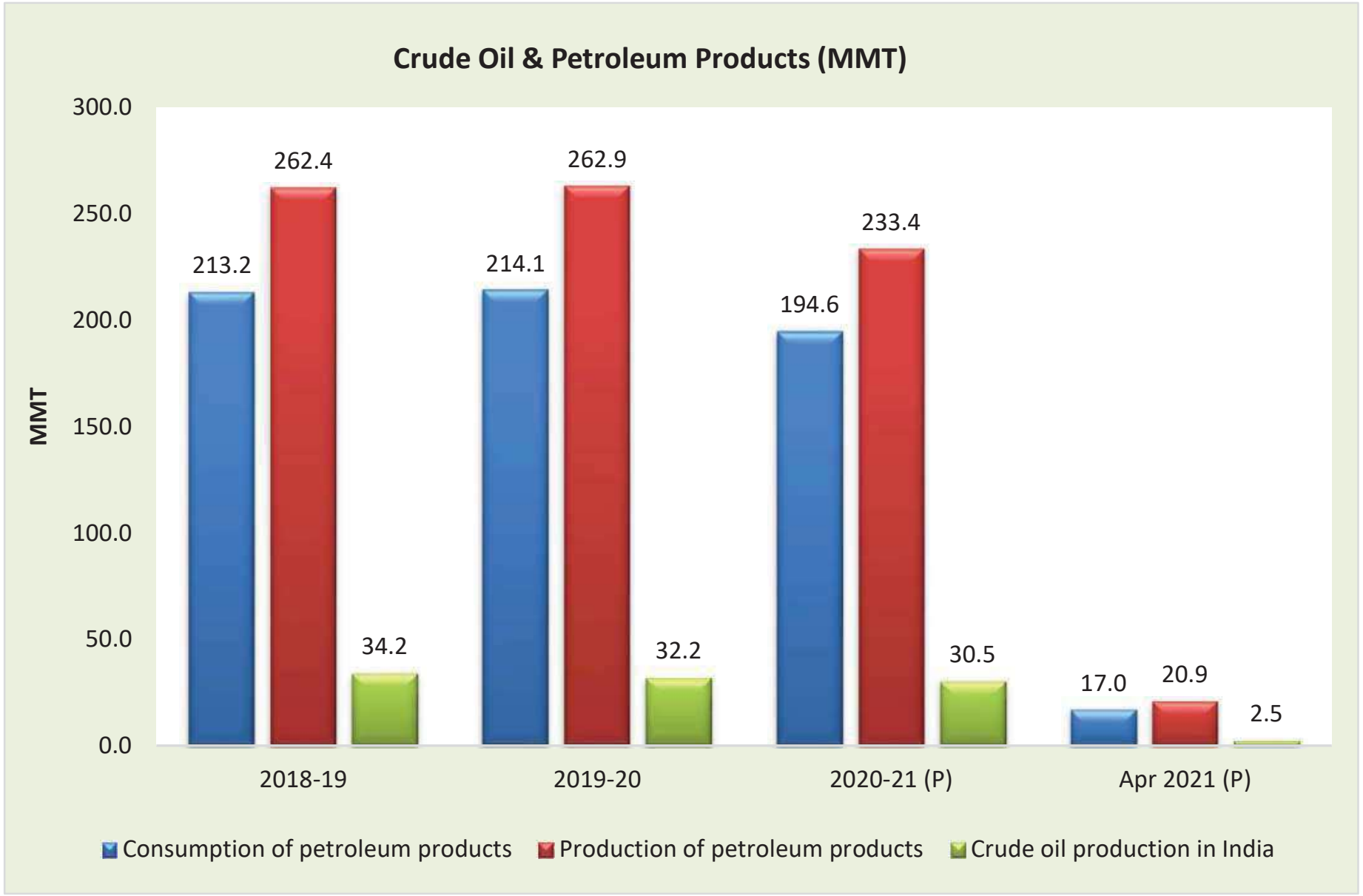
- The consumption of petroleum products during April 2021 with a volume of 17 MMT reported a growth of 81.6% as compared to the volume of 9.4 MMT during April 2020. The growth was mainly due to the low base during April 2020 because of nationwide lockdown as a preventive measure against the COVID-19 pandemic in India. During April 2021, except Kerosene all the products registered a growth as compared to the same period of the previous year.
- Ethanol blending with Petrol was 8.2% during April 2021 and cumulative during December 2020- April 2021 was 7.4%.
- Total consumption of natural gas (including internal consumption) for the month of April 2021 was 5238 MMSCM which was 34.5% higher than the corresponding month of the previous year.
- OIL registered a de-growth of 2.2 % and ONGC registered a de-growth of 2.7 % during April 2021 as compared to April 2020. PSCs registered a de-growth of 0.3% during April 2021 as compared to April 2020.
- Crude oil processed during April 2021 was 19.9 MMT, which was 34.9% higher than April 2020 as compared to a de-growth of 1.0% during March 2021.
- Production of petroleum products saw a growth of 30.9% during April 2021 over April 2020 as compared to a de-growth of 0.7% during March 2021.
- Gross production of natural gas for the month of April, 2021 was 2651 MMSCM which was higher by 22.7% compared with the corresponding month of the previous year.
- Crude oil imports increased by 10.3% during April 2021 as compared to the corresponding period of the previous year.
- POL products imports increased by 24.2% as compared to the corresponding period of the previous year. Increase in POL products imports during April 2021 was mainly due to increase in imports of all products except liquified petroleum gas (LPG) and high speed diesel (HSD).

•	LNG import for the month of April, 2021(P) was 2655 MMSCM which was 45.2% higher than the corresponding month of the previous year.
•	Exports of POL products decreased by 35.7% during April 2021 as compared to the corresponding period of the previous year. Decrease in POL products exports during April 2021 was due to decrease in exports of high speed diesel (HSD), naphtha, aviation turbine fuel (ATF), fuel oil (FO) and petcoke/CBFS.
•	The price of Brent Crude averaged $64.70/bbl during April, 2021 as against $65.63/bbl during March 2021 and $18.55/bbl during April 2020. The Indian basket crude price averaged $63.40/bbl during April 2021 as against $64.73/bbl during March 2021 and $19.90 /bbl during April 2020.

2. Crude oil, LNG and petroleum products at a glance

Details		Unit/ Base	2018-19	2019-20	2020-21 (P)	April	
						2020-21 (P)	2021-22 (P)
1	Crude oil production in India[#]	MMT	34.2	32.2	30.5	2.5	2.5
2	Consumption of petroleum products*	MMT	213.2	214.1	194.6	9.4	17.0
3	Production of petroleum products	MMT	262.4	262.9	233.4	16.0	20.9
4	Gross natural gas production	MMSCM	32,875	31,184	28,672	2,161	2,651
5	Natural gas consumption	MMSCM	60,798	64,144	60,646	3,895	5,238
6	Imports & exports:						
	Crude oil imports	MMT	226.5	227.0	198.1	16.6	18.3
		$ Billion	111.9	101.4	62.7	3.0	8.5
	Petroleum products (POL) imports*	MMT	33.3	43.8	43.5	2.8	3.5
		$ Billion	16.3	17.7	14.2	0.7	1.3
	Gross petroleum imports (Crude + POL)	MMT	259.8	270.7	241.6	19.4	21.8
		$ Billion	128.3	119.1	76.9	3.8	9.9
	Petroleum products (POL) export	MMT	61.1	65.7	56.8	6.0	3.9
		$ Billion	38.2	35.8	21.4	1.2	2.2
	LNG imports*	MMSCM	28,740	33,887	32,861	1,829	2,655
		$ Billion	10.3	9.5	7.4	0.3	0.8
7	Petroleum imports as percentage of India's gross imports (in value terms)	%	24.9	25.1	19.8	22.1	21.6
8	Petroleum exports as percentage of India's gross exports (in value terms)	%	11.6	11.4	7.4	11.4	7.0
9	Import dependency of crude (on consumption basis)	%	83.8	85.0	84.4	75.6	86.3

[#]Includes condensate; *Jul 2020- Apr 2021 DGCIS data prorated


Crude Oil & Petroleum Products (MMT)
300.0
250.0
200.0
150.0
100.0
50.0
0.0
MMT
213.2
262.4
34.2
214.1
262.9
32.2
194.6
233.4
30.5
17.0
20.9
2.5
2018-19
2019-20
2020-21 (P)
Apr 2021 (P)
Consumption of petroleum products
Production of petroleum products
Crude oil production in India

3. Indigenous crude oil production (Million Metric Tonnes)

Details	2018-19	2019-20	2020-21 (P)	April		
				2020-21 (P)	2020-21 Target*	2021-22 (P)
ONGC	19.6	19.2	19.1	1.6	1.6	1.5
Oil India Limited (OIL)	3.3	3.1	2.9	0.2	0.2	0.2
Private / Joint Ventures (JVs)	9.6	8.2	7.1	0.6	0.6	0.6
Total Crude Oil	**32.5**	**30.5**	**29.1**	**2.4**	**2.5**	**2.4**
ONGC condensate	1.5	1.4	1.1	0.1		0.1
PSC condensate	0.2	0.3	0.3	0.02		0.02
Total condensate	**1.7**	**1.6**	**1.4**	**0.1**		**0.1**
Total (Crude + Condensate) (MMT)	**34.2**	**32.2**	**30.5**	**2.5**	**2.5**	**2.5**
Total (Crude + Condensate) (Million Bbl/Day)	0.69	0.64	0.61	0.62		0.61

*Provisional targets inclusive of condensate.

4. Domestic oil & gas production vis-à-vis overseas production

Details	2018-19	2019-20	2020-21 (P)	April	
				2020-21 (P)	2021-22 (P)
Total domestic production (MMTOE)	67.1	63.4	59.2	4.7	5.1
Overseas production (MMTOE)	24.7	24.5	21.9	2.0	1.8
Overseas production as percentage of domestic production	**36.8%**	**38.7%**	**37.0%**	**42.1%**	**35.3%**

Source: ONGC Videsh, GAIL, OIL , IOCL, HPCL & BPRL

5. High Sulphur (HS) & Low Sulphur (LS) crude oil processing (MMT)

	Details	2018-19	2019-20	2020-21 (P)	April	
					2020-21 (P)	2021-22 (P)
1	High Sulphur crude	194.2	192.4	161.3	10.7	15.0
2	Low Sulphur crude	63.0	62.0	60.5	4.1	4.8
Total crude processed (MMT)		**257.2**	**254.4**	**221.8**	**14.7**	**19.9**
Total crude processed (Million Bbl/Day)		5.17	5.09	**4.45**	**3.60**	**4.86**
Percentage share of HS crude in total crude oil processing		**75.5%**	**75.6%**	**72.7%**	**72.3%**	**75.6%**

6. Quantity and value of crude oil imports

Year	Quantity (MMT)	$ Million	Rs. Crore
2018-19	226.5	1,11,915	7,83,183
2019-20	227.0	1,01,376	7,17,001
2020-21 (P)	198.1	62,711	4,62,996

7. Self-sufficiency in petroleum products (Million Metric Tonnes)

	Particulars	2018-19	2019-20	2020-21 (P)	April	
					2020-21 (P)	2021-22 (P)
1	Indigenous crude oil processing	31.7	29.3	28.0	2.1	2.1
2	Products from indigenous crude (93.3% of crude oil processed)	29.6	27.3	26.1	2.0	2.0
3	Products from fractionators (Including LPG and Gas)	4.9	4.8	4.2	0.3	0.4
4	Total production from indigenous crude & condensate **(2 + 3)**	34.5	32.1	30.3	2.3	2.3
5	Total domestic consumption	213.2	214.1	194.6	9.4	17.0
% Self-sufficiency (4 / 5)		**16.2%**	**15.0%**	**15.6%**	**24.4%**	**13.7%**

8. Refineries: Installed capacity and crude oil processing (MMTPA / MMT)								
Company	Refinery	Installed capacity (1.5.2021) MMTPA	Crude oil processing (MMT)					
			2018-19	2019-20	2020-21 (P)	April		
						2020-21 (P)	2021-22 (Target)	2021-22 (P)
IOCL	Barauni (1964)	6.0	6.7	6.5	5.5	0.2	0.6	0.5
	Koyali (1965)	13.7	13.5	13.1	11.6	0.6	1.2	1.0
	Haldia (1975)	8.0	8.0	6.5	6.8	0.3	0.7	0.7
	Mathura (1982)	8.0	9.7	8.9	8.9	0.5	0.7	0.8
	Panipat (1998)	15.0	15.3	15.0	13.2	0.5	1.3	1.3
	Guwahati (1962)	1.0	0.9	0.9	0.8	0.0	0.0	0.06
	Digboi (1901)	0.65	0.7	0.7	0.6	0.05	0.06	0.06
	Bongaigaon(1979)	2.35	2.5	2.0	2.5	0.2	0.2	0.2
	Paradip (2016)	15.0	14.6	15.8	12.5	0.7	1.3	1.3
	IOCL-TOTAL	**69.7**	**71.8**	**69.4**	**62.4**	**3.0**	**6.1**	**6.0**
CPCL	Manali (1969)	10.5	10.3	10.2	8.2	0.3	0.5	0.8
	CBR (1993)	1.0	0.4	0.0	0.0	0.0	0.0	0.0
	CPCL-TOTAL	**11.5**	**10.7**	**10.2**	**8.2**	**0.3**	**0.5**	**0.8**
BPCL	Mumbai (1955)	12.0	14.8	15.0	12.9	0.8	1.3	1.2
	Kochi (1966)	15.5	16.1	16.5	13.3	0.8	1.4	1.4
BORL	Bina (2011)	7.8	5.7	7.9	6.2	0.3	0.6	0.6
NRL	Numaligarh (1999)	3.0	2.9	2.4	2.7	0.2	0.2	0.2
	BPCL-TOTAL	**38.3**	**39.4**	**41.8**	**35.1**	**2.1**	**3.4**	**3.5**

Company	Refinery	Installed capacity (1.5.2021) (MMTPA)	Crude oil processing (MMT)					
			2018-19	2019-20	2020-21 (P)	April		
						2020-21 (P)	2021-22 (Target)	2021-22 (P)
ONGC	Tatipaka (2001)	0.066	0.066	0.087	0.081	0.002	0.005	0.007
MRPL	Mangalore (1996)	15.0	16.2	14.0	11.5	0.7	1.1	1.1
	ONGC-TOTAL	**15.1**	**16.3**	**14.0**	**11.6**	**0.7**	**1.1**	**1.1**
HPCL	Mumbai (1954)	7.5	8.7	8.1	7.4	0.5	0.04	0.04
	Visakh (1957)	8.3	9.8	9.1	9.1	0.8	0.8	0.8
HMEL	Bathinda (2012)	11.3	12.5	12.2	10.1	0.6	0.9	1.1
	HPCL- TOTAL	**27.1**	**30.9**	**29.4**	**26.5**	**1.9**	**1.7**	**1.9**
RIL	Jamnagar (DTA) (1999)	33.0	31.8	33.0	34.1	2.8	2.8	2.8
	Jamnagar (SEZ) (2008)	35.2	37.4	35.9	26.8	2.5	2.5	2.2
NEL	Vadinar (2006)	20.0	18.9	20.6	17.1	1.4	1.4	1.6
All India (MMT)		**249.9**	**257.2**	**254.4**	**221.8**	**14.7**	**19.5**	**19.9**
All India (Million Bbl/Day)		**5.02**	**5.17**	**5.09**	**4.45**	**3.60**		**4.86**

Note: Provisional Targets; Some sub-totals/ totals may not add up due to rounding off at individual levels.

9. Major crude oil and product pipeline network (as on 01.05.2021)

Details		ONGC	OIL	Cairn	HMEL	IOCL	BPCL	HPCL	Others*	Total
Crude Oil	Length (KM)	1,283	1,193	688	1,017	5,301	937			**10,419**
	Cap (MMTPA)	60.6	9.0	10.7	11.3	48.6	7.8			**147.9**
Products	Length (KM)		654			9,400	2,241	3,775	2,395	**18,465**
	Cap (MMTPA)		1.7			47.5	19.5	34.1	9.4	**112.2**

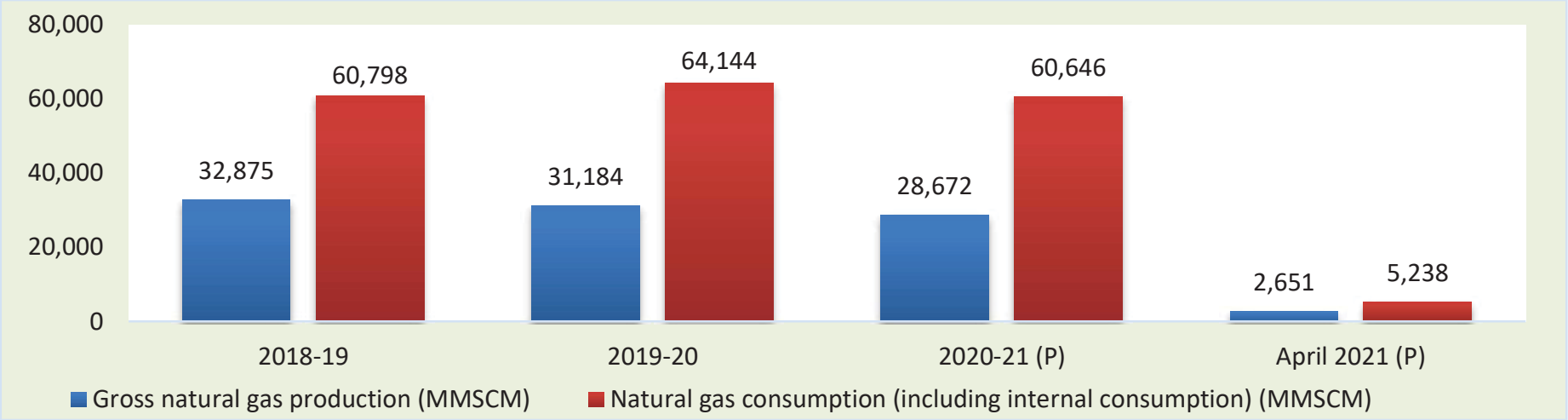
*Others include GAIL and Petronet India. HPCL and BPCL lubes pipeline included in products pipeline data

19. Natural gas at a glance

(MMSCM)

Details	2018-19	2019-20	2020-21 (P)	April		
				2020-21 (P)	2021-22 (Target)	2021-22 (P)
(a) Gross production	32,875	31,184	28,672	2,161	2,679	2,651
- ONGC	24,677	23,746	21,872	1,726	1,805	1,725
- Oil India Limited (OIL)	2,722	2,668	2,480	202	240	215
- Private / Joint Ventures (JVs)	5,477	4,770	4,321	234	634	711
(b) Net production (excluding flare gas and loss)	32,058	30,257	27,785	2,066		2,583
(c) LNG import#	28,740	33,887	32,861	1,829		2,655
(d) Total consumption including internal consumption (b+c)	60,798	64,144	60,646	3,895		5,238
(e) Total consumption **(in BCM)**	60.8	64.1	60.6	3.9		5.2
(f) Import dependency based on consumption (%), {c/d*100}	47.3	52.8	54.2	47.0		50.7

#Jul 2020-Apr 2021 DGCIS data prorated



20. Coal Bed Methane (CBM) gas development in India

Prognosticated CBM resources		91.8	TCF
Established CBM resources		10.4	TCF
CBM Resources (33 Blocks)		62.8	TCF
Total available coal bearing areas (India)		32760	Sq. KM
Total available coal bearing areas with MoPNG/DGH		21659	Sq. KM
Area awarded		16613	Sq. KM
Blocks awarded (ST CBM Block awarded twice in CBM Round II and Round IV)		32	Nos.
Exploration initiated (Area considered if any boreholes were drilled in the awarded block)		10669.55	Sq. KM
Production of CBM gas	April 2021 (P)	56.51	MMSCM

21. Natural gas pipeline network as on 31.12.2020

Nature of pipeline		GAIL	GSPL	PIL	IOCL	AGCL	RGPL	GGL	DFPCL	ONGC	GIGL	GITL	Others*	Total
Operational	Length	8,241	2,265	1,460	132	105	312	73	42	24				**12,654**
	Capacity	171.6	43.0	85.0	20.0	2.4	3.5	5.1	0.7	6.0				**337.3**
Partially commissioned#	Length	3,643			23						442	364		**4,472**
	Capacity	-			-						-	-		**-**
Total operational length		**11,884**	**2,265**	**1,460**	**155**	**105**	**312**	**73**	**42**	**24**	**442**	**364**	**0**	**17,126**
Under construction	Length	6,242			1,398						2,335	1,678	3,780	**15,433**
	Capacity	23.2			-						-	-	157.7	**-**
Total length		**18,126**	**2,265**	**1,460**	**1,553**	**105**	**312**	**73**	**42**	**24**	**2,777**	**2,042**	**3,780**	**32,559**

Source: PNGRB; Length in KMs ; Authorized Capacity in MMSCMD; *Others-APGDC, HEPL, IGGL, IMC, Consortium of H-Energy

22. Existing LNG terminals

Location	Promoters	Capacity as on 01.05.2021	% Capacity utilisation (Apr-Mar 2020-21)
Dahej	Petronet LNG Ltd (PLL)**	17.5 MMTPA	94.0
Hazira	Shell Energy India Pvt. Ltd.	5 MMTPA	76.8
Dabhol	Konkan LNG Limited	*5 MMTPA	75.6
Kochi	Petronet LNG Ltd (PLL)**	5 MMTPA	17.3
Ennore	Indian Oil LNG Pvt Ltd	5 MMTPA	13.0
Mundra	GSPC LNG Limited	5 MMTPA	34.8
Total Capacity		**42.5 MMTPA**	

* To increase to 5 MMTPA with breakwater. Only HP stream of capacity of 2.9 MMTPA is commissioned; ** PLL capacity utilization data upto February 2021

Japan Expects Tight Summer Power Supply on Hot Weather, Outages
2021-05-14 03:53:43.910 GMT

By Stephen Stapczynski
(Bloomberg) -- Japan's power supply is expected to be the tightest in "several years" this summer amid an outlook for warmer-than-normal weather and lower electricity output as some thermal facilities are shut, Minister of Economy, Trade and Industry Hiroshi Kajiyama said to press on Friday.
* Japan's nationwide peak power reserve rate, excluding Okinawa and Hokkaido, is expected to be 3.7%-3.8% this summer, according to NHK, citing the Organization for Cross-regional Coordination of Transmission Operators
** NOTE: The minimum level required by the Japanese government during peak demand times is 3%
* Supplies are also expected to be tight next winter, with the Tokyo region seen not having a safe reserve of electricity

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https://blinks.bloomberg.com/news/stories/QT2UKYT0G1KW

https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/051421-japans-meti-to-compile-emergency-response-for-summer-winter-power-outlook-minister

- 14 May 2021 | 03:07 UTC

Japan's METI to compile 'emergency response' for summer, winter power outlook: minister

Author Takeo Kumagai

Tokyo — Japan's Minister of Economy, Trade and Industry Hiroshi Kajiyama on May 14 said he issued a directive for the ministry to prepare an "emergency response" for the country's severe summer and winter supply outlook, by the end of May.

"This summer we expect to have a needed [power] supply capacity to ensure stable supply, but we expect to have the most severe outlook [compared to] the last few years," Kajiyama told a press conference.

"We also expect Tokyo Electric's area [not to have] sufficient supply capacity to ensure stable supply this winter."

In response to the severe power supply outlook, Kajiyama had issued the directive to prepare the emergency response, including requests to power utilities to ensure supply capacity as well as to end-users to cooperate and provide timely information on supply and demand situations.

Among possible measures, METI intends to request Japanese utilities to report their LNG as well as other fuel procurement plans for summer in June to scrutinize them, a METI source told S&P Global Platts.

METI's move was the latest in its efforts to ensure the country's power supply and demand balance, after facing a severe shortage of power supply last winter.

METI aims to formulate power fuel guidelines around August, under plans released April 20, as part of precautionary measures for the next winter after grappling with severe power supply concerns in January.

Robust demand

METI has attributed the tightened supply-power balance from last winter mainly to robust power demand during severe cold spells when local power utilities had to restrict gas-fired power generation due to a fall in LNG stocks.

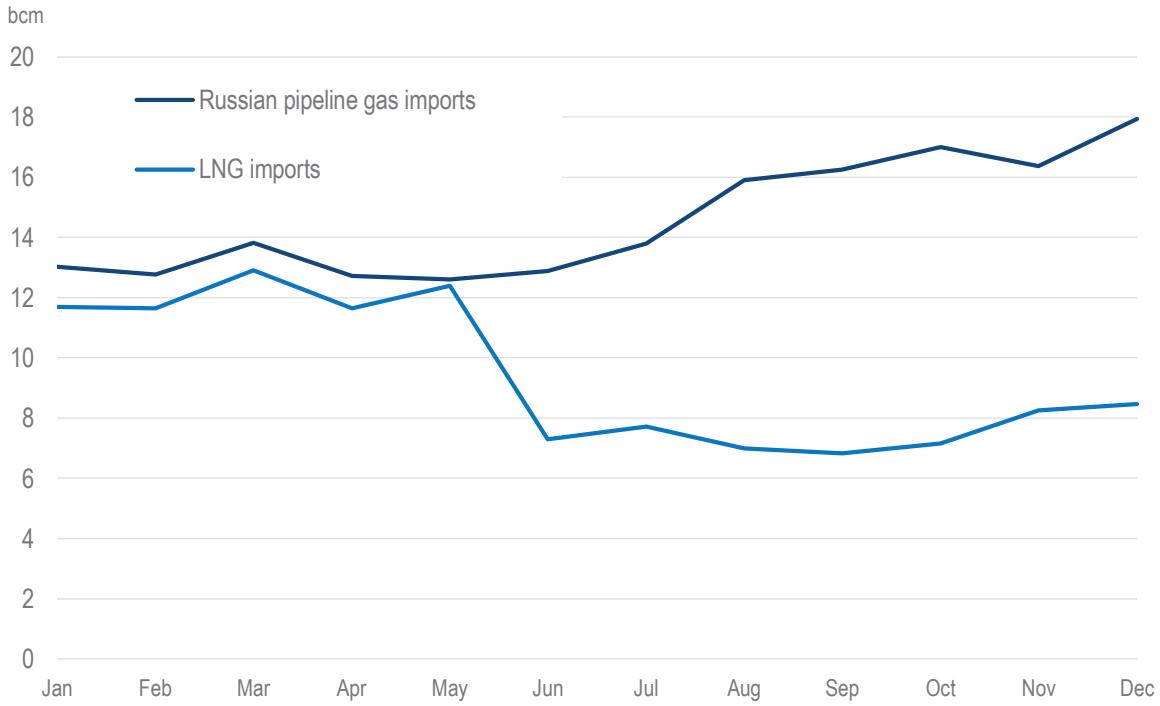
Japanese power utilities had boosted their LNG procurement from December, peaking in January at 5.54 million mt, from around 5 million mt in the same month over the last two years, according to METI's calculations based on its hearings with major power utilities.

LNG stocks held by power utilities also dropped by around 40% over the course of a month from mid-December. This led to utilities restricting LNG thermal power generation amid difficulties in building LNG inventories in the face of strong demand in East Asia, coupled with shipping constraints in the Panama Canal, according to METI.

The power supply-and-demand balance was exacerbated further by glitches at coal-fired power plants, low hydropower generation output due to droughts, and fluctuating solar power output from bad weather, amid reduced oil-fired power generation capacity and low nuclear power output, according to METI.

EUROPEAN MARKET IN 2020

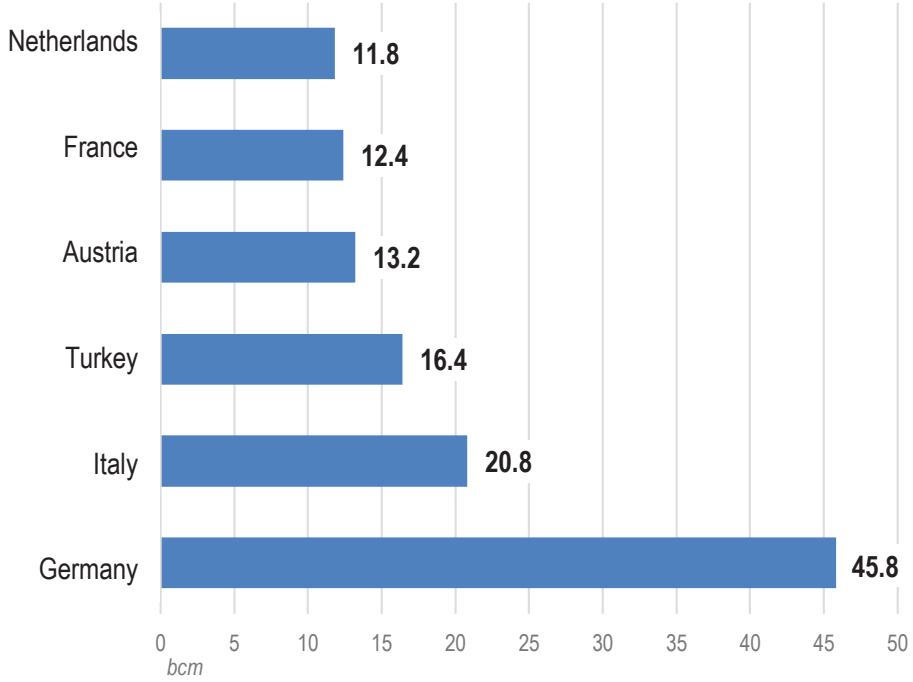
Comparison between Russian pipeline gas supplies and LNG imports to Europe in 2020



- Gazprom remains the main supplier of gas to Europe in the periods of gas oversupply and plays a stabilizing role in the market throughout the entire year

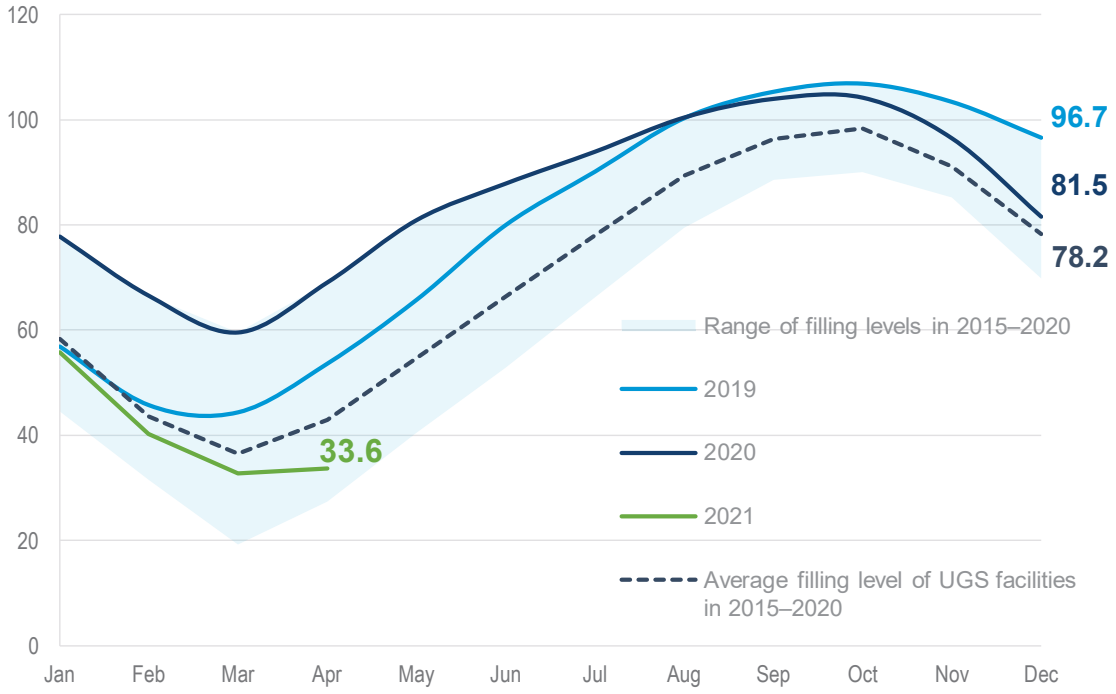
GAZPROM – KEY SUPPLIER OF GAS TO EUROPEAN COUNTRIES

Gas supplies to major European buyers*



- The aggregate supplies in 2020 under the contracts of Gazprom Export amounted to **174.89** bcm
- Gazprom's share in the European market remained at **around 1/3**

UGS FACILITIES IN EUROPE



month-end data for UGS facilities in Europe and Turkey

- The currently low level of inventories in European UGS facilities is caused by unusually cold weather and the rerouting of LNG supplies to Asia.
- The need to replenish inventories in UGS facilities is going to support the demand and prices for gas in summer months.
- The low-price environment of 2020 is not going to reoccur.

DIVERSIFICATION OF ROUTES: NEW GAS PIPELINES TOWARDS EUROPE

Gas supplies via **TurkStream** commenced **in January 2020**

In 2020, TurkStream delivered Russian gas to consumers in **Turkey, Bulgaria, Greece, North Macedonia, and Romania**

On January 1, 2021, **Serbia** and **Bosnia and Herzegovina** also started receiving gas via TurkStream and further across Turkey, as well as via the newly created capacities of the national gas transmission systems of Bulgaria and Serbia. Supplies to **Hungary** can be expected to commence after the national operators of Bulgaria, Serbia, and Hungary expand their gas transmission systems.

Construction of **Nord Stream 2** was resumed in December 2020

DIVERSIFICATION OF ROUTES: GAS SUPPLIES TOWARDS ASIA

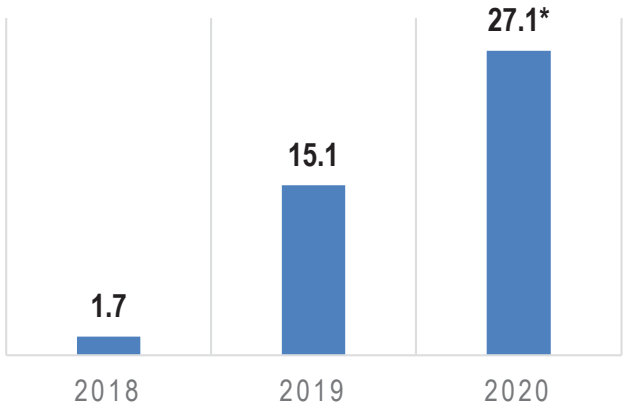
EASTERN ROUTE
POWER OF SIBERIA

Throughout 2020, the volumes of gas supplies to China via the Power of Siberia pipeline were increasing, and totaled **4.1 bcm** for the year.

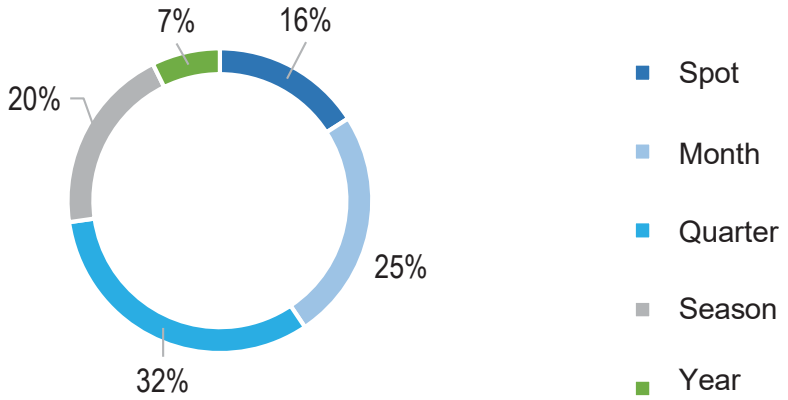
In Q4 2020, gas supplies were in excess of the contractual amounts upon requests from the Chinese party (as of December 31, 2020 – **by 84%**).

