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Energy Tidbits

Did COP27 Sneak in Admission of a 2-Step? Step 1 Transform to Low-Carbon Economy, Step 2 Work to Reach Net Zero in 2050?

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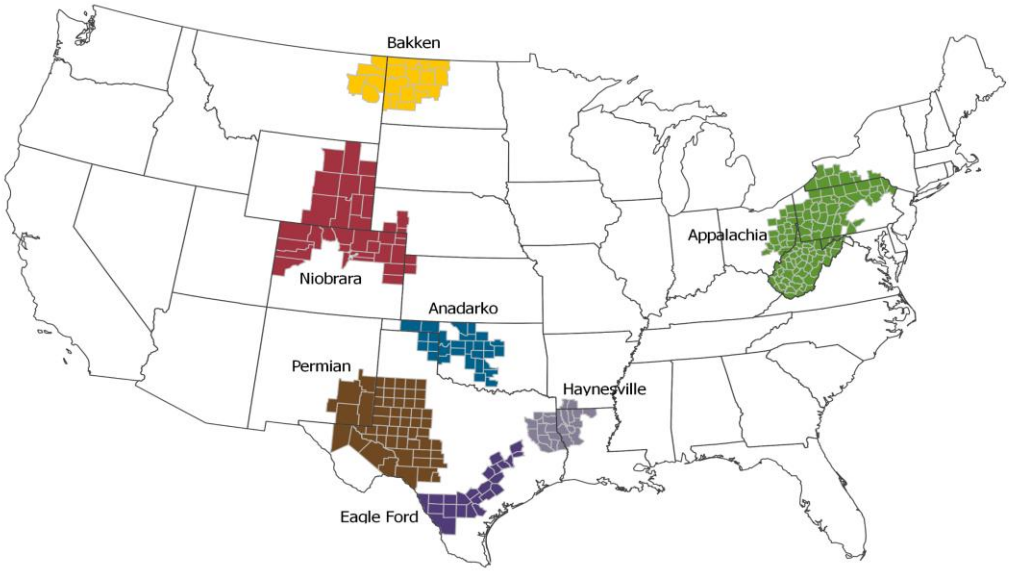
Independent Statistics & Analysis
U.S. Energy Information Administration
November 2022

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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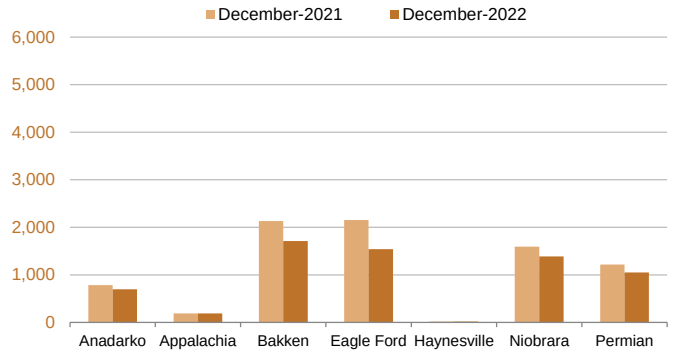
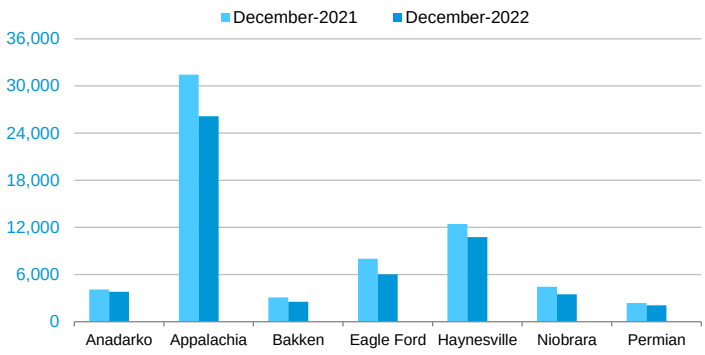
projected production through December

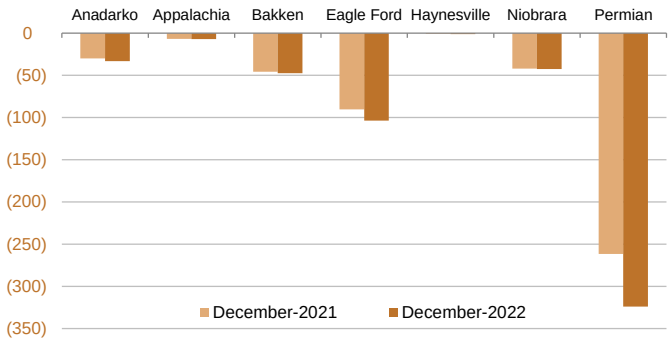
New-well oil production per rig
barrels/day



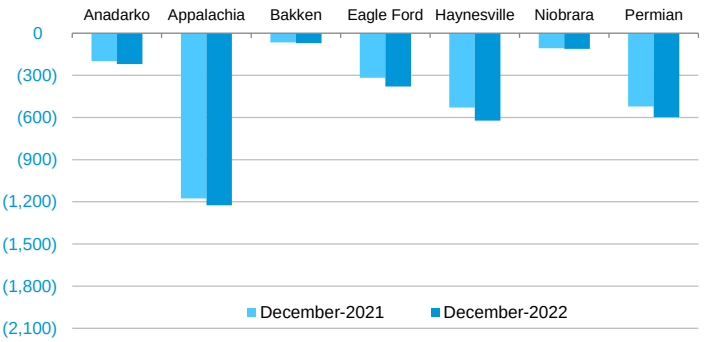
New-well gas production per rig
thousand cubic feet/day



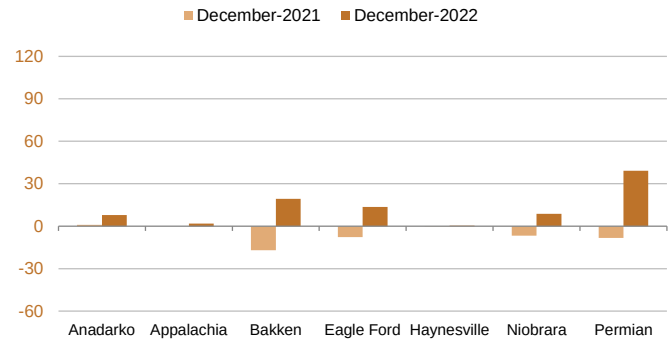
Legacy oil production change
thousand barrels/day



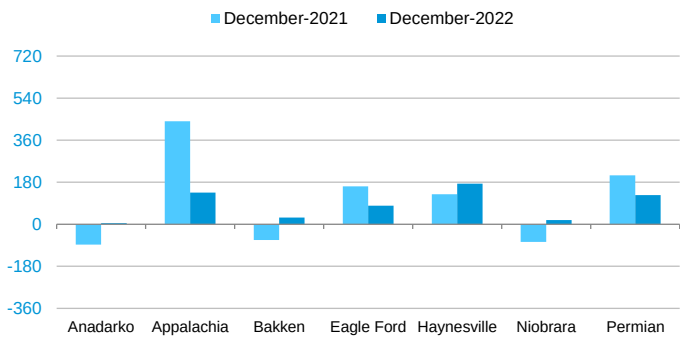
Legacy gas production change
million cubic feet/day



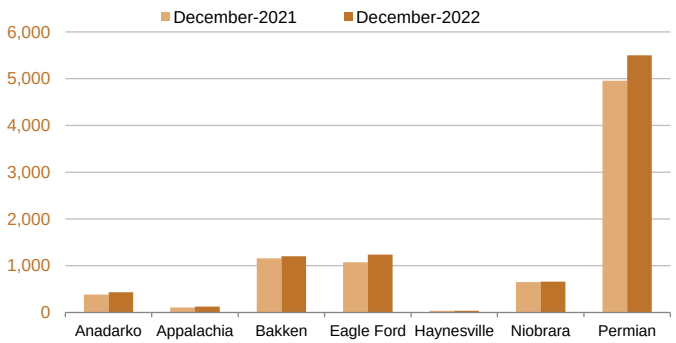
Indicated monthly change in oil production (Dec vs. Nov)
thousand barrels/day



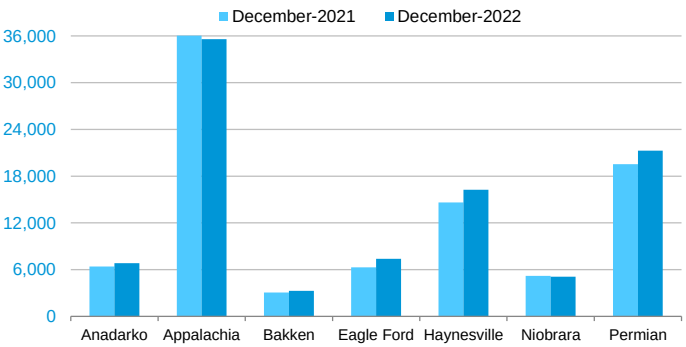
Indicated monthly change in gas production (Dec vs. Nov)
million cubic feet/day



Oil production
thousand barrels/day



Natural gas production
million cubic feet/day



Anadarko Region

Drilling Productivity Report

November 2022

drilling data through October
projected production through December

Oil +1
barrels/day
month over month

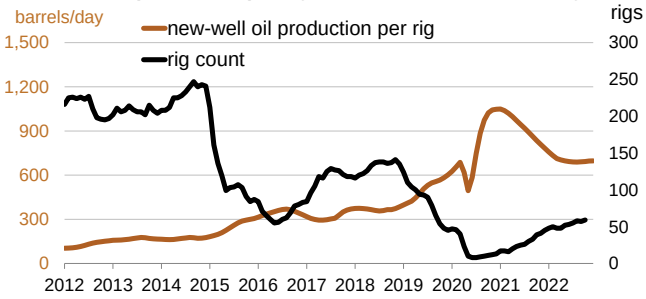
697 *December*
696 *November*
barrels/day

Monthly additions from one average rig

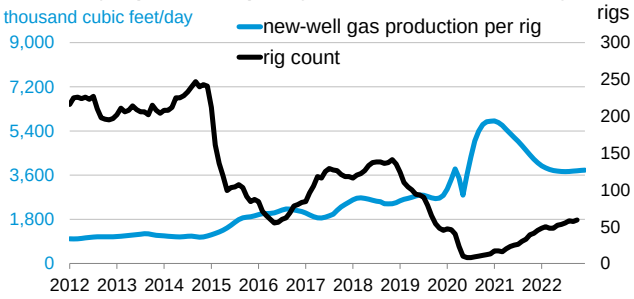
December **3,803**
November **3,796**
thousand cubic feet/day

Gas +7
thousand cubic feet/day
month over month

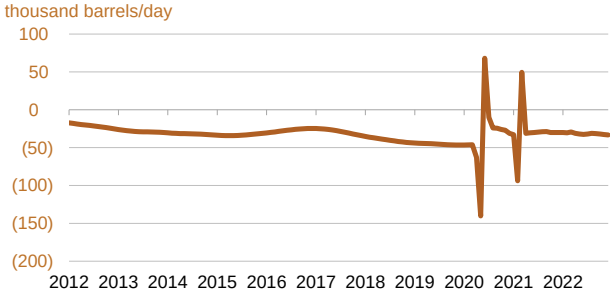
Anadarko Region
New-well oil production per rig



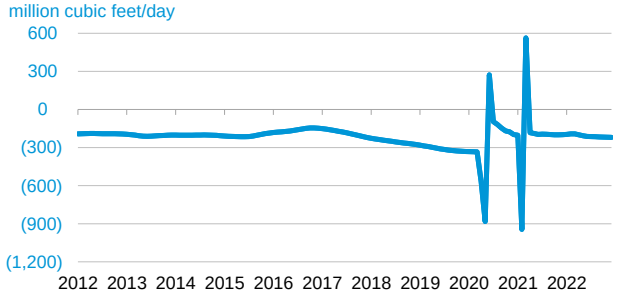
Anadarko Region
New-well gas production per rig



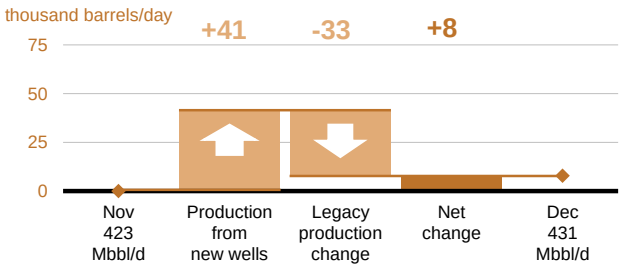
Anadarko Region
Legacy oil production change