ELECTRONIC TRADING PLATFORM OF GAZPROM EXPORT

Sales, bcm



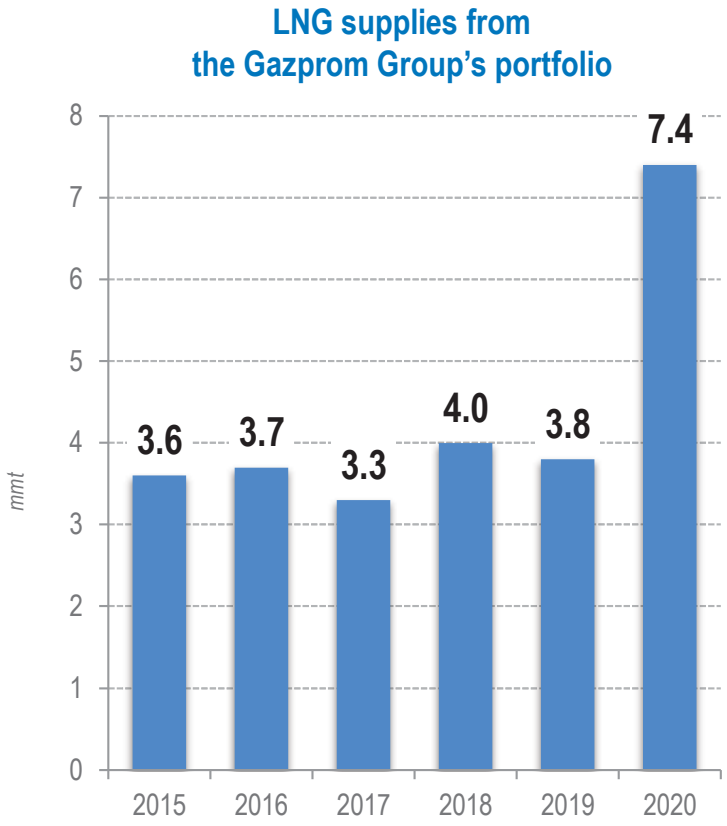
Breakdown of sales by instrument



*including the supply contracts for 2021 and 2022

- Gas sales through the ETP increased ~2 times versus 2019.
- In November 2020, the first trading sessions were held at the Bulgaria/Turkey border in the Malkoclar custody transfer point, i.e. the number of the ETP's custody transfer points increased to 11.
- In addition to the traditional auction sales, a new trading mode similar to DOM was introduced in early 2021.

LARGE-SCALE LNG SUPPLIES BY GAZPROM GROUP



- Double increase in LNG supplies in 2020;
- Diversified supply routes – 14 countries against 7 countries in 2019;
- Asia-Pacific – the main supply region;
- India – a key buyer accounting for one-fourth of total sales.

May 19, 2021

COVID-19 UPDATE

State of Local Emergency (SOLE) declared in the RMWB.

On Monday, April 26, the Regional Municipality of Wood Buffalo declared a State of Local Emergency (SOLE) to help stop the continued spread of COVID-19 in the region, protect the local health care system and take action to address other local challenges and risks related to the on-going pandemic. The SOLE will remain in effect for 90-days or until terminated. At this time, no further public health measures have been made. Municipal information regarding the pandemic will continue to be updated and available at rmwb.ca/covid19.

Today, Minister of Education Lagrange announced that At-Home Learning will continue in the RMWB until at least May 31, while the rest of the Province will return to in-class learning on May 25.

Schools:

Outbreak 10+ Cases:
- Holy Trinity High School
- Father Mercredi
- Ecole Dickinsfield
- Fort McMurray Comp.
- Ecole Boreal
- St. Anne
- Ecole McTavish
- Fort McMurray Islamic
- St. Martha

Outbreak 5-9 Cases:
- Fort McMurray Christian School
- St. Paul's
- Fr. M. Beauregard
- St. Kateri
- Dave McNeilly
- Thickwood Heights
- Dr. Karl A Clark
- Sister Mary Phillps
- Father JA Turcotte
- Walter & Gladys Hill

Alert 2-4 Cases
- Greely Road
- Westview School
- Timberlea Public
- St. Gabriel
- Hillcrest Montessori
- Christina Gordon

RMWB Case Outcomes: 1323 Active Cases 5083 Resolved Cases 6 Deceased Cases

- **Fort McMurray**
- 68 New cases
- 1268 Active Cases (-58)
- 4855 Recoveries (+126)
- 1596.6 per 100,000 pop

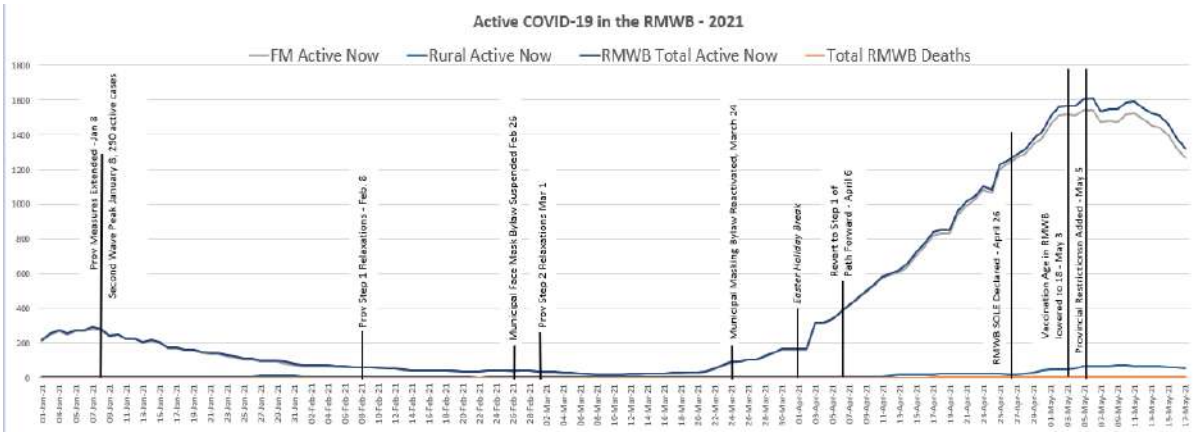
- **Rural RMWB**
- 3 New Cases
- 55 Active Cases (-5)
- 228 Recoveries (+8)
- 1355.3 per 100,000 pop

- **Alberta**
- 908 New Cases
- 2102 New Recoveries
- 18,813 Active Cases (-1200)
- 685 in hospital (-6) 185 in ICU (-2)

- **Canada**
  3230 New Cases
  62,745 Active Cases

- **Alberta**
- 27,986 doses distributed in last 24 hours
- 2.27M first doses ever
- 332K people are fully vaccinated
- See page 2 for local vaccination data.
- "Rest of Alberta" R-Value: 0.85
- **Today, Dr. Hinshaw announced some relaxed restrictions in Continuing Care settings. More info here.**
- Data as of end of May 18th, compared to May 17th.

- **Get Vaccinated – Doses available**
- **Everyone over age 12 can now book. Be patient, and please cancel unwanted appointments. The Rapid Flow Through Clinic at MacDonald Island is no longer offering Walk-In Appointments.**
- **Book your appointment online here, or find a pharmacy offering vaccine here.**
- Changes were announced regarding the handling requirements of Pfizer, meaning it will be more accessible in rural areas. More info here.
- Current restrictions and guidance documents can be found here.



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Outbreaks in RMWB

Industrial:
MEG Energy
CNRL Horizon
CNRL Albian
CNRL Jackfish
Kearl Lake
Civeo Lynx Lodge
Civeo McClelland Lake
Wapasu Creek Lodge
Civeo Athabasca
Cenovus Sunrise Lodge
Suncor Baseplant
Suncor Firebag
Suncor Mackay River
Syncrude Mildred Lake
Syncrude Aurora
Suncor Fort Hills
CNOOC Long Lake
Oilsands Industrial Lodge - Fort McKay

Outbreaks in RMWB

Other:
Sunshine Community Dayhome
Bethel Happy Daycare
Beacon Hill
Chez Madamme
Piccolo/Ecole Boreal
YMCA Eagle Ridge Care
North Star Ford
Brandt Tractor
MMA Silin Forest Campus
Joly's Your Independent Grocer
Salvation Army Shelter
Centre of Hope
Pastew Place Detoxification Centre
Birch Mountain Enterprises

Report non-compliance to the public health orders here or call AHS Public Health Inspectors here 1-833-415-9179

Do your part, even after your vaccination:

Until most Albertans are protected, fully vaccinated people must continue following all public health measures: no indoor social gatherings, keep 2 metres apart from others, wear a mask in public, wash your hands, and stay home when sick.

Once both doses take effect, you are less likely to become severely sick with COVID-19. But we don't yet know if the vaccine prevents vaccinated people from spreading the virus.

We must continue reviewing emerging evidence on asymptomatic and variant transmission before we can safely alter public health guidelines. Alberta Health will let Albertans know when rules for fully vaccinated people can be changed

Second Dose:

Results show the first dose is at least 80% effective in preventing severe illness. The second dose ensures you're protected for as long as possible. The timing for getting your second dose depends on your health status.
Most Albertans are eligible for your second dose of:

- Pfizer or Moderna no later than 4 months after the first dose
- No later than 4 months and no earlier than 12 weeks after the first dose.

When to book:

- Bookings for second doses will begin when supply allows, after all Albertans 12 and over have been offered a first dose, likely in late June.
- Contact your pharmacy or AHS closer to your eligibility date to book your next appointment. Do not try booking in advance.

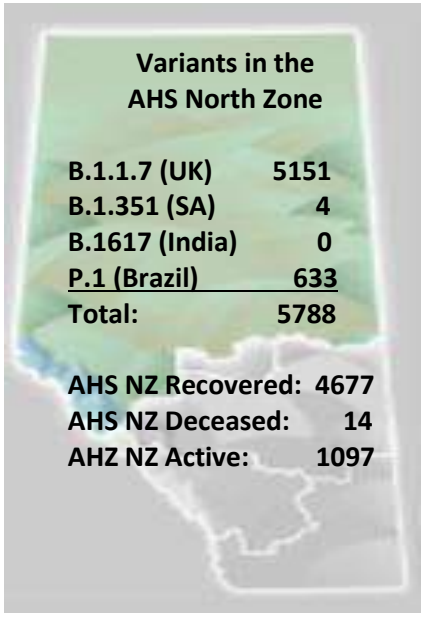
Alberta.ca started publishing local vaccination rates here.

Local Vaccination Rates:

	Fort McMurray	Rural
75+	65.8%	56.6%
60-74	63.2%	48.5%
40-59	53.5%	38.5%
20-39	32.8%	19.0%
12-19	38.5%	14%
All Ages	35.1%	24.8%

Thursday, May 13, Dr. Hinshaw announced a change to the face mask bylaw requirement.

Anyone with qualifying health issues will now be required to have an exemption letter from a Nurse Practitioner, Physician, or Psychologist.



https://www.minister.industry.gov.au/ministers/taylor/media-releases/locking-australias-fuel-security

Locking in Australia's fuel security

17 May 2021

Joint media release with Prime Minister Scott Morrison

The Morrison Government is taking strong action to further boost Australia's long-term fuel security by locking in the future of our refining sector.

The Government's fuel security package will help secure Australia's recovery from the COVID crisis and it will help secure our sovereign fuel stocks, locking in jobs and protecting families and businesses from higher fuel prices.

Prime Minister Scott Morrison said the Government was delivering on its commitment to maintain a self-sufficient refining capability in Australia by supporting the operation of the Ampol refinery in Lytton (Queensland) and the Viva Energy refinery in Geelong (Victoria). The package will protect the jobs of 1,250 direct employees across the two refineries and create another 1,750 construction jobs.

The Prime Minister Scott Morrison said locking in Australia's fuel security would deliver benefits for all Australians.

"This is a key plank of our plan to secure Australia's recovery from the pandemic, and to prepare against any future crises," the Prime Minister said.

"Shoring up our fuel security means protecting 1,250 jobs, giving certainty to key industries, and bolstering our national security.

"Earlier investment in Australia's ability to produce better quality fuels, including ultra-low sulfur levels, will also improve air quality and deliver an estimated $1 billion in lower health costs.

"Major industries like agriculture, transport and mining, as well as mum and dad motorists, will have more certainty and can look forward to vehicle maintenance savings and greater choice of new vehicle models.

"This next stage in our plan for Australia's recovery will create jobs and make our country more self-sufficient and secure."

Minister for Energy and Emissions Reduction Angus Taylor said Australia's economy is reliant on fuel and this significant package will not only lock-in our refineries, but the jobs of thousands of Australians.

"Fuel is what keeps us and the economy moving. That is why we are backing our refineries," Minister Taylor said.

"Supporting our refineries will ensure we have the sovereign capability needed to prepare for any event, protect families and businesses from higher prices at the bowser, and keep Australia moving as we secure our recovery from COVID-19."

The 2021-22 Budget initiatives include:

- A variable Fuel Security Service Payment (FSSP) to the refineries, funded by the Government, which recognises the fuel security benefits refineries provide to all Australians;
- Up to $302 million in support for major refinery infrastructure upgrades to help refiners bring forward the production of better-quality fuels from 2027 to 2024; and

- $50.7 million for the implementation and monitoring of the FSSP and the minimum stockholding obligation (MSO), ensuring industry complies with the new fuel security framework.

The variable FSSP has been costed up to AUD$2.047 billion to 2030 in a worst-case scenario.

This figure assumes that both refineries are paid at the highest rate over the entire nine years in COVID-19-like economic conditions, which is unlikely as the economy recovers.

Actual payments are expected to be less than this, as payments are linked to refining margins at the time and to actual production of key transport fuels.

Payments will be made between the following ranges, limiting the downside risk for refineries:

- Refineries will receive 0 cent per litre (cpl) when the margin marker hits $10.20/bbl (the collar)
- Refineries will receive a maximum of 1.8 cpl when the marker drops to $7.30/bbl (the cap).

This will mean that the refineries are only supported in downtimes, and will not receive Government support when they are performing well.

Refineries will have an option to extend the support and their commitment out to mid-2030.

The Government is also ensuring better quality fuel is provided across Australia earlier.

We will work with the refineries to bring forward improvements to fuel quality from 2027 to 2024 by co-investing with domestic refiners to undertake the necessary infrastructure upgrades for low sulfur fuel production.

Accelerating the necessary major infrastructure upgrades will create up to an additional 1,750 construction jobs, bringing flow-on benefits to the Lytton and Geelong communities.

The Government will also accelerate the industry-wide review of the petrol and diesel standard to 2021, including a consideration of aromatics levels. This aims to create a Euro-6 equivalent petrol and diesel standard that are appropriate for Australia.

The Government will work with both refineries on their plans to consider future fuel technologies and other development opportunities. This will include the refineries' roles in the roll-out of future fuels, such as electric vehicle charging and hydrogen transport infrastructure.

The Government will introduce the Fuel Security Bill to the Parliament in the coming weeks. This Bill will implement the FSSP to ensure it can begin on 1 July 2021, and set the key parameters for the Minimum Stockholding Obligation that will commence in 2022.

This package implements the Morrison Government's commitment to the refining sector, announced as part of the 2020-21 Budget, and complements other measures including increased onshore diesel storage and taking advantage of record low prices to store oil in the US Strategic Petroleum Reserve.

Media contact:
Minister Taylor's office: 02 6277 7120

ASX Release

17 May 2021

Federal Government Fuel Security Announcement

Viva Energy Group Limited (the **Company**) welcomes today's announcement by the Federal Government to implement a long-term Fuel Security Package (**FSP**) to support Australia's refining industry. The FSP acknowledges the importance of refining to the country's broader energy security and enhances the long-term viability of the domestic refining sector (noting that the package remains subject to legislative approval processes)[1]. Viva Energy expects to commit to and participate in the FSP, subject to the finalisation of the detail of the package, and approval of the legislative package. A conference call (dial-in details found at the end of this release) has been scheduled for 11am (AEST) today to discuss the FSP further.

The FSP consists of three main elements: A Fuel Security Services Payment (**FSSP**), the introduction of industry minimum stockholding obligations (**MSO**), and capital contributions towards refinery upgrades to allow the production of ultra-low sulphur gasoline (**LSG**)[2] (together with bringing forward of LSG specifications to the end of 2024). As part of the package, Viva Energy would make a six-year commitment to maintain refining operations through to 30 June 2027, with a further three-year option for the Company to extend until 30 June 2030.

CEO and Managing Director, Scott Wyatt said: "Today's announcement by the Federal Government provides important and welcome structural support to the refining sector in Australia. The sector has faced several structural headwinds in recent years from challenged trading conditions globally, increased competition from Asian refinery imports, and the significant impacts of demand destruction from the COVID-19 pandemic in 2020. This has seen the number of refineries in Australia reduce from six in 2011, to only two continuing refineries today, leaving the country predominantly reliant on product imports from international refineries for our fuel requirements. We thank Minister Taylor for working closely with the sector to secure and maintain our remaining refinery capacity through this package.

"Refineries provide a critical role in energy security to this country, through their crude conversion capability and substantial inventory positions. In FY2020, our Geelong operations had a cash-loss of over $200 million, and without the support of the Federal Government continued operations would have not been sustainable. This could have seen the loss of over 700 direct jobs, the loss of the last major manufacturing operations in Geelong, and a significant contributor to the Victorian economy.

"Critically, the structure of the FSP allows us to commit to the necessary and significant capital program through the package's life cycle. The structure of the FSSP is not designed to underpin or support profits of Geelong, but rather to mitigate some of the downside risk of low refining margin cycles, to which Australian refineries are exposed outside of their control. Reducing this risk allows us to proceed with greater confidence, as we seek to invest in the future of the Geelong site.

"This confidence supports our vision for the Geelong Energy Hub, to transition the refining site to multiple sources of energy, as we participate in the longer-term goal of energy transition to a lower carbon economy. Coupled with this is a commitment to improved fuel standards, through the advancement of ultra-LSG fuel specifications, and working towards further harmonisation to Euro 6[3] vehicle emission standards.

"We now look forward to a period of substantial investment in Geelong, providing an exciting period in the site's history. The investment in capital upgrades needed for ultra-LSG, together with our normal capital investments and major maintenance turnarounds, and our plans for Energy Hub projects -

including the Gas Terminal Project and hydrogen refuelling station - means a period of substantial investment which supports the site's future.

"2020 was a challenging period for our refinery, as it was for many people and businesses. Our people played a critical role in maintaining refining operations in the toughest of circumstances, and it is very much through their dedication, attitude and hard work that we are able to now move forward to a more positive period. I thank them greatly for this."

The following sets out the key expected parameters of the FSP. We note that the final package remains subject to legislative approval, and the preparation and adoption of the necessary regulatory and contractual mechanisms to implement the package. Viva Energy intends to work with the Federal Government through this period – and Viva Energy's formal commitment to the package will be agreed following the finalisation of all necessary mechanisms.

Fuel Security Service Payment

The FSSP is intended to commence from 1 July 2021 and will continue to 30 June 2027 (unless extended by option). When applicable, the FSSP will be a cents-per-litre (**cpl**) payment calculable on the actual production of main grade fuels (gasoline, jet and diesel), produced from the Geelong Refinery.

The payment will be determined by reference to a Margin Marker, developed separately for each Australian refinery. It comprises transparent and public markers for crude, product and freight to develop a base margin, with a calibration factor to adapt the public data to Geelong Refinery's operations. The Margin Marker has been calibrated based on Geelong's historical performance and it is intended to approximate Geelong's actual refining margin, on average. It is expected that the marker will be published by the Federal Government when the regulatory instruments and mechanisms are finalised.

The FSSP support will commence when the Margin Marker falls below A$10.20/bbl. The support will increase from 0 cpl to 1.8 cpl (or A$0.0/bbl to A$2.90/bbl), on a linear basis until the support caps at the Margin Marker level of A$7.30/bbl. Below this margin level, full support at 1.8cpl (A$2.90/bbl) will be provided.

The support is designed to mitigate some of the downside risk to refining margins, providing payments when the margin environment falls below the long-term cash breakeven level (having regard to all operating costs and capital expenditure) of Geelong's operations. The structure also incentivises Viva Energy to continue to operate the Geelong facility as efficiently as possible, and to seek process and production improvements where possible.

The FSSP effectively reduces the cash break-even level of Geelong operations by the quantum of the 1.8 cpl support – that is, it reduces the average margin necessary to achieve cash breakeven by approximately A$2.90/bbl.

The FSSP replaces the existing Temporary Refinery Production Payment. The total payments received through to 30 June 2021 are expected to be approximately $40 million (approximately 1.39 cpl or A$2.21/bbl)[4].

Minimum Stockholding Obligations

The Federal Government intends to introduce minimum stockholding obligations on main grade fuels (petrol, jet and diesel) across the fuel industry, on a staged basis.

The first stage is expected commence from 1 July 2022 and is designed to maintain current average product levels in the country, requiring stored holdings of fuel equalling national consumption coverage of 24 days for petrol, 20 days for diesel and 24 days for jet.

The second stage is expected commence from 1 July 2024 and requires a 40% increase of holdings of diesel nationally – increasing the consumption days coverage to 28 days for diesel.

The MSO will apply to Viva Energy; however, refineries are exempt from the increased diesel requirements at an asset level. Further, the crude held by refineries will be counted toward the product holding requirements, on a converted product basis. The Company expects that a secondary trading market in storage will develop through the introduction of the MSO.

Ultra-Low Sulphur Gasoline Specification

As part of the FSP, the Federal Government intends to bring forward the requirement for ultra-LSG to the end of 2024. To produce refined fuel to this specification requires substantial upgrades to the Geelong Refinery.

To facilitate this, the Federal Government intends to provide a 50% (up to a maximum of $125 million) contribution towards the capital upgrades necessary at Geelong to produce ultra-LSG. The Company currently expects the capital upgrades to cost up to $250 million and is conducting assessment work to commence the project to deliver this by the end of 2024. In conjunction, it is anticipated that the upgrades will also involve energy efficiency improvements, and potential work toward further harmonisation with Euro 6 vehicle emissions standards.

Viva Energy and the Federal Government have also agreed to bring forward important work to assess Australian gasoline and diesel specifications, and particularly the aromatics content of fuels, in order to seek further progression towards harmonisation to Euro 6 vehicle emissions standards. This work will be brought forward to the second half of 2021, and should the review result in further changes, the Federal Government has made available additional funding for any identified capital spend (up to $26 million), or for adjustments necessary to the FSSP setting to allow for operating expenditure increases.

The Company has long supported the continued improvement in Australian fuels standards where there are direct benefits, and looks forward to working with Government and industry to identify future pathways.

Refining Commitment

In order to receive the benefit of the FSSP and ultra-LSG capital grants, the Company will be required to commit to continued refining operations until 30 June 2027 – aligning the refining commitment with the benefit of the FSSP. In addition, an option to extend the program to 30 June 2030 will be made available for future election. Subject to the package being approved and finalised (discussed further below), Viva Energy expects that it will commit to the package.

In the event that a commitment to continue refining is made under the legislation and not ultimately satisfied, refiners will be required to repay a proportion of funds received under the program (proportionate to the period of the commitment that remains unsatisfied). Such repayments will not be required in circumstances of force majeure, or where operating conditions or financial performance are substantially loss making over an extended period, notwithstanding receipt of the FSSP.

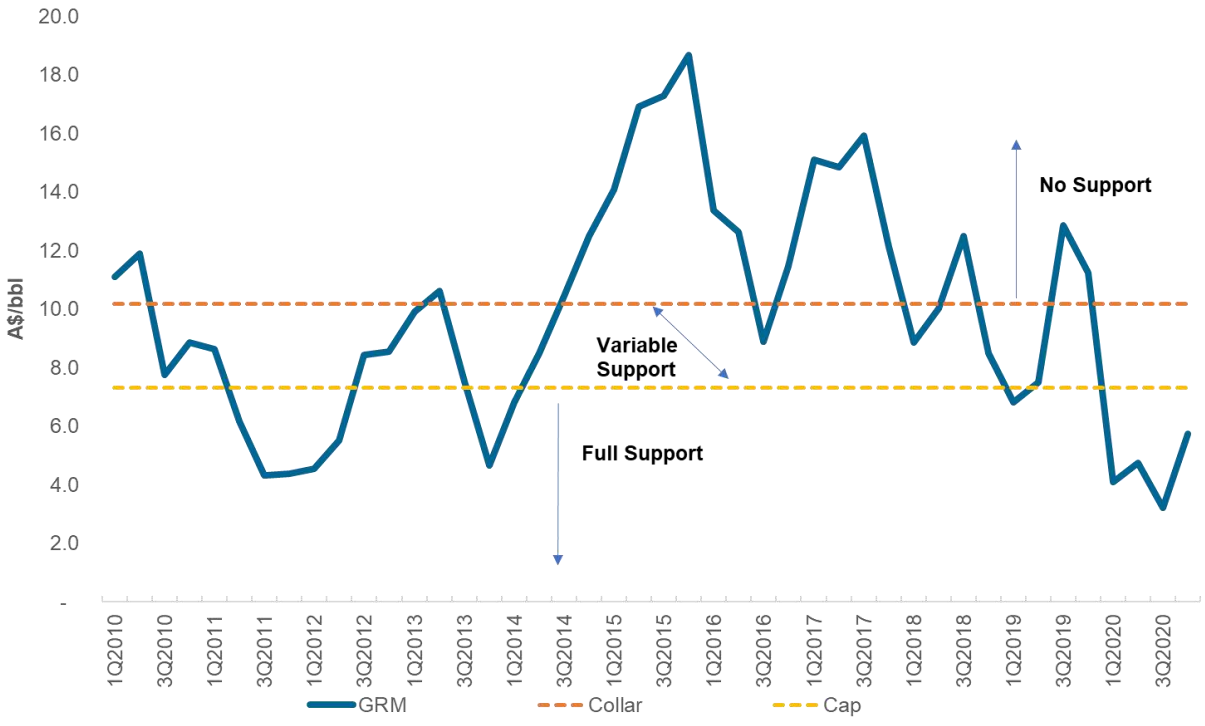
Process, Timing and Review

The FSP is expected to be implemented through a suite of legislative instruments and contractual grants. In particular, the legislation requires political support for it to be passed through parliament, prior to its implementation. Accordingly, the final FSP, and Viva Energy's final commitment to the mechanisms, will not be finalised until this process is complete. Viva Energy intends to work with Government to finalise these matters as soon as is practicable.

Once the package is implemented, it is expected that the Federal Government will conduct a review two-years after its implementation, and prepare a milestone report. This review is expected to assess the performance of the Margin Marker mechanism against policy objections, the impacts of the MSO, and the outcome of the aromatics fuel specification review.

Historical Actual GRM and FSSP mechanism

*The following chart is provided for illustrative purposes only, to show how the cap and collar mechanism is intended to operate. It charts Geelong's actual historical refining margin (A$/bbl) (**GRM**) from FY2010 through to FY2020 (on a quarterly basis). The Margin Marker is intended to approximate GRM, on average and over time. And whilst it is intended to be strongly correlated to GRM, the Margin Marker will not exactly track GRM, and as such there will be some variance between the Margin Marker and GRM. Payments of the FSSP (and the application of the cap and collar structure) will be based on the Margin Marker, not GRM.*



Authorised for release by: the Disclosure Committee of Viva Energy Group Limited

ASX Release

Notes:

1. All policy settings noted within this ASX notice in relation to the Fuel Securities Package announced by the Federal Government on 17 May 2021 remain subject to resolution through the legislative process.
2. Requires gasoline with a sulphur content of less than 10 parts per million.
3. Euro 6 fuel standards refers to vehicle emission standards developed by the United Nations to regulate gasoline and diesel vehicle emissions.
4. Total final payment amount under the interim refining production grant is dependent upon levels of refined production at Geelong Refinery during 2Q2021.

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About Viva Energy

Viva Energy (ASX: VEA) is one of Australia's leading energy companies and supplies approximately a quarter of the country's liquid fuel requirements. It is the exclusive supplier of high-quality Shell fuels and lubricants in Australia through an extensive network of more than 1,330 service stations across the country.

Viva Energy owns and operates the strategically located Geelong Refinery in Victoria, and operates bulk fuels, aviation, bitumen, marine, chemicals and lubricants businesses supported by more than 20 terminals and 55 airports and airfields across the country.

www.vivaenergy.com.au

ASX Release

Conference Call details

Viva Energy management will today be hosting a conference call to discuss this update:

Date: 17 May 2021

Time: 11:00 am (AEST)

Dial-in Details	
Conference ID:	1001 4005
Participant Numbers	
Participants can pre-register by navigating to https://s1.c-conf.com/diamondpass/10014005-yte963.html Please note that registered participants will receive their dial in number upon registration to enter the call automatically on the day.	
To enter the call via operator you will need to quote the conference ID provided above and use the dial in below.	
Participant toll:	+612 9007 8048
Participant toll free:	1800 908 299 / 1800 455 963
International Dial-in Details	
These numbers are toll-free dial-in numbers for each country listed below. For countries not listed below, the Australian Participant Toll number listed above can be dialled. To ask a question, you will need to dial *1 on the telephone keypad.	

Hong Kong	800 968 273	Singapore	800 101 2702
Japan	0066 3386 8000	United Kingdom	0800 051 1453
New Zealand	0800 452 795	United States	1 855 624 0077

ASX Release

17 May 2021

PROPOSED GOVERNMENT REFINING SUPPORT AND DECISION TO CONTINUE OPERATION OF LYTTON

Ampol Limited (ASX:ALD) today provides an update on the outcome of its Lytton refining review.

Key points

- Ampol welcomes the Federal Government's proposed support for Australian refineries, which provides a variable support payment of up to $108m pa for Lytton operations during periods of low refining margins
- The package also provides for a funding grant of up to $125 million from the Federal government to undertake infrastructure upgrades to produce ultra-low sulfur petrol
- Ampol intends to continue refining at Lytton until at least mid-2027, in accord with the package requirements, provided that the legislation is enacted and government support initiatives are finalised as proposed
- With ongoing refining operations, Ampol will realise benefits afforded to Australian refiners under proposed minimum stock holding obligations, including lower holding obligations, reducing working capital requirements and avoidance of costs on incremental storage
- Ampol's decision maximises shareholder value, and enables progress towards alternative uses for this strategic site, while preserving and developing manufacturing skills that will be critical for success in the energy transition
- Support during periods of low margins improves the quality of Lytton's earnings profile by significantly reducing earnings volatility and earnings downside risk, which should result in a higher earnings outcome on average
- Reduced volatility will improve earnings quality, lower average cost of capital, and enable Ampol to increase its target leverage range to 2.0x – 2.5x Adj. Net Debt / EBITDA, in turn supporting incremental growth and/or shareholder returns
- The Federal Government recognises that fuel security and energy transition are linked, and has confirmed an intention to work in partnership with Ampol to leverage its privileged assets, supply chain expertise and customer positions in shaping the energy transition and developing future energy solutions for Australian businesses

Ampol intends to continue refining operations at Lytton

Ampol is pleased to announce, that following comprehensive management analysis and constructive engagement with the Federal and Queensland State Governments, it has completed its review of the Lytton refinery.

Today the Federal Government has announced an extensive package of support initiatives, including variable refining support payments, funding support for capital investment which is required to meet the introduction of new clean fuel standards, and lower working capital requirements under the proposed minimum stock holding requirements.

After careful consideration of all options available for value creation from the Lytton site, Ampol has decided that continued refining operations with the proposed government support maximises shareholder value and retains the opportunity to transition the strategically located site to alternative uses in the future.

Assuming the proposed refinery support initiatives receive sufficient bipartisan support and are successfully legislated, Ampol intends to commit, as required by the government package, to ongoing refinery operations at Lytton until at least 2027, as a partner with government in meeting the dual objectives of fuel security and energy transition. Enactment of government legislation is anticipated early in 2H 2021. Ampol may reconsider its decision if this does not occur as planned.

Matt Halliday, Managing Director and CEO said: "Through our constructive engagement during the review, the Federal Government has proposed a package of support initiatives that will underpin the viability of the Lytton refinery over the medium term, and in doing so enable the continued employment of ~550 people in Australian manufacturing jobs and the indirect employment of hundreds more.

“We have also had constructive discussions with the Queensland State Government that are continuing. The Queensland government is committed to working with Ampol to support ongoing refining operations, deliver a transition to the production of “future fuels”, and sustainable growth-orientated industrial uses at Lytton.

“We are pleased that the governments have recognised the challenges faced by the local refining industry which includes competition from large-scale international refineries and the impacts of COVID-19. Under the proposed government support initiatives, we expect Lytton to generate an appropriate return on capital through the cycle which will allow for continued investment to deliver both cost competitive and ultra-low sulfur fuels, whilst also investing in future energy initiatives at the site.”

“Ampol is an Australian company with a long and proud history and has been refining at Lytton since 1965. Our operations play an important role in the economy and in delivering national prosperity, and consistent with this, our discussions with the government have been open and productive throughout our review.”

Rationale for continued operations at Lytton

Ampol’s decision to keep Lytton operational for the medium-term has several key benefits:

- **Provides an appropriate return for Lytton through the cycle:** the government support manages losses during poor margin conditions, to enable Ampol to keep operating and to make profits without any government support when conditions improve;
- **Improves the quality of Ampol’s earnings:** the government support significantly reduces Lytton’s earnings volatility and earnings downside risk with support payments highest when refining margins are low;
- **Improves cost of capital and balance sheet capacity:** the reduced volatility in earnings will provide increased balance sheet capacity to support incremental growth and/or shareholder returns, consistent with Ampol’s Capital Allocation Framework;
- **Fuel security & energy transition:** Ampol is partnering with government to meet the dual objectives of Australia’s fuel security and energy transition;
- **Community:** Ampol can continue the employment of ~550 Australian manufacturing jobs at Lytton and the indirect employment of hundreds more; and
- **Optimal use of the Lytton site:** government support will assist in funding investments required to meet Australia’s new fuel standards. Lytton will remain an operating refinery and, longer term, Ampol has ambitions to invest in future energy technologies at the site to facilitate an orderly energy transition.

Although Ampol intends to commit to refining until at least mid-2027, under the legislation, Ampol retains flexibility to withdraw from the package and pursue an earlier conversion to an import terminal in the case of persistently low refinery margins, or other materially adverse events including changes to the Fuel Security Services Payment (FSSP) by future governments. Ampol also expects to be entitled to receive the one-off short-term refining support payments which were announced by the Federal Government in September 2020, which should be in the order of ~A$40 million for production in 1H 2021.

Reduced earnings volatility to support revised target capital structure

Given the material reduction in earnings volatility under the proposed government support initiatives, Ampol has received confirmation from Moody’s that Ampol‘s Baa1 investment grade threshold will increase to 2.8x Adj. Debt / EBITDA (from 2.3x currently). As a result, Ampol expects to increase its target leverage range (under its Capital Allocation Framework) to 2.0x – 2.5x Adj. Net Debt / EBITDA (from 1.5x – 2.0x currently).

Ampol’s leverage at the end of 2020 was 1.7x Adj. Net Debt / EBITDA, on a pro-forma basis following the $300 million off-market share buy-back completed in January 2021. Ampol will assess balance sheet capacity after the later of enactment of the support initiatives and Ampol’s 1H 2021 financial result in August 2021, with excess capacity used for investment in incremental growth and/or additional shareholder returns as per our Capital Allocation Framework.

Decision supports government partnership on energy transition and decarbonisation

Evolving our business to build the foundations for energy transition is one of the three key elements of Ampol’s strategy. Ampol’s privileged assets, supply chain expertise and deep customer relationships mean we are uniquely placed to be

part of the decarbonisation solution by enabling an orderly energy transition and capitalising on opportunities that can deliver sustainable returns for shareholders over the long-term.

The outcome of the review will help enable an orderly energy transition from crude oil refining by assisting the Federal Government's policy objectives around liquid fuel security, while in parallel pursuing alternative future uses for the Lytton site that seek to leverage its industrial zoning, port access, and connection to existing utilities and infrastructure. The financial benefit of the refining support during times of low margins will support Ampol's investment in future energy opportunities, as will the retention and development of manufacturing skills that will be critical for success in future energy transition.

The Federal Government recognises the importance of fuel security and the role of refineries. The Government has confirmed an intention to work in partnership with Ampol to leverage its privileged assets, supply chain expertise and customer positions to develop future fuel technologies. The partnership will include working together on current and future measures relating to future fuels policy, and potential funding support through government agencies for future energy projects, particularly around enabling infrastructure.

Ampol looks forward to providing further information with the release of its Energy Transition and Decarbonisation strategy later this week.

Summary of government's proposed support initiatives

The Federal Government has today announced its Fuel Security package, including an intended Fuel Security Services Payment (FSSP) to support refining in Australia, and Minimum Stock Holding Obligation (MSO), with key details summarised below:

Fuel Security Services Payment (FSSP)[1]

Under the proposed FSSP, Australian refineries are entitled to a variable support payment based on the quantity of fuels refined and the Government's external marker margin. As it relates to Lytton refining operations, the FSSP is anticipated to provide:

- **Variable payment:** a variable support payment when the refining price marker is between 4.6AcpL and 6.4AcpL, which effectively increases realised margin to 6.4AcpL (an effective increase in LRM to a range between ~US$7.00 - $7.50/bbl),
- **Cap payment:** a maximum support payment of 1.8 AcpL if the refining price marker is 4.6AcpL or below; and
- **Collar payment:** no support payment if the Government refining price marker is greater than 6.4AcpL.

The cap and collar nature of the FSSP is intended to provide a high level of support when refining margins are low, and no support when refining margins are above the collar. In doing so, the payment reduces the volatility of Lytton's earnings and provides greater financial certainty in times of low margins, reduces the downside risk of the asset, and retains upside exposure to periods of higher margins. The maximum support payment reduces Lytton's EBIT breakeven LRM, which enables the confidence to continue to invest in sustaining capex.

The support initiatives apply for a period of 6 years commencing 1 July 2021, with acceptance requiring Ampol to commit to operating the refinery until mid-2027, with an option for Ampol to then extend the support for a further three years.

The variable support payment equates to up to $108m pa for Lytton operations during periods of low refining margins, based on 6.0 BL of production at 1.8 AcpL

Minimum Stock Holding Obligation ("MSO")

Under the proposed MSO, the Australian fuel industry will be required to hold a minimum stock holding in Australia, commencing from July 2022. This minimum level is anticipated to be equal to 24 days of petrol and jet demand, plus 20 days of diesel demand, increasing to an industry average of 28 days of diesel demand from July 2024.

The government has proposed that Australian refineries will be afforded reduced working capital obligations relative to importers by being allowed to count crude toward their MSO, and by a lower diesel stock holding obligation (20 days of diesel coverage with no increase in 2024). This lower than average MSO for local refineries will then require importers to hold a higher than average MSO, for the industry to meet mandated minimum stock holding targets.

Based on the decision to continue refining operations, it is expected that Ampol will have sufficient storage capacity to meet this obligation but more work is required to finalise this view, with higher holding obligations if Lytton were converted to an import terminal.

Federal Government funding to accelerate new fuel standards

In addition to the proposed FSSP and MSO benefits, the Federal Government will provide a grant of up to A$125 million to the Lytton refinery, to undertake infrastructure upgrades to produce ultra-low sulfur petrol in accordance with fuel quality standard changes by end 2024. Ampol expects this support initiative will cover approximately half of the required investment at Lytton to produce ultra-low sulfur petrol.

The Federal government is also considering a pathway towards Euro 6 equivalent standards in Australia, and has proposed potential for both capital to support required aromatics upgrades at Lytton and further support under the FSSP in this event.

Conference Call Details

Ampol is hosting an investor call to discuss the outcome of its refining review at 9.00am (AEDT) on 17 May 2021.

To participate in the call, pre-registration is available via https://s1.c-conf.com/diamondpass/10014029-p3tr01.html, or investors are able to listen in via the webcast on our website: https://www.ampol.com.au/about-ampol/investor-centre

Authorised for release by: the Board of Ampol Limited.

Appendix

To assist in investor understanding of the refining review outcome, Ampol provides some of the key determinants in arriving at this decision, which are subject to formal front end engineering and design work:

Continued refining operations

- LRM outlook: A range of refining margins were considered, from continuation of weakness over last 12 months (~US$5/bbl) to a recovery back to 10yr average levels (~US$9/bbl)
- Volume outlook: ~6BL p.a. production.
- Capex: $50-90m p.a. SIB capex, ~$150-250m capex (100% basis) in 2021-2024 to meet new fuel standards

Conversion to import terminal

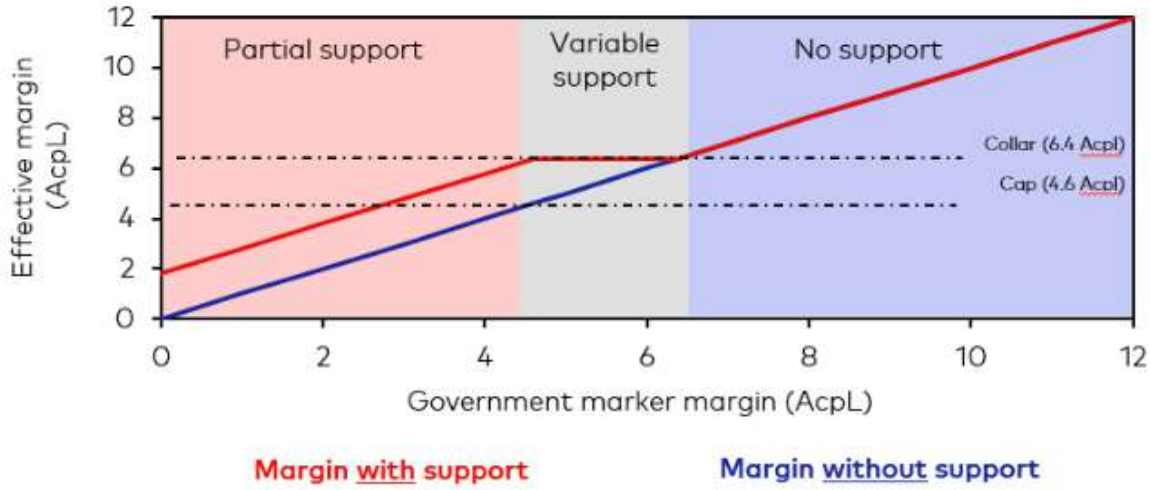
- Volume outlook: 2.5 BL p.a. – 4 BL p.a. import facility, with the upper end of this range representing the opportunity for industry collaboration to optimise supply chains
- Capex: ~$200m for decommissioning, redundancies, and demolition, ~$100-150m conversion capex, and a further $50-100m [present value] for longer dated remediation
- Cash offsets: ~$200m cash tax benefit realised post dismantling, ~$100m working capital release
- Terminal case replacement EBIT: materially lower than refining
- Incremental tankage may be required to meet MSO

1. Notes to Federal Security Services Payment (FSSP)

FSSP payments are denominated in AcpL, based on a Government refining price marker, which broadly correlates to the Lytton Refiner Margin ("LRM"). Payments are made quarterly based on the average of the refining marker in the quarter.

FSSP is structured with a maximum payment of 1.8 AcpL when the refining price marker is below 4.6 AcpL, variable support when the refining price marker is between 4.6 AcpL and 6.4 AcpL, and no support when the price market is above 6.4 AcpL.

For the purpose of illustration, all LRM comparatives in this document are based on an AUDUSD of 0.78.



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Norwegian Petroleum Directorate

Production figures April 2021

20/05/2021 Preliminary production figures for April 2021 show an average daily production of 2 008 000 barrels of oil, NGL and condensate.

Total gas sales were 9.2 billion Sm^3 (GSm^3), which is a decrease of 0.6 GSm^3 from the previous month.

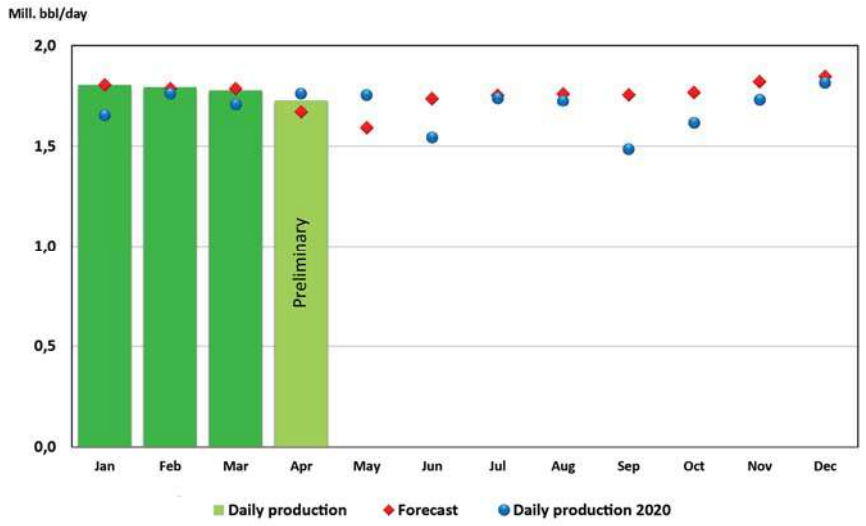
Average daily liquids production in April was: 1 725 000 barrels of oil, 270 000 barrels of NGL and 13 000 barrels of condensate.

Oil production in April is 3.2 percent higher than the NPD's forecast, and 0.7 percent higher than the forecast so far this year.

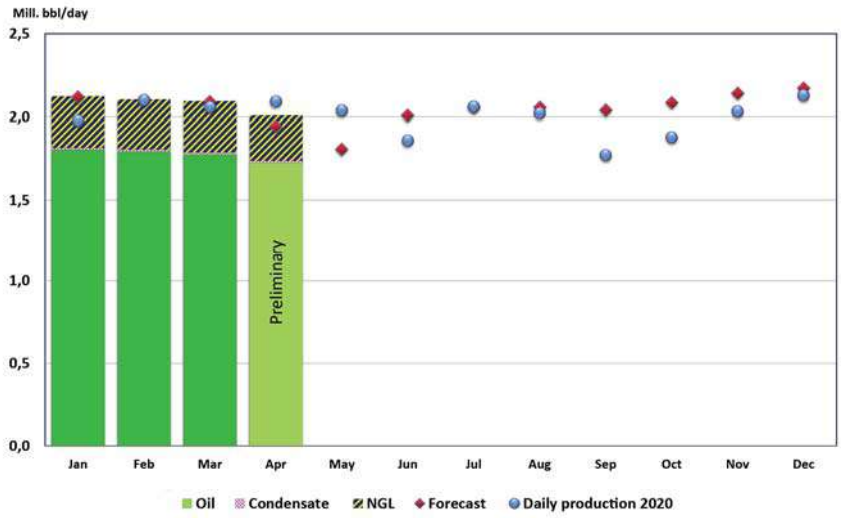
Production April 2021

		Oil	Sum liquid	Gas	Total
		mill bbl/d	mill bbl/d	MSm^3 /d	MSm^3 o.e/d
Production	**April 2021**	**1,725**	**2,008**	**307,6**	**0,627**
Forecast for	April 2021	1,671	1,945	275,7	0,585
Deviation from forecast		0,054	0,063	31,9	0,042
Deviation from forecast in %		3,2 %	3,2 %	11,6 %	7,2 %
Production	March 2021	1,775	2,092	318,1	0,651
Deviation from	March 2021	-0,050	-0,084	-10,5	-0,024
Deviation in % from	March 2021	-2,8 %	-4,0 %	-3,3 %	-3,7 %
Production	April 2020	1,761	2,092	302,8	0,635
Deviation from	April 2020	-0,036	-0,084	4,8	-0,008
Deviation in % from	April 2020	-2,0 %	-4,0 %	1,6 %	-1,3 %

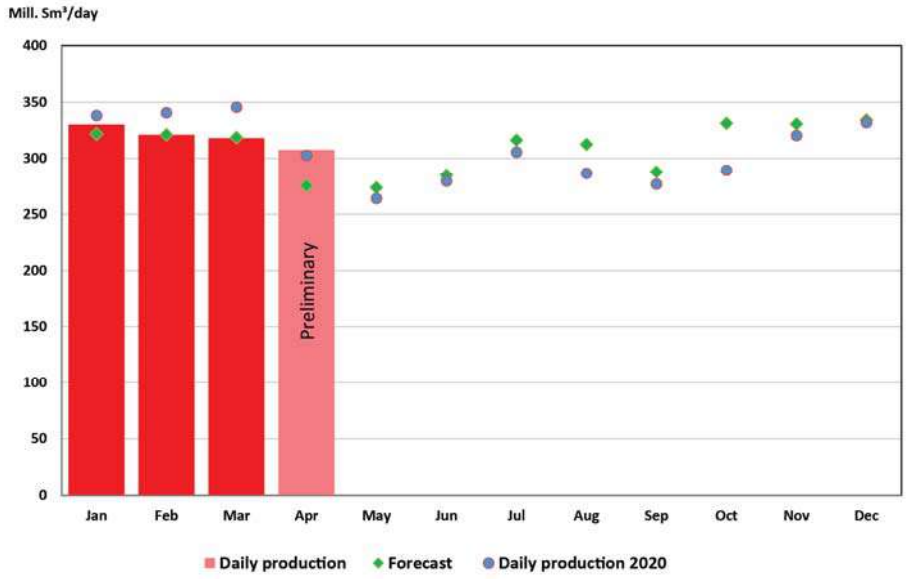
Oil production 2021



Liquid production 2021



Gas production 2021



The total petroleum production for the first four months in 2021 is about 78.0 million Sm^3 oil equivalents (MSm^3 o.e.), broken down as follows: about 33.8 MSm^3 o.e. of oil, about 5.9 MSm^3 o.e. of NGL and condensate and about 38.3 MSm^3 o.e. of gas for sale.

The total volume is 1.7 MSm^3 o.e. lower than in 2020.

Updated: 20/05/2021

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https://www.reuters.com/world/middle-east/opec-says-iea-net-zero-pathway-could-add-oil-price-volatility-2021-05-20/?taid=60a6c4737e2160000118c0f7&utm_campaign=trueAnthem:+Trending+Content&utm_medium=trueAnthem&utm_source=twitter

May 20, 202110:15 AM MDT

OPEC says IEA net-zero pathway could add to oil-price volatility

Dmitry Zhdannikov

OPEC has said that an IEA report suggesting that investors should not fund new oil projects to curb emissions could lead to oil-price volatility if it is acted on.

The International Energy Agency on Tuesday said investors should not fund new oil, gas and coal supply projects if the world wants to reach net zero emissions by mid-century, in its starkest warning yet to curb fossil fuels. read more

The research division at the Organization of the Petroleum Exporting Countries, whose 13 members sit on 80% of the world's crude oil reserves, produced an internal briefing document on the IEA's report, a copy of which was seen by Reuters.

"The claim that no new oil and gas investments are needed post-2021 stands in stark contrast with conclusions often expressed in other IEA reports and could be the source of potential instability in oil markets if followed by some investors," OPEC's report said.

OPEC also said a scenario in the IEA's report could affect how companies invest and limit demand for oil. The producer group currently forecasts oil demand will recover strongly this year and continue rising until the 2030s.

"While the NZE (net zero) Scenario seems overly ambitious in terms of assumptions and results, it will certainly influence investment decisions, which may curb demand (growth) for fossil fuels such as oil and gas, as many policymakers and oil & gas companies use the IEA's scenarios for their strategic planning," OPEC said.

OPEC made the further point that for many developing countries, the route to net-zero emissions without international help was not clear and they would need technical and financial support to get there.

"Without greater international cooperation, global CO2 emissions will not fall to net zero by 2050," OPEC said.

Our Standards: The Thomson Reuters Trust Principles.

Excerpt from https://soundcloud.com/user-846530307/podcast-daily-energy-markets-forum-new-silk-road-live-may-19th
Gulf Intelligence Podcast: Daily Energy Markets Forum – New Silk Road "Live" May 19th

Items in "*italics*" are SAF Group created transcript

Ole Hansen, Head, Commodity Strategy, Saxo Bank, Dr. Sara Vakhshouri, Founder & President, SVB Energy International, Matt Stanley, Director, Star Fuels joined us on today's Live Daily Energy Markets Forum Commentary to share their insights on current market dynamics.

At 3:00min mark. Dr. Sara Hakhshouri "… *Iran's exports in May, we have seen a drop compared to previous month's. the exports dropped from about 800,000 barrels, 750-800 in the previous month to about 560, lower than 600,000 barrels a day. but it does not mean we not expect Iran oil exports to spike in the coming weeks, even by the end of May because what we say is the government has changed the export grade of crude oil, which is again the formula or cocktail that they were exporting before the sanctions, which means that they are getting ready for sanctions removal at some point soon, in the coming weeks or perhaps starting from next month. because what they are offering in terms of types of crude oil, the types of export crude oil is pretty much the pre-sanctions formula*"

https://www.spglobal.com/platts/PlattsContent/_assets/_images/latest-news/20210517-infographic-iran-oil-industry-eyes-end-to-sanctions.jpg

IRAN'S OIL INDUSTRY EYES END TO SANCTIONS

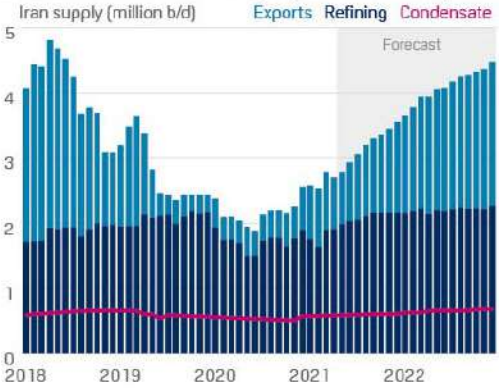
A flurry of talks involving the US, Iran and European nations could revive the nuclear deal and lift sanctions that had more than halved Iranian oil production, though significant obstacles remain. Iran pumped as much as 4.8 million b/d of crude and condensate before the sanctions were reimposed in 2018, and S&P Global Platts Analytics expects an agreement could bring full sanctions relief by Q4 2021, which could see volumes ramp up 850,000 b/d by December to 3.55 million b/d, with further gains in 2022.

Iranian oil on quest to reclaim market share

Heavy crude, condensate producers stand to lose from Iran's return

Light Sweet Light Sour Medium Sour Heavy Sour

Nuclear deal could bring rapid oil recovery



Source: S&P Global Platts, Shana, BP

Crude Oil in Floating Storage Falls 3.7% in Past Week: Vortexa
2021-05-17 07:00:01.361 GMT

By Bloomberg Automation
(Bloomberg) -- The amount of crude oil held around the world on tankers that have been stationary for at least 7 days fell to 106.03m bbl as of May 14, Vortexa data show.
* That's down 3.7% from 110.13m bbl on May 7
* Asia Pacific up 1.1% w/w to 82.00m bbl; highest since February
* Middle East up 24% w/w to 7.66m bbl
* Europe up 140% w/w to 6.45m bbl

* West Africa down 48% w/w to 2.14m bbl
* U.S. Gulf Coast down 76% w/w to 629.00k bbl
* Company Exposure:
** Asia: Cosco Shipping Energy Transportation Co., HMM Co. Ltd., Mitsui O.S.K. Lines Ltd., Nippon Yusen KK
** Europe: Euronav NV, Frontline, Vopak
** U.S.: DHT Holdings, International Seaways, Nordic American Tankers, Teekay Tankers, Tsakos Energy Navigation
* NOTE:
** Vortexa data exclude FPSO units, oil products and Iranian condensate
** Crude oil transferred by STS isn't included until that volume has been stationary on receiving vessel for 7 days
** Data don't include vessels booked for floating storage until they are actually stationary for the minimum period
** See VTXA or DATA FLOAT for more data, which is subject to revisions, and see NI TANTRA for all tanker-tracking stories
** See SPOT FREIGHT for freight rate assessments using shipbroker data

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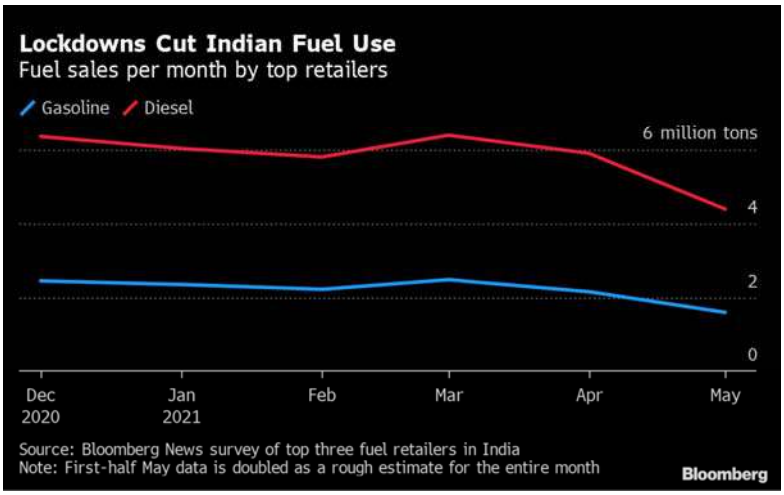
OIL DEMAND MONITOR: U.S., Europe Pick Up Pace; India Stressed
2021-05-19 05:09:14 GMT

By Stephen Voss -- (Bloomberg)

Indian oil demand deteriorated further in the past couple of weeks while European road-use continues to recover, reflecting a stark divergence in the effectiveness of efforts to control the coronavirus pandemic.

Gasoline sales in the first half of May by India's top three retailers fell to an average of 53,300 tons a day, the lowest in a year, according to a Bloomberg News survey. That's down 27% from 2019 levels, compared with a reduction of 4% in April. The slide was widely anticipated given numerous statewide lockdowns across India and fears among many urban citizens, and those in the countryside, that the spread of infection is out of control.

Sales of diesel, a more important fuel in India, were down 29% from 2019 levels in the first 15 days of May. The decline versus 2019 was only about 10% in April and 5% in March.



On the flipside, new data from China was more upbeat. Apparent oil demand, which is notoriously difficult to estimate because of large swings in import volumes, nudged down in April versus March, but was still about 10% above a year earlier, according to data compiled by Bloomberg, which uses numbers sourced from the National Bureau of Statistics

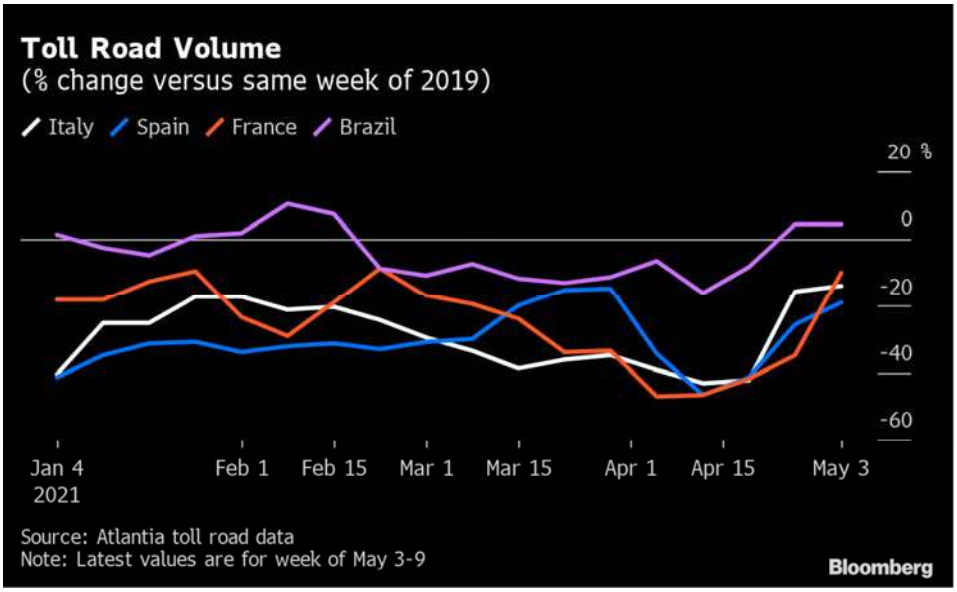
China's Crude Appetite

Furthermore, China processed a record amount of crude oil in the first four months of the year as new refineries ramped up operations and fuel demand rebounded strongly from the pandemic. The nation refined 232 million tons during those months, up 12% from the same period in 2019 prior to the outbreak, according to official data.

More frequent estimates of processing from Chinese researcher SCI99 show the utilization rates for independent refineries in Shandong province rose for the first time in 10 weeks. Even with a slide since early March, current rates of 66.72% are still only about seven percentage points below a year ago while they are about eight percentage points above two years ago.

Busier Roads in Europe

European roads continue to swell with cars. France in particular saw an upswing, with toll road volumes now just 10% below the equivalent week of 2019 compared with a 35% deficit a week earlier, according to Atlantia Group, which manages about 13,000 kilometers (8,000 miles) of toll motorways worldwide.



U.K. road fuel sales took a small step backward in the latest week of data, and are running about 14% below the equivalent period of 2019. The country has benefited from a fast rollout of vaccinations and easing of restrictions, with pubs and restaurants allowing customers inside at the start of this week.

The rest of Europe is fast catching up. Only 12% of European Union citizens had had at least one dose of a coronavirus vaccine at the start of April versus 46% in the U.K., according to Global Change Data Lab. As of this week, those figures stood at about 32% and 54%, respectively. Even so, London was the only one of western Europe's five biggest capital cities with higher-than-2019 levels of traffic congestion at 8 a.m. on Monday morning. Berlin and Paris were the next closest, data from location technology company TomTom NV show.

Department of Transportation data show U.S. interstate highway traffic in the week ended May 9 running slightly below 2019, for a combination of passenger vehicles and trucks. The readings, from roadside sensors, have been between 3% and 5% below 2019 levels for several weeks now, after briefly notching up a 1% increase in early April.

Air Travel: Seeing the Light

The U.K. remains among the worst places in the air travel industry, when compared against other major countries, because of its reliance on international travel.

Airline seat capacity data for May 17 from OAG Aviation shows France and Germany trailing the same week of 2019 by 69% and 78%, respectively, while the U.K. lags at 82%. With their vast domestic markets still able to function, the clear leaders are China, with seat capacity about 10% above 2019, and the U.S. at 25% below.

"We can see the light at the end of the tunnel but it's a little ways to go," United Airlines Inc. CEO Scott Kirby said Monday.

About a third of United's business is U.S. domestic leisure travel, which is back to normal, Kirby said in a Bloomberg TV interview. International long haul is still largely missing and domestic business travel will probably recover "in earnest around September."

Two measures from FlightRadar24 and OAG show how far the global air industry is still behind the equivalent period of 2019: commercial flights are down 34% and seat capacity is down 42%.

The Bloomberg weekly oil-demand monitor uses a range of high-frequency data series to help identify trends that may become clearer later in more comprehensive monthly figures.

Taking a global view, the main three forecasting agencies agree that excess oil inventories built up during the pandemic in major industrialized nations of the OECD have now been almost completely drained. Yet their expectations for demand growth rely heavily on a rebound occurring later this year.

The International Energy Agency and Organization of Petroleum Exporting Countries -- two of the three agencies -- last week cut their year-on-year oil demand growth forecasts for both the first and second quarters, while boosting growth predictions for the second half, particularly the fourth quarter.

Following are the latest indicators, in the four tables below. The first two show fuel demand and mobility, the next shows air travel globally and the last is refinery activity:

Measure	Location	% y/y	% vs 2019	% m/m	Freq.	Latest as of Date	Latest Value	Source
Gasoline demand	U.S.	+19	-3.8	-1.6	w	May 7	8.8m b/d	EIA
Distillates demand	U.S.	+3.9	-3.1	-3.9	w	May 7	3.97m b/d	EIA
Jet fuel demand	U.S.	+264	-27	-5.6	w	May 7	1.28m b/d	EIA
Total oil products demand	U.S.	+4	-10	-14	w	May 7	17.5m b/d	EIA
All vehicles miles traveled	U.S.		-4		w	May 9	16.0b miles	DoT
Passenger car VMT	U.S.		-6		w	May 9	n/a	DoT
Truck VMT	U.S.		+8		w	May 9	n/a	DoT
All motor vehicle use index	U.K.	+90	-7	+2.2	d	May 10	93	DfT
Car use	U.K.	+96	-12	+2.3	d	May 10	88	DfT
Heavy goods vehicle use	U.K.	+47	+9	+2.8	d	May 10	109	DfT

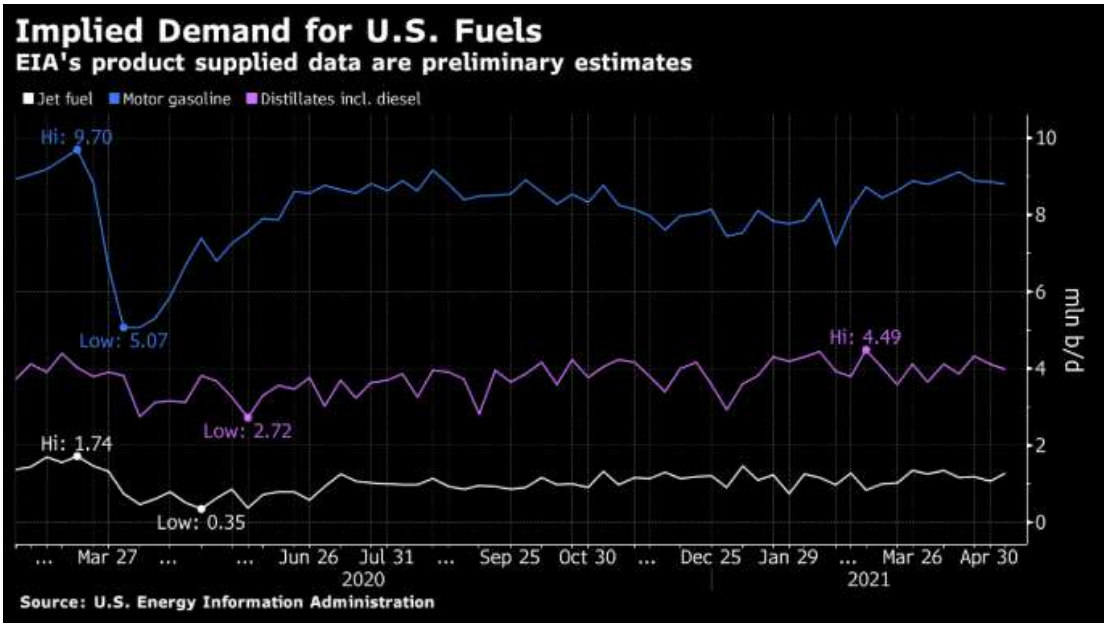
Car use	U.K.	+96	-12	+2.3	d	May 10	88	DfT
Heavy goods vehicle use	U.K.	+47	+9	+2.8	d	May 10	109	DfT
Gasoline (petrol) avg sales per filling station	U.K.	+125	-14	+13	w	May 9	6,233 liters/d	BEIS
Diesel avg sales per station	U.K.	+89	-14	+11	w	May 9	9,017 liters/d	BEIS
Total road fuels sales per station	U.K.	+103	-14	+12	w	May 9	15,250 liters/d	BEIS
Gasoline	India	+39	-27	-20	2/m	May 1-15	799k tons	Bberg
Diesel	India	+14	-29	-21	2/m	May 1-15	2.21m tons	Bberg
Jet fuel	India	+195	-60	-38	2/m	May 1-15	125k tons	Bberg
Total Products	India	+82	-7.2	-9.4	m	April 2021	17.01m tons	PPAC
Passenger car traffic	Poland	+30	+1	+21	w	May 16	22,048	GDDKiA
Heavy goods traffic	Poland	+16	+8	-1.3	w	May 16	4,716	GDDKiA

Toll roads volume	France	+178	-10		w	May 2-9	n/a	Atlantia
Toll roads volume	Italy	+115	-14		w	May 2-9	n/a	Atlantia
Toll roads volume	Spain	+157	-19		w	May 2-9	n/a	Atlantia
Toll roads volume	Brazil	+36	+4.3		w	May 2-9	n/a	Atlantia
Toll roads volume	Mexico	+59	+2.6		w	May 2-9	n/a	Atlantia
All vehicles traffic	Italy	+181		+1	m	April	n/a	Anas
Heavy vehicle traffic	Italy	+71		-6	m	April	n/a	Anas
Gasoline	Portugal	+112	-18	+16	m	April	75k tons	ENSE
Diesel	Portugal	+62	-10	+5.1	m	April	380k tons	ENSE
Jet fuel	Portugal	+301	-74	+43	m	April	33k tons	ENSE
Gasoline	Colombia	+28		+3	m	March	5.8m gal/d	Ministry
Diesel	Colombia	+6		-7	m	March	5.1 m gal/d	Ministry
Jet fuel	Colombia	-50		-39	m	March	400k gal/d	Ministry

The frequency column shows d for data updated daily, w for weekly, 2/m for twice a month and m for monthly.

* In DfT U.K. data, the column showing versus 2019 is actually showing the change versus the first week of February 2020, to represent the pre-Covid era.

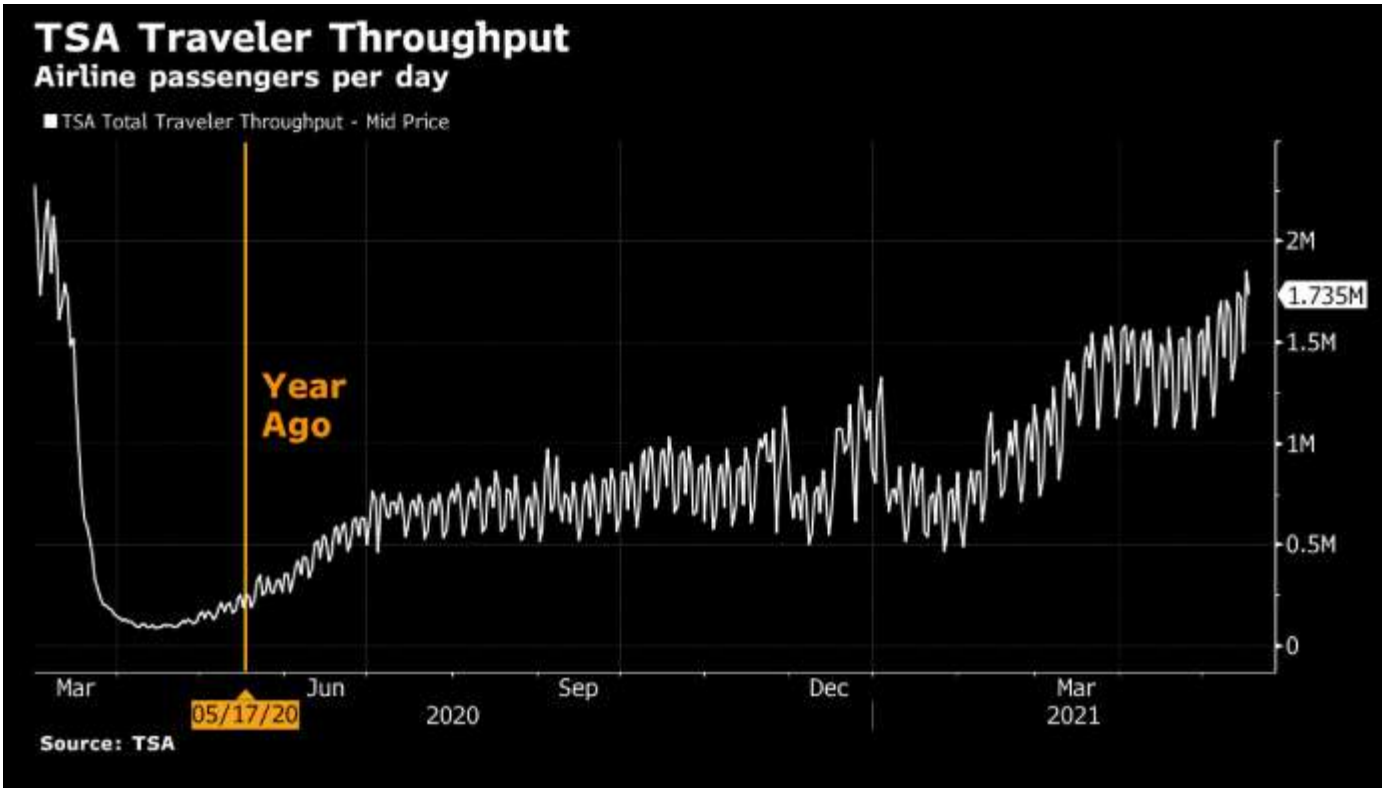
** In BEIS U.K. data, the column showing versus 2019 is actually showing the change versus the average of Jan. 27-March 22, 2020, to represent the pre-Covid era.