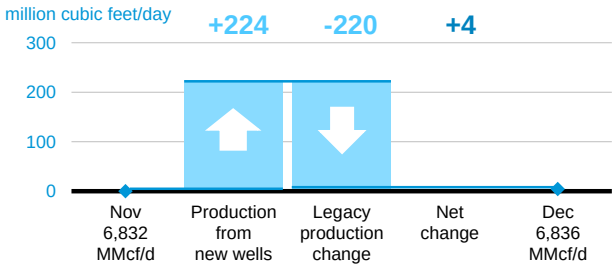
Anadarko Region
Legacy gas production change



Anadarko Region
Indicated change in oil production (Dec vs. Nov)

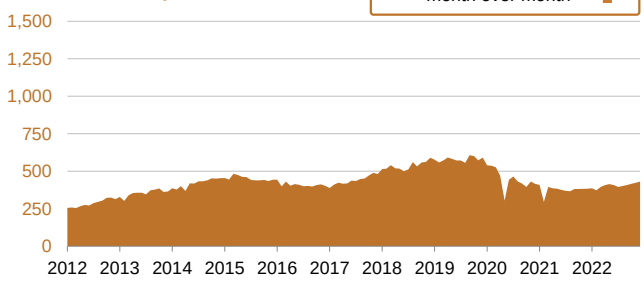


Anadarko Region
Indicated change in natural gas production (Dec vs. Nov)



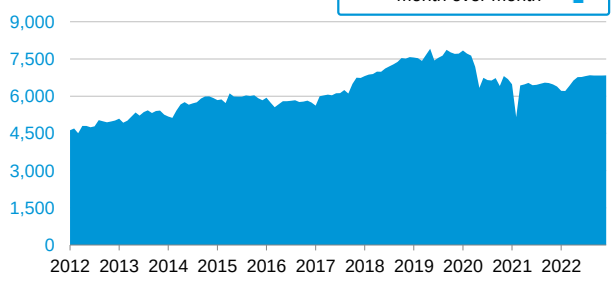
Anadarko Region
Oil production

Oil +8
thousand barrels/day
month over month



Anadarko Region
Natural gas production

Gas +4
million cubic feet/day
month over month



Appalachia Region
Drilling Productivity Report

November 2022

drilling data through October
projected production through December

Oil 0 barrels/day month over month

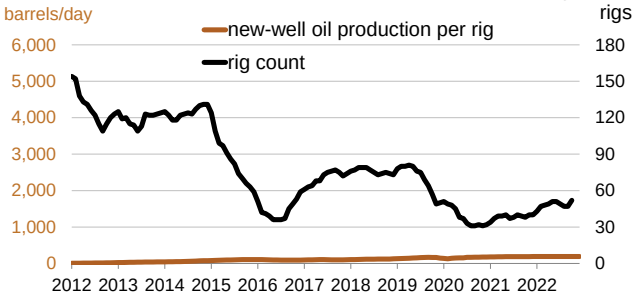
191 *December*
191 *November*
barrels/day

Monthly additions from one average rig

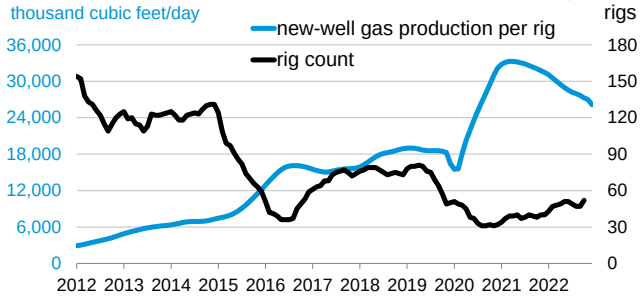
December **26,149**
November **26,985**
thousand cubic feet/day

Gas -836 thousand cubic feet/day month over month

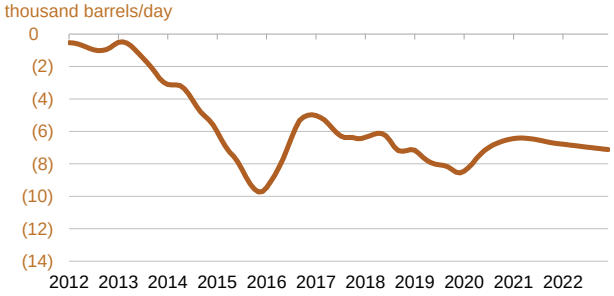
Appalachia Region
New-well oil production per rig



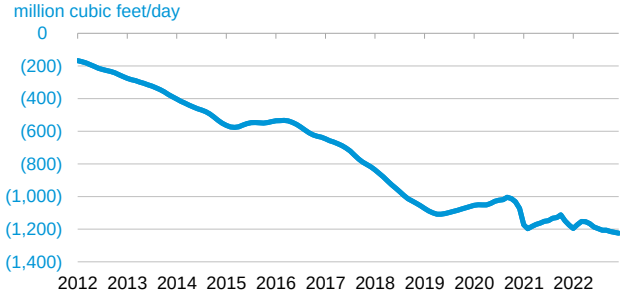
Appalachia Region
New-well gas production per rig



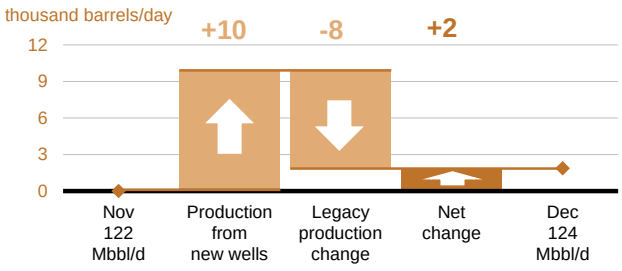
Appalachia Region
Legacy oil production change



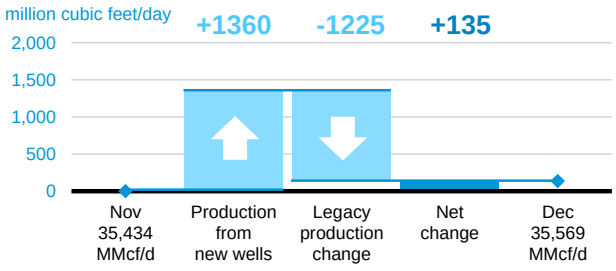
Appalachia Region
Legacy gas production change



Appalachia Region
Indicated change in oil production (Dec vs. Nov)

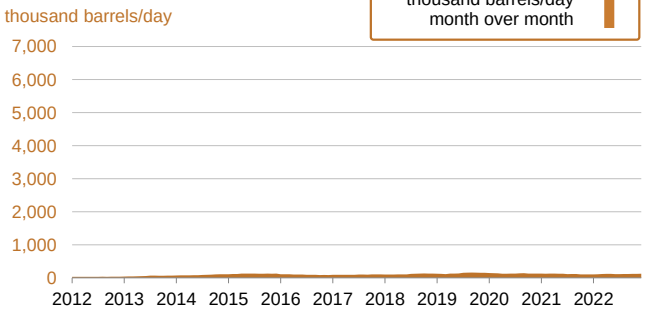


Appalachia Region
Indicated change in natural gas production (Dec vs. Nov)



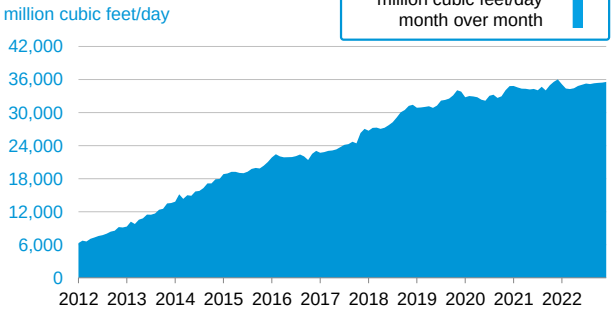
Appalachia Region
Oil production

Oil +2 thousand barrels/day month over month



Appalachia Region
Natural gas production

Gas +135 million cubic feet/day month over month



Bakken Region

Drilling Productivity Report

November 2022

drilling data through October
projected production through December

Oil +14
barrels/day
month over month

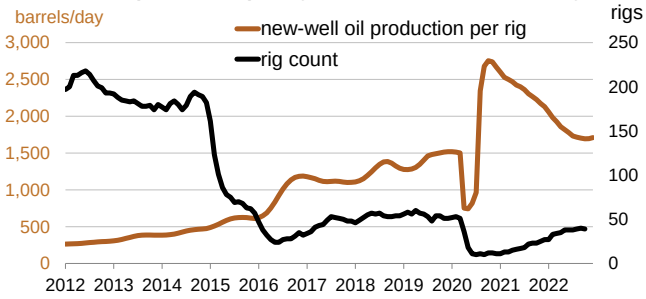
1,710 *December*
1,696 *November*
barrels/day

Monthly additions from one average rig

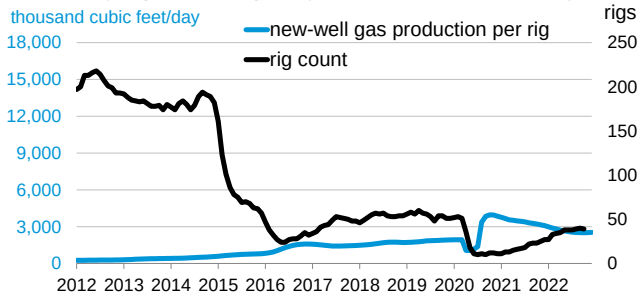
December **2,535**
November **2,510**
thousand cubic feet/day

Gas +25
thousand cubic feet/day
month over month

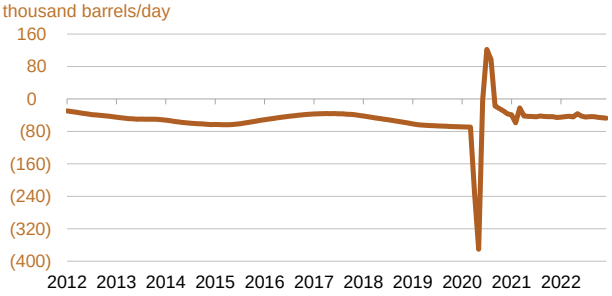
Bakken Region
New-well oil production per rig



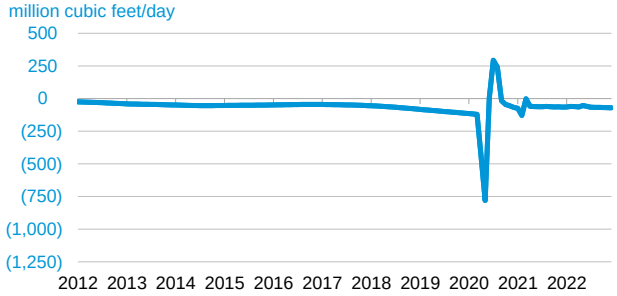
Bakken Region
New-well gas production per rig



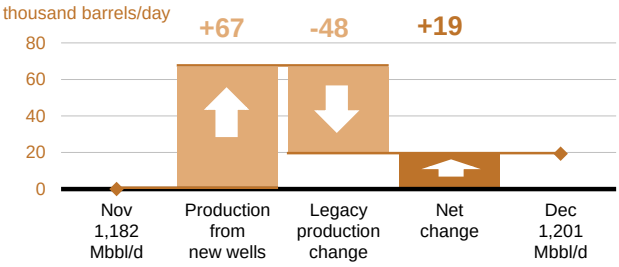
Bakken Region
Legacy oil production change



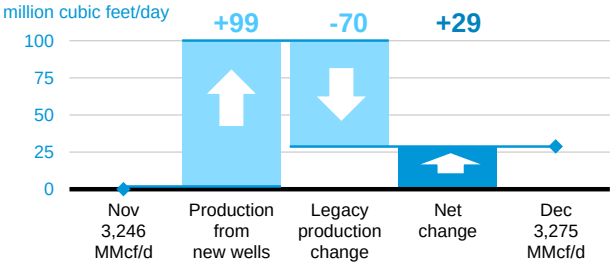
Bakken Region
Legacy gas production change



Bakken Region
Indicated change in oil production (Dec vs. Nov)

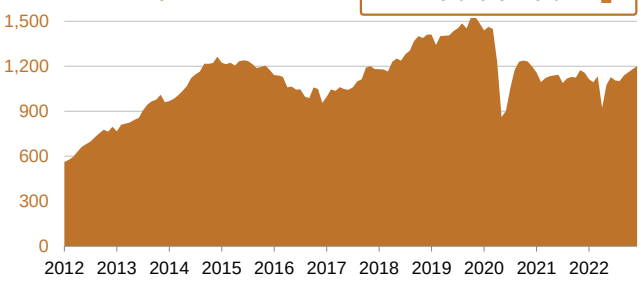


Bakken Region
Indicated change in natural gas production (Dec vs. Nov)