Measure	Location	% chg vs 2019	% chg m/m	May 17	May 10	May 3	Apr. 26	Apr. 19	Apr. 12	Apr. 5	Mar. 29	Mar. 22
		(May 17)		Minutes of congestion at 8am local time								
Congestion	Tokyo	-16	+4	31	28	7	32	30	28	25	31	32
Congestion	Mumbai	-92	+67	3	2	1	2	2	2	5	0	7
Congestion	New York	-46	-15	17	19	20	20	20	18	17	11	18
Congestion	Los Angeles	-47	-6	19	19	20	18	20	16	14	16	16
Congestion	London	+6	+5	40	41	2	44	38	25	2	30	40
Congestion	Rome	-30	-7	34	40	29	37	37	41	0	16	19
Congestion	Madrid	-46	-3	19	24	1	28	20	23	7	5	20
Congestion	Paris	-28	+141	32	31	29	23	13	19	1	22	26
Congestion	Berlin	-27	-7	25	24	23	28	26	23	3	16	23
Congestion	Mexico City	-54	+12	23	14	20	23	20	20	18	19	20
Congestion	Sao Paulo	-49	unch	22	22	24	22	22	19	17	10	15
Congestion	Shanghai	n/a	n/a	n/a	n/a	n/a	n/a	45	57	n/a	47	47
Congestion	Beijing	n/a	n/a	n/a	n/a	n/a	n/a	49	50	n/a	48	47

Source: TomTom. Note: M/m comparison is May 17 vs April 19. TomTom is unable to provide Chinese data for April 5 and from April 26 onwards.

Air Travel:



Measure	Location	% chg y/y	% chg vs 2019	% chg m/m	Freq.	Latest as of Date	Latest Value	Source
Airline passenger throughput	U.S.	+610	-29	+23	d	May 17	1.73m people	TSA
Commercial flights	Worldwide	+124	-34	-2.4	d	May 18	75,908	FlightRadar24
Air traffic (flights)	Europe		-62	+17	d	May 18	11,975	Eurocontrol
Seat capacity	Worldwide	+90	-42		w	May 17	64.08m	OAG
Seat cap.	China	+58	+9.8		w	May 17	17.25m	OAG
Seat cap.	U.S.	+212	-25		w	May 17	16.49m	OAG
Seat cap.	India	-31	-50		w	May 17	1.94m	OAG
Seat cap.	Japan	-24	-61		w	May 17	1.58m	OAG
Seat cap.	Australia	+629	-31		w	May 17	1.35m	OAG
Seat cap.	Brazil	+436	-54		w	May 17	1.13m	OAG
Seat cap.	France	+289	-69		w	May 17	732k	OAG
Seat cap.	Germany	+137	-78		w	May 17	714k	OAG
Seat cap.	U.K.	+6.8	-82		w	May 17	660k	OAG

Refineries:

Measure	Location	y/y chg	m/m chg	Latest as of Date	Latest Value	Source
Crude intake	U.S.	+21%	-0.2%	May 7	15m b/d	EIA
Utilization	U.S.	+18 ppt	+1.1 ppt	May 7	86.1 %	EIA
Utilization	Gulf Coast U.S.	+17 ppt	+2 ppt	May 7	88.3 %	EIA
Utilization	East Coast U.S.	+31 ppt	-1.8 ppt	May 7	79.3 %	EIA
Utilization	Midwest U.S.	+14 ppt	+0.1 ppt	May 7	84.7 %	EIA
Apparent Oil Demand	China	+9.7%	-0.5%	April 2021	12.958m b/d	NBS
Indep. refs run rate	Shandong, China	-7.1 ppt	-2.6 ppt	May 14	66.7 %	SCI99
State refs run rate	East China	+2.4 ppt	+5.5 ppt	May 14	75.2 %	SCI99
State refs run rate	South China	-0.4 ppt	+7.8 ppt	May 14	75.3 %	SCI99

NOTE: All of the refinery data is weekly, except for SCI99 state refineries, which is twice per month, and the NBS apparent demand, which is usually monthly.

--With assistance from Julian Lee, Debjit Chakraborty

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ATA TRUCK TONNAGE INDEX DECREASED 0.3% IN APRIL

MAY18

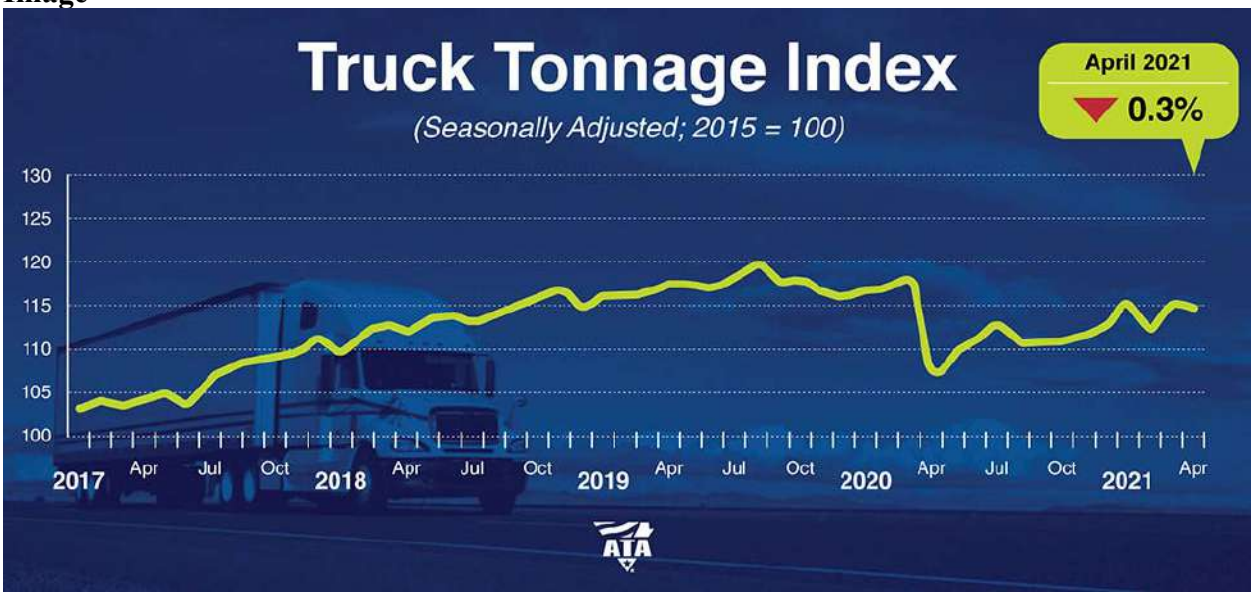
BACK

Media Contact:
Sean McNally

Index 6.9% Above April 2020

Arlington, Virginia — American Trucking Associations' advanced seasonally adjusted (SA) For-Hire Truck Tonnage Index decreased 0.3% in April after increasing 2.3% in March. In April, the index equaled 114.7 (2015=100) compared with 115.1 in March.

Image



"After a revised increase in March of 2.3%, the April index declined just slightly," said **ATA Chief Economist Bob Costello**. "The outlook is solid for tonnage going forward as the country approaches pre-pandemic levels of activity, with strong economic growth in key areas for trucking – including retail, home construction and even manufacturing.

"Additionally, the index increased on a year-over-year basis for the first time since March 2020. Part of the reason for the gain was due to an easy comparison with when the index fell significantly in April 2020," he said. "But I'm expecting increases, albeit smaller than April's, on a year-over-year basis going forward. Trucking's biggest challenges are not on the demand side, but on the supply side, including difficulty finding qualified drivers."

March's reading was revised up to +2.3% from our April 20 press release.

Compared with April 2020, the SA index jumped 6.9%, which was preceded by a 2.4% year-over-year decline in March.

The not seasonally adjusted index, which represents the change in tonnage actually hauled by the fleets before any seasonal adjustment, equaled 114.3 in April, 4.2% below the March level (119.3). In calculating the index, 100 represents 2015. ATA's For-Hire Truck Tonnage Index is dominated by contract freight as opposed to spot market freight.

Trucking serves as a barometer of the U.S. economy, representing 72.5% of tonnage carried by all modes of domestic freight transportation, including manufactured and retail goods. Trucks hauled 11.84 billion tons of freight in 2019. Motor carriers collected $791.7 billion, or 80.4% of total revenue earned by all transport modes.

ATA calculates the tonnage index based on surveys from its membership and has been doing so since the 1970s. This is a preliminary figure and subject to change in the final report issued around the 5th day of each month. The report includes month-to-month and year-over-year results, relevant economic comparisons, and key financial indicators.

https://www.noaa.gov/media-release/noaa-predicts-another-active-atlantic-hurricane-season

NOAA predicts another active Atlantic hurricane season

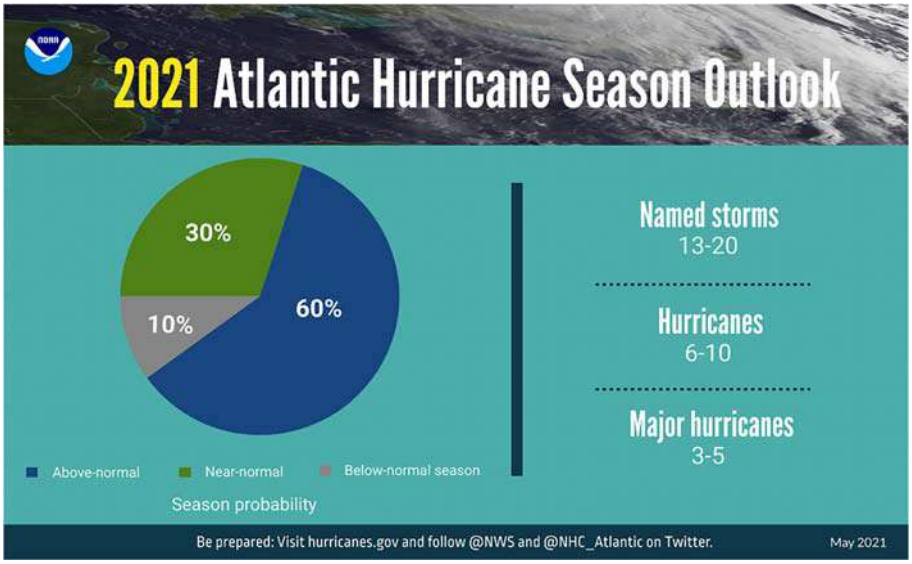
May 20, 2021

—

NOAA's Climate Prediction Center is predicting another above-normal Atlantic hurricane season. Forecasters predict a 60% chance of an above-normal season, a 30% chance of a near-normal season, and a 10% chance of a below-normal season. However, experts do not anticipate the historic level of storm activity seen in 2020.

For 2021, a likely range of 13 to 20 named storms (winds of 39 mph or higher), of which 6 to 10 could become hurricanes (winds of 74 mph or higher), including 3 to 5 major hurricanes (category 3, 4 or 5; with winds of 111 mph or higher) is expected. NOAA provides these ranges with a 70% confidence. The Atlantic hurricane season extends from June 1 through November 30.

"Now is the time for communities along the coastline as well as inland to get prepared for the dangers that hurricanes can bring," said Secretary of Commerce Gina Raimondo. "The experts at NOAA are poised to deliver life-saving early warnings and forecasts to communities, which will also help minimize the economic impacts of storms."



A summary infographic showing hurricane season probability and numbers of named storms predicted from NOAA's 2021 Atlantic Hurricane Season Outlook. (NOAA)

Last month, NOAA updated the statistics used to determine when hurricane seasons are above-, near-, or below-average relative to the latest climate record. Based on this update an average hurricane season produces 14 named storms, of which 7 become hurricanes, including 3 major hurricanes. [Watch this video summary of the Outlook.]

Highlights from NOAA's 2021 Atlantic Hurricane Season Outlook. A close-captioned version of this video can be viewed on the National Weather Service YouTube channel at https://youtu.be/cU0ljJ4v-XA.

El Nino Southern Oscillation (ENSO) conditions are currently in the neutral phase, with the possibility of the return of La Nina later in the hurricane season. "ENSO-neutral and La Nina support the conditions associated with the ongoing high-activity era," said Matthew Rosencrans, lead seasonal hurricane forecaster at NOAA's Climate Prediction Center. "Predicted warmer-than-average sea surface temperatures in the tropical Atlantic Ocean and Caribbean Sea, weaker tropical Atlantic trade winds, and an enhanced west African monsoon will

likely be factors in this year's overall activity." Scientists at NOAA also continue to study how climate change is impacting the strength and frequency of tropical cyclones.

"Although NOAA scientists don't expect this season to be as busy as last year, it only takes one storm to devastate a community," said Ben Friedman, acting NOAA administrator. "The forecasters at the National Hurricane Center are well-prepared with significant upgrades to our computer models, emerging observation techniques, and the expertise to deliver the life-saving forecasts that we all depend on during this, and every, hurricane season."

In an effort to continuously enhance hurricane forecasting, NOAA made several updates to products and services that will improve hurricane forecasting during the 2021 season.

- In March, NOAA upgraded the flagship Global Forecast System (GFS) to improve hurricane genesis forecasting and coupled GFS with a wave model extending ocean wave forecasts from 10 days out to 16 days. Additionally, Global Positioning Satellite Radio Occultation (GPS-RO) data are now included in the GFS model, providing an additional source of observations to strengthen overall model performance.
- Forecasters at the National Hurricane Center are now using an upgraded probabilistic storm surge model — known as P-Surge — which includes improved tropical cyclone wind structure and storm size information that offers better predictability and accuracy. This upgrade extends the lead time of P-Surge forecast guidance from 48 to 60 hours in situations where there is high confidence.
- NOAA's Atlantic Oceanographic and Meteorological Laboratory will deploy its largest array of air and water uncrewed systems to gather data designed to help improve hurricane intensity forecasts and forecast models. New drones will be launched from NOAA Hurricane Hunter aircraft that will fly into the lower part of hurricanes, and in the ocean, saildrones, hurricane gliders, global drifters, and air-deployable technology — called ALAMO floats — will track various parts of the life cycle of tropical storms.

Last year's record-breaking season serves as a reminder to all residents in coastal regions or areas prone to inland flooding from rainfall to be prepared for the 2021 hurricane season.

A summary graphic showing an alphabetical list of the 2021 Atlantic tropical cyclone names as selected by the World Meteorological Organization. The first named storm of the season. The official start of the Atlantic hurricane season is June 1 and runs through November 30. (NOAA)

Download Image

"With hurricane season starting on June 1, now is the time to get ready and advance disaster resilience in our communities," said FEMA Administrator Deanne Criswell. “Visit Ready.gov and Listo.gov to learn and take the steps to prepare yourself and others in your household. Download the FEMA app to sign-up for a variety of alerts and to access preparedness information. Purchase flood insurance to protect your greatest asset, your home. And, please encourage your neighbors, friends and coworkers to also get ready for the upcoming season.”

NOAA also issued seasonal hurricane outlooks for the Eastern and Central Pacific basins, and will provide an update to the Atlantic outlook in early August, just prior to the peak of the season.

Visit FEMA’s Ready.gov to be prepared for the start of hurricane season and the National Hurricane Center’s website at hurricanes.gov throughout the season to stay current on watches and warnings.

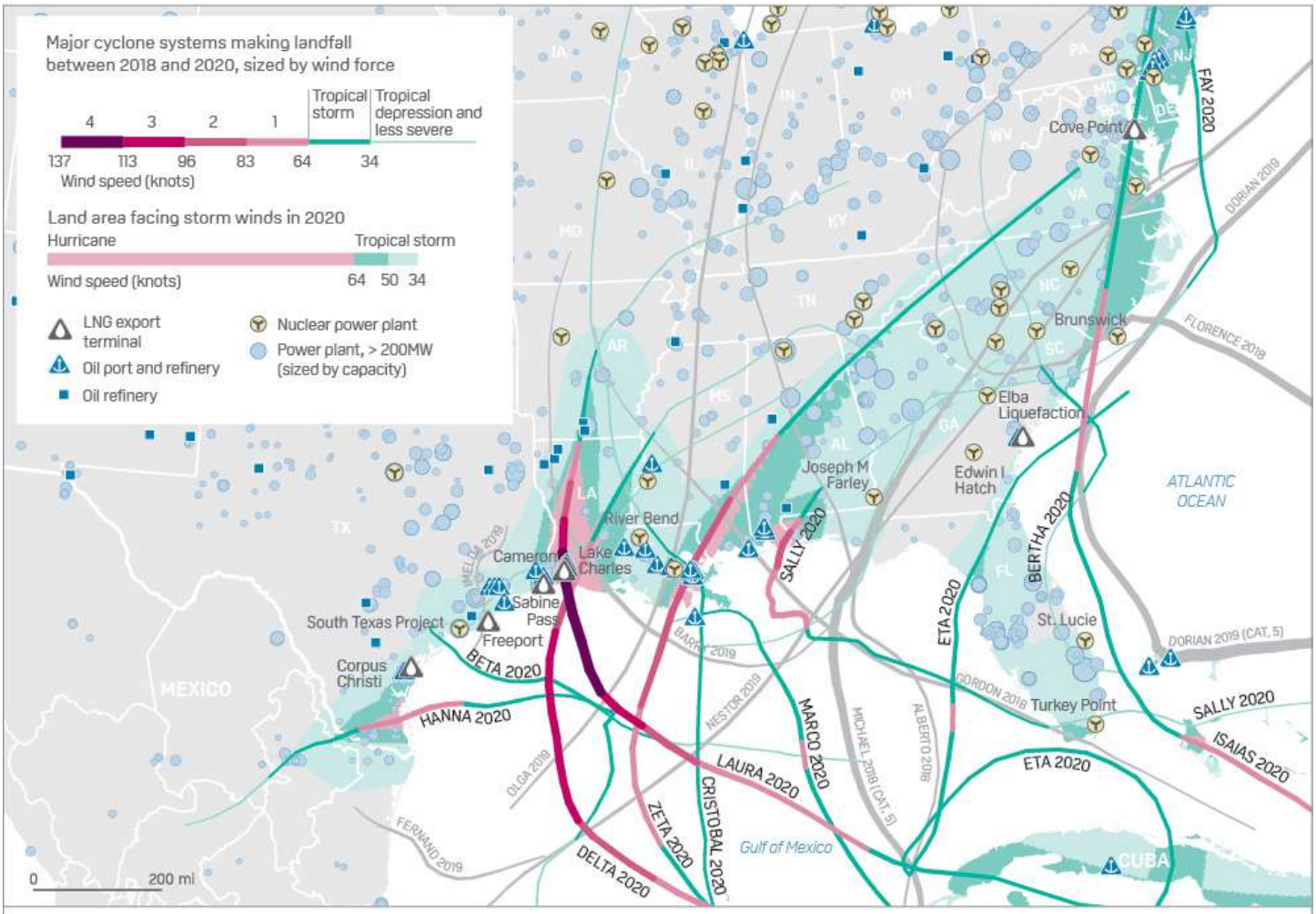
Media contact

Lauren Gaches, lauren.gaches@noaa.gov, (202) 740-8314

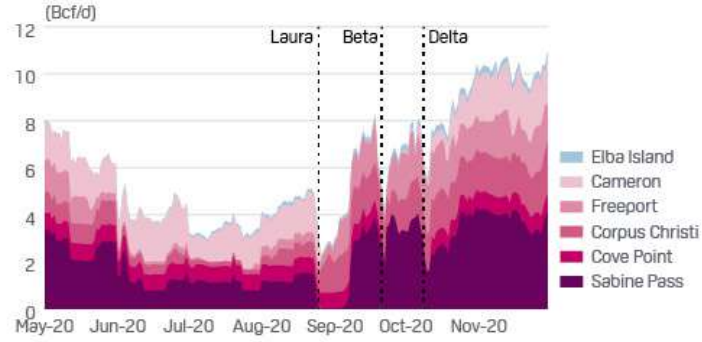
https://www.spglobal.com/platts/plattscontent/_assets/_images/latest-news/20210520-hurricanes.jpg

US OIL, LNG, POWER GRID BRACE FOR 'ABOVE AVERAGE' 2021 HURRICANE SEASON

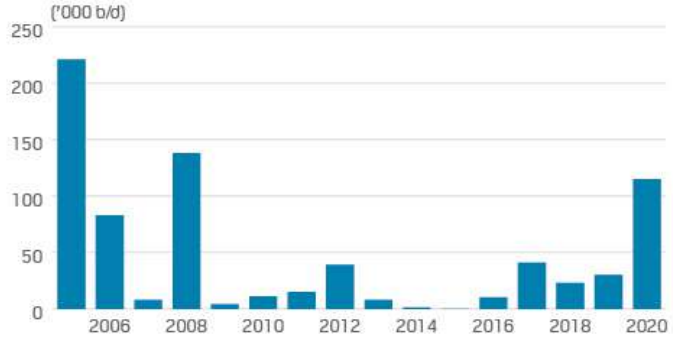
The US National Oceanic and Atmospheric Administration has forecast an "above average" hurricane season for 2021 (June 1-Nov. 30) that includes 13 to 20 named storms, six to 10 hurricanes, and three to five major hurricanes. This year, however, is not expected to be as active as the record-setting 2020 season, which saw 30 named storms, including 13 hurricanes, six of which became major hurricanes. It was the most disruptive season for US oil production in the past 12 years, suppressing US Gulf of Mexico crude output by around 115,000 b/d. US Gulf Coast refiners and LNG terminals suffered multiple but mostly short-lived disruptions. However, Sempra Energy's Cameron LNG in Louisiana didn't export a cargo for more than a month after hurricane damage suffered in late August.



LNG FEEDGAS AND MAJOR STORM LANDFALL



GULF OF MEXICO OIL OUTPUT DISRUPTIONS



Source: S&P Global Platts, S&P Global Market Intelligence, NOAA

Financial system participants remain concerned about potential cyber incidents. Respondents to the Bank's spring 2021 Financial System Survey continue to identify a cyber incident as one of the top three risks facing the financial system. They also view cyber threats as the top risk to their own institutions. Banks and insurance companies are particularly concerned about what a cyber incident could mean for them and the overall financial system.

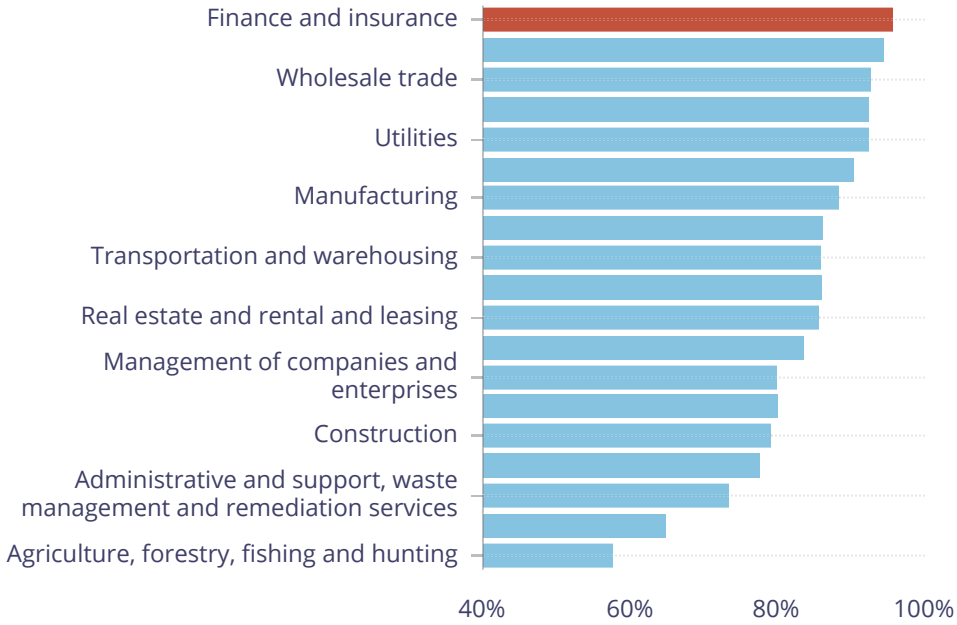
Since December 2020, several global cyber incidents involving third-party vendors have occurred. Perpetrators used multiple avenues to target and gain access to organizations' networks over an extended period. As a result, entities worldwide, both public and private, were compromised.

Financial institutions and authorities continue to invest in improving cyber resilience. The financial industry is a leading sector in cyber risk management (**Chart 15**). The most recent cyber attacks have reinforced third-party and supply-chain risk as a major source of concern for the financial sector. In response, financial institutions continue to enhance their security controls, including third-party risk management practices. These and other investments by individual businesses are crucial, but sector-wide action is needed to address broader implications of a successful cyber incident. That is why the Bank has been leading efforts to enhance collaboration and information sharing across the financial sector.

Find out what the Bank is doing to improve the financial system's resilience to cyber threats.

Chart 15: Among firms in the finance and insurance industry, 95 percent use at least one cyber risk management arrangement—more than in any other industry

Share of firms within each industry that use at least one cyber risk management arrangement



Note: Cyber risk management arrangements include written policies on cyber security, business continuity plans, employees or managers dedicated to cyber security, regular security updates to the operating system or software, and a cyber security insurance policy.
Sources: Statistics Canada and Bank of Canada calculations Last observation: 2019

Climate change considerations

Assets exposed to climate-related risks are generally mispriced (Vulnerability 6).[41] Climate change poses important risks to individual financial system participants and the stability of the financial system.[42] In general, inadequate information about the impacts of climate change can lead to them not being fully factored into the prices of financial instruments. This mispricing can leave investors exposed to sudden losses in the value of carbon-intensive assets as the economy transitions to a lower-carbon-emitting state. It also delays investments in the low-carbon infrastructure needed to achieve climate targets.

Risks to financial stability from climate change have two dimensions—physical and transitional. The value of financial assets or liabilities could be affected by:

- the actual or expected economic effects of continued climate change (physical)
- an adjustment toward a low-carbon economy (transitional)

Physical risks refer to the direct financial damages associated with increases in average global temperatures and changes in weather patterns. Climate change exposes people and assets to more frequent and intense weather events. For example, weather-related disasters such as forest fires can result in direct damage to infrastructure assets, and classification of an area as a floodplain can affect real estate values. When natural disasters strike households with high financial vulnerability, the effects on the financial system can be amplified (see **Box 4**).

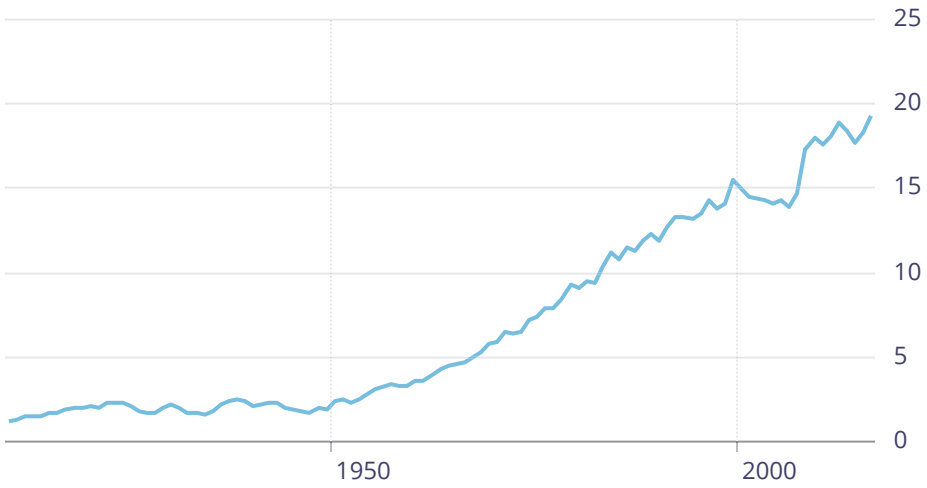
Transition risks arise in the financial system as it adapts to a low-carbon economy and changes in climate policy and regulation, technology, and consumer and investor attitudes. Such changes, if unanticipated, can cause a sudden revaluation of assets and reassessment of projected earnings, both in carbon-intensive sectors and in sectors connected to them through supply chains. This abrupt asset repricing could have large implications for a wide range of financial institutions that have significant exposures to these sectors.

Box 4: Assessing the intersection between household financial vulnerabilities and physical climate risks

Natural disasters related to climate change happen more frequently than in the past (**Chart 4-A**). These events can trigger financial distress among households that are affected severely. For example, following the 2016 wildfires in Fort McMurray, Alberta, the share of borrowers falling behind on their mortgage payments rose sharply.[43] Studying the intersection between household financial vulnerabilities and severe weather events is therefore an important step toward evaluating the resilience of the financial system to physical climate risks.[44]

Chart 4-A: The frequency of natural disaster events has increased over time

Number of natural disasters registered across Canada, 10-year moving average



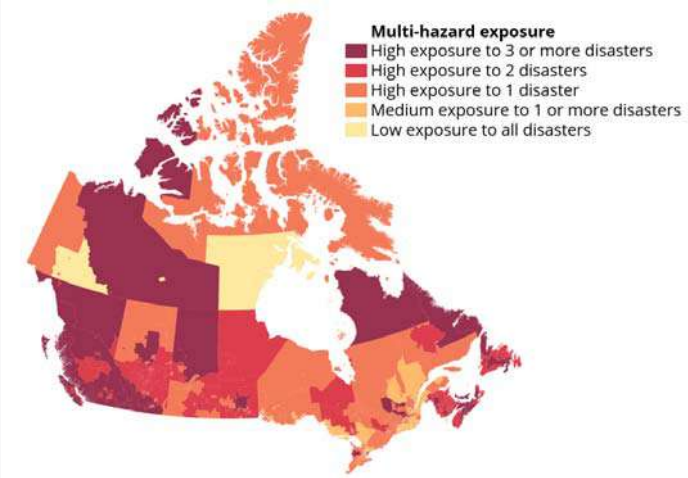
Note: Some of the increase in the number of natural disasters over time likely reflects more systematic reporting and better measurement by authorities.
Sources: Canadian Disaster Database and Bank of Canada calculations

Last observation: 2016

We use historical data from the Canadian Disaster Database (Public Safety Canada) to identify areas most exposed to natural disasters. These data allow us to map 15 types of disasters that occurred between 1900 and 2016 to forward sortation areas (FSAs).[45] We then construct a multi-hazard exposure index to classify FSAs based on exposure across all 15 types of disasters (**Figure 4-A**).

Figure 4-A: Exposure to different types of natural disasters varies by region across Canada

Multi-hazard exposure index, by forward sortation area



Source: The Canadian Disaster Database and Bank of Canada calculations

▶ ⇨ Description: Exposure to different types of natural disasters varies by region across Canada

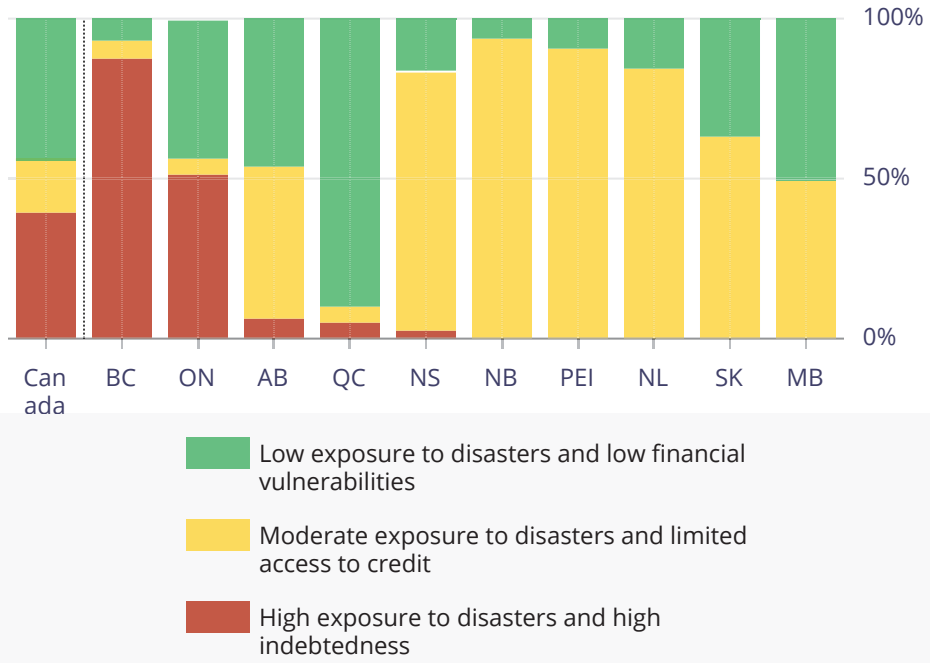
An unsupervised machine learning algorithm then sorts FSAs into distinct groups based on different combinations of financial vulnerabilities and multi-hazard exposure to natural disasters. The algorithm identifies three groups:

- **High exposure to natural disasters and high household indebtedness.** Physical destruction of assets in these FSAs would likely lead to larger financial system losses. These FSAs account for 39 percent of household debt in Canada and are mainly located in British Columbia and Ontario (**Chart 4-B**). This largely reflects the higher house prices in these regions.
- **Moderate exposure to natural disasters and reduced access to credit.** Households in these FSAs may have relatively limited ability to cope with a sudden disruption to their incomes due to credit constraints. They hold 17 percent of aggregate debt and tend to be in the Prairies and Atlantic provinces.
- **Low exposure to natural disasters and low financial vulnerability.** This group accounts for about 44 percent of household debt. Households in this group are primarily located in Quebec and, to a lesser extent, in Ontario and the Prairies.

These different combinations of disaster exposure and financial vulnerabilities could have implications for how natural disasters affect the economy and the financial system as well as for the appropriate policy responses.

Chart 4-B: Households vulnerable to both natural disasters and financial stress hold a large portion of household debt, particularly in British Columbia and Ontario

Household debt with varied exposures to natural disaster and financial vulnerabilities as a share of national and provincial household debt



Sources: Canadian Disaster Database, TransUnion and Bank of Canada calculations
Last observation: 2020Q3

Financial system participants need better information to appropriately assess and price physical risks and support the smooth transition to a low-carbon economy. The financial system plays a critical role in supporting the achievement of global climate targets. Many of the investments and innovations that will promote the transition to a low-carbon economy are capital-intensive, requiring the financial system to efficiently direct capital to the most promising sustainable investments.

To appropriately price assets exposed to climate-related risks and support the shift to a low-carbon economy, financial system participants need—and are increasingly demanding—better information. They require climate-data analysis combined with economic and financial information to guide their decision making. This data gap can be filled only if globally consistent standards for disclosure of climate-related financial risk are developed and widely adopted.[46] This will ensure that companies reliably, consistently and comparably measure and report their climate change exposures.

There is renewed momentum among governments and investors to address climate change. Nearly every nation has joined the Paris Agreement, with the goal of substantially reducing global greenhouse gas emissions. They also aim to cap global warming in this century to 2 degrees Celsius while pursuing the means to limit the increase even further to 1.5 degrees.[47] Canada and the United States have recently strengthened their pledges by joining a coalition of more than 100 countries committed to making their economies achieve net zero emissions by 2050.[48]

The investment decisions of financial market participants are increasingly informed by climate change considerations. Some investors are divesting from carbon-intensive assets altogether, while others are taking an advocacy approach and increasingly integrating environmental, social and governance (ESG) considerations into their investment portfolios. For instance, large asset managers (including Canada's eight largest pension funds) are encouraging ESG disclosure from the companies they invest in.[49] The flow of money into ESG funds globally in 2020 was roughly double that of 2019, which was about triple that of 2018. Canadian bond ESG issuance is also growing rapidly, going from less than $2 billion in 2017 to about $13 billion in 2020. However, this remains far short of what will be needed to fund the transition to net zero emissions by 2050.

Addressing climate change sooner will result in lower risk overall. The current global momentum to address climate change can have different impacts depending on the time horizon. Over the short term, a clearer definition of the ultimate goal and credible commitments to achieve it could mean that some transition risks materialize earlier than expected under the status quo. In particular, prices for certain assets tied to carbon-intensive industries could decline sooner than anticipated. Over a longer period, however, taking earlier action on climate change creates a smoother and more certain transition path, thereby reducing transition risks overall.

Acting now has a number of advantages for the economy and the financial system over the medium to long term:[50]

- It contributes to reducing both physical damages and risks.
- It avoids the need for more abrupt climate action to meet target deadlines later on, which would imply large transition risks in the future.
- It allows more time for new technologies to enter the market in response to price signals.

In sum, earlier action can lead to a more orderly and less costly transition to a low-carbon economy.

Find out what the Bank is doing to help improve the understanding, measurement and transparency of climate-related risks.

The energy sector is the source of around three-quarters of greenhouse gas emissions today and holds the key to averting the worst effects of climate change, perhaps the greatest challenge humankind has faced. Reducing global carbon dioxide (CO_2) emissions to net zero by 2050 is consistent with efforts to limit the long-term increase in average global temperatures to 1.5 °C. This calls for nothing less than a complete transformation of how we produce, transport and consume energy. The growing political consensus on reaching net zero is cause for considerable optimism about the progress the world can make, but the changes required to reach net-zero emissions globally by 2050 are poorly understood. A huge amount of work is needed to turn today's impressive ambitions into reality, especially given the range of different situations among countries and their differing capacities to make the necessary changes. This special IEA report sets out a pathway for achieving this goal, resulting in a clean and resilient energy system that would bring major benefits for human prosperity and well-being.

The global pathway to net-zero emissions by 2050 detailed in this report requires all governments to significantly strengthen and then successfully implement their energy and climate policies. Commitments made to date fall far short of what is required by that pathway. The number of countries that have pledged to achieve net-zero emissions has grown rapidly over the last year and now covers around 70% of global emissions of CO_2. This is a huge step forward. However, most pledges are not yet underpinned by near-term policies and measures. Moreover, even if successfully fulfilled, the pledges to date would still leave around 22 billion tonnes of CO_2 emissions worldwide in 2050. The continuation of that trend would be consistent with a temperature rise in 2100 of around 2.1 °C. Global emissions fell in 2020 because of the Covid-19 crisis but are already rebounding strongly as economies recover. Further delay in acting to reverse that trend will put net zero by 2050 out of reach.

In this Summary for Policy Makers, we outline the essential conditions for the global energy sector to reach net-zero CO_2 emissions by 2050. The pathway described in depth in this report achieves this objective with no offsets from outside the energy sector, and with low reliance on negative emissions technologies. It is designed to maximise technical feasibility, cost-effectiveness and social acceptance while ensuring continued economic growth and secure energy supplies. We highlight the priority actions that are needed today to ensure the opportunity of net zero by 2050 – narrow but still achievable – is not lost. The report provides a global view, but countries do not start in the same place or finish at the same time: advanced economies have to reach net zero before emerging markets and developing economies, and assist others in getting there. We also recognise that the route mapped out here is a path, not necessarily the path, and so we examine some key uncertainties, notably concerning the roles played by bioenergy, carbon capture and behavioural changes. Getting to net zero will involve countless decisions by people across the world, but our primary aim is to inform the decisions made by policy makers, who have the greatest scope to move the world closer to its climate goals.

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Net zero by 2050 hinges on an unprecedented clean technology push to 2030

The path to net-zero emissions is narrow: staying on it requires immediate and massive deployment of all available clean and efficient energy technologies. In the net-zero emissions pathway presented in this report, the world economy in 2030 is some 40% larger than today but uses 7% less energy. A major worldwide push to increase energy efficiency is an essential part of these efforts, resulting in the annual rate of energy intensity improvements averaging 4% to 2030 – about three-times the average rate achieved over the last two decades. Emissions reductions from the energy sector are not limited to CO_2: in our pathway, methane emissions from fossil fuel supply fall by 75% over the next ten years as a result of a global, concerted effort to deploy all available abatement measures and technologies.

Ever-cheaper renewable energy technologies give electricity the edge in the race to zero. Our pathway calls for scaling up solar and wind rapidly this decade, reaching annual additions of 630 gigawatts (GW) of solar photovoltaics (PV) and 390 GW of wind by 2030, four-times the record levels set in 2020. For solar PV, this is equivalent to installing the world's current largest solar park roughly every day. Hydropower and nuclear, the two largest sources of low-carbon electricity today, provide an essential foundation for transitions. As the electricity sector becomes cleaner, electrification emerges as a crucial economy-wide tool for reducing emissions. Electric vehicles (EVs) go from around 5% of global car sales to more than 60% by 2030.

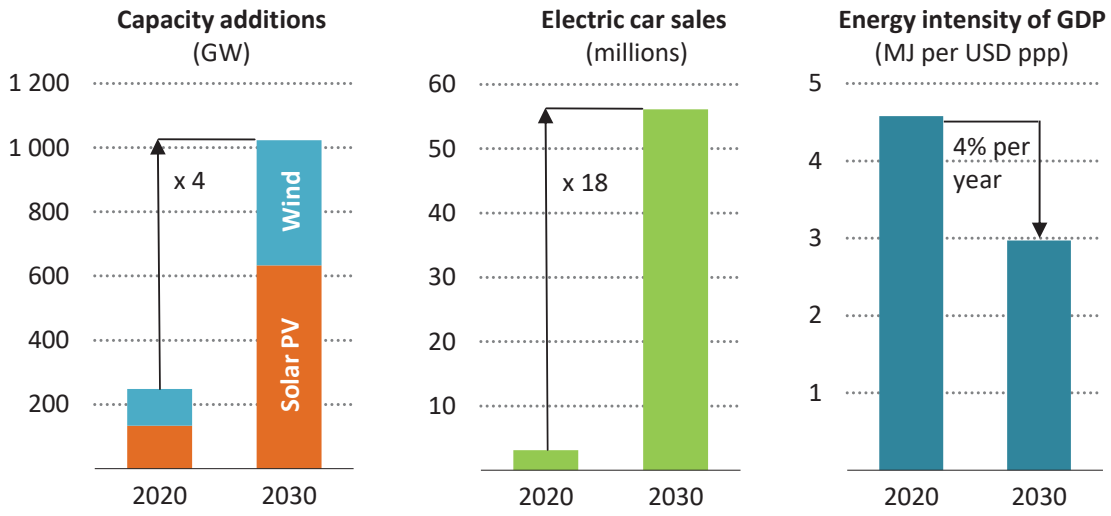
PRIORITY ACTION

Make the 2020s the decade of massive clean energy expansion

All the technologies needed to achieve the necessary deep cuts in global emissions by 2030 already exist, and the policies that can drive their deployment are already proven.

As the world continues to grapple with the impacts of the Covid-19 pandemic, it is essential that the resulting wave of investment and spending to support economic recovery is aligned with the net zero pathway. Policies should be strengthened to speed the deployment of clean and efficient energy technologies. Mandates and standards are vital to drive consumer spending and industry investment into the most efficient technologies. Targets and competitive auctions can enable wind and solar to accelerate the electricity sector transition. Fossil fuel subsidy phase-outs, carbon pricing and other market reforms can ensure appropriate price signals. Policies should limit or provide disincentives for the use of certain fuels and technologies, such as unabated coal-fired power stations, gas boilers and conventional internal combustion engine vehicles. Governments must lead the planning and incentivising of the massive infrastructure investment, including in smart transmission and distribution grids.

Key clean technologies ramp up by 2030 in the net zero pathway



Note: MJ = megajoules; GDP = gross domestic product in purchasing power parity.

Net zero by 2050 requires huge leaps in clean energy innovation

Reaching net zero by 2050 requires further rapid deployment of available technologies as well as widespread use of technologies that are not on the market yet. Major innovation efforts must occur over this decade in order to bring these new technologies to market in time. Most of the global reductions in CO_2 emissions through 2030 in our pathway come from technologies readily available today. But in 2050, almost half the reductions come from technologies that are currently at the demonstration or prototype phase. In heavy industry and long-distance transport, the share of emissions reductions from technologies that are still under development today is even higher.

The biggest innovation opportunities concern advanced batteries, hydrogen electrolysers, and direct air capture and storage. Together, these three technology areas make vital contributions the reductions in CO_2 emissions between 2030 and 2050 in our pathway. Innovation over the next ten years – not only through research and development (R&D) and demonstration but also through deployment – needs to be accompanied by the large-scale construction of the infrastructure the technologies will need. This includes new pipelines to transport captured CO_2 emissions and systems to move hydrogen around and between ports and industrial zones.

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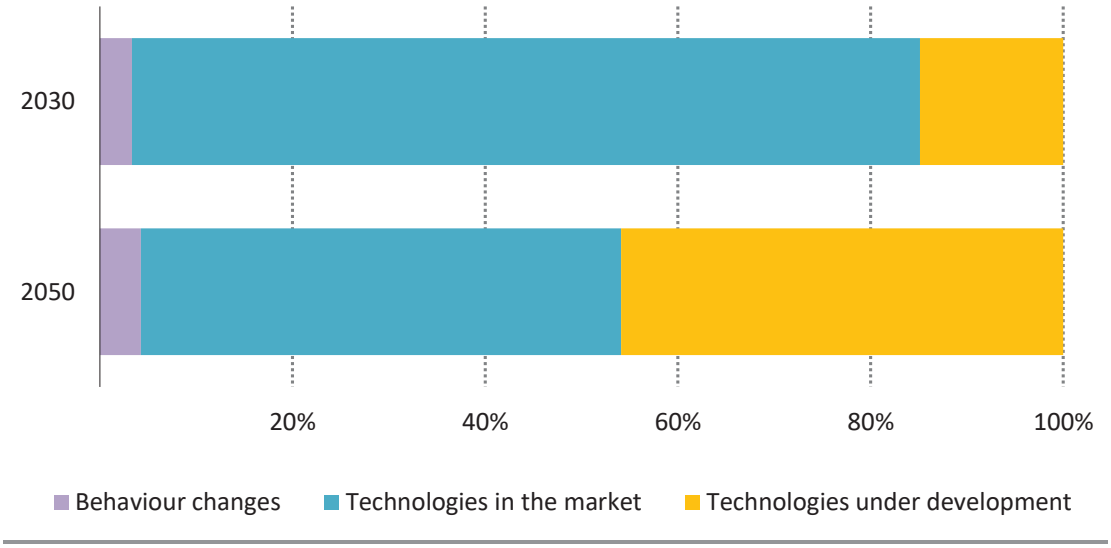
PRIORITY ACTION

Prepare for the next phase of the transition by boosting innovation

Clean energy innovation must accelerate rapidly, with governments putting R&D, demonstration and deployment at the core of energy and climate policy.

Government R&D spending needs to be increased and reprioritised. Critical areas such as electrification, hydrogen, bioenergy and carbon capture, utilisation and storage (CCUS) today receive only around one-third of the level of public R&D funding of the more established low-carbon electricity generation and energy efficiency technologies. Support is also needed to accelerate the roll-out of demonstration projects, to leverage private investment in R&D, and to boost overall deployment levels to help reduce costs. Around USD 90 billion of public money needs to be mobilised globally as soon as possible to complete a portfolio of demonstration projects before 2030. Currently, only roughly USD 25 billion is budgeted for that period. Developing and deploying these technologies would create major new industries, as well as commercial and employment opportunities.

Annual CO_2 emissions savings in the net zero pathway, relative to 2020



The transition to net zero is for and about people

A transition of the scale and speed described by the net zero pathway cannot be achieved without sustained support and participation from citizens. The changes will affect multiple aspects of people's lives – from transport, heating and cooking to urban planning and jobs. We estimate that around 55% of the cumulative emissions reductions in the pathway are linked to consumer choices such as purchasing an EV, retrofitting a house with energy-efficient technologies or installing a heat pump. Behavioural changes, particularly in advanced economies – such as replacing car trips with walking, cycling or public transport, or foregoing a long-haul flight – also provide around 4% of the cumulative emissions reductions.

Providing electricity to around 785 million people that have no access and clean cooking solutions to 2.6 billion people that lack those options is an integral part of our pathway. Emissions reductions have to go hand-in-hand with efforts to ensure energy access for all by 2030. This costs around USD 40 billion a year, equal to around 1% of average annual energy sector investment, while also bringing major co-benefits from reduced indoor air pollution.

Some of the changes brought by the clean energy transformation may be challenging to implement, so decisions must be transparent, just and cost-effective. Governments need to ensure that clean energy transitions are people-centred and inclusive. Household energy expenditure as a share of disposable income – including purchases of efficient appliances and fuel bills – rises modestly in emerging market and developing economies in our net zero pathway as more people gain access to energy and demand for modern energy services increases rapidly. Ensuring the affordability of energy for households demands close attention: policy tools that can direct support to the poorest include tax credits, loans and targeted subsidies.

PRIORITY ACTION

Clean energy jobs will grow strongly but must be spread widely

Energy transitions have to take account of the social and economic impacts on individuals and communities, and treat people as active participants.

The transition to net zero brings substantial new opportunities for employment, with 14 million jobs created by 2030 in our pathway thanks to new activities and investment in clean energy. Spending on more efficient appliances, electric and fuel cell vehicles, and building retrofits and energy-efficient construction would require a further 16 million workers. But these opportunities are often in different locations, skill sets and sectors than the jobs that will be lost as fossil fuels decline. In our pathway, around 5 million jobs are lost. Most of those jobs are located close to fossil fuel resources, and many are well paid, meaning structural changes can cause shocks for communities with impacts that persist over time. This requires careful policy attention to address the employment

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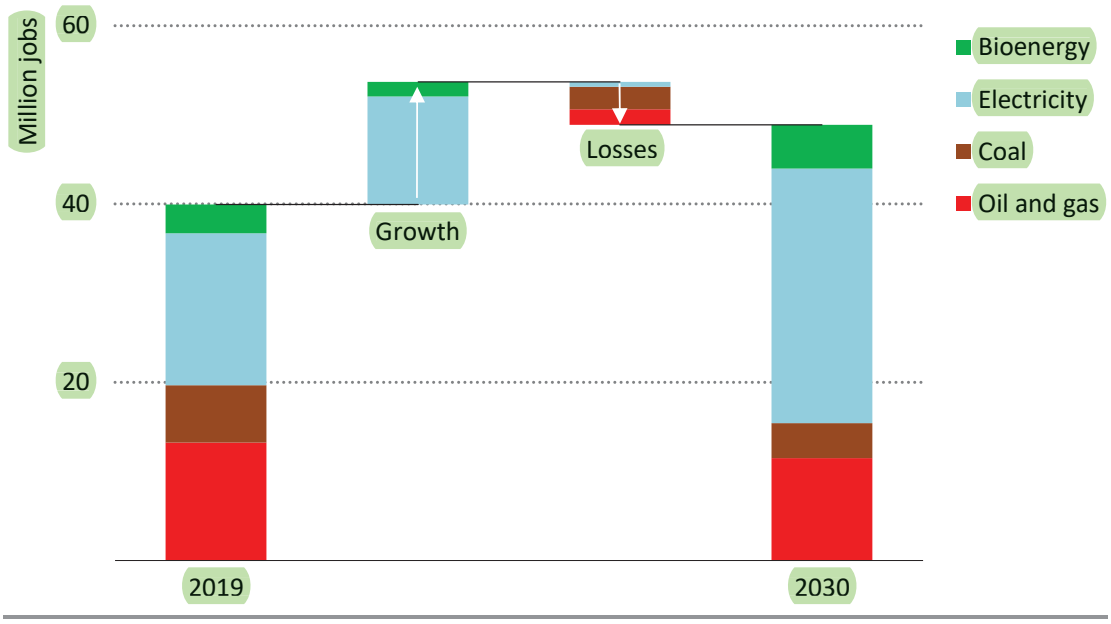
losses. It will be vital to minimise hardships associated with these disruptions, such as by retraining workers, locating new clean energy facilities in heavily affected areas wherever possible, and providing regional aid.

Global employment in energy supply in the net zero pathway, 2019-2030



An energy sector dominated by renewables

In the net zero pathway, global energy demand in 2050 is around 8% smaller than today, but it serves an economy more than twice as big and a population with 2 billion more people. More efficient use of energy, resource efficiency and behavioural changes combine to offset increases in demand for energy services as the world economy grows and access to energy is extended to all.

Instead of fossil fuels, the energy sector is based largely on renewable energy. Two-thirds of total energy supply in 2050 is from wind, solar, bioenergy, geothermal and hydro energy. Solar becomes the largest source, accounting for one-fifth of energy supplies. Solar PV capacity increases 20-fold between now and 2050, and wind power 11-fold.

Net zero means a huge decline in the use of fossil fuels. They fall from almost four-fifths of total energy supply today to slightly over one-fifth by 2050. Fossil fuels that remain in 2050 are used in goods where the carbon is embodied in the product such as plastics, in facilities fitted with CCUS, and in sectors where low-emissions technology options are scarce.

Electricity accounts for almost 50% of total energy consumption in 2050. It plays a key role across all sectors – from transport and buildings to industry – and is essential to produce low-emissions fuels such as hydrogen. To achieve this, total electricity generation increases over

two-and-a-half-times between today and 2050. At the same time, no additional new final investment decisions should be taken for new unabated coal plants, the least efficient coal plants are phased out by 2030, and the remaining coal plants still in use by 2040 are retrofitted. By 2050, almost 90% of electricity generation comes from renewable sources, with wind and solar PV together accounting for nearly 70%. Most of the remainder comes from nuclear.

Emissions from industry, transport and buildings take longer to reduce. Cutting industry emissions by 95% by 2050 involves major efforts to build new infrastructure. After rapid innovation progress through R&D, demonstration and initial deployment between now and 2030 to bring new clean technologies to market, the world then has to put them into action. Every month from 2030 onwards, ten heavy industrial plants are equipped with CCUS, three new hydrogen-based industrial plants are built, and 2 GW of electrolyser capacity are added at industrial sites. Policies that end sales of new internal combustion engine cars by 2035 and boost electrification underpin the massive reduction in transport emissions. In 2050, cars on the road worldwide run on electricity or fuel cells. Low-emissions fuels are essential where energy needs cannot easily or economically be met by electricity. For example, aviation relies largely on biofuels and synthetic fuels, and ammonia is vital for shipping. In buildings, bans on new fossil fuel boilers need to start being introduced globally in 2025, driving up sales of electric heat pumps. Most old buildings and all new ones comply with zero-carbon-ready building energy codes.[1]

PRIORITY ACTION

Set near-term milestones to get on track for long-term targets

Governments need to provide credible step-by-step plans to reach their net zero goals, building confidence among investors, industry, citizens and other countries.

Governments must put in place long-term policy frameworks to allow all branches of government and stakeholders to plan for change and facilitate an orderly transition. Long-term national low-emissions strategies, called for by the Paris Agreement, can set out a vision for national transitions, as this report has done on a global level. These long-term objectives need to be linked to measurable short-term targets and policies. Our pathway details more than 400 sectoral and technology milestones to guide the global journey to net zero by 2050.

[1] A zero-carbon-ready building is highly energy efficient and either uses renewable energy directly or uses an energy supply that will be fully decarbonised by 2050, such as electricity or district heat.

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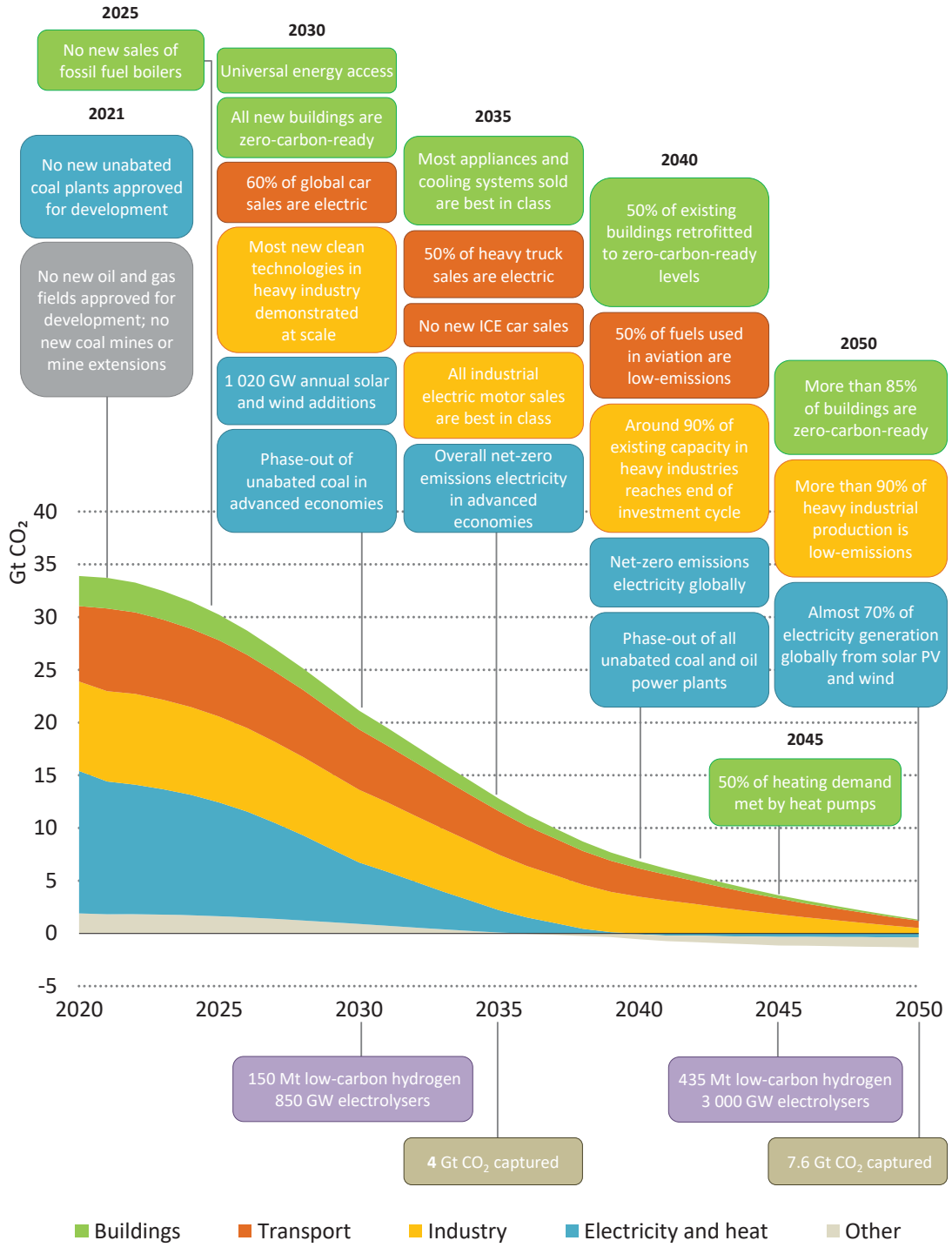
Key milestones in the pathway to net zero



There is no need for investment in new fossil fuel supply in our net zero pathway

Beyond projects already committed as of 2021, there are no new oil and gas fields approved for development in our pathway, and no new coal mines or mine extensions are required. The unwavering policy focus on climate change in the net zero pathway results in a sharp decline in fossil fuel demand, meaning that the focus for oil and gas producers switches entirely to output – and emissions reductions – from the operation of existing assets. Unabated coal demand declines by 90% to just 1% of total energy use in 2050. Gas demand declines by 55% to 1 750 billion cubic metres and oil declines by 75% to 24 million barrels per day (mb/d), from around 90 mb/d in 2020.

Clean electricity generation, network infrastructure and end-use sectors are key areas for increased investment. Enabling infrastructure and technologies are vital for transforming the energy system. Annual investment in transmission and distribution grids expands from USD 260 billion today to USD 820 billion in 2030. The number of public charging points for EVs rises from around 1 million today to 40 million in 2030, requiring annual investment of almost USD 90 billion in 2030. Annual battery production for EVs leaps from 160 gigawatt-hours (GWh) today to 6 600 GWh in 2030 – the equivalent of adding almost 20 gigafactories[2] each year for the next ten years. And the required roll-out of hydrogen and CCUS after 2030 means laying the groundwork now: annual investment in CO_2 pipelines and hydrogen-enabling infrastructure increases from USD 1 billion today to around USD 40 billion in 2030.

PRIORITY ACTION

Drive a historic surge in clean energy investment

Policies need to be designed to send market signals that unlock new business models and mobilise private spending, especially in emerging economies.

Accelerated delivery of international public finance will be critical to energy transitions, especially in developing economies, but ultimately the private sector will need to finance most of the extra investment required. Mobilising the capital for large-scale infrastructure calls for closer co-operation between developers, investors, public financial institutions and governments. Reducing risks for investors will be essential to ensure successful and affordable clean energy transitions. Many emerging market and developing economies, which rely mainly on public funding for new energy projects and industrial facilities, will need to reform their policy and regulatory frameworks to attract more private finance. International flows of long-term capital to these economies will be needed to support the development of both existing and emerging clean energy technologies.

[2] Battery gigafactory capacity assumption = 35 gigawatt-hours per year.

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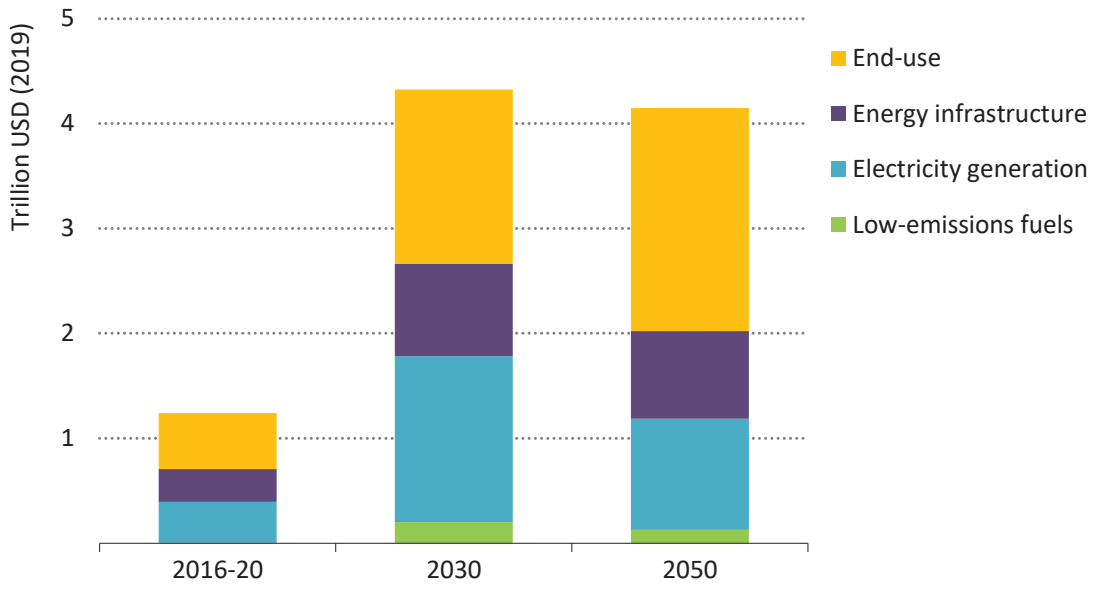
Clean energy investment in the net zero pathway



An unparalleled clean energy investment boom lifts global economic growth

Total annual energy investment surges to USD 5 trillion by 2030, adding an extra 0.4 percentage point a year to annual global GDP growth, based on our joint analysis with the International Monetary Fund. This unparalleled increase – with investment in clean energy and energy infrastructure more than tripling already by 2030 – brings significant economic benefits as the world emerges from the Covid-19 crisis. The jump in private and government spending creates millions of jobs in clean energy, including energy efficiency, as well as in the engineering, manufacturing and construction industries. All of this puts global GDP 4% higher in 2030 than it would be based on current trends.

Governments have a key role in enabling investment-led growth and ensuring that the benefits are shared by all. There are large differences in macroeconomic impacts between regions. But government investment and public policies are essential to attract large amounts of private capital and to help offset the declines in fossil fuel income that many countries will experience. The major innovation efforts needed to bring new clean energy technologies to market could boost productivity and create entirely new industries, providing opportunities to locate them in areas that see job losses in incumbent industries. Improvements in air quality provide major health benefits, with 2 million fewer premature deaths globally from air pollution in 2030 than today in our net zero pathway. Achieving universal energy access by 2030 would provide a major boost to well-being and productivity in developing economies.

New energy security concerns emerge, and old ones remain

The contraction of oil and natural gas production will have far-reaching implications for all the countries and companies that produce these fuels. No new oil and natural gas fields are needed in our pathway, and oil and natural gas supplies become increasingly concentrated in a small number of low-cost producers. For oil, the OPEC share of a much-reduced global oil supply increases from around 37% in recent years to 52% in 2050, a level higher than at any point in the history of oil markets. Yet annual per capita income from oil and natural gas in producer economies falls by about 75%, from USD 1 800 in recent years to USD 450 by the 2030s, which could have knock-on societal effects. Structural reforms and new sources of revenue are needed, even though these are unlikely to compensate fully for the drop in oil and gas income. While traditional supply activities decline, the expertise of the oil and natural gas industry fits well with technologies such as hydrogen, CCUS and offshore wind that are needed to tackle emissions in sectors where reductions are likely to be most challenging.

The energy transition requires substantial quantities of critical minerals, and their supply emerges as a significant growth area. The total market size of critical minerals like copper, cobalt, manganese and various rare earth metals grows almost sevenfold between 2020 and 2030 in the net zero pathway. Revenues from those minerals are larger than revenues from coal well before 2030. This creates substantial new opportunities for mining companies. It also creates new energy security concerns, including price volatility and additional costs for transitions, if supply cannot keep up with burgeoning demand.

The rapid electrification of all sectors makes electricity even more central to energy security around the world than it is today. Electricity system flexibility – needed to balance wind and solar with evolving demand patterns – quadruples by 2050 even as retirements of fossil fuel capacity reduce conventional sources of flexibility. The transition calls for major increases in all sources of flexibility: batteries, demand response and low-carbon flexible power plants, supported by smarter and more digital electricity networks. The resilience of electricity systems to cyberattacks and other emerging threats needs to be enhanced.

P R I O R I T Y A C T I O N

Address emerging energy security risks now

Ensuring uninterrupted and reliable supplies of energy and critical energy-related commodities at affordable prices will only rise in importance on the way to net zero.

The focus of energy security will evolve as reliance on renewable electricity grows and the role of oil and gas diminishes. Potential vulnerabilities from the increasing importance of electricity include the variability of supply and cybersecurity risks. Governments need to create markets for investment in batteries, digital solutions and electricity grids that reward flexibility and enable adequate and reliable supplies of electricity. The growing dependence on critical minerals required for key clean energy technologies calls for new international mechanisms to ensure both the timely

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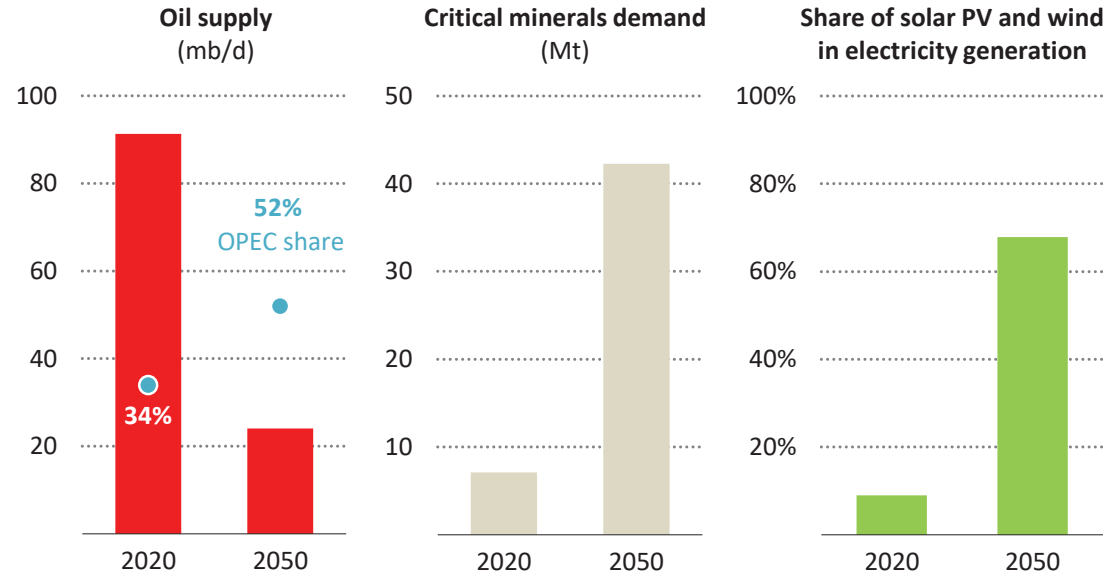
availability of supplies and sustainable production. At the same time, traditional energy security concerns will not disappear, as oil production will become more concentrated.

Global energy security indicators in the net zero pathway



Note: mb/d = million barrels per day; Mt = million tonnes.

International co-operation is pivotal for achieving net-zero emissions by 2050

Making net-zero emissions a reality hinges on a singular, unwavering focus from all governments – working together with one another, and with businesses, investors and citizens. All stakeholders need to play their part. The wide-ranging measures adopted by governments at all levels in the net zero pathway help to frame, influence and incentivise the purchase by consumers and investment by businesses. This includes how energy companies invest in new ways of producing and supplying energy services, how businesses invest in equipment, and how consumers cool and heat their homes, power their devices and travel.

Underpinning all these changes are policy decisions made by governments. Devising cost-effective national and regional net zero roadmaps demands co-operation among all parts of government that breaks down silos and integrates energy into every country's policy making on finance, labour, taxation, transport and industry. Energy or environment ministries alone cannot carry out the policy actions needed to reach net zero by 2050.

Changes in energy consumption result in a significant decline in fossil fuel tax revenues. In many countries today, taxes on diesel, gasoline and other fossil fuel consumption are an important source of public revenues, providing as much as 10% in some cases. In the net zero pathway, tax revenue from oil and gas retail sales falls by about 40% between 2020 and 2030. Managing this decline will require long-term fiscal planning and budget reforms.

The net zero pathway relies on unprecedented international co-operation among governments, especially on innovation and investment. The IEA stands ready to support governments in preparing national and regional net zero roadmaps, to provide guidance and assistance in implementing them, and to promote international co-operation to accelerate the energy transition worldwide.

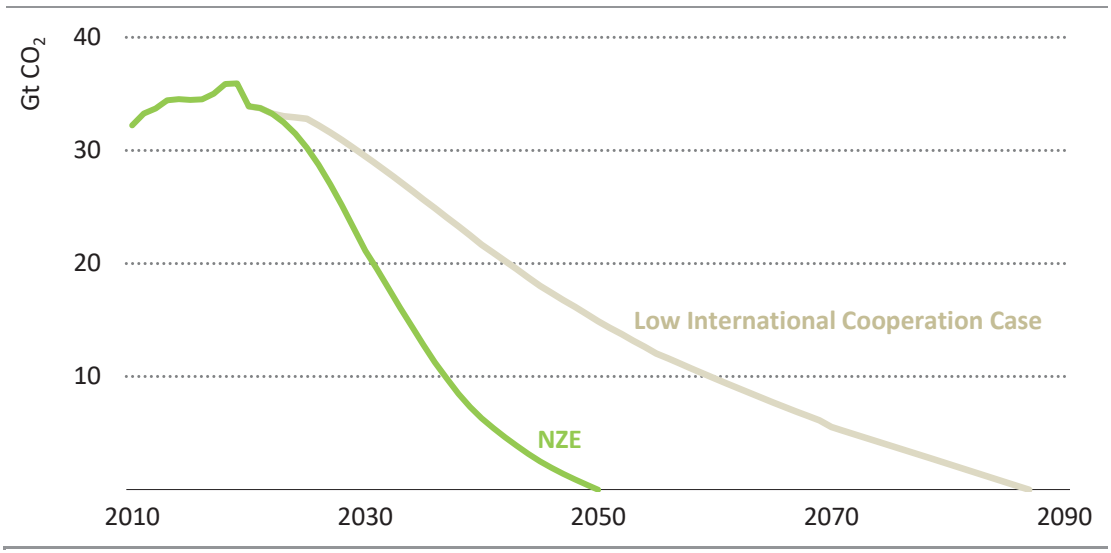
PRIORITY ACTION

Take international co-operation to new heights

This is not simply a matter of all governments seeking to bring their national emissions to net zero – it means tackling global challenges through co-ordinated actions.