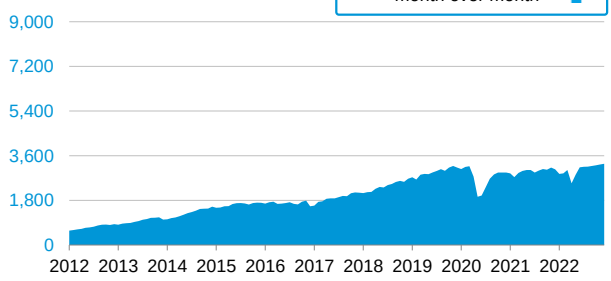
Bakken Region
Oil production

Oil +19
thousand barrels/day
month over month



Bakken Region
Natural gas production

Gas +29
million cubic feet/day
month over month



Eagle Ford Region

Drilling Productivity Report

November 2022

drilling data through October
projected production through December

Oil -16
barrels/day
month over month

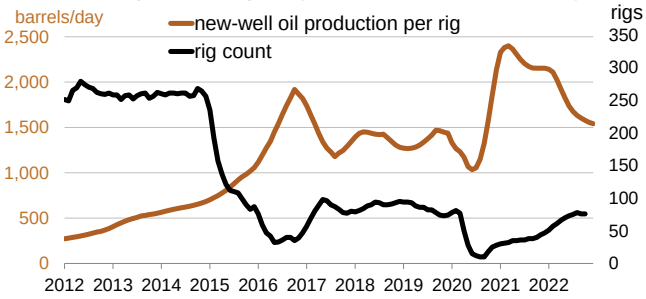
1,541 *December*
1,557 *November*
barrels/day

Monthly additions from one average rig

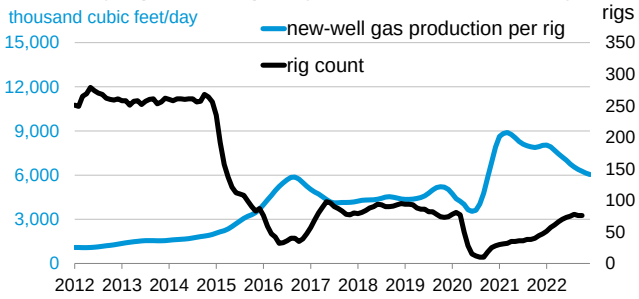
December **6,041**
November **6,133**
thousand cubic feet/day

Gas -92
thousand cubic feet/day
month over month

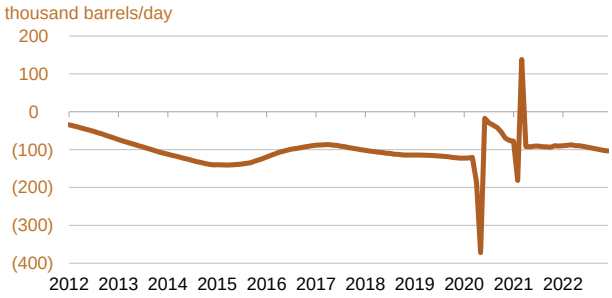
Eagle Ford Region
New-well oil production per rig



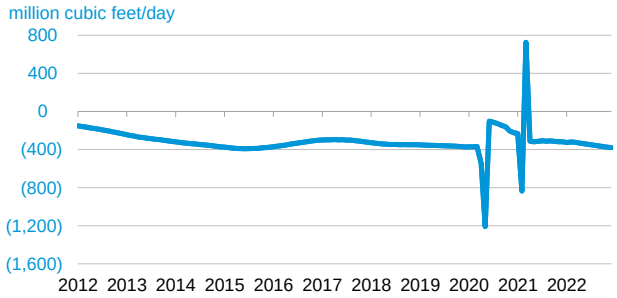
Eagle Ford Region
New-well gas production per rig



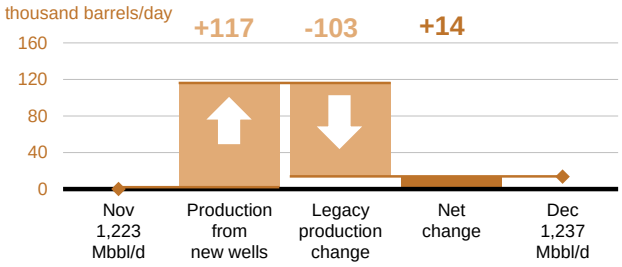
Eagle Ford Region
Legacy oil production change



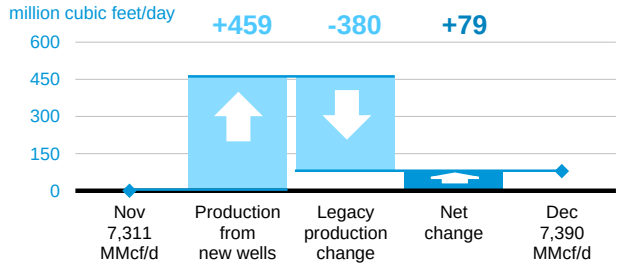
Eagle Ford Region
Legacy gas production change



Eagle Ford Region
Indicated change in oil production (Dec vs. Nov)

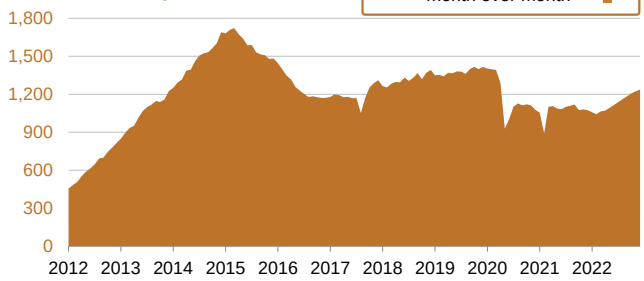


Eagle Ford Region
Indicated change in natural gas production (Dec vs. Nov)



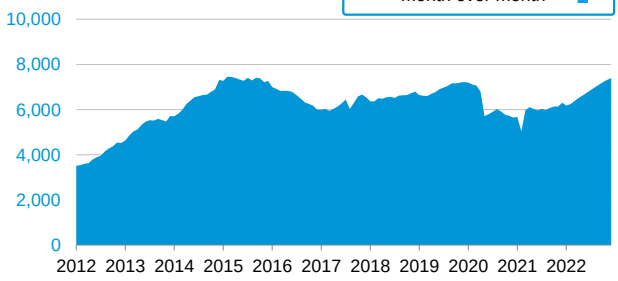
Eagle Ford Region
Oil production

Oil +14
thousand barrels/day
month over month



Eagle Ford Region
Natural gas production

Gas +79
million cubic feet/day
month over month



Haynesville Region

Drilling Productivity Report

November 2022

drilling data through October
projected production through December

Oil 0 barrels/day month over month

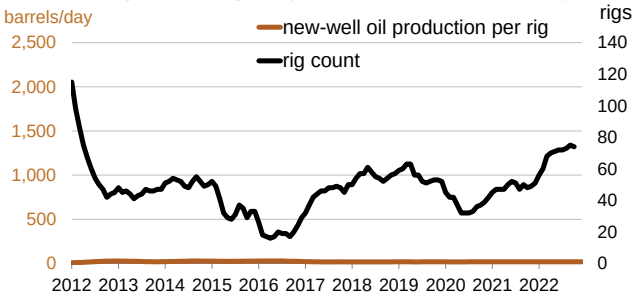
20 *December*
20 *November*
barrels/day

Monthly additions from one average rig

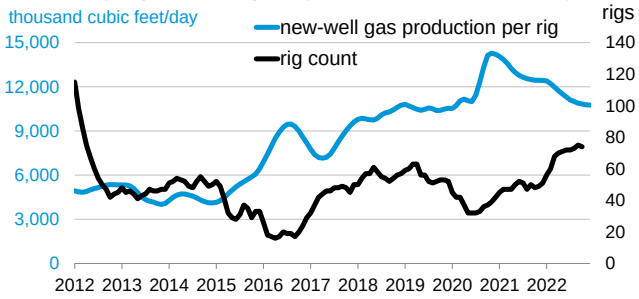
December **10,760**
November **10,781**
thousand cubic feet/day

Gas -21 thousand cubic feet/day month over month

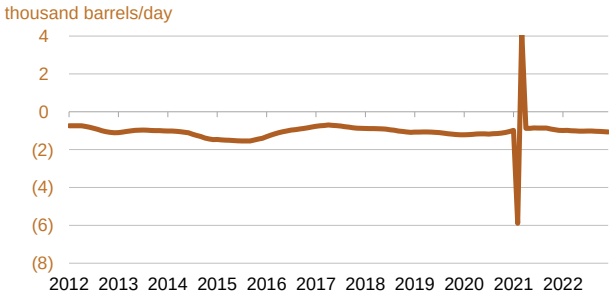
Haynesville Region
New-well oil production per rig



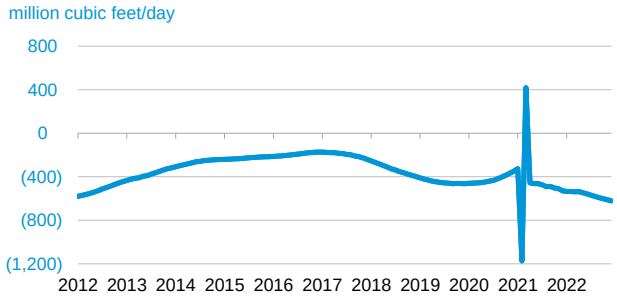
Haynesville Region
New-well gas production per rig



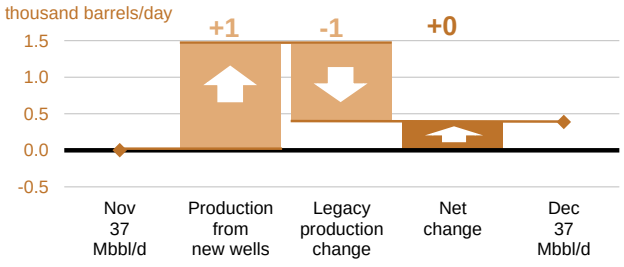
Haynesville Region
Legacy oil production change



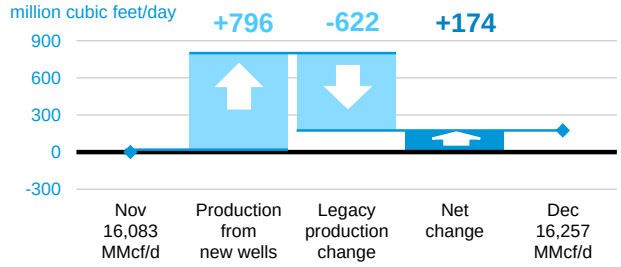
Haynesville Region
Legacy gas production change



Haynesville Region
Indicated change in oil production (Dec vs. Nov)

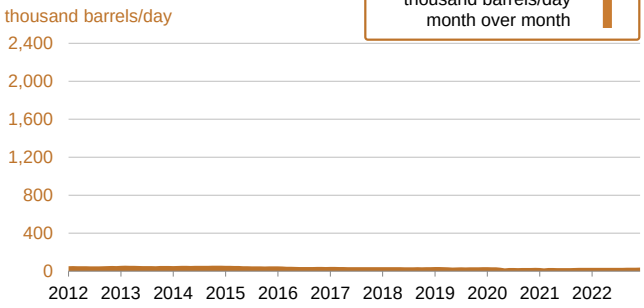


Haynesville Region
Indicated change in natural gas production (Dec vs. Nov)