Governments must work together in an effective and mutually beneficial manner to implement coherent measures that cross borders. This includes carefully managing domestic job creation and local commercial advantages with the collective global need for clean energy technology deployment. Accelerating innovation, developing international standards and co-ordinating to scale up clean technologies needs to be done in a way that links national markets. Co-operation must recognise differences in the stages of development of different countries and the varying situations of different parts of society. For many rich countries, achieving net-zero emissions will be more difficult and costly without international co-operation. For many developing countries, the pathway to net zero without international assistance is not clear. Technical and financial support is needed to ensure deployment of key technologies and infrastructure. Without greater international co-operation, global CO_2 emissions will not fall to net zero by 2050.

Global energy-related CO_2 emissions in the net zero pathway and Low International Co-operation Case



Note: Gt = gigatonnes.

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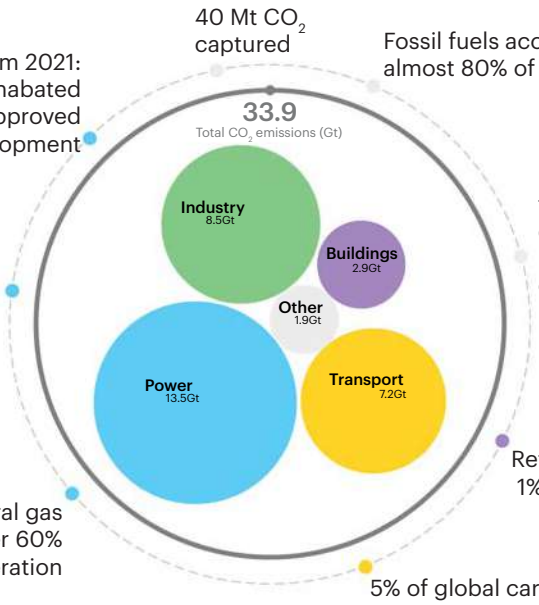
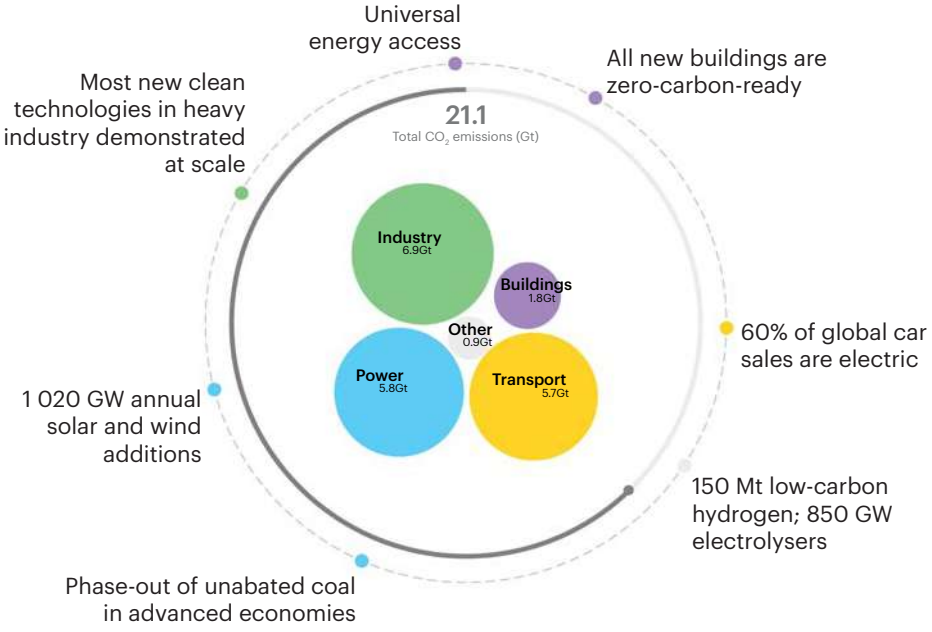
Net Zero Emissions by 2050 Interactive iea.li/nzeroadmap

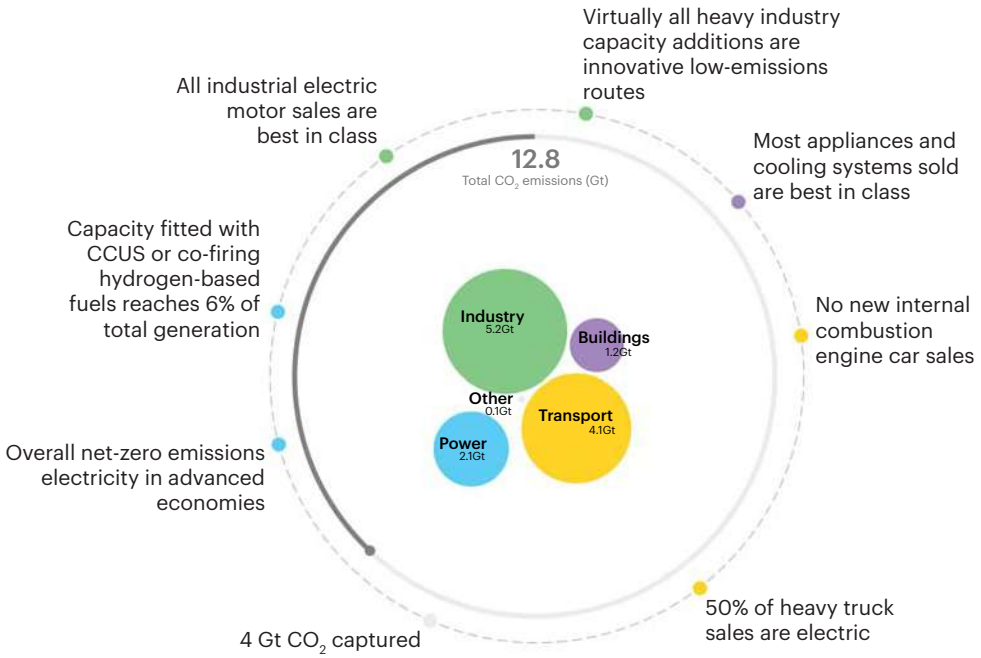
2020

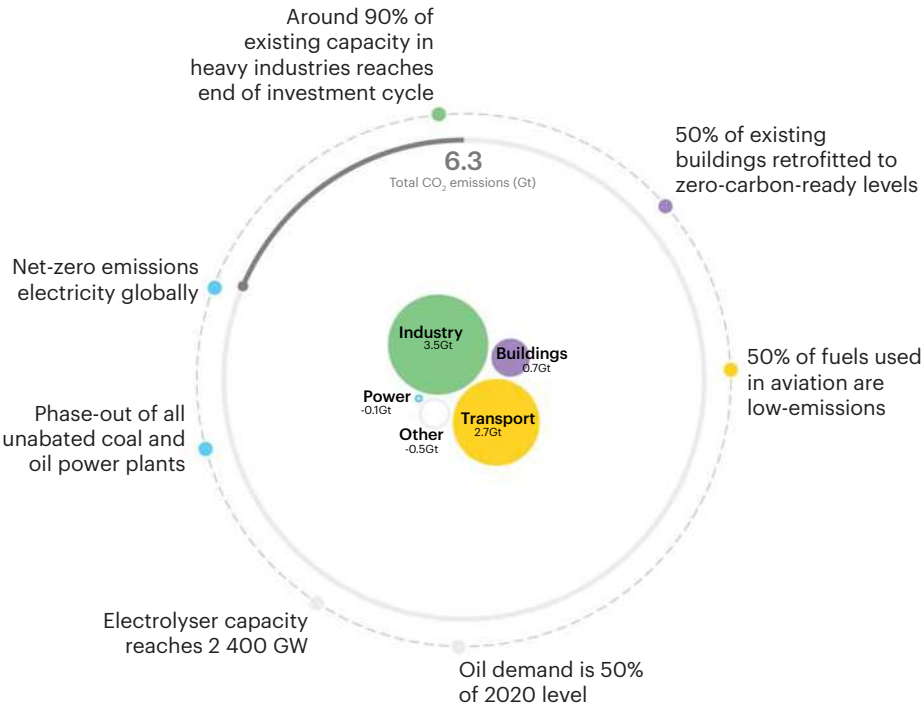


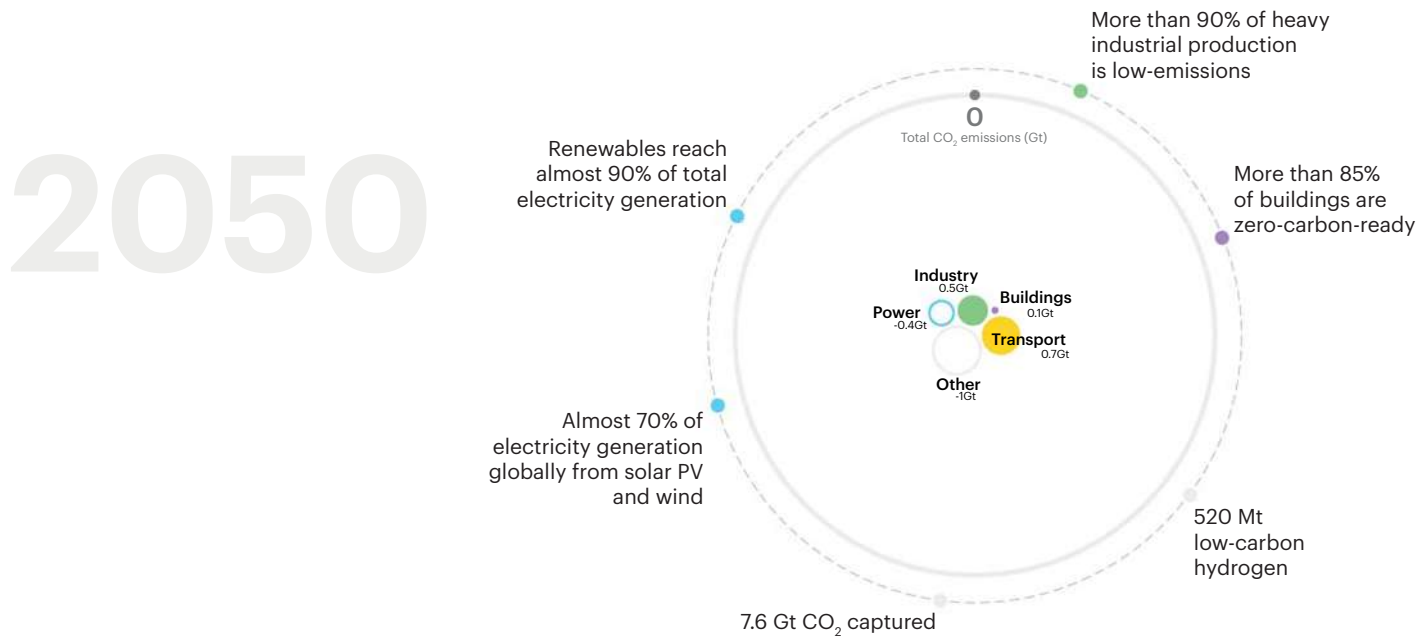
2030



2035







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Net Zero Emissions by 2050 Interactive iea.li/nzeroadmap

Announced net zero pledges and the energy sector

SUMMARY

- There has been a rapid increase over the last year in the number of governments pledging to reduce greenhouse gas emissions to net zero. Net zero pledges to date cover around 70% of global GDP and CO_2 emissions. However, fewer than a quarter of announced net zero pledges are fixed in domestic legislation and few are yet underpinned by specific measures or policies to deliver them in full and on time.
- The Stated Policies Scenario (STEPS) takes account only of specific policies that are in place or have been announced by governments. Annual energy-related and industrial process CO_2 emissions rise from 34 Gt in 2020 to 36 Gt in 2030 and remain around this level until 2050. If emissions continue on this trajectory, with similar changes in non-energy-related GHG emissions, this would lead to a temperature rise of around 2.7 °C by 2100 (with a 50% probability). Renewables provide almost 55% of global electricity generation in 2050 (up from 29% in 2020), but clean energy transitions lag in other sectors. Global coal use falls by 15% between 2020 and 2050; oil use in 2050 is 15% higher than in 2020; and natural gas use is almost 50% higher.
- The Announced Pledges Case (APC) assumes that all announced national net zero pledges are achieved in full and on time, whether or not they are currently underpinned by specific policies. Global energy-related and industrial process CO_2 emissions fall to 30 Gt in 2030 and 22 Gt in 2050. Extending this trajectory, with similar action on non-energy-related GHG emissions, would lead to a temperature rise in 2100 of around 2.1 °C (with a 50% probability). Global electricity generation nearly doubles to exceed 50 000 TWh in 2050. The share of renewables in electricity generation rises to nearly 70% in 2050. Oil demand does not return to its 2019 peak and falls about 10% from 2020 to 80 mb/d in 2050. Coal use drops by 50% to 2 600 Mtce in 2050, while natural gas use expands by 10% to 4 350 bcm in 2025 and remains about that level to 2050.
- Efficiency, electrification and the replacement of coal by low-emissions sources in electricity generation play a central role in achieving net zero goals in the APC, especially over the period to 2030. The relative contributions of nuclear, hydrogen, bioenergy and CCUS vary across countries, depending on their circumstances.
- The divergence in trends between the APC and the STEPS shows the difference that current net zero pledges could make, while underlining at the same time the need for concrete policies and short-term plans that are consistent with long-term net zero pledges. However, the APC also starkly highlights that existing net zero pledges, even if delivered in full, fall well short of what is necessary to reach global net-zero emissions by 2050.

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https://www.g7uk.org/uk-secures-historic-g7-commitments-to-tackle-climate-change-and-halt-biodiversity-loss-by-2030/

UK secures historic G7 commitments to tackle climate change and halt biodiversity loss by 2030

Published 21 May 2021

- G7 Environment and Climate ministers commit to protect land and ocean to bend the curve of biodiversity loss by 2030.
- They also commit to phase out new direct government support for international fossil fuels
- Securing meaningful action from leading economies to tackle climate change is a priority for the UK's G7 presidency, ahead of COP26 in November

The Climate and Environment Ministers of the G7, under UK leadership, have today (Friday 21 May) secured historic commitments which will put climate, biodiversity and the environment at the heart of worldwide COVID-19 recovery.

COP26 President-Designate, Alok Sharma and Defra Secretary of State George Eustice, convened the Ministers ahead of the G7 leaders summit in June, including the guest countries of India, Australia, South Africa and South Korea.

All G7 members signed up to the global '30x30' initiative to conserve or protect at least 30 per cent of the world's land and at least 30 per cent of the world's ocean by 2030, and committed to '30x30' nationally.

This year is already the first ever 'net zero G7', with all countries committed to reaching net zero carbon emissions by 2050 at the latest, with deep emissions reduction targets in the 2020s.

Taking this further by supporting the transition to green energy overseas, the group also agreed to phase out government funding for fossil fuel projects internationally – following a leading commitment made by the UK in December.

As a first step the G7 countries will end all new finance for coal power by the end of 2021, matched by increased support for clean energy alternatives like solar and wind. It was also agreed to accelerate the transition away from unabated coal capacity and to an overwhelmingly decarbonised power system in the 2030s.

The G7 has agreed to increase the quantity of finance for climate action, including for nature, in order to meet the $100bn per annum target to support developing countries.

In addition to this, the G7 have committed to champion a range of ambitious and effective global biodiversity targets, including the agreement of an ambitious and effective global biodiversity framework at CBD COP15 later this year.

Measures to tackle global deforestation were also secured, with the G7 committing to increase support for sustainable supply chains that decouple agricultural production from deforestation and forest degradation, including production stemming from illegal land conversion.

In this crucial year for global action on the environment and climate, the UK has placed tackling climate change and biodiversity loss at the centre of its G7 agenda.

Speaking after the event the Environment Secretary George Eustice said:

For the first time, the G7 has committed to halting and reversing the loss of biodiversity by 2030.

"This is a major step forward before we host the G7 in Cornwall next month and is a sign of the dedication to accelerate action within the G7 - and beyond - to tackle the twin challenges of climate change and biodiversity loss.

"We have seen tremendous progress this week and it has been great to see countries working together to raise our ambition and lead by example, each playing our part."

COP26 President-Designate said:

We are the first net zero G7. Under the UK's Presidency, the G7 is showing great leadership in tackling climate change and making sure those who are worst affected by it are better protected.

"As we recover from the pandemic we are focused on building back greener - creating jobs and prosperity, without harming the planet.

"We know we need to consign coal to history and the G7 has taken a major step towards a decarbonised power system. We are acting abroad as we're doing at home by agreeing to phase out international fossil fuel finance, starting with coal - another key milestone in this crucial year for climate action.

"I look forward to continuing this work as we make progress ahead of COP26 in Glasgow later this year and keep 1.5 degrees within reach.

ENDS

· Please find a link to the Communique here: https://www.gov.uk/government/publications/g7-climate-and-environment-ministers-meeting-may-2021-communique

21/05/2021

https://www.g7uk.org/g7-climate-and-environment-ministers-communique/

G7 Climate and Environment: Ministers' Communiqué

Published 21 May 2021

Joint commitments

We, the G7 Ministers responsible for Climate and Environment, met virtually on 20 -21 May 2021.

As we continue to address the ongoing pandemic, we acknowledge with grave concern that the unprecedented and interdependent crises of climate change and biodiversity loss pose an existential threat to nature, people, prosperity and security. We recognise that some of the key drivers of global biodiversity loss and climate change are the same as those that increase the risk of zoonoses, which can lead to pandemics. We highlight that urgent and concrete action is needed to move towards global sustainability, further mitigate and adapt to climate change, as well as halt and reverse biodiversity loss and environmental degradation. We recognise that climate change and the health of the natural environment are intrinsically linked and will ensure that the actions we take maximise the opportunities to solve these crises in parallel.

We will do this by building back better from the pandemic, and we stress our determination to put climate, biodiversity, and the environment at the heart of our COVID-19 recovery strategies and investments. In doing so, we will transform our economies to promote sustainable development, deliver decent green jobs and build resilience. We will also accelerate the clean energy transition, improve resource efficiency, including by reducing food loss and waste and promoting a circular economic approach, transition to sustainable supply chains and mainstream nature, including biodiversity, and climate into economic decision-making. We will help set the world on a nature positive and climate-resilient pathway to bend the curve of biodiversity loss by 2030 and to keep a limit of 1.5°C temperature rise within reach by making our 2030 ambitions consistent with the aim of achieving net zero emissions as soon as possible and by 2050 at the latest.

We recognise these are global challenges which require urgent and ambitious global action at all levels. We reaffirm our commitment to international cooperation and multilateralism, and will work collectively to implement fully our national and international commitments. In this critical year of action we

recognise the need to increase global ambition and enhance collaboration, underpinned by the most ambitious sub-national, national and international action. We call on all countries to join us in action.

The COVID-19 crisis has reinforced the importance of science and evidence in government policies and decision-making. Recent assessments by the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the International Resource Panel (IRP), and the UN Environment Programme (UNEP) have documented that rapid and far-reaching transformations across all sectors of society and the economy are necessary to tackle climate change, environmental degradation and biodiversity loss. Recalling the outcomes of previous G7 meetings on Earth observation systems, we recognise the important role of research and systematic observation to provide information on the state of the planet and support and guide action to address climate change and conserve, protect and restore essential and biodiverse ecosystems. We will ensure our domestic action and international commitments are informed by the best available science and will support others wishing to enhance their evidence-based policy-making processes by sharing our experiences and best practices.

Tackling the twin crises of Climate Change and Biodiversity Loss

We recognise the critical role the ocean and seas play for biodiversity and in regulating the Earth's climate, absorbing over 90 percent of all excess heat in the Earth's system and between 20-30 percent of all anthropogenic carbon dioxide emissions since the 1980s, providing a home to up to 80 percent of all life on Earth, and a healthy ocean is central to the livelihoods of more than three billion people. We therefore commit to increase efforts at international, regional and national level, to conserve and sustainably use the ocean, thus increasing its resilience.

We recognise the critical role of our world's forests as home to most of the world's terrestrial biodiversity, reducing our vulnerability to climate change impacts, improving our adaptability and resilience, and acting as key carbon sinks with tropical forests capturing and storing up to 1.8 $GtCO_2$ from the atmosphere every year. We recognise deforestation and forest degradation as a significant cause of climate change. We commit to urgent action to conserve, protect and restore natural ecosystems including forests and habitat connectivity and promote sustainable forest management. We also commit to implement

decarbonisation pathways that do not cause further biodiversity loss or deforestation.

We recognise the crucial role of Nature-based Solutions in delivering significant multiple benefits for climate mitigation and adaptation, biodiversity, and people and thereby contributing to the achievement of various Sustainable Development Goals (SDGs). Such benefits include, among others, improving air quality, water quality and availability, soil health, storm and flood protection, disaster risk reduction, and alleviating and preventing land degradation. Nature-based Solutions can also provide sustainable livelihoods through protecting and supporting a wide range of ecosystem services on which the world's most vulnerable and poorest people disproportionately rely. We therefore commit to strengthen their deployment and implementation. We stress that Nature-based Solutions do not replace the necessity for urgent decarbonisation and reduction of emissions, but are needed alongside these efforts. In addition to action on the ocean and forests, we commit to take urgent action across ecosystems, including soils, grasslands, savannah, drylands, wetlands, coral reefs, rivers, lakes, coastal dunes, peatland, seagrass beds, mangroves and saltmarshes, whilst ensuring that relevant safeguards are in place.

We reiterate that achieving our collective ambitions will require all sources of finance: public and private, domestic and international, including innovative sources. We commit to using all relevant sources, tools and approaches, including Official Development Assistance and other sources of finance, to support and accelerate global action to tackle climate change and conserve, protect, restore and sustainably manage nature and the environment. We underscore the importance of a predictable investment environment and clear public policies and strategies in facilitating the alignment of global and national financial flows with these objectives, and as such, welcome the UK's incoming United Nations Framework Convention on Climate Change (UNFCCC) COP26 Presidency's ambitious efforts as they relate to mobilising private and public finance. We are each working intensively to increase the quantity of finance for climate mitigation and adaptation actions, including for Nature-based Solutions, and are committed to increasing its effectiveness, accessibility, and where possible its predictability, and call on others to join us in these efforts. In conjunction with these efforts, we are working intensively towards increasing the quantity of finance to nature and Nature-based Solutions. We reaffirm our commitment to the collective developed country climate finance goal to jointly mobilise US$100 billion annually by 2020 through to 2025 from a wide variety of

sources, and welcome the commitments already made by some of the G7 to increase climate finance and look forward to new commitments from others well ahead of COP26 in Glasgow. We will promote enabling environments to mobilise private finance towards these efforts while also enhancing action from the international community to support the poorest and those most vulnerable to climate change, biodiversity loss, and environmental degradation. We are committed to further enhance synergies between finance for climate and biodiversity and to promote funding that has co-benefits for climate and nature.

We call upon Multilateral Development Banks (MDBs), bilateral Development Finance Institutions (DFIs), multilateral funds, public banks, and export credit agencies to ensure that financial flows from these institutions are aligned with the goals of the Paris Agreement and support the objectives of international biodiversity conventions including the Convention on Biological Diversity (CBD) and the post-2020 global biodiversity framework, by increasing finance for nature and climate, and leveraging further private capital, in particular for developing countries and emerging markets. We call on MDBs, bilateral DFIs and other support providers to mobilise finance at scale by delivering on their climate finance objectives and targets, and nature finance objectives, making them more ambitious, and mainstreaming climate and nature into their analysis, policy advice, decision-making and financing. We further call on all MDBs to publish, before the UNFCCC COP26, a plan and date by which their operations will be aligned with and support the goals of the Paris Agreement, and encourage them to sign a joint statement committing them to mainstream nature across their operations as appropriate. We also urge the MDBs to commit their private sector arms to pilot and scale up private finance programmes for nature and climate, in particular in under-funded sectors like adaptation and resilience and Nature-based Solutions.

In the context of building back better and achieving a global green recovery from COVID-19, we acknowledge the particularly significant impacts faced by developing countries and that increasing debt burdens can constrain fiscal space and the ability to provide stimulus for a green recovery alongside other development objectives, including access to clean and sustainable energy for all. We recognise that macro and fiscal policies, a free, fair and rules-based multilateral trading system, international initiatives and domestic efforts to create an enabling environment to mobilise private finance, offer a powerful tool to both transforming and revitalising economies. We thank Professor Lord Stern for his work and note with interest his paper on “G7 Leadership for Sustainable,

Resilient and Inclusive Growth and Recovery" as commissioned by the UK G7 Presidency. We welcome the discussions of Finance Ministers on supporting a global recovery and their role in enabling a smooth transition to net zero, addressing biodiversity loss, and mobilising the private sector.

Leaving no-one behind

We recognise the disproportionate impacts of climate change, biodiversity loss, and environmental degradation on the most vulnerable communities, people living in poverty and those already facing intersecting inequalities and discrimination, including women and girls, Indigenous Peoples, people with disabilities and other marginalised groups. We will increase our efforts to address environmental justice issues in order to make their voices heard and support their full, equal and meaningful participation in decision-making, recognising their critical role as leaders and agents of change, and adapting new and existing policies to support social justice, economic empowerment and achieving gender equality. We further recognise the need to protect the rights of Indigenous Peoples, as acknowledged in national law and international instruments, and respect and value their knowledge and leadership in tackling climate change and biodiversity loss. We are steadfastly committed to addressing barriers to accessing finance for climate and nature faced by women, marginalised people, and underrepresented groups and increasing the gender-responsiveness and inclusivity of finance. We reaffirm our commitment to implementing the 2030 agenda for sustainable development and its associated SDGs and taking action in support of the UNFCCC, CBD and the UN Convention to Combat Desertification (UNCCD) Gender Action Plans.

We will ensure that the transition to a net zero emissions and nature positive economy happens in a fair and inclusive way. This transition must go hand in hand with policies and support for a just transition for affected workers, and sectors so that no person, group or geographic region is left behind.

Climate change

A G7 committed to accelerating progress under the Paris Agreement

We reaffirm our strong and steadfast commitment to strengthening implementation of the Paris Agreement and to unleashing its full potential. To this end we will make ambitious and accelerated efforts to reduce emissions to keep a limit of 1.5°C temperature rise within reach, strengthen adaptation to the impacts of climate change, scale-up finance and support, protect, restore and

sustainably manage nature, and enhance inclusive and gender-responsive action. We affirm our commitment to work with these objectives in mind towards a successful COP26 in Glasgow and beyond.

A net zero G7 leading a step change in mitigation

There is a global imperative to pursue efforts to limit the increase in the global average temperature to 1.5°C above pre-industrial levels, recognising that the avoided climate impacts are greater at 1.5°C than 2°C, as stated in the IPCC's 2018 Special Report on Global Warming of 1.5°C. This will require meaningful action by all countries, in particular the major emitting economies, pursuant to continuous improvement in climate and environmental action to align with a pathway that keeps 1.5°C within reach. We, G7 members, will lead by example and each commit to achieve net zero greenhouse gas (GHG) emissions as soon as possible and by 2050 at the latest.

We affirm the importance of taking domestic action to phase down hydrofluorocarbons (HFCs) and of pursuing further actions to enhance the benefits of the Montreal Protocol in ozone layer protection and tackling climate change, and call upon all countries who have not already done so to ratify the Kigali Amendment to the Montreal Protocol.

Short-term action – building back better and more resilient through a net zero pathway

Accelerating the transformation of the global economy towards a net zero pathway will depend upon securing a green, sustainable, resilient, inclusive and gender-responsive recovery from COVID-19 in a manner consistent with the 2030 Agenda for Sustainable Development, leaving no one behind. To accelerate progress towards achieving our Paris Agreement goals, we need to harness the significant opportunities for sustainable development – including green jobs and sustainable, resilient growth – by making investments in the recovery from COVID-19 that are aligned with pathways towards our respective enhanced Nationally Determined Contributions (NDCs) and 2050 net zero commitments, recognising the risk of stranded assets associated with high carbon investments.

Medium and long-term action – guided by net zero aligned NDCs and LTSs

We highlight with deep concern the findings from the IPCC Special Report 2018, and recognise the need to reduce the global level of annual GHG emissions to

25-30 Gt of carbon dioxide equivalent or lower by 2030 to put the world on track to limit global warming to 1.5°C above pre-industrial levels, in order to reduce the risk of catastrophic consequences of climate change. We commit to submitting long-term strategies (LTSs) that set out concrete pathways to net zero GHG emissions by 2050 as soon as possible, making utmost efforts to do so by COP26. We commit to updating them regularly, including to reflect on the latest science, as well as technological and market developments. We also note with concern the initial version of the NDC Synthesis Report prepared by the UNFCCC Secretariat which highlights that many parties are yet to submit new and updated NDCs. NDCs communicated by 2020 collectively fall far short of the ranges found in pathways identified by the IPCC, which limit global warming to 1.5°C or well below 2°C. We welcome the significantly enhanced ambition reflected in 2030 targets announced by all G7 members, which put us on clear and credible pathways towards our respective 2050 net zero GHG emission reduction targets. We note the important contribution these commitments make towards keeping 1.5°C within reach and in providing an unequivocal direction of travel for business, investors and society at large. Those of us who have not already done so commit to submitting our enhanced NDCs to the UNFCCC as soon as possible ahead of COP26.

The G7 members cannot tackle climate change alone. The G7 calls on all countries, in particular other major emitting economies, to join the growing numbers that have made 2050 net zero commitments, to present specific and credible strategies for achieving them – including LTSs – and to enhance their NDCs accordingly to keep 1.5°C within reach, highlighting the importance of parties who have not already done so submitting their increased ambition NDCs to the UNFCCC as soon as possible ahead of COP26.

We reaffirm our commitment that our successive NDCs will represent a progression and reflect the highest possible level of ambition, in alignment with the Paris Agreement. Both our NDCs and LTSs will remain informed by the global stocktake outcomes and the best available science – particularly IPCC reports (including the forthcoming 6th Assessment Report), as well as IPBES reports. In preparing and implementing our NDCs, we reaffirm our commitment to public participation. We highlight the important and active role of all levels of government as well as businesses, workers, local communities, non-governmental organisations (NGOs), academia, Indigenous Peoples, youth and other non-state actors in driving ambitious climate action, including in a gender-responsive manner. We call for an enhanced Marrakech Partnership for Global

Climate Action (MPGCA) to accelerate and broaden climate ambition and action in this regard, with improved tracking of its initiatives. We recognise the benefits of enhanced international collaboration in driving action in all sectors as part of an economy-wide effort.

More people protected from climate impacts

We acknowledge with grave concern the impacts of climate change already being experienced worldwide, particularly by those most vulnerable to them. We commit to enhance, accelerate and scale up adaptation actions, including Nature-based Solutions, and to support the most vulnerable to adapt to and cope with the impacts of climate change and biodiversity loss, identified by plans at local, national and sub-national levels, including ambitious National Adaptation Plans (NAPs). We reaffirm our commitment to Article 9.4 of the Paris Agreement, which calls for the provision of scaled-up financial resources to aim to achieve a balance between adaptation and mitigation, taking into account country-driven strategies. This includes continuing to scale-up finance contributing to adaptation action. We highlight the important role of businesses, workers, investors, cities, women, Indigenous Peoples and civil society in mobilising action to support vulnerable communities. Finally, we call on all states and non-state actors to cooperate to enhance adaptation and resilience, including through the Adaptation Action Coalition, InsuResilience Global Partnership, and National Adaptation Plans Global Network, and for non-state actors to join the Race to Resilience Campaign to strengthen the resilience of 4 billion people in vulnerable communities by 2030, and to participate in the adaptation activities undertaken within the Marrakech Partnership for Global Climate Action. Recognising the importance of adaptation in our own national planning, we G7 members commit to submitting Adaptation Communications as soon as possible, and if feasible by COP26. We further affirm our commitment to a diverse and inclusive, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems in the delivery of adaptation policies, plans, strategies and actions. As Climate and Environment Ministers, we acknowledge and fully support the work of the Foreign and Development Ministers' track to increase action on adaptation and protect more people from climate impacts, including the commitment to continue scaling up finance contributing to adaptation action.

Mobilising and aligning finance to support the green recovery

We, the G7, reaffirm our commitment to the collective developed country goal of jointly mobilising US$100 billion annually through to 2025, from a wide variety of sources, public and private, bilateral and multilateral and in the context of meaningful mitigation actions and transparency on implementation. We welcome the commitments already made by some of the G7 to increase climate finance and look forward to new commitments from others well ahead of COP26 in Glasgow. We underline G7 commitments to further strengthen the Green Climate Fund (GCF) as an effective tool in implementing the Paris Agreement. Further, we highlight the Paris Agreement's recognition that mobilising finance requires a global effort. In this context, we encourage all potential contributors of official finance, including emerging economies, to join existing providers in supporting climate action in developing countries. We underline the urgent need to scale up efforts to mobilise the private sector if we are to achieve a global green recovery and net zero emissions by 2050, recognising the critical role that innovative financing vehicles, bilateral and multilateral finance institutions, blended finance, policies, risk pools and enabling environments play in this regard.

We affirm the crucial importance of making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development, as reflected in Article 2.1.c of the Paris Agreement and in line with the SDGs. As part of our efforts towards this objective, we commit to making official finance flows consistent with the goals of the Paris Agreement and call on all countries, as well as MDBs, DFIs, multilateral funds, public banks and export credit agencies to join us in this effort. We emphasise the transformative role of the policies and actions of all governments, but also public and private stakeholders in creating the right enabling environments to support climate action and in integrating climate change into economic and financial decision-making processes. We also urge businesses and investors to join the Race to Zero, align their portfolios with the goals of the Paris Agreement and set science-based net zero targets of 2050 at the latest.

We recognise the potential of carbon markets and carbon pricing to foster cost-efficient reductions in emission levels, drive innovation and boost the breakthrough of technologies that enable a transformation to net zero. We affirm the fundamental importance of environmental integrity and sustainable development in the design of high integrity carbon market mechanisms, including those used for voluntary purposes, which should be based on robust rules and accounting that ensure avoidance of all forms of double counting. They should require the use of conservative emissions and emissions reductions estimations

and assumptions, as well as safeguards to mitigate carbon leakage risks, avoid negative social and biodiversity impacts, and to address potential reversals. We further note that such mechanisms can mobilise private finance and help to close the ambition gap for limiting global warming to 1.5°C.

Unleashing the full potential of the Paris Agreement

We are steadfast in our commitment to achieving an ambitious set of outcomes from COP26 in line with the objectives set out above. We emphasise the importance of finalising the outstanding mandates relating to the Paris Rulebook – including the adoption of common tables and formats for the enhanced transparency framework, decisions on cooperative approaches (Article 6), and common time frames for NDCs – in a manner that promotes transparency and accountability and ensures environmental integrity. We will address mandates and deliver on our commitments across the three pillars of the Paris Agreement – on mitigation, adaptation, and support – and enhance international collaboration to accelerate global implementation ahead of COP26 and beyond. We will have a continued focus on supporting those most vulnerable to the impacts of climate change and will continue to support developing country partners as they pursue green, sustainable, resilient, inclusive and gender-responsive recoveries from COVID-19. This includes providing support with the preparation and implementation of national plans and commitments (including NDCs, LTSs, NAPs and Adaptation Communications) bilaterally, through our contributions to multilateral funds and through the NDC Partnership and other such initiatives. We welcome the creation by the OECD of the 'International Programme for Action on Climate' as part of the 'Horizontal Project on Climate and Economic Resilience in the Transition to a Low Carbon Economy', and look forward to its possible contribution to climate action.