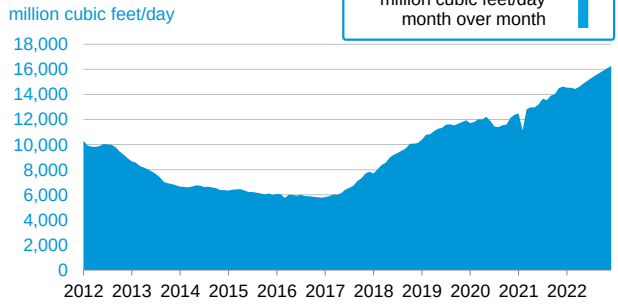
Haynesville Region
Oil production

Oil +0 thousand barrels/day month over month



Haynesville Region
Natural gas production

Gas +174 million cubic feet/day month over month



Niobrara Region

Drilling Productivity Report

November 2022

drilling data through October
projected production through December

Oil -7 barrels/day month over month

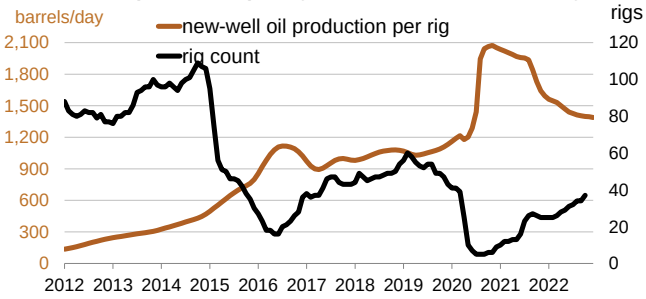
1,388 *December*
1,395 *November*
barrels/day

Monthly additions from one average rig

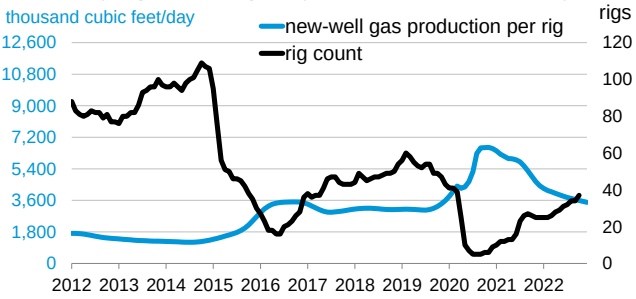
December **3,492**
November **3,545**
thousand cubic feet/day

Gas -53 thousand cubic feet/day month over month

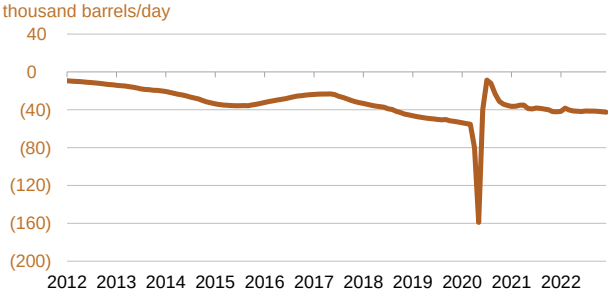
Niobrara Region
New-well oil production per rig



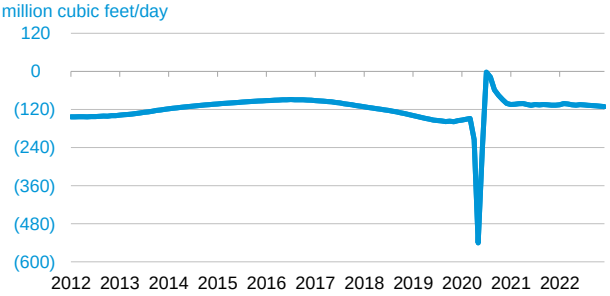
Niobrara Region
New-well gas production per rig



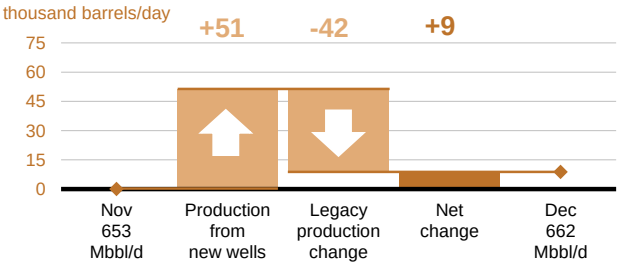
Niobrara Region
Legacy oil production change



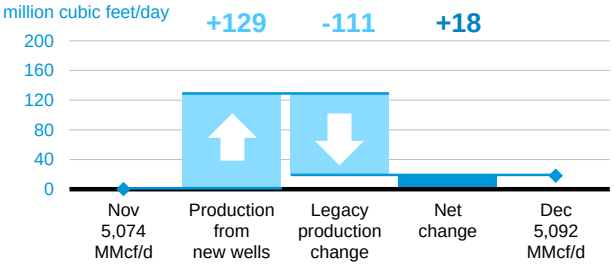
Niobrara Region
Legacy gas production change



Niobrara Region
Indicated change in oil production (Dec vs. Nov)

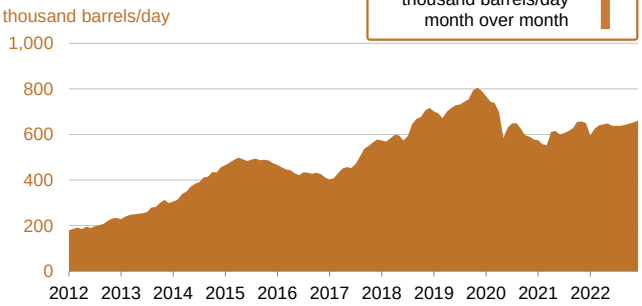


Niobrara Region
Indicated change in natural gas production (Dec vs. Nov)



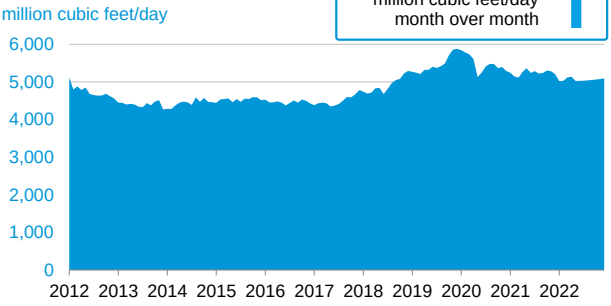
Niobrara Region
Oil production

Oil +9 thousand barrels/day month over month



Niobrara Region
Natural gas production

Gas +18 million cubic feet/day month over month



Permian Region
Drilling Productivity Report

November 2022
drilling data through October
projected production through December

Oil -12
barrels/day
month over month

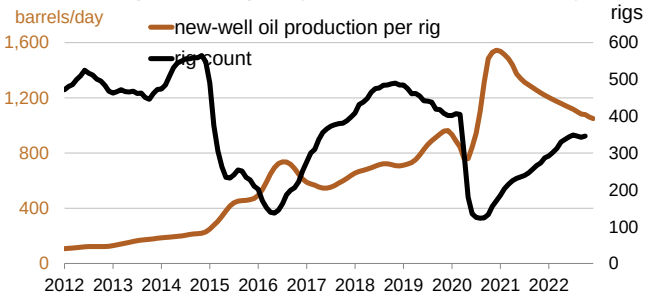
1,049 *December*
1,061 *November*
barrels/day

Monthly additions from one average rig

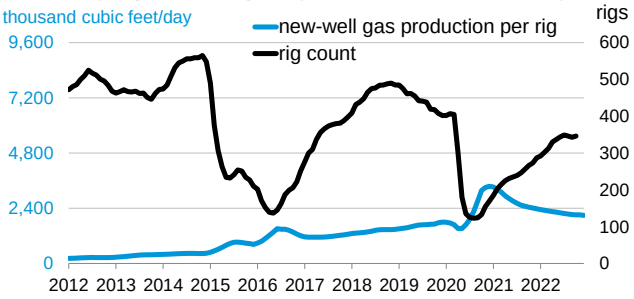
December **2,089**
November **2,112**
thousand cubic feet/day

Gas -23
thousand cubic feet/day
month over month

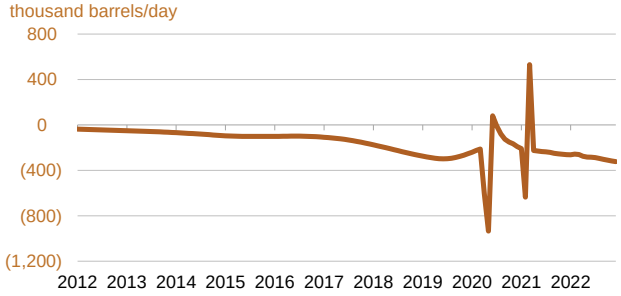
Permian Region
New-well oil production per rig



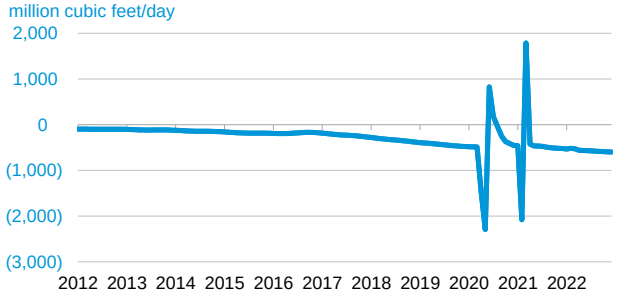
Permian Region
New-well gas production per rig



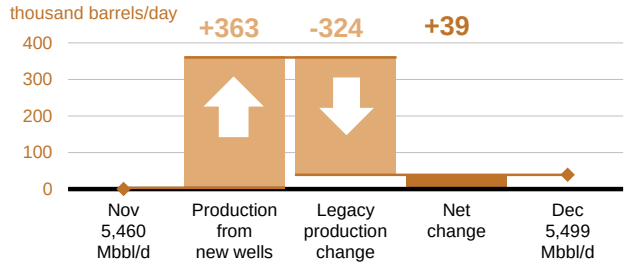
Permian Region
Legacy oil production change



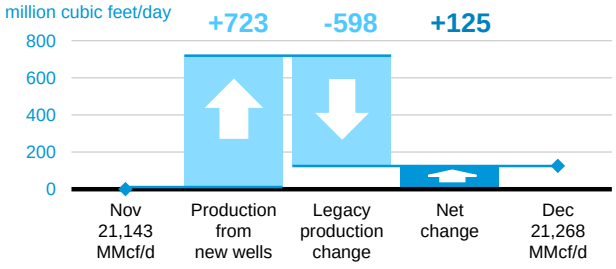
Permian Region
Legacy gas production change



Permian Region
Indicated change in oil production (Dec vs. Nov)

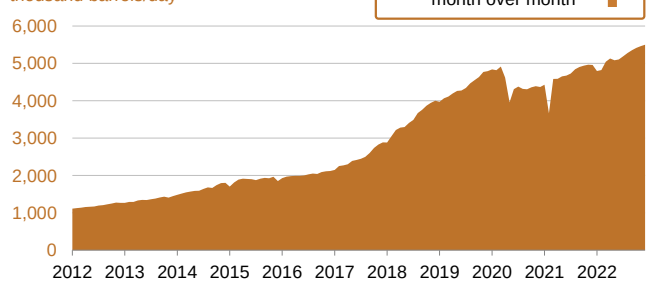


Permian Region
Indicated change in natural gas production (Dec vs. Nov)



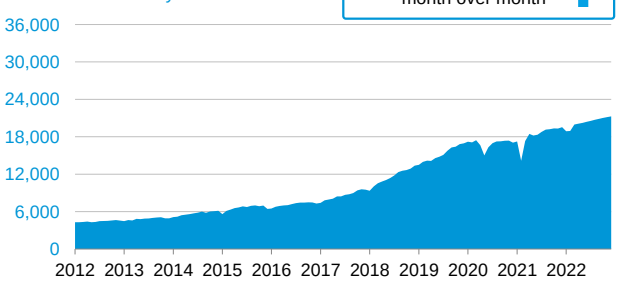
Permian Region
Oil production

Oil +39
thousand barrels/day
month over month



Permian Region
Natural gas production

Gas +125
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

Summary

Overview of Activity for September 2022

- **Top five countries of destination, representing 61.4% of total U.S. LNG exports in September 2022**
  - France (57.9 Bcf), United Kingdom (48.0 Bcf), Netherlands (30.9 Bcf), Spain (24.7 Bcf), and South Korea (19.7 Bcf)
- **295.1 Bcf of exports in September 2022**
  - 1.6% decrease from August 2022
  - 3.7% more than September 2021
- **98 cargos shipped in August 2022**
  - Sabine Pass (33), Cameron (33), Corpus Christi (20), Cove Point (8), Elba (4), and Freeport (0)
  - 99 cargos in August 2022
  - 94 cargos in September 2021

1a. Table of Exports of Domestically-Produced LNG Delivered by Region (Cumulative from February 2016 through September 2022)

Region	Number of Countries Receiving Per Region	Volume Exported (Bcf)	Percentage Receipts of Total Volume Exported (%)	Number of Cargos*
East Asia and Pacific	8	4,264.4	33.7%	1235
Europe and Central Asia	13	5,104.9	40.4%	1531
Latin America and the Caribbean**	13	2,113.5	16.7%	750
Middle East and North Africa	5	373.3	3.0%	107
South Asia	3	792.2	6.3%	233
Sub-Saharan Africa	0	0.0	0.0%	0
Total LNG Exports	**42**	**12,648.2**	**100.0%**	**3,856**