Supporting the transition to a net zero economy

We recognise that the transition to net zero will depend upon developing the skilled workforce necessary to deliver it, in a way that leaves no one behind, by building on the skills and knowledge in transitioning sectors, developing new labour markets for decent work and quality green jobs, as well as investing in pioneering clean and sustainable industries and technologies. We will address the challenges workers face by ensuring that they have the appropriate skills and training to build back greener, alongside a long-term plan for skills needed for a net zero economy, in a gender-responsive way. This will support the creation of green jobs, a diverse workforce, and will support workers in high carbon sectors

to gain skills and knowledge to implement more sustainable practices and green technologies. We reaffirm our commitment under the Equal by 30 Campaign to work towards equal pay, leadership and opportunities for women in the clean energy sector by 2030. We agree to deepen efforts to advance gender equality and diversity in the energy sector, including under the Equal by 30 Campaign by adopting a set of strengthened commitments. This will support our commitment to make diversity and gender equality central to the global energy sector's recovery efforts and help build a more inclusive and equitable energy future. We acknowledge the need for specific support for all workers as part of a clean energy transition.

We recognise that delivering and accelerating the transition to a net zero global economy will require scaled-up international collaboration. The institutional architecture to enable this should be structured and strengthened appropriately where needed, utilising synergies with existing initiatives to ensure net zero emissions are achieved on an economy-wide basis. We will convene to review the pace of the transition required in each sector to meet the Paris Agreement goals, and the international landscape of institutions and sectoral fora to decarbonise major emitting sectors, with a view to strengthening collaboration in key sectors up to COP26 and beyond.

We recognise the importance of working closely with city, state and regional governments in driving the transition to a net zero economy, and the vital role of national governments to support such actions. We highlight the role of cities in piloting a future with net zero emissions, through innovative and sustainable energy solutions. Local governments and sub-national actors, including businesses, workers, communities and civil society, are central to taking ambitious action on high-emitting sectors and should implement solutions that curb emissions while ensuring equitable and inclusive development for citizens and communities. We will implement a range of measures to encourage and empower citizens, business, communities and regions to decarbonise, including supporting the development of local strategies and plans, encouraging investments for the implementation of model projects for low carbon urban infrastructure, encouraging behavioural change, utilising information systems to promote the transparency of local actions and achievements, and disseminating good practices of concrete actions.

Net zero energy

We recognise the key contribution of energy efficiency as “the first fuel” to emissions reduction, energy security, economic growth, sustainable development, alleviating energy poverty, and job creation. We therefore note with concern the decline in the global rate of energy efficiency improvements and commit to strengthen our efforts to deliver improvements in buildings, industry and transport. We continue to emphasise the need for stronger international exchanges to learn about best practices in this policy space. We stress the importance of strengthening and coordinating international collaboration in developing policy frameworks for new business models and to ensure the necessary investments in energy efficiency measures in all sectors. We therefore welcome the establishment of the Energy Efficiency Hub, hosted at the International Energy Agency, as a key international forum for global collaboration on energy efficiency. We welcome the Super-Efficient Equipment and Appliance Deployment (SEAD) initiative. We further endorse its goal of doubling the efficiency of four key energy-using products sold globally by 2030: lighting, cooling, refrigeration, and motor systems, and will contribute to that end using the full policy toolkit at our disposal.

We affirm the fundamental role of renewable energy sources. We welcome the rapid growth, decreasing cost and increasing value of renewable energy technologies around the world. We stress the need for their further integration in the systems, and we recognise that renewables are a major driver of economic growth, jobs, and increased access to affordable energy. We recognise that the significant progress made in the development and deployment of renewable energy has been driven by a virtuous circle of technological development, a supportive regulatory and policy environment including innovative market designs, and industry-led cost reductions. We affirm our commitment to supporting the development and deployment of renewable energy globally, particularly for developing countries, as well as accelerating the development and deployment of renewable heating and cooling, where a step change in progress is urgently required. We recognise the importance of promoting clean energy transitions in islands, as well as in remote and rural communities, through innovative renewable energy solutions, fostering self-determination and community ownership of resources.

We recognise the role of energy storage as an enabling technology to support the transformation of the global economy towards a net zero pathway. We commit to drive energy storage technology innovation and accelerate its commercialisation and deployment by supporting the private sector in reducing

the cost and increasing the performance of energy storage technologies, through policies and tools supportive of energy storage market adoption, including regulatory frameworks and market structures.

Recognising that coal power generation is the single biggest cause of global temperature increases, we commit now to rapidly scale-up technologies and policies that further accelerate the transition away from unabated coal capacity and to an overwhelmingly decarbonised power system in the 2030s, consistent with our 2030 NDCs and net zero commitments. In doing so, we reaffirm the importance of national energy security and resilience and underscore the importance of providing support for affected workers, regions and communities. We welcome with appreciation the work of the Energy Transition Council in supporting the new economic opportunities and sustained quality job creation offered by a transition to clean energy in developing countries. We commit to exploring further ways that we can accelerate global progress towards net zero power, including leading by example as the G7, and working with collaborative initiatives and institutions. We note that several G7 members participate in the Powering Past Coal Alliance. We will convene by COP26 to lay the groundwork for further joint action by G7 members.

In line with Article 2.1.c of the Paris Agreement, we commit to aligning official international financing with the global achievement of net zero GHG emissions no later than 2050 and deep emissions reductions in the 2020s. We commit to promoting the increased international flow of public and private capital toward Paris Agreement-aligned investments and away from high-carbon power generation to support the clean energy transition in developing countries. In this context, we will phase out new direct government support for carbon intensive international fossil fuel energy, except in limited circumstances at the discretion of each country, in a manner that is consistent with an ambitious, clearly defined pathway towards climate neutrality in order to keep 1.5°C within reach, in line with the long-term objectives of the Paris Agreement and best available science. Consistent with this overall approach and recognising that continued global investment in unabated coal power generation is incompatible with keeping 1.5°C within reach, we stress that international investments in unabated coal must stop now and commit to take concrete steps towards an absolute end to new direct government support for unabated international thermal coal power generation by the end of 2021, including through Official Development Assistance, export finance, investment, and financial and trade promotion support. We commit to reviewing our official trade, export and development finance policies towards

these objectives. We further call on other major economies to adopt these commitments. We welcome the support provided and mobilised by DFIs and multilateral funds, including the GCF, to support the energy transition. In particular, we note the recent Climate Investment Funds board decision to launch new sector specific funds, including those to accelerate coal transitions, and support renewable energy deployment in emerging economies.

We reaffirm the need to take into account the imperative of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities, as reflected in the Paris Agreement. Recalling the SDGs, we commit ourselves to a people-centred transition, that will work to create decent employment in the low carbon economy while making energy more accessible, affordable, and cleaner for all communities. We support reskilling workers across industries and communities and developing the industries of the future, as the clean energy transition continues to gather momentum. We welcome the substantial economic opportunities inherent in a people-centred transition, including alleviating energy poverty for people and communities, removing barriers to employment, especially for marginalised populations, which will in turn lead to substantial and equitable economic growth and prosperity for all.

We recognise that inefficient fossil fuel subsidies encourage wasteful consumption, reduce energy security, impede investment in clean energy sources, and undermine efforts to deal with the threat of climate change. We reaffirm our commitment to the elimination of inefficient fossil fuel subsidies by 2025 and encourage all countries to adopt this commitment. We encourage greater international action to meet this commitment and we support calls for greater transparency.

We recognise the importance of ambitious and urgent action to reduce emissions and leakage of methane (fossil and biogenic) from the energy sector, as well as waste and agricultural sectors, and of other potent warming substances, such as black carbon, in order to slow global warming. This will require improved measurement and reporting to better locate and quantify these emissions.

We recognise the importance of maintaining energy security as we transform our energy systems and the need for energy markets that are open, flexible, transparent, competitive, stable, sustainable, reliable and resilient. We reaffirm the need for investment to ensure energy supply and demand remain balanced throughout energy transitions, recognising the need for energy demand to be met

by sources that align with our Paris Agreement and net zero objectives. We commit to developing strategies and actions that enhance our focus on the security of innovative, clean, safe, and sustainable energy technologies. This includes resilience in the face of cyber security threats, the system integration of variable renewable energy, energy storage, flexible power plants, hydrogen, as well as demand side management, smart grids, and related infrastructure including the accommodation of sustainable biofuels and hydrogen. We recognise the important role of electricity interconnection in market integration, flexibility and promoting decarbonisation, alongside supporting security of supply and system security. We recognise that natural gas may still be needed during the clean energy transition on a time-limited basis and we will work to abate related emissions towards overwhelmingly decarbonised power systems in the 2030s. We also note the importance of ensuring secure, safe and sustainable clean energy supply chains, including with regards to critical minerals and critical renewables components.

We affirm that access to secure affordable, reliable, sustainable, clean and modern energy is a key enabler of the SDGs. We welcome progress made to increase energy access and eradicate energy poverty worldwide, while noting that the world remains off-track to meet our SDG for access to energy. We note the essential role of gender equality in achieving sustainable energy access and welcome synergies with the work of the G7 Gender Equality Advisory Council. We stress the importance of achieving universal, equitable and sustainable access in driving forward a global and inclusive clean energy transition that addresses the disproportionate impact of energy poverty on vulnerable and marginalised populations, both in developing countries and in more mature economies. We welcome the UN commitment to address progress on SDG7 within the High-Level Energy Dialogue.

Those countries that opt to use it reaffirmed the role of nuclear energy in their energy mix. Those countries recognise its potential to provide affordable low carbon energy and contribute to the security of energy supply as a baseload energy source.

Net zero mobility

We stress the urgent need to promote sustainable mobility and reduce GHG emissions from the transport sector to help achieve net zero emissions by 2050. We recognise that this will require dramatically increasing the pace of the global decarbonisation of the road transport sector throughout the 2020s and beyond,

consistent with the goals of the Paris Agreement and our respective 2030 NDCs and net zero commitments. In this regard, and as part of this effort, we welcome and support the Zero Emission Vehicle Transition Council and will work with other global partners to accelerate the deployment of zero emission vehicles for passengers and freight, including exploring ways to support developing countries in making the transition. We further recognise the commitments of some states to the target of sales of passenger cars being zero emission by 2040 or earlier. Furthermore, we also need to promote decarbonising the entire life cycle of vehicles. We commit to support transitioning our industrial bases and providing ambitious investment to research, further develop, and scale up the technologies needed to support a rapidly growing global market for sustainable mobility. We will intensify our efforts in enhancing the offer of more sustainable transport modes in urban and rural areas, including public transport, shared mobility, cycling and walking, and supporting inter-modal transport with investment in rail and waterborne infrastructure.

We further recognise the urgent need for effective efforts to reduce emissions from the international aviation and maritime sectors to put both sectors on a pathway of emissions reduction consistent with the mitigation goals of the Paris Agreement. We commit to supporting the development and adoption of ambitious mid- and long-term measures at the International Maritime Organization (IMO) and to building a global consensus on strengthening the levels of ambition in the initial IMO strategy on reduction of GHG emissions from ships in the context of its forthcoming revision, with the aim of contributing to the Paris Agreement temperature goal. We will also support the development and adoption of an ambitious long-term global goal at the International Civil Aviation Organization in line with our vision for decarbonising the aviation sector.

Net zero innovation

We recognise clean energy innovation as a driver of sustainable and inclusive growth to create jobs, an enabler of a resilient economic recovery. We also recognise the need to accelerate innovation this decade to meet our net zero goal by 2050 or sooner. This includes scaling up demonstrations and the early deployment of zero and negative carbon technologies while ensuring negative impacts on the environment and human wellbeing are avoided. This must be enabled by mechanisms and clear signals, including an increased focus on ESG (environmental, social and governance) performance, that incentivise private sector investment to fast-track innovations to the market. To accelerate the pace of industry decarbonisation, we commit to launch the G7 Industrial

Decarbonisation Agenda to complement and support the activities of existing key initiatives and amplify ambition, while plugging critical gaps in the landscape wherever they exist.

For the G7, we commit to increasing clean energy innovation investments to a level in line with our net zero ambition. We support the launch of a second phase of Mission Innovation as a global platform to strengthen international cooperation that will continually promote increased clean energy innovation ambition and concrete actions for clean energy technical innovation. We support the commencement of Clean Energy Ministerial's third phase as a global platform to share experience, raise ambition, and implement cooperative action for clean energy deployment, including innovative policy, regulatory and market measures. We encourage closer alignment between Mission Innovation and the Clean Energy Ministerial to better coordinate efforts from innovation all the way through to the deployment of clean and sustainable energy technologies including through energy efficiency and from renewable energy sources. We will design appropriate pull mechanisms to accelerate the innovation and scaling up of clean energy and net zero technologies across G7 members and to support the green transition in developing countries. We also acknowledge that the successful deployment of clean energy technologies requires further investment in a skilled, technologically advanced and diverse workforce.

Innovation that supports net zero industries can help existing sectors through the transition, as well as creating additional value with the birth of new industries. We will work together in the lead up to COP26, building on existing initiatives to coordinate action on standards and public procurement in order to create globally competitive markets for green industrial products. In parallel, we will also work to reduce emissions from key industrial processes through enhanced energy efficiency, the development of circular economy and resource efficiency principles, electrification, comprehensive industrial heat utilisation and reduced waste in industry, fuel switching and carbon capture, usage and storage (CCUS). We recognise the importance of early action to decarbonise hard-to-abate industrial sectors such as iron and steel, cement, chemicals, and petrochemicals, to ensure that emissions across the entire economy reach net zero by 2050. For these hard to abate sectors to achieve this, we commit to targeting greater levels of innovation funding to lower the costs of industrial decarbonisation technologies, including the use of hydrogen, electrification, sustainable biomass, CCUS and synthetic fuels (including ammonia and fuels made from hydrogen). Acknowledging that achieving net zero industry will require enhanced global

efforts, we will support low and middle-income countries through financial and technical cooperation, as well as in multilateral fora. We will work together to accelerate the decarbonisation of industry, and welcome the development of the new Industrial Decarbonisation Innovation Mission and the launch of the Clean Energy Ministerial's Industrial Deep Decarbonisation Initiative, while supporting ongoing activities in the Leadership Group for Industry Transition.

We recognise the importance of renewable and low carbon hydrogen on the pathway to net zero. We will step up efforts to advance commercial scale hydrogen from low carbon and renewable sources across our economies, including support for fuel cell deployment globally. This will help realise the development of a future international hydrogen market that creates new jobs for current and future workers in the energy sector.

While the focus must remain on protecting and expanding our natural carbon sinks, we recognise that negative emissions technologies, such as Direct Air Capture, can also play a role in reaching net zero GHG emissions. Negative emissions will be required to offset residual emissions in sectors that are difficult to decarbonise completely. Technical solutions such as CCUS, and carbon recycling where appropriate, will also be important for some countries in meeting our goal of a net zero economy.

Environment

Resetting our relationship with nature

A healthy natural environment is critical to human health, wellbeing and prosperity globally and underpins sustainable development. Despite existing global agreements for the protection, conservation, sustainable use and restoration of biodiversity, global negative trends in biodiversity and ecosystem functions are projected to continue or worsen. We therefore confirm our strong determination to halt and reverse biodiversity loss by 2030, building on the G7 Metz Charter on Biodiversity and the Leaders' Pledge for Nature as appropriate.

We recall with deep concern the 2019 IPBES Global Assessment Report on Biodiversity and Ecosystem Services and the 2021 UNEP Making Peace with Nature report. We commit to take urgent action to address the five direct drivers of biodiversity loss, all a result of human activity: changes in land and sea use, direct exploitation of organisms, climate change, pollution and invasive alien species. We will also address overexploitation and illegal exploitation of resources as well as the indirect drivers identified, including those caused by

unsustainable methods and patterns of consumption and production. We stress that concerted and collaborative action is needed by all partners and stakeholders including governments, businesses, farmers, academia and scientists, NGOs, citizens, Indigenous Peoples, and local communities, and underline the importance of including these groups in co-design, decision-making and implementation.

We commit to raise ambition and accelerate and intensify action, including at CBD COP 15, UNFCCC COP 26, Ramsar COP 14, UNCCD COP 15, UN Environment Assembly (UNEA) 5, UN Food Systems Summit and the UN Ocean Conference, and in support of the UN Decades on Ecosystem Restoration and Ocean Science for Sustainable Development. We will also build on existing synergies, break down silos and support linkages at the domestic and institutional level across relevant Multilateral Environmental Agreements, as appropriate, including Regional Seas Conventions.

Highlighting the urgent need for transformative action, we will champion the agreement and successful implementation of an ambitious and effective post 2020 global biodiversity framework to be adopted by parties at CBD COP15 to protect, conserve and restore ecosystems, halt and reverse biodiversity loss, ensure the conservation and sustainable use of biodiversity, increase resilience to climate change and sustain healthy ecosystems on which our lives, well-being and economies depend. We commit to champion ambitious and effective global biodiversity targets, including conserving or protecting at least 30 percent of global land and at least 30 percent of the global ocean by 2030 to halt and reverse biodiversity loss by 2030 and address climate change, including through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures (OECMs) by 2030 (30by30), recognising that Indigenous Peoples, and local communities, are full partners in the implementation of this target. We will strive to ensure the effective and equitable management of protected areas and OECMs, and strive to improve their ecological connectivity, with a focus on areas that deliver the greatest benefits for global biodiversity, ecosystem services and climate protection. We underline the importance of a strong accountability framework that strengthens implementation and increases transparency of our actions to meet these targets, and will actively support the development of robust implementation, monitoring and review frameworks. We will enhance or put in place robust, science-based domestic implementation plans, strategies and policies to conserve, protect and restore terrestrial,

freshwater, marine and coastal ecosystems and play our part in successfully delivering these global goals and targets. We will work with the competent international and regional organisations, including Regional Seas programmes, Regional Seas Conventions and Regional Fisheries Management Organisations (RFMOs). We will contribute to 30by30 by conserving or protecting at least 30 percent of our own land, including terrestrial and inland waters, and coastal and marine areas by 2030 according to national circumstances and approaches.

Mainstreaming nature

According to the WEF “New Nature Economy Report 2020”, over half the world’s GDP in 2019, almost US$44 trillion, was generated from industries that depend on nature. Waldron et al in their report “Protecting 30% of the planet for nature: costs, benefits and economic implications” suggest that achieving 30 percent protection in two biomes alone could result in gross economic benefits of US$170 billion to US$530 billion per annum by 2050. The report also states that the global financial cost of adequately protecting 30 percent of all the earth’s land and ocean has been estimated to be between US$103 billion and US$177.5 billion per annum. It is clear therefore that the economic benefits of protecting and conserving the land and ocean far outweigh the financial costs of doing so.

We welcome the contribution of the Dasgupta Review on the Economics of Biodiversity, which builds on The Economics of Ecosystems and Biodiversity (TEEB) process among other initiatives. Its conclusion that a fundamental change is needed in how we think about and approach economics if we are to reverse biodiversity loss and protect and enhance our prosperity will inform our work. We will work collaboratively to build on the Dasgupta Review insights and those of other such reports, as appropriate, to support efforts for economic and financial decision-making to account for the goods and services we derive from, and the intrinsic value attributed to nature. We commit to take the urgent and transformative action required to ensure that a deep understanding of ecosystem processes, their interlinkages, and how they are affected by economic activity, is incorporated as part of economic and financial decision-making. To ensure appropriate management of environmental risks and reduce related transaction costs, we will also work with businesses and other stakeholders in developing standardised natural capital accounting practices. We welcome the work being done by the UN Statistical Commission to continue updating the SEEA ecosystem accounting system.

We commit to mainstream nature into all sectors and policies. We recognise the urgency and call for the integration of both climate and nature-related risks into organisational risk management architecture, and of investing in natural capital, which will enable finance to play a greater role by pivoting towards nature positive projects and investments. We recognise the importance of work on nature-related financial disclosure and note with interest the establishment of the Taskforce on Nature-related Financial Disclosures and its aims.

We note the analysis from the OECD, which provides policy recommendations based on the findings of the Dasgupta Review, among other reports. The G7 commits to review these recommendations in order to identify actions to mainstream nature into financial and economic decision-making. In particular we note the OECD's analysis and recognise the harmful effect of some subsidies on the environment and people's livelihoods. We therefore commit to lead by example by reviewing relevant policies with recognised harmful impacts on nature and will take action, as appropriate, to deliver nature positive outcomes.

Preventing and combatting zoonoses and antimicrobial resistance (AMR) using a One Health approach

The COVID-19 pandemic reminds us that human, plant, animal and environmental health are interdependent and we therefore stress the importance of a strengthened One Health approach. We welcome the contribution of the IPBES Workshop Report on Biodiversity and Pandemics to the debate and recognise with concern that increased contact between humans, wildlife and livestock, as a result of human activities including habitat loss, human encroachment into natural areas, land use change such as agricultural expansion, unsustainable food production systems, deforestation, climate change, the legal and illegal wildlife trade, unsustainable international trade and unsustainable consumption is increasing the risk of zoonotic disease emergence and spread. The COVID-19 pandemic has reinforced the importance of close international collaboration in preventing and combatting existing and emerging zoonotic threats. We call for further cross sector research and scientific analysis and evidence on the interactions between humans, wildlife, domesticated animals and the environment, the pathogens which exist in these populations, the risks arising from these interactions and the control and prevention of zoonoses. We call on all governments to ensure transparency and swift sharing of data and information on zoonoses.

As the G7, we will continue to strengthen global collaboration and work towards improving the resilience of our surveillance systems through sharing relevant information in a timely manner, implementing best practice, building capability and improving technology domestically and internationally, particularly with developing countries and countries with economies in transition.

We endorse the work of the One Health Working Group and will join, on a voluntary basis, the International Zoonoses Community of Experts (IZCE) established under the UK Presidency. The IZCE will bring together national points of contact with expertise and interest in zoonoses, their drivers, prevention and monitoring. Through sharing best practice and methodologies, knowledge will be increased across the community and will contribute to improve risk assessment, risk management and early warning capabilities at a global level. We recognise the need to ensure complementarity with such initiatives as the Tripartite Plus and the One Health High Level Expert Panel to avoid duplication. The IZCE will liaise with other relevant G7 working groups, for example the G7 Chief Veterinary Officers Group.

We recognise that better understanding and enhanced visibility, accessibility and interoperability of data is a crucial first step in delivering improved global surveillance and response to One Health threats and issues. We encourage climate, environment and health stakeholders to consider how best they can work together to support the Tripartite Plus in this crucial work.

We recognise that the release of antimicrobials into the environment can select for antimicrobial resistance (AMR) and have an impact on human, animal and environmental health. We also note that heavy metals and biocides potentially have an impact on AMR and human, animal and environmental health. We underline the importance of a One Health approach in tackling AMR and call on all governments to promptly implement measures for the sound management and reduction of inappropriate use of antimicrobials. In this context, we note the potential role that soil microorganisms may play in the fight against AMR. We call on UNEP, in collaboration with the Tripartite organisations, to strengthen the evidence base on the contamination, mechanisms, causes and impacts of AMR emerging and spreading in the environment as mandated at UNEA 3. We commit to work in close collaboration with governments and relevant parties such as, medicines regulators where independent of government agriculture, academia, industry, the Tripartite on AMR and UNEP to develop and implement long-term, sustainable solutions to this issue. We note with concern that there are currently no international standards on safe concentrations of antimicrobials released into

the environment from, inter alia, pharmaceutical manufacturing, healthcare facility effluent, agriculture and aquaculture. We also acknowledge the work of the AMR Industry Alliance in this regard. We commit to accumulate knowledge on AMR in the environment. We will work with our ministerial colleagues with responsibility for health, food, farming and medicines regulators where independent of government, as appropriate to develop and agree such standards.

Transition to sustainable and legal use of natural resources

Resource efficiency

Recalling the findings of the Global Resources Outlook 2019 of the International Resource Panel, we recognise that the continued degradation and loss of natural resources threatens our ability to meet our shared commitments to sustainable development, conservation and restoration, food security and combatting climate change. We underline the importance of increasing the resource efficiency and reducing the global environmental footprint of products and moving to more globally sustainable methods and patterns of consumption and production. We reaffirm our commitment to progress actions to increase resource efficiency and transition to a more circular economy, in line with the Bologna Roadmap, to reduce the pressure and adverse impacts on our natural environment, reduce resource use, maximise the value of materials through a life-cycle approach, curb biodiversity loss, and support climate mitigation and adaptation action and in doing so are determined to reduce pollution from all sources. We ask the G7 Alliance for Resource Efficiency to continue technical work on all aspects of the Bologna Roadmap and invite the next G7 Presidency to take stock of its implementation.

Deforestation

We recognise that deforestation, forest degradation and ecosystem conversion are global threats to our climate, biodiversity, food security and livelihoods and are driven by the expansion of agriculture, mining, logging and infrastructure projects. Agricultural expansion is the driver of around 80 percent of global deforestation. A significant proportion of this expansion is linked to the production of agricultural commodities, including particularly those traded internationally. We will increase our support for sustainable supply chains that decouple agricultural production from deforestation and forest degradation, including production stemming from illegal land conversion, and other negative impacts on

nature, in accordance with our national legislation, and commit to conserve, sustainably manage, restore and protect forests and other ecosystems. We will do this while promoting development and trade, including through participating in the dialogue between consumer and producer countries under the Forest, Agriculture and Commodity Trade (FACT) dialogue hosted by the UK as UNFCCC COP26 President, and through work by the International Tropical Timber Organisation. We will work with partners, including the private sector and producer countries, NGOs, as well as Indigenous Peoples, and local communities, to incentivise consumption of commodities that are not associated with deforestation and forest degradation. We will therefore enhance supply chain transparency and traceability, and if appropriate, develop regulatory frameworks or policies, which may include the introduction of due diligence requirements, to bring about trade that is environmentally, socially, and economically sustainable, and resilient, in order to achieve a successful green recovery. We look forward to discussions by G7 Trade Ministers on facilitating sustainable supply chains.

We reaffirm our commitment to the New York Declaration on Forests to end natural forest loss and, building on the Bonn Challenge, restore 350 million hectares of forest by 2030. We commit to support measures to strengthen forest governance, transparency, and the rule of law, while also empowering Indigenous Peoples as partners in decision-making as well as local communities. We also support measures that promote sustainable finance and tackle the drivers of forest loss and degradation, including efforts to enhance sustainable production and increasing the incentives for preventing deforestation, protecting intact forests and restoring degraded forests and lands. We recognise the need for enhanced monitoring of deforestation globally, regionally and nationally.

Illicit threats to nature

We recognise that the illegal wildlife trade (IWT), trafficking in timber and timber products, hazardous and other wastes, and precious metals, gemstones and other minerals, illegal logging and illegal, unreported and unregulated (IUU) fishing have a devastating impact on our natural environment and livelihoods, with an estimated full global economic value of over US$1 trillion to US$2 trillion per year. These activities drive biodiversity loss, corruption, money laundering, insecurity and other forms of organised criminal activities as well as undermining our efforts to tackle climate change and its impacts. We commit to continue our efforts to strengthen international and transboundary cooperation to tackle these crimes and harmful activities.

We acknowledge that wildlife trafficking is a serious crime, often carried out by transnational organised criminal networks linked to other forms of organised crimes and commit to take urgent and collective action to address this criminal activity in a way that reflects and acknowledges the serious nature of this crime. We remain robustly committed to delivering on our commitments within the 2018 London Declaration and will work to strengthen the capacity of law enforcement authorities and judiciaries in investigating, prosecuting and adjudicating wildlife-related offences where needed. We note proposals to discuss options inter alia to strengthen the international criminal legal framework to effectively combat such offences including prevention, while maintaining our focus on making the best possible use of existing international mechanisms, strengthening legislation, international cooperation, capacity building, criminal justice responses, and law enforcement efforts to strengthen our response. We commit to increase our efforts to reduce the demand for IWT products by developing targeted and evidence-based interventions in order to inform consumer behaviour and close markets where these illegal products are trafficked and sold. We will review our administrative, preventative and criminal justice responses to wildlife and forest crime using the International Consortium on Combatting Wildlife Crime's (ICCWC) Wildlife and Forest Crime Analytic Toolkit. We welcome the discussions by Finance Ministers on strengthening beneficial ownership transparency to better tackle the illicit financial flows stemming from IWT and other illicit threats to nature and welcome the work of the Financial Action Task Force and its recommended actions in this area.

We recognise that IUU fishing remains one of the most serious threats to a healthy ocean, depleting fish stocks, distorting competition, destroying marine habitats and jeopardising international efforts to promote better ocean governance and effectively and sustainably manage fisheries. We recognise the importance of concerted international action to deter IUU fishing, including through support for developing countries. Urgent efforts are needed to prohibit harmful fisheries subsidies that contribute to overfishing, overcapacity and IUU fishing. We commit to concluding the ongoing WTO negotiations as swiftly as possible in order to ensure that a meaningful agreement is reached that delivers effective disciplines.

Building on the outcomes of the Canadian G7 Presidency, we commit to ending IUU fishing by ensuring strong measures are effectively implemented and enforced, such as the Catch Documentation Schemes (CDS) to increase traceability, including those used by RFMOs and other relevant bodies for certain

species; a commitment to develop and enforce more robust Port State measures including by effectively implementing the UN Food and Agriculture Organization (FAO) Port State Measures Agreement (PSMA) and other relevant initiatives, as well as increasing Monitoring, Control and Surveillance (MCS) activities to help tackle IUU fishing. We highlight the importance of bilateral agreements that include mechanisms that effectively address IUU fishing, in particular through effective regulation and enhanced monitoring of fisheries activities, transhipments, landings, and trade in fish and fish products. We also commit to the enhanced sharing of information, intelligence, and best practice and expertise in tackling IUU fishing, acknowledging that international cooperation is the most effective way to tackle this issue.

Recognising that illicit threats to nature deprive some of the world's poorest communities of sustainable forms of living income, we commit to mobilise public and private support for sustainable livelihoods as an alternative to these activities. We recognise the importance of Indigenous Peoples, and local communities, in protecting forests and natural habitats and supporting sustainable land use. We further recognise the importance of securing the legal recognition of the right of Indigenous Peoples to the lands, territories and resources which they owned, occupied, or otherwise used or acquired as acknowledged in national law and international instruments. We also recognise the importance of securing applicable resource and legitimate tenure rights of persons belonging to local (or other) communities, women, and persons in marginalised groups as acknowledged in national law and international instruments. We underline the importance of engagement with these groups to co-develop solutions to these issues, including land tenure rights.

Ocean Action

We recognise that the health of our seas and ocean is critical to the economic, social and environmental well-being of people and the planet, and has a vital role in supporting biodiversity, providing ecosystem services including regulating our climate. Yet the ocean and seas are under significant threat from human actions. Overfishing, IUU fishing, overexploitation of marine habitats and resources, the introduction of invasive alien species, pollution, including marine litter, other anthropogenic pressures on ocean habitats, microplastics, underwater noise are major drivers of marine biodiversity loss. At the same time, climate change is leading to sea level rise, extreme weather events, ocean warming and influences stratification, reduced oxygen levels and shifts in marine resources, which also impact marine biodiversity. Increased carbon dioxide absorption is also leading to

increased ocean acidification. We acknowledge with concern the recent high-level findings from the IPCC Report on Climate Change on the Ocean and Cryosphere. Building on the outcomes of the Canadian and other G7 Presidencies, including the Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities, we commit to support the UN Decade of Ocean Science for Sustainable Development (2021-2030) and work towards its goals, which include the global ocean being clean, healthy and resilient, productive, safe, predicted, accessible and inspiring and engaging. We recognise the value of robust and continuous scientific observation and cooperation to ensure a sustainable ocean for all and to support the science-based implementation of commitments under the 2030 Agenda, SDGs, the CBD, the Paris Agreement and within UNEA resolutions. We will continue our efforts to strengthen the conservation, protection and restoration of coral reefs, mangroves, seagrass beds, salt marshes, polar regions and other ecosystems and we recognise the value of blue carbon ecosystems, which can provide climate resilience benefits while also sequestering carbon. We recognise the importance of sustainable resilience for coastal communities and marine ecosystems and will strengthen our support for the Ocean Risk and Resilience Action Alliance (ORRAA).

We commit to upholding the UN Convention on the Law of the Sea (UNCLOS) which sets out the legal framework within which all activities in the ocean and seas must be carried out, including for the conservation and sustainable use of the ocean and seas. We will work to expeditiously conclude, if possible by the end of 2021, the negotiation of a new and ambitious international legally binding instrument under UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction which will include a clear obligation to conserve and sustainably use marine biodiversity and include a mechanism to establish Area-Based Management Tools (AMBTs), including Marine Protected Areas (MPAs) and will aid the implementation of intended new marine targets, recognising our commitment to support global 30by30 for the ocean.

As an example of the kind of action that needs to be taken to protect and conserve the ocean, we fully support the commitment by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) to develop a representative system of MPAs in the Convention Area. This should be based on the best available scientific evidence, the proposals to establish MPAs in East Antarctica, in the Weddell Sea and in the Antarctic Peninsula, and taking full consideration of the CCAMLR Convention.

Recognising that marine litter continues to pollute the ocean worldwide, has adverse impacts on marine life through ingestion and entanglement, as well as damaging habitats and people's livelihoods, and with possible impacts on food safety and human health, we are determined to accelerate action to tackle sources of marine litter, building on national, regional and global efforts, noting the example of the G7 Action Plan to Combat Marine Litter, the Osaka Blue Ocean Vision, and the G20 Implementation Framework for Actions on Marine Plastic Litter and the Ocean Plastics Charter as appropriate. We acknowledge that there are a number of key contributors to marine litter, including inadequate management of land-based sources, and abandoned, lost and otherwise discarded fishing gear, also known as Ghost Gear, which has a significant direct impact on marine life. Effective policies, practices and management measures to address these issues need to be taken nationally, regionally and internationally by all countries, in partnership with relevant stakeholders, including industry and NGOs. Concerning fishing gear loss and its retrieval, we commit to working through relevant international and regional frameworks to address Ghost Gear including by the FAO, IMO, RFMOs and the Regional Seas Conventions and will work with or support other initiatives such as the Global Ghost Gear Initiative (GGGI). We will collaborate through concrete actions such as gear marking and retrieval and will support and expand existing efforts to address ghost gear as appropriate, including through the implementation of the UN FAO voluntary guidelines on the marking of fishing gear. We note with interest the contribution to the debate of the OECD report Towards G7 Action to Combat Ghost Fishing Gear, and will carefully consider its recommendations.

Recognising the scale, urgency and transboundary nature of the global action needed to tackle marine plastic litter and microplastics, including by considering a life-cycle approach, we welcome the work of the ad hoc open-ended expert group (AHEG) established by UNEA resolution 3/7 and extended by UNEA resolution 4/6 towards UNEA 5.2, and will fully engage in discussions or negotiations on the options identified, with the aim of taking a step forward on that occasion on suggested options which include strengthening existing instruments, a potential new global instrument, and multi-stakeholder engagement. We look forward to the forthcoming OECD study on existing MDB resources that address marine litter, prepared in cooperation with the G7 Alliance for Resource Efficiency.

We welcome the discussions of the Expanded Future of the Seas and Oceans Working Group and endorse the G7 Ocean Decade Navigation Plan establishing

a framework for ambitious and collaborative action under the UN Ocean Decade. This framework will advance the ocean science needed to underpin ocean action, with direct reference to the UN Ocean Decade, its societal outcomes and other international agreements. We commit to work closely with international and regional partners and organisations, including the Intergovernmental Oceanographic Commission (IOC) of UNESCO, to support the UN Ocean Decade and its societal outcomes. We welcome the ongoing work of the G7 Future of the Seas and Oceans Initiative and will continue to support its programme of activities, including to share best practice, and advance scoping activities such as to develop a digital twin ocean, work towards net zero oceanographic capability, and evaluate global ocean indicator frameworks.