*Split cargos counted as both individual cargos and countries

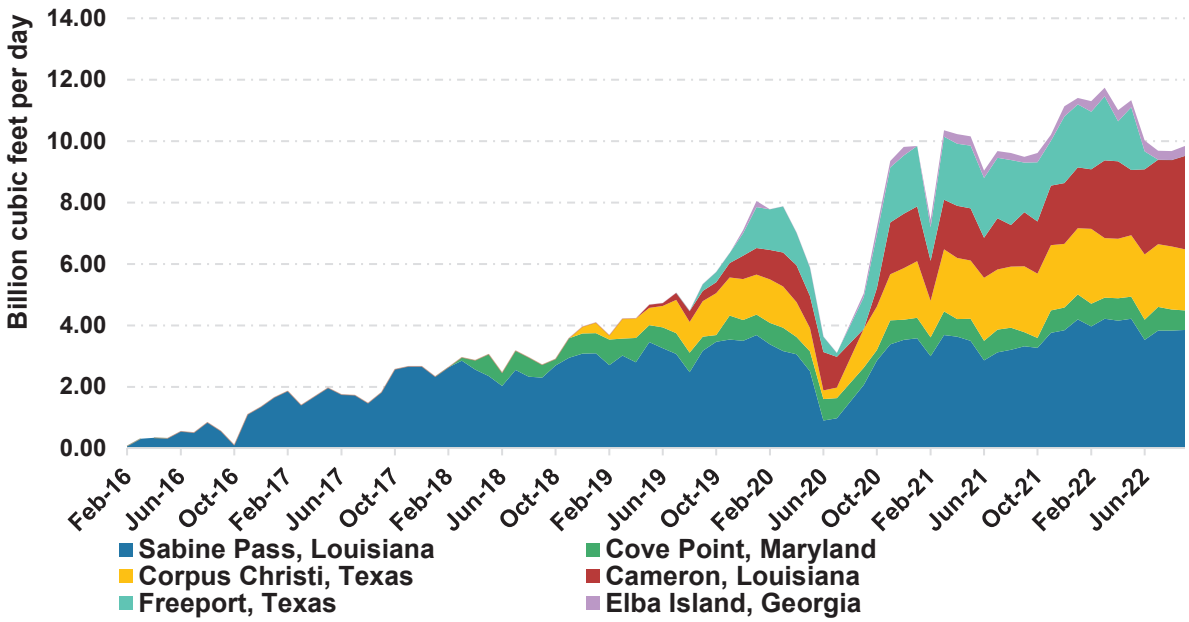
**Number of cargos does not include the shipments by ISO container

1b. Shipments of Domestically-Produced LNG Delivered – by Country
(Cumulative from February 2016 through September 2022)

	Country of Destination	Region	Number of Cargos	Volume (Bcf of Natural Gas)	Percentage of Total U.S LNG Exports (%)
1.	South Korea*	East Asia and Pacific	467	1,647.4	13.0%
2.	Japan*	East Asia and Pacific	342	1,187.0	9.4%
3.	Spain*	Europe and Central Asia	300	967.7	7.7%
4.	China*	East Asia and Pacific	270	935.4	7.4%
5.	France*	Europe and Central Asia	241	837.6	6.6%
6.	United Kingdom*	Europe and Central Asia	221	793.8	6.3%
7.	Netherlands*	Europe and Central Asia	185	636.9	5.0%
8.	Brazil*	Latin America and the Caribbean	216	604.9	4.8%
9.	India*	South Asia	174	598.8	4.7%
10.	Mexico*	Latin America and the Caribbean	163	546.3	4.3%
11.	Turkey*	Europe and Central Asia	163	532.6	4.2%
12.	Chile*	Latin America and the Caribbean	131	419.3	3.3%
13.	Italy*	Europe and Central Asia	90	302.1	2.4%
14.	Taiwan*	East Asia and Pacific	92	301.7	2.4%
15.	Argentina*	Latin America and the Caribbean	110	265.2	2.1%
16.	Poland*	Europe and Central Asia	68	244.4	1.9%
17.	Portugal*	Europe and Central Asia	74	240.7	1.9%
18.	Greece*	Europe and Central Asia	70	167.8	1.3%
19.	Kuwait	Middle East and North Africa	42	153.1	1.2%
20.	Dominican Republic*	Latin America and the Caribbean	61	147.7	1.2%
21.	Lithuania	Europe and Central Asia	42	133.2	1.1%
22.	Belgium*	Europe and Central Asia	37	131.2	1.0%
23.	Pakistan*	South Asia	40	128.9	1.0%
24.	Jordan*	Middle East and North Africa	36	124.2	1.0%
25.	Croatia	Europe and Central Asia	31	102.4	0.8%
26.	Singapore*	East Asia and Pacific	31	100.7	0.8%
27.	Thailand*	East Asia and Pacific	23	82.9	0.7%
28.	Bangladesh*	South Asia	19	64.5	0.5%
29.	Jamaica*	Latin America and the Caribbean	25	57.4	0.5%
30.	United Arab Emirates	Middle East and North Africa	15	51.1	0.4%
31.	Panama*	Latin America and the Caribbean	27	47.9	0.4%
32.	Israel*	Middle East and North Africa	9	28.0	0.2%
33.	Colombia*	Latin America and the Caribbean	17	20.5	0.2%
34.	Egypt*	Middle East and North Africa	5	16.9	0.1%
35.	Malta*	Europe and Central Asia	9	14.6	0.1%
36.	Indonesia*	East Asia and Pacific	9	5.5	0.0%
37.	Malaysia	East Asia and Pacific	1	3.7	0.0%
	Total Exports by Vessel		**3,856**	**12,643.9**	
38.	Barbados	Latin America and the Caribbean	304	1.3	0.0%
39.	Bahamas	Latin America and the Caribbean	614	1.4	0.0%
	Jamaica	Latin America and the Caribbean	112	1.2	0.0%
40.	Haiti	Latin America and the Caribbean	128	0.4	0.0%
41.	Antigua and Barbuda	Latin America and the Caribbean	29	0.0	0.0%
42.	Nicaragua	Latin America and the Caribbean	1	0.0	0.0%
	Total Exports by ISO		**1158**	**4.3**	
	Total Exports by Vessel and ISO		**5,014**	**12,648.2**	

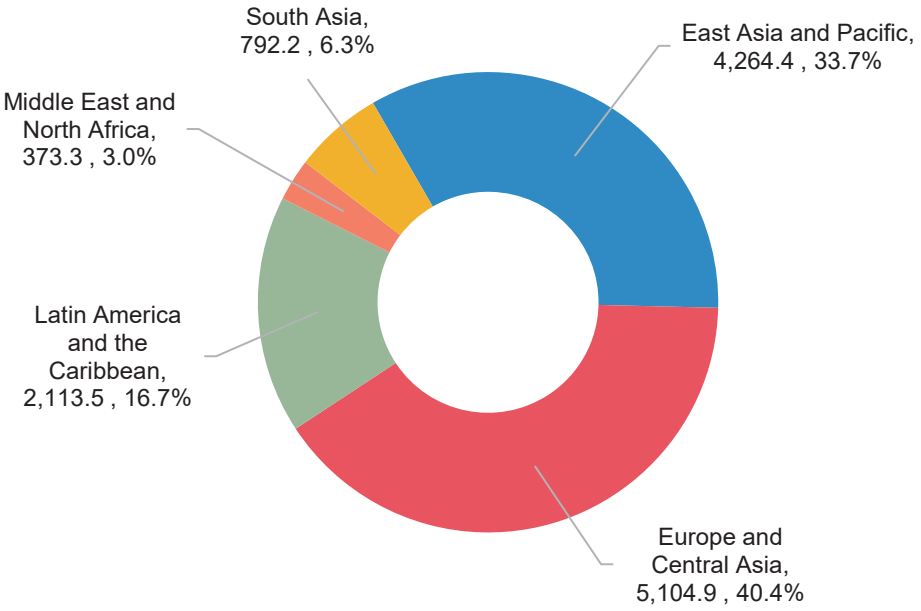
Note:
Volume and Number of Cargos are the cumulative totals of each individual Country of Destination by Region starting from February 2016.
Jamaica has received U.S. LNG exports by both vessel and ISO container. The volumes are totaled separately
* Split cargos counted as both individual cargos and countries.
Vessel = LNG Exports by Vessel and ISO container = LNG Exports by Vessel in ISO Containers.
Does not include re-exports of previously-imported LNG. See table 2c for re-exports data.
Totals may not equal sum of components because of independent rounding.

1c. Domestically-Produced LNG Exported by Point of Exit
(February 2016 through September 2022)



The Cameron, LA point of exit includes exports from Cameron LNG and Venture Global Calcasieu Pass.

1d. Domestically-Produced LNG Exported by Region
(Cumulative from February 2016 through September 2022)
(Bcf, %)



http://freeportlng.newsrouter.com/news_release.asp?intRelease_ID=9753&intAcc_ID=77

FREEPORT LNG PROVIDES UPDATE ON INITIAL RESTART OF ITS LIQUEFACTION FACILITY

Houston, TX, November 18, 2022 – Freeport LNG Development, L.P. (Freeport LNG) today provided an update on the ongoing reconstruction and resumption of operations at its natural gas liquefaction and LNG export facility. As of November 14th, the reconstruction work necessary to commence initial operations, including utilization of all three liquefaction trains, two LNG storage tanks and one dock, was approximately 90% complete, with all reconstruction work anticipated to be completed by the end of November. Proposed remedial work activities for a safe restart of initial operations have been submitted to the relevant regulatory agencies for review and approval. Subject to Freeport LNG meeting its regulatory requirements, it is targeting initial production at the facility in mid-December.

Each of Freeport LNG's three liquefaction trains will be restarted and ramped up safely, in a slow and deliberate manner, with each train starting separately before restarting a subsequent train. It is expected that approximately 2 BCF per day of production will be achieved in January 2023. Full production utilizing both docks remains anticipated to commence in March 2023.

"Our teams have worked diligently over the last several months alongside regulators to ensure the safe restart of our facility. I am immensely grateful for their efforts," said Michael Smith, Founder, Chairman and CEO. "We are committed to moving forward with an uncompromising safety focus and enhanced operational processes that will enable us to chart a safe, sustainable path forward to serve our customers and the broader LNG market as a whole."

ABOUT FREEPORT LNG

Freeport LNG is an LNG export company headquartered in Houston, Texas. The company's three train, 15 MTPA liquefaction facility is the seventh largest in the world and second largest in the U.S. Freeport LNG's liquefaction facility is the largest all-electric drive motor plant of its kind in the world, making it the most environmentally sustainable site of its kind. The facility's electric drive motors reduce carbon emissions by over 90% relative to gas turbine-driven liquefaction facilities. Freeport plans to expand by adding a fourth liquefaction train, which has received all regulatory approvals for construction. Freeport was formed in 2002 to develop, own and operate an LNG terminal on Quintana Island, near Freeport, Texas. The terminal started LNG import operations in June 2008 and began LNG export operations in 2019. Further information can be found on Freeport's website at www.freeportlng.com.

Major US LNG Exporter May Extend Outage Through December (1)
2022-11-14 18:46:10.881 GMT

By Stephen Stapczynski and Anna Shiryaevskaya
(Bloomberg) -- A major US liquefied natural gas exporter will likely extend an outage that began in June, curbing much-needed supply to customers in Europe and Asia right before winter.

Freeport LNG told buyers it will likely cancel shipments scheduled for November and December as work continues on repairs and regulatory approvals before a restart, according to people with knowledge of the matter.

The company's LNG export facility in Freeport, Texas, which previously accounted for about 15% of US shipments of the fuel, was knocked offline following an explosion and fire. The fate of the plant has fixated gas traders ever since. US gas prices slumped Friday after speculation that repairs could take longer than expected. The closely held company later said that a tweet about cracks in pipes at its terminal contained false information.

While global LNG prices are currently sliding amid a temporary glut ahead of the northern hemisphere winter, an extended outage could tighten the market once again and complicate Europe's effort to replace Russian pipeline gas. And the longer the export plant remains offline, the more gas will be accumulated at home, weighing on domestic prices.

US gas futures partially erased earlier gains on the news. Gas for December delivery were 1.9% higher at $5.99 per million British thermal units as of 1:40 p.m. in New York, after surging as much as 9.1%.

As recently as last week, Freeport said it was targeting a resumption of operations this month. But Freeport recently told customers that timeline has become challenging, according to the people, who asked not to be identified as they weren't authorized to discuss the matter. Freeport LNG hasn't been clear to clients about when exactly its facility will restart, they said.

The company said it doesn't comment on its customers' communications.

"Our work of progressing towards the restart of our liquefaction facility continues. That work includes obtaining the necessary regulatory approvals required for the restart of our facility," Heather Browne, a Freeport LNG spokesperson, said by email Monday, without providing a timeline.

Freeport still needs to submit its restart plan with the Pipeline and Hazardous Materials Safety Administration, a US regulator, before it can resume operations. The process may take at least one or two weeks to get authorization, according to energy analysis firm Wood Mackenzie Ltd., which estimates the plant won't start until December.

--With assistance from Gerson Freitas Jr..

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To view this story in Bloomberg click here:
https://blinks.bloomberg.com/news/stories/RLCOTKT0AFB4

http://freeportlng.newsrouter.com/news_release.asp?intRelease_ID=9752&intAcc_ID=77

FREEPORT LNG PROVIDES SUMMARY OF ROOT CAUSE FAILURE ANALYSIS REPORT

ON JUNE 8 INCIDENT

Houston, TX, November 15, 2022 – Freeport LNG Development, L.P. (Freeport LNG) is today providing the results of an independent, third-party root cause failure analysis (RCFA) report on the June 8, 2022 incident that occurred at its liquefaction facility. The RCFA report was commissioned by Freeport LNG and independently conducted by a highly qualified incident investigation company, IFO Group, in order to identify the causes underlying the June 8th incident. Over the course of almost five months, IFO Group investigated the incident, collected and analyzed physical specimens from the incident, interviewed witnesses, reviewed process and design data, and ultimately developed the RCFA report, identifying specific causes that led or contributed to the June 8th incident.

The safety and security of our workforce and surrounding community, and environmental stewardship are Freeport LNG's top priorities. Freeport LNG believes that transparency around the causes of this incident, and the remedial actions it is taking to ensure an incident of this nature never occurs again, is critical to maintaining public trust.

With that in mind, the results of the root cause failure analysis prepared by IFO Group are as follows:

Direct Cause

• Isolation of a piping segment containing cryogenic liquefied natural gas (LNG) without proper overpressure protection, which LNG then warmed and expanded due to exposure to ambient conditions, resulting in a boiling liquid, expanding vapor explosion, or BLEVE, and the rupturing of the piping segment.

Root Causes

• Pressure safety valve (PSV) testing procedure and car seal program deficiencies;
• Failure to repurpose temperature indicator alarms used for cool down operations during commissioning on LNG piping that could warn operators of increasing temperatures in LNG piping during operations; and
• Operating procedures that allowed operator discretion to close valves that could allow LNG to be isolated in a piping segment.

Contributing Causes

• Failure of 2016 Hazard and Operability study to evaluate the potential for a blocked-in LNG piping segment with inadequate overpressure protection;
• Failure to utilize management of change process for revisions to tank management operating procedures;
• Failure to accurately and timely diagnose sudden pipe movement as being due to piping stresses from the overpressuring of an adjacent piping segment; and
• Operator fatigue as a result of significant overtime needs.

IFO Group proposed recommendations to resolve each of the above root and contributing causes, and Freeport LNG is implementing each of those recommendations. Specifically, Freeport LNG has made significant enhancements to its PSV testing processes and car seal program, implemented procedural changes to avoid operating scenarios that could allow blocked-in LNG in piping segments, and revised its control system logic to alert control room operators to valve positions or temperature readings that indicate possible isolation of LNG in any piping segments. Freeport LNG is also updating its training program to address causes of the incident, as well as identification and diagnosis of abnormal operating conditions in the facility.

To supplement IFO's report, Freeport LNG also engaged another independent consultant to perform a full review of its LNG storage and transfer operating procedures, its control systems maintenance and inspection procedures, and its personnel qualifications and training programs. As a result of this independent, multi-month review, Freeport LNG is implementing various recommended improvements in these areas. Additionally, Freeport LNG

has undertaken a significant hiring effort to increase LNG plant employee staffing by over 30%, in order to reduce the amount of overtime, as well as create new functional departments within the organization that are focused on improved training, operational excellence, quality assurance, and improved business performance. Freeport LNG is also executing an extensive company-wide process safety management initiative to apply and reinforce process safety concepts into daily work processes across the organization.

Freeport LNG is committed to emerging from the June 8th incident with an unmatched focus on safety, operational integrity and operational excellence.

ABOUT FREEPORT LNG

Freeport LNG is an LNG export company headquartered in Houston, Texas. The company's three train, 15 MTPA liquefaction facility is the seventh largest in the world and second largest in the U.S. Freeport LNG's liquefaction facility is the largest all-electric drive motor plant of its kind in the world, making it the most environmentally sustainable site of its kind. The facility's electric drive motors reduce carbon emissions by over 90% relative to gas turbine-driven liquefaction facilities. Freeport plans to expand by adding a fourth liquefaction train, which has received all regulatory approvals for construction. Freeport was formed in 2002 to develop, own and operate an LNG terminal on Quintana Island, near Freeport, Texas. The terminal started LNG import operations in June 2008 and began LNG export operations in 2019. Further information can be found on Freeport's website at www.freeportlng.com.

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Highlights for the month

- The consumption of petroleum products during April-Oct 2022 with a volume of 126.118 MMT reported a growth of 11.8% compared to the volume of 112.789 MMT during the same period of the previous year. This growth was led by 17.0% growth in MS, 14.4% in HSD & 63.1% in ATF consumption during the half year. The consumption of petroleum products during Oct 2022 recorded a growth of 3.4% with a volume of 18.37 MMT compared to the same period of the previous year.
- Indigenous crude oil and condensate production during October 2022 was down by 2.2 % than that of October 2021 as compared to a de-growth of 2.3 % during September 2022. OIL registered a growth of 5.2 % and ONGC registered a de-growth of 0.004 % during October 2022 as compared to October 2021. PSC registered de-growth of 11.1 % during October 2022 as compared to October 2021. De-growth of 1.4 % was registered in the total crude oil and condensate production during April - October 2022 over the corresponding period of the previous year.
- Total Natural Gas Consumption (including internal consumption) for the month of October 2022 was 5238 MMSCM which was 2.7 % lower than the corresponding month of the previous year. The cumulative consumption of 36475 MMSCM for the current year till October 2022 was lower by 5.1 % compared with the corresponding period of the previous year.
- Crude oil processed during October 2022 was 20.4 MMT, which was 2.6 % lower than October 2021 as compared to a growth of 7.3 % during September 2022. Growth of 9.3 % was registered in the total crude oil processing during April-October 2022 over the corresponding period of the previous year.
- Production of petroleum products saw a de-growth of 3.1 % during October 2022 over October 2021 as compared to a growth of 6.6 % during September 2022. Growth of 8.1 % was registered in the total POL production during April- October 2022 over the corresponding period of the previous year.
- Ethanol blending with Petrol was 5.68% during Oct 2022 and cumulative ethanol blending during December 2021- Oct 2022 was 9.53%.

•	Gross production of natural gas for the month of October 2022 (P) was 2892 MMSCM which was lower by 4.1% compared with the corresponding month of the previous year. The cumulative gross production of natural gas of 20076 MMSCM for the current financial year till October 2022 was higher by 0.8 % compared with the corresponding period of the previous year.
•	LNG import for the month of October 2022 (P) was 2411 MMSCM which was 0.8% lower than the corresponding month of the previous year. The cumulative import of 16876 (P) MMSCM for the current year till October 2022 was lower by 11.2% compared with the corresponding period of the previous year.
•	Crude oil imports increased by 8.1% and 13.2% during October 2022 and April- October 2022 respectively as compared to the corresponding period of the previous year. The net import bill for oil & gas was $12.0 billion in October 2022 compared to $9.7 billion in October 2021. In this the crude oil imports constitutes $12.8 billion, LNG imports $1.6 billion and the exports were $4.7 billion during October 2022.
•	POL products imports decreased by 7% and increased by 8.5% during October 2022 and April- October 2022 respectively as compared to the corresponding period of the previous year. Increase in POL products imports during April- October 2022 were due to increase in imports of all products except aviation turbine fuel (ATF), superior kerosene oil (SKO) and others etc.
•	Exports of POL products decreased by 10.5% and increased by 3.8% during October 2022 and April- October 2022 respectively as compared to the corresponding period of the previous year. Increase in POL products exports during April-October 2022 were due to increase in exports of all products except naphtha, superior kerosene oil (SKO), high speed diesel (HSD), fuel oil (FO) and bitumen etc.
•	The price of Brent Crude averaged $93.33/bbl during October 2022 as against $89.87/bbl during September 2022 and $83.66/bbl during October 2021. The Indian basket crude price averaged $91.70/bbl during October 2022 as against $90.71/bbl during September 2022 and $82.11 /bbl during October 2021.

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

Details		Unit/ Base	2020-21	2021-22 (P)	Oct		April-Oct	
					2021-22 (P)	2022-23 (P)	2021-22 (P)	2022-23 (P)
1	Crude oil production in India[#]	MMT	30.5	29.7	2.5	2.5	17.4	17.2
2	Consumption of petroleum products*	MMT	194.3	204.2	17.8	18.4	112.8	126.1
3	Production of petroleum products	MMT	233.5	254.3	21.6	20.9	140.9	152.3
4	Gross natural gas production	MMSCM	28,672	34,024	3,017	2,892	19,908	20,076
5	Natural gas consumption	MMSCM	60,815	63,907	5,385	5,238	38,427	36,475
6	Imports & exports:							
	Crude oil imports	MMT	196.5	212.4	17.1	18.5	118.5	134.2
		$ Billion	62.2	120.7	9.6	12.8	61.1	102.1
	Petroleum products (POL) imports*	MMT	43.2	42.1	4.0	3.7	23.0	25.0
		$ Billion	14.8	25.2	2.7	2.2	13.1	16.5
	Gross petroleum imports (Crude + POL)	MMT	239.7	254.4	21.0	22.1	141.6	159.2
		$ Billion	77.0	145.9	12.4	15.0	74.3	118.6
	Petroleum products (POL) export	MMT	56.8	62.8	5.3	4.8	34.9	36.3
		$ Billion	21.4	44.4	3.8	4.7	21.7	37.7
	LNG imports*	MMSCM	33,031	30,776	2,431	2,411	19,003	16,876
		$ Billion	7.9	13.4	1.2	1.6	7.0	11.5
	Net oil & gas imports	$ Billion	63.5	114.9	9.7	12.0	59.5	92.4
7	Petroleum imports as percentage of India's gross imports (in value terms)	%	19.5	23.8	21.9	24.6	27.1	31.2
8	Petroleum exports as percentage of India's gross exports (in value terms)	%	7.3	10.6	11.4	13.3	11.0	16.3
9	Import dependency of crude oil (on POL consumption basis)	%	84.4	85.7	85.7	86.6	84.9	86.6

#Includes condensate; *Private direct imports are prorated for the period April'22 to Oct'22 for POL & Natural Gas. RIL data prorated for Oct'22. Total may not tally due to rounding off.

3. Indigenous crude oil production (Million Metric Tonnes)

Details	2020-21	2021-22 (P)	Oct			April-Oct		
			2021-22 (P)	2022-23 Target*	2022-23 (P)	2021-22 (P)	2022-23 Target*	2022-23 (P)
ONGC	19.1	18.5	1.6	1.6	1.6	10.8	11.2	10.9
Oil India Limited (OIL)	2.9	3.0	0.3	0.3	0.3	1.7	2.0	1.8
Private / Joint Ventures (JVs)	7.1	7.0	0.6	0.8	0.5	4.2	5.1	3.7
Total Crude Oil	**29.1**	**28.4**	**2.4**	**2.8**	**2.3**	**16.7**	**18.3**	**16.4**
ONGC condensate	1.1	0.9	0.08	0.0	0.1	0.6	0.0	0.6
PSC condensate	0.3	0.30	0.03	0.0	0.03	0.18	0.0	0.17
Total condensate	**1.4**	**1.2**	**0.11**	**0.0**	**0.1**	**0.7**	**0.0**	**0.8**
Total (Crude + Condensate) (MMT)	**30.5**	**29.7**	**2.5**	**2.8**	**2.5**	**17.4**	**18.3**	**17.2**
Total (Crude + Condensate) (Million Bbl/Day)	0.61	0.60	0.59	0.65	0.58	0.60	0.63	0.59

*Provisional targets inclusive of condensate.