Food Loss and Waste

We recognise that one third of food produced for human consumption is lost or wasted globally, and that food grown but never eaten consumes an estimated 250 km3 of fresh water per year and requires an estimated 1.4 billion hectares land area. Furthermore, food loss and waste produces an estimated 8 percent of global GHGs. We note with concern the recent estimate within UNEP's Food Waste Index Report 2021 that 931 million tonnes of food waste was generated globally in 2019 at the level of retail, food service and households, which represents 17percent of food available for consumption. We acknowledge the importance of reducing food loss and waste in improving food security, particularly in the most vulnerable communities, mitigating climate change and land degradation and protecting biodiversity. We welcome the upcoming UN Food Systems Summit which will highlight the need to put sustainable food systems at the centre of efforts to meet the 2030 Agenda and its SDGs. We reaffirm our commitment to achieve SDG 12.3 and commit to utilise a "Target, Measure, Act" approach and establish national targets to reach that goal.

We further commit to measure food loss and waste in accordance with the transparent methodologies outlined in the Food Loss and Waste Accounting and Reporting Standard and consistent with the requirements of international reporting under SDG 12.3. We will establish national baselines and goals against which progress can be measured. We will implement actions to support food supply chains and households to reduce food loss and waste and promote the adoption of sustainable food consumption and production through circular economy and resource efficiency approaches. Our actions will include encouraging collaboration and cooperation between public, private and civil society actors, the adoption of innovative business models and technologies,

redistribution of surplus food, the promotion of youth and wider public education and behaviour change programmes across all sectors on food loss and waste prevention. Food no longer intended for human consumption should be prevented from becoming waste through use as animal feed or reprocessing into new products, whilst ensuring that all safety and related requirements are met. Recalling our commitments under the Bologna Roadmap, and recognising that approximately 60 percent of global food waste occurs in households, we welcome the discussions of the G7 Alliance for Resource Efficiency on key components that support action to reduce food waste at the household level, and the Presidency Summary of the discussion. We further welcome the G7 Alliance for Resource Efficiency document highlighting examples of best practice across the G7 to address this issue.

Conclusion

We express our appreciation to the Formal G7 Engagement Groups and other partners for their important contributions to the UK's G7 Presidency. We look forward to continuing our collaborative efforts on these and other issues under the German G7 Presidency in 2022.

21/05/2021

https://www.ofgem.gov.uk/publications-and-updates/one-four-consumers-plan-buy-electric-car-next-five-years-according-ofgem-research

One in four consumers plan to buy an electric car in next five years according to Ofgem research

Publication date 21st May 2021

Ahead of Ofgem's launch of its COP26 'green, fair future' campaign, new research has found that almost one in four (24%) consumers plan to buy an electric vehicle or plug-in hybrid in the next five years.

The Climate Change Committee anticipates around 18 million battery and plug-in hybrid electric vehicles will be on the road by the ban on the sale of new internal combustion vehicles being introduced in 2030.

Ofgem's research showed that:

- Those who own electric vehicles are more open to embracing changes in how they use their energy.
- Electric vehicle owners are three times more likely to say they are on a time of use tariff than non-owners.
- Over half (60%) would consider smart charging of their vehicle to avoid times when electricity is most expensive.

Although many consumers intend on changing their car to an electric one, over a third (38%) said they were unlikely to get an electric vehicle in the next five years. This is due to perceived barriers like the price being too high (59%), a short battery life and/or short range (38%) and worries about having nowhere to charge their electric vehicle close to home (36%).

Three in four (74%) consumers identified electricity generation and transport, such as fossil fuel power stations and exhaust emissions, as activities that play a big part in contributing to climate change. But the research shows that fewer consumers (60%) identified domestic heating, like gas boilers, as playing a big part in contributing to climate change, although one in seven (14%) intend to install low carbon heating such as heat pumps.

This research outlines some of the challenges that will be covered at Ofgem's conference on Monday 24 May marking the start of its 'green, fair future' campaign, which seeks to work with international regulators to share and develop best practice to bring forward decarbonised energy systems in the run up to November's COP26 climate change talks in Glasgow.

The virtual event will hear from representatives from global energy regulators about the common issues faced in enabling energy-related decarbonisation, including supporting the move to the electrification of transport.

Jonathan Brearley, Ofgem's chief executive, said:

"As more consumers make the switch to electric vehicles in the next five years, Ofgem will be announcing millions of pounds of investment to create a more flexible energy system to support the electrification of vehicles, renewable generation and low carbon forms of heat.

“Securing the investment is only half of the answer. Climate change can only be tackled if consumers are engaged in the process. For this to happen the transition to a low carbon economy needs to be fair, inclusive and affordable.

“Energy regulators have a key role to play in delivering this transition and we will be seeking to work with regulators across the world in the run up to the COP26 climate change talks to develop proposals that benefit consumers and the planet.”

Notes to editors

- Registration is open for Ofgem’s ‘Regulating for a green, fair future’ event on Monday 24 May 2021.
- Ofgem will be making a major investment announcement on Monday 24 May. This announcement is price sensitive and will be released at 7am.
- Ipsos MORI carried out the research on behalf of Ofgem interviewing 4,608 respondents between June and September 2020. Interviews were carried out with consumers across England, Scotland and Wales.
- The Climate Change Committee estimates that there will be 17.8 million electric vehicles on the road by 2030, of which 14.5 million will be battery electric vehicles.
- A time-of-use tariff charges consumers a lower rate when demand is low, encouraging them to use energy at off-peak times.

THE INVESTMENT FUNDS INSTITUTE OF CANADA | L'INSTITUT DES FONDS D'INVESTISSEMENT DU CANADA

IFIC Monthly Investment Fund Statistics – April 2021

Mutual Fund and Exchange-Traded Fund Assets and Sales

May 21, 2021 (Toronto) – The Investment Funds Institute of Canada (IFIC) today announced investment fund net sales and net assets for April 2021.

Mutual fund assets totalled $1.88 trillion at the end of April 2021. Assets increased by $37.3 billion or 2.0% compared to March 2021. Mutual funds recorded net sales of $9.0 billion in April 2021.

ETF assets totalled $288.0 billion at the end of April 2021. Assets increased by $10.0 billion or 3.6% compared to March 2021. ETFs recorded net sales of $5.5 billion in April 2021.

Mutual Fund Net Sales/Net Redemptions ($ Millions)*

Asset Class	Apr. 2021	Mar. 2021	Apr. 2020	YTD 2021	YTD 2020
Long-term Funds					
Balanced	4,567	8,987	(1,448)	27,279	(6,463)
Equity	3,612	4,544	1,328	18,863	1,376
Bond	1,396	151	833	7,125	(190)
Specialty	439	392	565	2,188	1,989
Total Long-term Funds	10,014	14,074	1,278	55,456	(3,288)
Total Money Market Funds	(965)	(1,093)	(27)	(4,499)	4,578
Total	9,049	12,981	1,252	50,957	1,290

Mutual Fund Net Assets ($ Billions)*

Asset Class	Apr. 2021	Mar. 2021	Apr. 2020	Dec. 2020
Long-term Funds				
Balanced	924.9	908.4	773.4	874.4
Equity	658.5	639.6	483.7	593.4
Bond	252.9	250.8	217.1	246.4
Specialty	17.6	16.7	27.3	35.0
Total Long-term Funds	1,853.9	1,815.5	1,501.5	1,749.3
Total Money Market Funds	29.2	30.3	36.8	34.4
Total	1,883.1	1,845.8	1,538.3	1,783.7

* Please see below for important information regarding this data.

ETF Net Sales/Net Redemptions ($ Millions)*

Asset Class	Apr. 2021	Mar. 2021	Apr. 2020	YTD 2021	YTD 2020
Long-term Funds					
Balanced	339	413	59	1,724	757
Equity	2,812	3,103	508	11,564	10,895
Bond	1,617	949	(629)	5,048	2,474
Specialty	1,430	815	509	3,179	567
Total Long-term Funds	6,198	5,281	446	21,515	14,693
Total Money Market Funds	(665)	(579)	257	(1,500)	1,188
Total	5,533	4,702	703	20,015	15,881

ETF Net Assets ($ Billions)*

Asset Class	Apr. 2021	Mar. 2021	Apr. 2020	Dec. 2020
Long-term Funds				
Balanced	9.3	8.8	5.2	7.2
Equity	182.3	175.4	121.6	158.4
Bond	82.0	80.4	68.0	79.3
Specialty	8.6	6.9	3.8	5.2
Total Long-term Funds	282.2	271.5	198.6	250.0
Total Money Market Funds	5.8	6.4	5.7	7.3
Total	288.0	278.0	204.2	257.3

* Please see below for important information regarding this data.

IFIC direct survey data (which accounts for approximately 91% of total mutual fund industry assets) is complemented by data from Investor Economics to provide comprehensive industry totals.

IFIC makes every effort to verify the accuracy, currency and completeness of the information; however, IFIC does not guarantee, warrant, represent or undertake that the information provided is correct, accurate or current.

*** Important Information Regarding Investment Fund Data:**

1. Mutual fund data is adjusted to remove double counting arising from mutual funds that invest in other mutual funds.
2. ETF data is not adjusted to remove double counting arising from ETFs that invest in other ETFs.
3. The Balanced Funds category includes funds that invest directly in a mix of stocks and bonds or obtain exposure through investing in other funds.
4. Mutual fund data reflects the investment activity of Canadian retail investors.
5. ETF data reflects the investment activity of Canadian retail and institutional investors.

About IFIC

The Investment Funds Institute of Canada is the voice of Canada's investment funds industry. IFIC brings together 150 organizations, including fund managers, distributors and industry service organizations, to foster a strong, stable investment sector where investors can realize their financial goals. By connecting Canada's savers to Canada's economy, our industry contributes significantly to Canadian economic growth and job creation. To learn more about IFIC, please visit www.ific.ca.

For more information please contact:

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Senior Manager, Communications and Public Affairs
pkumarasamy@ific.ca
416-309-2317

Dan Tsubouchi @Energy_Tidbits · 42m

much more on this #G7 new commitments tweet in SAF Group May 23 Energy Tidbits memo that should be posted in next hour safgroup.ca/insights/trend... #OOTT #EnergyTransition #NatGas

> **Dan Tsubouchi** @Energy_Tidbits · 44m
>
> More important to #Oil #NatGas co's in 2021 than @IEA #NetZero pathway? #G7 policymakers make new commitments on #EnergyTransition ie. regs/laws that are coming. Also warning needed acceleration to NetZero will lead to stranded #FossilFuels assets. #OOTT g7uk.org/g7-climate-and...

2

Dan Tsubouchi @Energy_Tidbits · 44m

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G7 Climate and Environment: Ministers' Communiqué - G7 UK Preside...
Prime Minister Boris Johnson will use the UK's G7 Presidency to unite leading democracies to help the world fight, and then build back bette...
g7uk.org

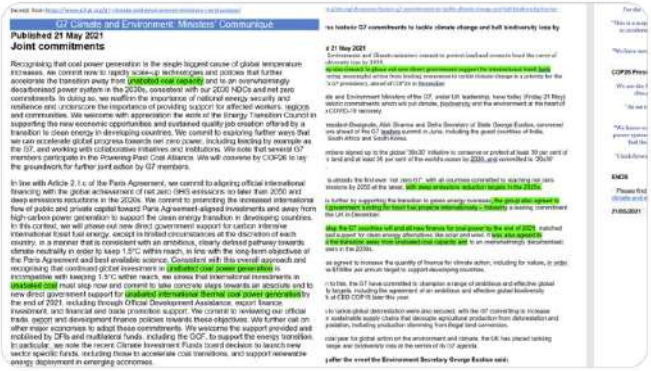
1 2 1

Dan Tsubouchi @Energy_Tidbits · May 22

#G7 want #Coal power to stop, release says will end all new finance for #Coal power by the end of 2021. but not what 30-pg communique says, only refers to "unabated coal". Potential abatements ie. CCS? other? #EnergyTransition

g7uk.org/uk-secures-his...

gov.uk/government/pub...



G7 Climate and Environment: Ministers' Communique

Published 21 May 2021

Joint commitments

1 2 3

Dan Tsubouchi @Energy_Tidbits · May 22

A small amount of #PowerOutage in @Entergy TX/LA service area (serves the main part of #Oil #NatGas #LNG infra in GoM) from tropical disturbance in GoM. Separately, 1st named storm Ana in Atlantic moving away from Bemuda. #OOTT

https://www.etrviewoutage.com/map?state=TX&_ga=2.172704609.338996256.1621678926-176031067.1621678926

2

Dan Tsubouchi @Energy_Tidbits · May 22

Prelude to #JCPOA? #Blinken to visit Israel. Reminds of #Biden approach to Senate, meet/explain to try to get bipartisan support, but go ahead w/o any Republican votes. Looks like May is make it, not a break it month for JCPOA. #OOTT

Blinken to visit Israel, West Bank on May 26-27, sou...

U.S. Secretary of State Antony Blinken will visit Israel and the Palestinian Authority in the occupied West ...

reuters.com

2

Dan Tsubouchi @Energy_Tidbits · May 21

on the trans canada highway 10 min from #Canmore and this is not the normal view of the cdn rockies for may 21. be a little cold for those who are doing their long weekend camping.

2 1 12

Dan Tsubouchi @Energy_Tidbits · May 21

Still need to be wary of flood risk and interruptions even if the GoM disturbance only becomes short-lived tropical depression/storm. Good reminder its hurricane season time. #NatGas #OOTT #LNG

> **National Hurricane Center** @NHC_Atlantic · May 21
>
> 8am EDT 21 May: We continue to monitor two areas for possible development.
>
> 1) A low NE of Bermuda is likely to become a subtropical cyclone later today.
> 2) A Gulf of Mexico system could become a short-lived tropical depression/storm before moving inland over the NW Gulf coast.
>
> 
>

1

Dan Tsubouchi @Energy_Tidbits · May 21

Support for fuel #Oil demand. Gene Seroka @PortofLA Import ratio norm is 2.5:1. "As a more recent phenomena were the liner shipping companies are evacuating empty containers as a priority vs to get ready for the next round of imports back to the US" Thx @BeckyQuick #OOTT

Source: CNBC Squawk Box

Dan Tsubouchi @Energy_Tidbits · May 21

Or 3 in 4 won't buy an #EV in next 5 yrs despite knowing only 8.5 yrs left until 2030 UK ICE sales ban. Need to get price down & eliminate driver linked concerns on battery life/ability to charge. #PeakOil demand and #EnergyTransition will just take longer to get here. #OOTT

> **ofgem** @ofgem · May 21
>
> One in four consumers plan to buy an electric car in next five years according to Ofgem research: ow.ly/Wu5p50ES04k
>
> #GreenFairFuture | #TogetherForOurPlanet | #electricvehicle | #ev

Dan Tsubouchi @Energy_Tidbits · May 20

Why Venezuela #Oil production should be up in May. Two good @ArgusMedia reports are linked: allocating limited diluent to blend to crank up production & scrambling to load on tankers to China ahead of new tax. #OOTT

argusmedia.com/en/news/221665...

> Venezuela scrambling to load oil ahead of China tax
> Venezuela's state-owned PdV is scrambling to load crude cargoes before China imposes a new import ...
> argusmedia.com

1 2

Dan Tsubouchi @Energy_Tidbits · May 20

it's a major so of course @coreconn is showing up. just took the lead at 15 to go 4 under at @PGAChampionship

1 3

Dan Tsubouchi @Energy_Tidbits · May 20

Why Venezuela #Oil production should be up in May. Two good @ArgusMedia reports are linked: allocating limited diluent to blend to crank up production & scrambling to load on tankers to China ahead of new tax. #OOTT

argusmedia.com/en/news/221665...

> Venezuela scrambling to load oil ahead of China tax
> Venezuela's state-owned PdV is scrambling to load crude cargoes before China imposes a new import ...
> argusmedia.com

1 2

Dan Tsubouchi @Energy_Tidbits · May 20

#TiffMacklem on #ClimateChange risk "in sum, earlier action can lead to a more orderly and less costly transition to a low-carbon economy." Is this admission #JustinTrudeau #EnergyTransition = higher energy costs, just question how much higher? #OOTT #NatGas

Bank of Canada: Financial System Review—2021

Climate change considerations

Addressing climate change sooner will result in lower risk overall. The current global momentum to address climate change can have different impacts depending on the time horizon. Over the short term, a clearer definition of the ultimate goal and credible commitments to achieve it could mean that some transition risks materialize earlier than expected under the status quo. In particular, prices for certain assets tied to carbon-intensive industries could decline sooner than anticipated. Over a longer period, however, taking earlier action on climate change creates a smoother and more certain transition path, thereby reducing transition risks overall.

Acting now has a number of advantages for the economy and the financial system over the medium to long term:50

- It contributes to reducing both physical damages and risks.
- It avoids the need for more abrupt climate action to meet target deadlines later on, which would imply large transition risks in the future.
- It allows more time for new technologies to enter the market in response to price signals.

In sum, earlier action can lead to a more orderly and less costly transition to a low-carbon economy.

Find out what the Bank is doing to help improve the understanding, measurement and transparency of climate-related risks.

2 2

Dan Tsubouchi @Energy_Tidbits · May 20

reminds govts are putting the world on the path to #EnergyTransition but a $2/gallon credit reminds it will make energy more expensive. also do inflation expectations build in the flow thru of higher energy costs to pretty well everything? #OOTT

U.S. lawmakers to propose tax credit for sustainable aviation fuel

U.S. lawmakers plan to introduce a bill on Thursday that would create a tax credit for lower-carbon sustainable aviation fuel, which they hope ...

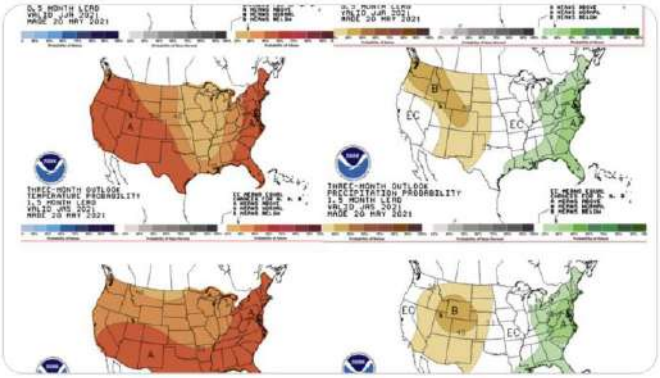
reuters.com

1 1

Dan Tsubouchi @Energy_Tidbits · May 20

Positive support for #NatGas price. @NOAA seasonal forecast is warmer than normal temps, but not like summer 2020 near record. Hope NOAA is wrong on precipitation forecast, #Drought conditions in west need rain to reduce #Wildfire risk. #OOTT #Electricity

cpc.ncep.noaa.gov/products/predi...

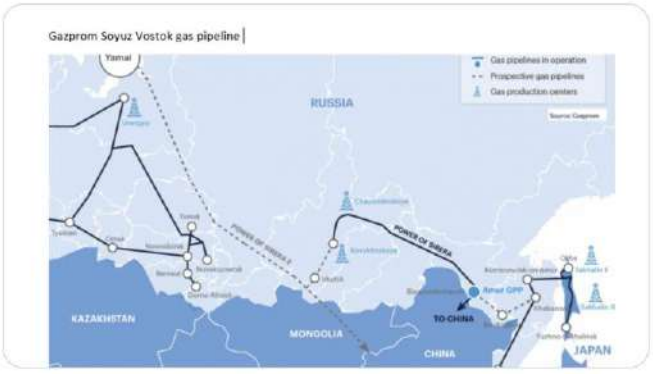


3 4

Dan Tsubouchi @Energy_Tidbits · May 20

#Gazprom Q&A just finished. Wanting to capture more China #NatGas share. re extension of Power of Siberia 2, Soyuz Vostok #NatGas trunkline thru Mongolia to China. flew over Mongolia, preliminarily considered a route, now starting detailed feasibility

gazpromvideo.ru/en/press/2021/...



Dan Tsubouchi @Energy_Tidbits · May 20

... #Gazprom Q&A still ongoing. Burmistrova late start to Europe gas injection means #NatGas injection could continue past Oct. Separate reply, as soon as #NordStream2 comes on stream, can meet additional demand ....

...

1

Dan Tsubouchi @Energy_Tidbits · May 20

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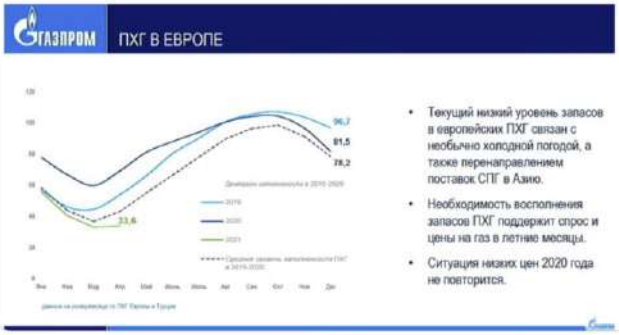
gazpromvideo.ru/en/press/2021/...

> **Dan Tsubouchi** @Energy_Tidbits · May 20
>
> #Gazprom Q&A still ongoing for Foreign Markets outlook. Burmistrova reminded why low Europe #NatGas storage, was cold in Apr, normally start storage injections in Apr, but even saw offtakes even late Apr. Thx Gazprom for simultaneous translation
> gazpromvideo.ru/en/press/2021/...
>
> Gazprom Foreign Markets presentation May 20 – Europe gas storage
>
> 
>

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Dan Tsubouchi @Energy_Tidbits · May 20

#JCPOA Iran President #Rouhani says "The current discussions [in Vienna] are on minor issue; major sanctions, including oil, petrochemical products, shipping, insurance and banks, have been agreed upon to be removed". #OOTT

President orders launching $1.3b national projects

Tehran, May 20, IRNA – In a video conference on Thursday, President Hassan Rouhani ordered launching of Oil Ministry's petrochemical ...

en.irna.ir

1 4 6

Dan Tsubouchi @Energy_Tidbits · May 19

India petroleum products consumption down 0.30 mmb/d MoM to 4.15 mmb/d in Apr. May should be lower as it would reflect a greater period of #Covid lockdowns. Lots more in the monthly @PetroleumMin PPAC's Snapshot of India's Oil & Gas Data report. #OOTT

ppac.gov.in/WriteReadData/...

India "PPAC's Snapshot of India's Oil & Gas data" for April 2021					
	Apr 2021	Mar 2021	MoM	Apr 2020	YoY
Consumption:					
Petroleum Products (mmb/d)	4.15	4.45	-0.30	2.30	1.85
Natural Gas (bcf/d)	6.17	6.36	-0.19	4.59	1.58
Production:					
Crude Oil (mmb/d)	0.611	0.615	-0.004	0.610	0.001
Natural Gas (bcf/d)	3.12	3.06	0.060	2.54	0.580
Imports:					
Crude Oil (mmb/d)	4.47	4.33	0.140	4.06	0.410
Petroleum Products (mmb/d)	0.86	0.83	0.030	0.68	0.180
LNG (bcf/d)	3.13	3.39	-0.260	2.15	0.980
Source: India Ministry of Petroleum & Natural Gas					
Prepared by SAF Group http://www.safgroup.ca/insights/trends-in-the-market/					

2 5

Dan Tsubouchi @Energy_Tidbits · May 19

Continues to look like make or break May for #JCPOA will be a make it month. but have to believe there will be some very careful drafting that will come under fire for any deal. #OOTT

> **Enrique Mora** @enriquemora_ · May 19
>
> Just chaired a #JCPOA Joint Commission to wrap-up 4th round Vienna talks.We've made good progress. An agreement is shaping up. Now a common understanding on what still needed for US return to #JCPOA, lifting of related sanctions and the resumption of nuclear commitments by Iran

1

Dan Tsubouchi @Energy_Tidbits · May 19

Green debt deals accelerating in 2021. Fossil fuels debt off to slow start, but will $60 #Oil since Feb bring back at least non-European banks? YoY debt normally = YoY changes in oil price. Thx @Bloomberg @TimQuinson mbenhamou4@bloomberg.net #OOTT bloomberg.com/graphics/2021-...

1 1

Dan Tsubouchi @Energy_Tidbits · May 19

apologies to @gulf_intel for typo should have been New Silk Road Live. it's a must listen each morning #OOTT

> **Dan Tsubouchi** @Energy_Tidbits · May 19
>
> Indicator #JCPOA deal is near. Iran changed export grade of crude #Oil to pre-sanctions cocktail. As usual @gulf_intel New Sild Road Live is a must listen to with guests with good insights, thx @SVakhshouri #OOTT
>
> soundcloud.com/user-846530307...
>
> ast-daily-energy-markets-forum-new-silk-road-live-may-19th
> Silk Road "Live" May 19th
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> w.safgroup.ca/insights/trends-in-the-market/
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> mentary to share their insights on current market dynamics.
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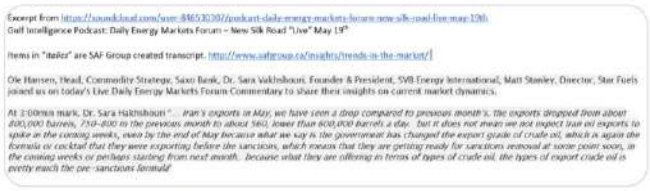
Dan Tsubouchi @Energy_Tidbits · May 19

Indicator #JCPOA deal is near. Iran changed export grade of crude #Oil to pre-sanctions cocktail. As usual @gulf_intel New Sild Road Live is a must listen to with guests with good insights, thx @SVakhshouri #OOTT

soundcloud.com/user-846530307...


Excerpt from https://soundcloud.com/user-846530307/podcast-daily-energy-markets-forum-new-silk-road-live-may-19th
Gulf Intelligence Podcast: Daily Energy Markets Forum – New Silk Road "Live" May 19th

Items in "italics" are SAF Group created transcript. http://www.safgroup.ca/insights/trends-in-the-market/

Ole Hansen, Head, Commodity Strategy, Saxo Bank, Dr. Sara Vakhshouri, Founder & President, SVB Energy International, Matt Stanley, Director, Star Fuels joined us on today's Live Daily Energy Markets Forum Commentary to share their insights on current market dynamics.

At 3:00min mark, Dr. Sara Hakhshouri "... *Iran's exports in May, we have seen a drop compared to previous month's, the exports dropped from about 800,000 barrels, 750-800 to the previous month to about 560, lower than 600,000 barrels a day. but it does not mean we not expect Iran oil exports to spike in the coming weeks, even by the end of May because what we say is the government has changed the export grade of crude oil, which is again the formula or cocktail that they were exporting before the sanctions, which means that they are getting ready for sanctions removal at some point soon, in the coming weeks or perhaps starting from next month. because what they are offering in terms of types of crude oil, the types of export crude oil is pretty much the pre-sanctions formula*"

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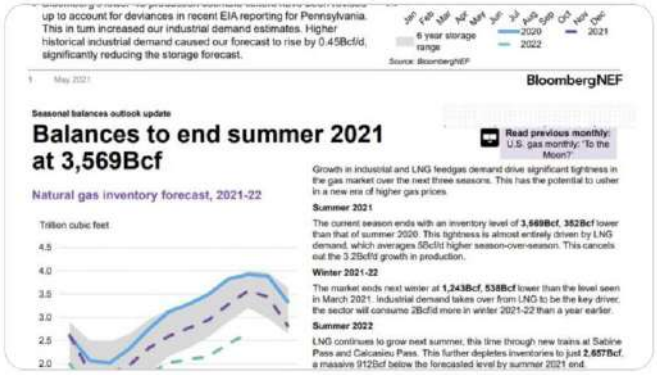
Dan Tsubouchi @Energy_Tidbits · May 18

Bullish #HenryHub price outlook for winter 21/22. @BloombergNEF forecast storage to start winter 3.569 tcf, down 0.352 tcf YoY. Thx @BloombergNEF Nakul Nair, Jade Patterson for US Gas Monthly report. #NatGas



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Dan Tsubouchi @Energy_Tidbits · May 18

#JCPOA. note the @Amb_Ulyanov is pulling back on the @BBC report ie. no important announcement tomorrow. #OOTT

> **Mikhail Ulyanov** @Amb_Ulyanov · May 18
>
> I didn't say there was a breakthrough at the Vienna talks on #JCPOA. I said that significant progress have been achieved, in my view. That is true. But unresolved issues still remain and the negotiators need more time and efforts to finalise an agreement on restoration of JCPOA. twitter.com/azodiac83/stat...

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Dan Tsubouchi @Energy_Tidbits · May 18

Should bring more #Gazprom #NatGas to Europe than expected by start of winter 21/22. Also reminds #Biden wants critical EU allies issues (ie #JCPOA) resolved before his Europe June trip instead of suspense at a NATO or Putin summit. thx @jonathanvswan

Biden to waive sanctions on Putin crony in charge of Nord Stream 2 pi...
Biden isn't willing to compromise the relationship with Germany over this pipeline.
axios.com

Dan Tsubouchi @Energy_Tidbits · May 18

waiting on #ColonialPipeline comments in @Reuters report. let's hope it's fixed quickly and not more than scheduling so can at least go back to the future and can go manual Colonial Pipeline shipment scheduling hit by network issues | Reuters

Colonial Pipeline nomination system shut Tuesday - market sources
Colonial Pipeline's [RIC:RIC:COLPI.UL] nomination system was shut on Tuesday, leaving shippers unable to plan fuel shipments, according to ...
reuters.com

Dan Tsubouchi @Energy_Tidbits · May 18

great reminder. even still it is a big positive as both sides know there is no time left to walk away. with iran elections in one month, may is the make or break month for #JCPOA and still pointing to a make it month #OOTT

> **Javier Blas** @JavierBlas · May 18
> OIL MARKET: Remember that the temporary IAEA monitoring deal expires May 21. So when Russian envoy talks about an announcement tomorrow (May 19), an extension of the IAEA understanding is likely what's on the table. So more time to talk | #OOTT

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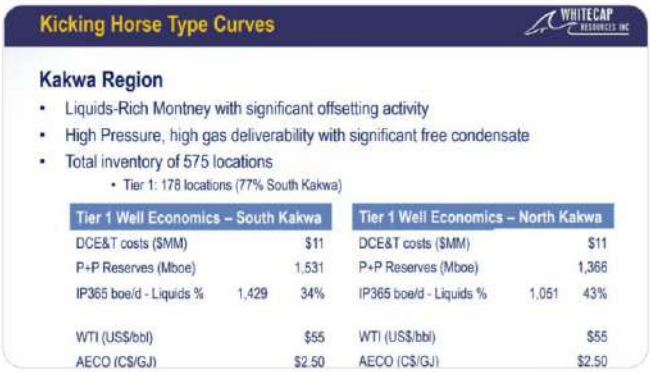
Dan Tsubouchi @Energy_Tidbits · May 17

"with the exceptional #Montney wells results" key for $WCP dividend increase. Overlooked Cdn Montney #NatGas with associated liquids likely best economics of any US/Can play with big free cash flow generation w/ payout ≤1 yr, and big NPV. #OOTT



Kicking Horse Type Curves

WHITECAP RESOURCES INC

Kakwa Region

- Liquids-Rich Montney with significant offsetting activity
- High Pressure, high gas deliverability with significant free condensate
- Total inventory of 575 locations
  - Tier 1: 178 locations (77% South Kakwa)

Tier 1 Well Economics – South Kakwa			Tier 1 Well Economics – North Kakwa		
DCE&T costs ($MM)		$11	DCE&T costs ($MM)		$11
P+P Reserves (Mboe)		1,531	P+P Reserves (Mboe)		1,366
IP365 boe/d - Liquids %	1,429	34%	IP365 boe/d - Liquids %	1,051	43%
WTI (US$/bbl)		$55	WTI (US$/bbl)		$55
AECO (C$/GJ)		$2.50	AECO (C$/GJ)		$2.50

> **Dan Tsubouchi** @Energy_Tidbits · Apr 7
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> 
>
> Overlooked. Cdn #Montney #NatGas wells with associated liquids, if condensate, are likely the best economics of any US/CAN play. No wonder $WCP latest acquisition generates big free cash flow, wells have ~1 yr payout. Payout is the key factor for a free ...

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Dan Tsubouchi @Energy_Tidbits · May 17

#JetFuel. $UA reopening, albeit modestly, more long haul international air. but indicating plan to add more long haul asap as americans want to bust out and travel this summer. more long haul is key to step change consumption . #OOTT

United Airlines Takes Big Step Toward Returning July Flying to Pre-Pan...

/PRNewswire/ -- United Airlines is announcing today more options for customers to take long-awaited summer vacations by adding more tha...

prnewswire.com

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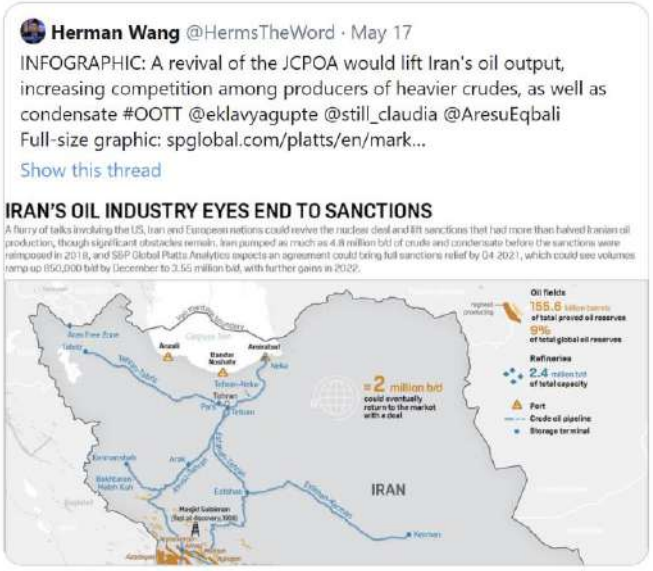
Dan Tsubouchi @Energy_Tidbits · May 17

Great map. Great chart comparing additional Iran crude qualities about to hit the market vs the other global crudes ie. Iran Pars vs WCS, Maya. In the old days, we would print and put on the wall beside the desk. thx @HermsTheWord #OOTT #Oil

> **Herman Wang** @HermsTheWord · May 17
>
> INFOGRAPHIC: A revival of the JCPOA would lift Iran's oil output, increasing competition among producers of heavier crudes, as well as condensate #OOTT @eklavyagupte @still_claudia @AresuEqbali
>
> Full-size graphic: spglobal.com/platts/en/mark...
>
> Show this thread



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Dan Tsubouchi @Energy_Tidbits · May 16

start of rafting season in the #Calgary Elbow River. 23c and sunny. only a raft every couple minutes but will be very busy if the long weekend is nice

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Dan Tsubouchi @Energy_Tidbits · May 16

Our weekly SAF May 16, 2021 Energy Tidbits memo was just posted to our SAF Group website. This 42-pg energy research piece expands upon and covers many more items than tweeted this week. See the research section of the SAF website. #Oil #OOTT #OPEC #LNG safgroup.ca/insights/trend...

SAF GROUP

Energy Tidbits

May 16, 2021

Produced by: Dan Tsubouchi

Will We See "The Signal" This Week That A Return to JCPOA Is Going To Happen?

Welcome to new Energy Tidbits memo readers. We are continuing to add new readers to our Energy Tidbits memo, energy blogs and tweets. The focus and concept for the memo was set in 1999 with input from PMs, who were looking for research (both positive and negative items) that helped them shape their investment thesis to the energy space, and not just focusing on daily trading. Our priority was and still is to not just report on events, but also try to interpret and point out implications therefrom. The best example is our review of investor days, conferences and earnings calls focusing on sector developments that are relevant to the sector and not just a specific company results. Our target is to write on 48 to 50 weekends per year and to post by noon mountain time on Sunday.

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