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

Details	2020-21	2021-22 (P)	Oct		April-Oct	
			2021-22 (P)	2022-23 (P)	2021-22 (P)	2022-23 (P)
Total domestic production (MMTOE)	59.2	63.7	5.5	5.3	37.3	37.3
Overseas production (MMTOE)	21.9	21.8	1.9	1.6	12.9	11.2
Overseas production as percentage of domestic production	**37.0%**	**34.2%**	**33.8%**	**29.3%**	**34.5%**	**30.1%**

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

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

Details		2020-21	2021-22 (P)	Oct		April-Oct	
				2021-22 (P)	2022-23 (P)	2021-22 (P)	2022-23 (P)
1	High Sulphur crude	161.4	185.0	16.1	15.4	101.2	113.7
2	Low Sulphur crude	60.3	56.7	4.9	5.0	33.0	33.0
Total crude processed (MMT)		**221.8**	**241.7**	**21.0**	**20.4**	**134.2**	**146.7**
Total crude processed (Million Bbl/Day)		4.45	4.85	4.96	4.83	4.60	5.03
Percentage share of HS crude in total crude oil processing		**72.8%**	**76.6%**	**76.8%**	**75.5%**	**75.4%**	**77.5%**

6. Quantity and value of crude oil imports			
Year	**Quantity (MMT)**	**$ Million**	**Rs. Crore**
2020-21	196.5	62,248	4,59,779
2021-22 (P)	212.4	120,675	9,01,262
April-Oct 2022(P)	134.2	102,109	8,04,137

7. Self-sufficiency in petroleum products (Million Metric Tonnes)							
Particulars		**2020-21**	**2021-22 (P)**	**Oct**		**April-Oct**	
				2021-22 (P)	**2022-23 (P)**	**2021-22 (P)**	**2022-23 (P)**
1	Indigenous crude oil processing	28.0	27.0	2.3	2.3	15.7	15.9
2	Products from indigenous crude (93.3% of crude oil processed)	26.1	25.2	2.2	2.2	14.6	14.9
3	Products from fractionators (Including LPG and Gas)	4.2	4.1	0.4	0.3	2.4	2.1
4	Total production from indigenous crude & condensate **(2 + 3)**	30.3	29.3	2.5	2.5	17.0	16.9
5	Total domestic consumption	194.3	204.2	17.8	18.4	112.8	126.1
% Self-sufficiency (4 / 5)		**15.6%**	**14.3%**	**14.3%**	**13.4%**	**15.1%**	**13.4%**

8. Refineries: Installed capacity and crude oil processing (MMTPA / MMT)										
Sl. no.	Refinery	Installed capacity (01.01.2022) MMTPA	Crude oil processing (MMT)							
			2020-21	2021-22 (P)	Oct			April-Oct		
					2021-22 (P)	2022-23 (Target)	2022-23 (P)	2021-22 (P)	2022-23 (Target)	2022-23 (P)
1	Barauni (1964)	6.0	5.5	5.6	0.4	0.6	0.6	2.8	3.7	4.0
2	Koyali (1965)	13.7	11.6	13.5	0.9	1.2	1.3	7.2	8.2	9.2
3	Haldia (1975)	8.0	6.8	7.3	0.7	0.7	0.7	4.7	4.9	5.0
4	Mathura (1982)	8.0	8.9	9.1	0.9	0.8	0.8	5.1	5.3	5.4
5	Panipat (1998)	15.0	13.2	14.8	1.3	1.1	1.2	8.6	7.9	8.4
6	Guwahati (1962)	1.0	0.8	0.7	0.09	0.1	0.1	0.30	0.6	0.6
7	Digboi (1901)	0.65	0.6	0.7	0.06	0.06	0.06	0.4	0.4	0.4
8	Bongaigaon(1979)	2.70	2.5	2.6	0.2	0.2	0.3	1.6	1.4	1.5
9	Paradip (2016)	15.0	12.5	13.2	0.9	1.3	1.239	6.8	7.2	6.8
	IOCL-TOTAL	**70.1**	**62.4**	**67.7**	**5.5**	**6.1**	**6.2**	**37.5**	**39.7**	**41.3**
10	Manali (1969)	10.5	8.2	9.0	0.5	0.9	0.7	4.5	5.8	6.5
11	CBR (1993)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CPCL-TOTAL	**10.5**	**8.2**	**9.0**	**0.5**	**0.9**	**0.7**	**4.5**	**5.8**	**6.5**
12	Mumbai (1955)	12.0	12.9	14.4	1.1	1.2	1.3	8.0	7.9	7.9
13	Kochi (1966)	15.5	13.3	15.4	1.4	1.0	0.6	8.2	8.7	8.6
14	Bina (2011)	7.8	6.2	7.4	0.7	0.7	0.7	4.0	4.3	4.4
	BPCL-TOTAL	**35.3**	**32.4**	**37.2**	**3.2**	**2.9**	**2.6**	**20.3**	**20.9**	**21.0**
15	Numaligarh (1999)	3.0	2.7	2.6	0.3	0.2	0.3	1.6	1.7	1.8

Sl. no.	Refinery	Installed capacity (1.01.2022) (MMTPA)	Crude oil processing (MMT)							
			2020-21	2021-22 (P)	Sept			April-Sept		
					2021-22 (P)	2022-23 (Target)	2022-23 (P)	2021-22 (P)	2022-23 (Target)	2022-23 (P)
16	Tatipaka (2001)	0.066	0.081	0.075	0.006	0.006	0.008	0.042	0.036	0.043
17	MRPL-Mangalore (1996)	15.0	11.5	14.9	1.5	1.4	1.5	7.6	8.9	9.8
	ONGC-TOTAL	**15.1**	**11.6**	**14.9**	**1.5**	**1.4**	**1.5**	**7.7**	**8.9**	**9.8**
18	Mumbai (1954)	9.5	7.4	5.6	0.5	0.8	0.8	2.0	5.2	5.6
19	Visakh (1957)	8.3	9.1	8.4	0.9	0.8	0.8	4.4	5.2	5.2
20	HMEL-Bathinda (2012)	11.3	10.1	13.0	1.1	1.0	1.1	7.6	6.7	7.4
	HPCL- TOTAL	**29.1**	**26.5**	**27.0**	**2.5**	**2.5**	**2.7**	**14.1**	**17.1**	**18.2**
21	RIL-Jamnagar (DTA) (1999)	33.0	34.1	34.8	3.1	3.1	2.9	19.9	19.9	20.8
22	RIL-Jamnagar (SEZ) (2008)	35.2	26.8	28.3	2.6	2.6	1.8	17.0	17.0	15.4
23	NEL-Vadinar (2006)	20.0	17.1	20.2	1.7	1.7	1.7	11.8	11.8	12.0
All India (MMT)		**251.2**	**221.8**	**241.7**	**21.0**	**21.6**	**20.4**	**134.2**	**142.6**	**146.7**
All India (Million Bbl/Day)		**5.02**	**4.45**	**4.85**	**4.96**	**5.11**	**4.83**	**4.60**	**4.88**	**5.03**

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 01.11.2022)

Details		ONGC	OIL	Cairn	HMEL	IOCL	BPCL	HPCL	Others*	Total
Crude Oil	Length (KM)	1,284	1,193	688	1,017	5,301	937			**10,420**
	Cap (MMTPA)	60.6	9.0	10.7	11.3	48.6	7.8			**147.9**
Products	Length (KM)		654			9,661	2,596	3,775	2,386	**19,072**
	Cap (MMTPA)		1.7			49.0	23.0	34.1	9.4	**117.2**

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

11. Production and consumption of petroleum products (Million Metric Tonnes)												
Products	2020-21		2021-22 (P)		Oct 2021		Oct 2022 (P)		Apr-Oct 2021		Apr-Oct 2022 (P)	
	Prod	Cons	Prod	Cons	Prod	Cons	Prod	Cons	Prod	Cons	Prod	Cons
LPG	12.1	27.6	12.2	28.3	1.0	2.5	1.2	2.4	6.7	16.1	7.5	16.2
MS	35.8	28.0	40.2	30.8	3.4	2.8	3.3	3.0	22.0	17.5	24.4	20.4
NAPHTHA	19.4	14.1	20.0	14.3	1.7	1.3	1.2	1.0	11.6	8.2	10.0	7.4
ATF	7.1	3.7	10.3	5.0	0.9	0.5	1.3	0.6	5.2	2.5	8.3	4.1
SKO	2.4	1.8	1.9	1.5	0.1	0.1	0.0	0.0	1.1	0.9	0.6	0.3
HSD	100.4	72.7	107.2	76.7	9.1	6.6	9.0	7.0	59.6	42.3	65.5	48.4
LDO	0.7	0.9	0.8	1.0	0.07	0.09	0.04	0.07	0.4	0.6	0.3	0.4
LUBES	1.1	4.1	1.2	4.6	0.1	0.5	0.1	0.4	0.6	2.5	0.7	2.6
FO/LSHS	7.4	5.6	8.9	6.3	0.7	0.6	0.8	0.6	4.9	3.5	6.0	3.9
BITUMEN	4.9	7.5	5.1	7.9	0.4	0.7	0.3	0.6	2.5	3.9	2.5	4.1
PET COKE	12.0	15.6	15.5	15.8	1.3	1.3	1.2	1.3	8.4	7.8	8.9	9.0
OTHERS	30.2	12.8	30.9	12.1	2.6	1.0	2.4	1.4	17.9	7.0	17.5	9.3
ALL INDIA	**233.5**	**194.3**	**254.3**	**204.2**	**21.6**	**17.8**	**20.9**	**18.4**	**140.9**	**112.8**	**152.3**	**126.1**
Growth (%)	**-11.0%**	**-8.9%**	**8.9%**	**5.1%**	**14.4%**	**0.2%**	**-3.1%**	**3.4%**	**11.7%**	**8.8%**	**8.1%**	**11.8%**

Note: Prod - Production; Cons - Consumption

15. LPG consumption (Thousand Metric Tonne)

LPG category	2020-21	2021-22	Oct			April-Oct		
			2021-22	2022-23 (P)	Growth (%)	2021-22	2022-23 (P)	Growth (%)
1. PSU Sales :								
LPG-Packed Domestic	25,128.1	25,501.6	2,193.4	2,109.9	-3.8%	14,501.6	14,501.9	0.0%
LPG-Packed Non-Domestic	1,886.0	2,238.8	237.8	243.8	2.5%	1,232.7	1,391.7	12.9%
LPG-Bulk	361.9	390.9	37.3	31.4	-15.7%	216.6	210.4	-2.9%
Auto LPG	118.4	122.0	12.5	8.9	-28.9%	69.2	64.1	-7.5%
Sub-Total (PSU Sales)	27,494.3	28,253.3	**2,481.0**	**2,394.0**	**-3.5%**	**16,020.1**	**16,168.1**	**0.9%**
2. Direct Private Imports*	64.2	82.0	0.01	6.4	42945.3%	44.0	44.5	1.1%
Total (1+2)	27,558.4	28,335.3	**2,481.0**	**2,400.4**	**-3.3%**	**16,064.1**	**16,212.6**	**0.9%**

*Apr -Oct 2022 DGCIS data is prorated

16. LPG marketing at a glance

Particulars (As on 1st of April)	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	1.11.22 (P)
LPG Active Domestic Customers	(Lakh)					1486	1663	1988	2243	2654	2787	2895	3053	3128
	Growth						11.9%	19.6%	12.8%	18.3%	5.0%	3.9%	5.5%	4.7%
LPG Coverage (Estimated)	(Percent)					56.2	61.9	72.8	80.9	94.3	97.5	99.8	-	-
	Growth						10.1%	17.6%	11.1%	16.5%	3.4%	2.3%	-	-
PMUY Beneficiaries	(Lakh)							200	356	719	802	800.4	899.0	955.6
	Growth								77.7%	101.9%	11.5%	-0.2%	12.2%	11.1%
LPG Distributors	(No.)	10541	11489	12610	13896	15930	17916	18786	20146	23737	24670	25083	25269	25327
	Growth	8.8%	9.0%	9.8%	10.2%	14.6%	12.5%	4.9%	7.2%	17.8%	3.9%	1.7%	0.7%	0.6%
Auto LPG Dispensing Stations	(No.)	604	652	667	678	681	676	675	672	661	657	651	601	570
	Growth	12.7%	7.9%	2.3%	1.6%	0.4%	-0.7%	-0.1%	-0.4%	-1.6%	-0.6%	-0.9%	-8.5%	-10.1%
Bottling Plants	(No.)	183	184	185	187	187	188	189	190	192	196	200	202	205
	Growth	0.5%	0.5%	0.5%	1.1%	0.0%	0.5%	0.5%	0.5%	1.1%	2.1%	2.0%	1.0%	3.0%

Source: PSU OMCs (IOCL,BPCL and HPCL)

1.Growth rates as on 01.11.2022 are with respect to figs as on 01.11.2021. Growth rates as on 1 April of any year are with respect to figs as on 1 April of previous year.

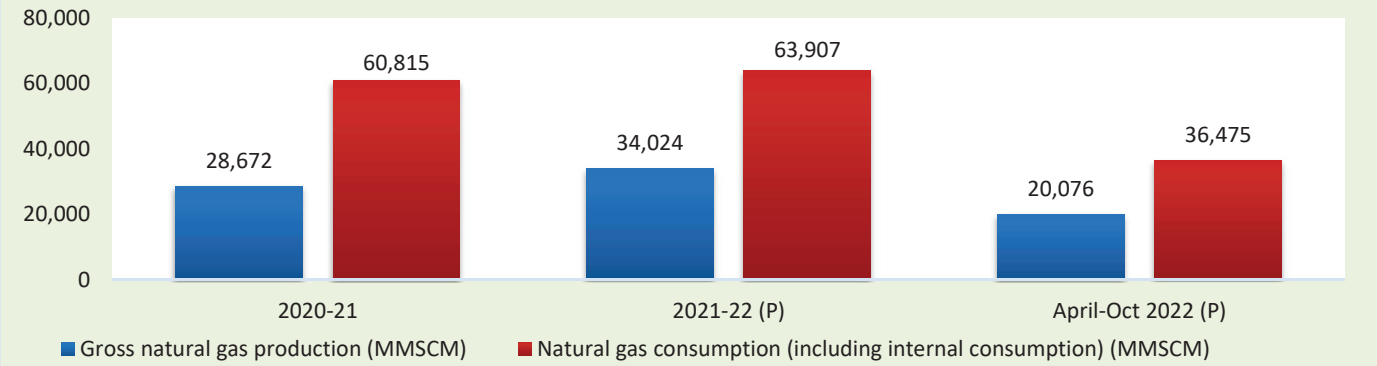
2. The LPG coverage is calculated by PSU OMCs based upon the active LPG domestic connections and the estimated number of households. The number of households has been projected by PSU OMCs based on 2011 census data. Factors like increasing nuclearization of families, migration of individuals/ families due to urbanization and reduction in average size of households etc. impact the growth of number of households. Due to these factors, the estimated no. of households through projection of 2011 census data may slightly differ from the actual no. of households in a State/UT. Further, this methodology does not include PNG (domestic) connections.

18. Natural gas at a glance

(MMSCM)

Details	2020-21 (P)	2021-22 (P)	Oct			April-Oct		
			2021-22 (P)	2022-23 (Target)	2022-23 (P)	2021-22 (P)	2022-23 (Target)	2022-23 (P)
(a) Gross production	28,672	34,024	3,017	3,030	2,892	19,908	20,730	20,076
- ONGC	21,872	20,629	1,801	1,734	1,683	12,057	11,907	11,759
- Oil India Limited (OIL)	2,480	2,893	266	316	259	1,701	2,179	1,786
- Private / Joint Ventures (JVs)	4,321	10,502	949	980	950	6,150	6,644	6,532
(b) Net production (excluding flare gas and loss)	27,784	33,131	2,954		2,827	19,423		19,599
(c) LNG import#	33,031	30,776	2,431		2,411	19,003		16,876
(d) Total consumption including internal consumption (b+c)	60,815	63,907	5,385		5,238	38,427		36,475
(e) Total consumption **(in BCM)**	60.8	63.9	5.4		5.2	38.4		36.5
(f) Import dependency based on consumption (%), {c/d*100}	54.3	48.2	45.1		46.0	49.5		46.3

April - Oct 2022 DGCIS data prorated.



19. 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		17886	Sq. KM
Area awarded		20460	Sq. KM
Blocks awarded*		36	Nos.
Exploration initiated (Area considered if any boreholes were drilled in the awarded block)		10667***	Sq. KM
Production of CBM gas	April-Oct 2022 (P)	400.34	MMSCM
Production of CBM gas	Oct 2022 (P)	57.63	MMSCM

*ST CBM Block awarded & relinquished twice- in CBM Round II and Round IV -Area considered if any boreholes were drilled in the awarded block.

**MoPNG awarded 04 new CBM Blocks (Area 3862 sq. km) under Special CBM Bid Round 2021 in September 2022.

***Area considered if any boreholes were drilled in the awarded block.

20. Common Carrier Natural Gas pipeline network as on 30.06.2022

Nature of pipeline		GAIL	GSPL	PIL	IOCL	AGCL	RGPL	GGL	DFPCL	ONGC	GIGL	GITL	Others*	Total
Operational	Length	9,602	2,695	1,459	143	107	304	73	42	24				**14,449**
	Capacity	167.2	43.0	85.0	20.0	2.4	3.5	5.1	0.7	6.0				**333**
Partially commissioned#	Length	4,519			166						1,131	365		**6,180**
	Capacity				-						-	-		**-**
Total operational length		**14,121**	**2,695**	**1,459**	**309**	**107**	**304**	**73**	**42**	**24**	**1,131**	**365**	**0**	**20,629**
Under construction	Length	5,404	100		1,265						1,201	1,666	3,550	**13,186**
	Capacity	-	3.0		-						-	-	149.0	**-**
Total length		**19,524**	**2,795**	**1,459**	**1,574**	**107**	**304**	**73**	**42**	**24**	**2,332**	**2,031**	**3,550**	**33,815**

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

Total authorized Natural Gas pipelines including Tie-in connectivity, dedicated & STPL is 35208 Kms (P)

21. Existing LNG terminals

Location	Promoters	Capacity as on 01.11.2022	% Capacity utilisation (April-Sept 2022)
Dahej	Petronet LNG Ltd (PLL)	17.5 MMTPA	83.5
Hazira	Shell Energy India Pvt. Ltd.	5.2 MMTPA	48.3
Dabhol	Konkan LNG Limited	*5 MMTPA	19.2
Kochi	Petronet LNG Ltd (PLL)	5 MMTPA	16.9
Ennore	Indian Oil LNG Pvt Ltd	5 MMTPA	13.0
Mundra	GSPC LNG Limited	5 MMTPA	17.8
Total Capacity		**42.7 MMTPA**	

* To increase to 5 MMTPA with breakwater. Only HP stream of capacity of 2.9 MMTPA is commissioned

22. Status of PNG connections and CNG stations across India (Nos.), as on 30.09.2022(P)

State/UT (State/UTs are clubbed based on the GAs authorised by PNGRB)	CNG Stations	PNG connections		
		Domestic	Commercial	Industrial
Andhra Pradesh	144	239,712	397	31
Andhra Pradesh, Karnataka & Tamil Nadu	28	18	0	2
Assam	1	46,109	1,307	437
Bihar	67	83,017	50	2
Bihar & Jharkhand	1	5,347	0	0
Chandigarh (UT), Haryana, Punjab & Himachal Pradesh	24	24,136	104	18
Dadra & Nagar Haveli (UT)	7	9,796	53	52
Daman & Diu (UT)	4	5,087	44	40
Daman and Diu & Gujarat	13	1,505	3	0
Goa	10	10,275	15	25
Gujarat	964	2,815,128	21,760	5,729
Haryana	284	280,164	728	1,319
Haryana & Himachal Pradesh	9	0	0	0
Haryana & Punjab	16	0	0	0
Himachal Pradesh	7	3,112	0	0
Jharkhand	59	91,653	2	0
Karnataka	224	356,925	474	266
Kerala	91	21,041	18	14
Kerala & Puducherry	9	0	0	0
Madhya Pradesh	190	173,495	292	388
Madhya Pradesh and Chhattisgrah	3	0	0	0
Madhya Pradesh and Rajasthan	23	135	0	0
Madhya Pradesh and Uttar Pradesh	15	0	0	0
Maharashtra	598	2,498,689	4,542	788
Maharashtra & Gujarat	48	130,928	2	12
National Capital Territory of Delhi (UT)	461	1,313,646	3,292	1,749
Odisha	42	72,933	4	0
Puducherry & Tamil Nadu	7	50	0	0
Punjab	173	47,117	203	210
Rajasthan	191	172,038	55	196
Tamil Nadu	146	2	0	5
Telangana	129	174,692	71	90
Tripura	18	56,828	506	62
Uttar Pradesh	672	1,255,075	2,003	2,365
Uttar Pradesh & Rajasthan	36	18,958	36	340
Uttar Pradesh and Uttrakhand	16	6,263	0	0
Uttrakhand	29	63,756	46	72
West Bengal	41	0	0	0
Total	**4,800**	**9,977,630**	**36,007**	**14,212**

Source: PNGRB

Note: 1. All the GAs where PNG connections/CNG Stations have been established are considered as Operational, 2. Under normal conditions. Operation of any particular GA commences within around one year of authorization. 3. State/UTs wherever clubbed are based on the GAs authorised by PNGRB.

23. Domestic natural gas price and gas price ceiling (GCV basis)

Period	Domestic Natural Gas price in US$/MMBTU	Gas price ceiling in US$/MMBTU
November 2014 - March 2015	5.05	-
April 2015 - September 2015	4.66	-
October 2015 - March 2016	3.82	-
April 2016 - September 2016	3.06	6.61
October 2016 - March 2017	2.50	5.30
April 2017 - September 2017	2.48	5.56
October 2017 - March 2018	2.89	6.30
April 2018 - September 2018	3.06	6.78
October 2018 - March 2019	3.36	7.67
April 2019 - September 2019	3.69	9.32
October 2019 - March 2020	3.23	8.43
April 2020 - September 2020	2.39	5.61
October 2020 - March 2021	1.79	4.06
April 2021 - September 2021	1.79	3.62
October 2021 - March 2022	2.90	6.13
April 2022 - September 2022	6.10	9.92
October 2022 - March 2023	8.57	12.46

24. CNG/PNG prices

City	CNG (Rs/Kg)	PNG (Rs/SCM)	Source
Delhi	78.61	53.59	IGL website (11.11.2022)
Mumbai	89.50	54.00	MGL website (11.11.2022)

Indian Natural Gas Spot Price for Physical Delivery

IGX Price Index Month	Avg. Price		Volume (MMSCM)	Source
	INR/MMBtu	$/MMBtu		
Oct 2022	1858	22.56	37.88	As per IGX website: www.igxindia.com

*Prices are weighted average prices | $1=INR 82.34 | 1 MMBtu=25.2 SCM

https://www.tf1info.fr/economie/video-totalenergies-toujours-present-en-russie-nous-avons-besoin-de-ce-gaz-defend-patrick-pouyanne-sur-lci-2239015.html?utm_medium=Social&utm_source=Twitter&Echobox=1668746745#xtor=CS5-113

TotalEnergies still present in Russia: "We need this gas", defends Patrick Pouyanné

S.M

Published yesterday at 11:22 p.m.

The CEO of TotalEnergies explains why the firm still has commercial ties with Russia, despite the war in Ukraine.

At the request of "European governments", TotalEnergies must indeed "supply Europe".

She nevertheless planned to "gradually withdraw" from the country.

e

Why does TotalEnergies remain in Russia, after more than eight months of war, while its competitors BP and Shell have left? For its CEO Patrick Pouyanné, if the company has remained established in Russia, it is because it has ensured *"the supply of Europe",* he assured on the set of LCI this Thursday evening.

"We apply all sanctions"

"We are obviously applying all *the sanctions*, and we had said that we *would gradually leave Russia,"* he explained, assuring that *"this is what we have done: we have left all the activities that had no connection with the supply of*

Europe." TotalEnergies has nevertheless maintained a contract with a liquefied natural gas plant, of which "*70% of its production"* has been transported to Europe. If it has not been sanctioned by European governments, it is because Europe *"needs this Russian gas,"* he said.

On the other hand, *"as soon as European governments decide to sanction Russian gas, we will stop this contract,"* continued Patrick Pouyanné. Especially since the leader assured that he had already announced, as early as September 28, that there would be no more new investments by TotalEnergies in Russia. In addition to the geopolitical risk of these investments, the company had already reached "*about 10%"* of its portfolio in Russia. *"Today we are trying to gradually leave Russia, while ensuring the supply of Europe,"* he said.

NORTH Dakota | Mineral Resources
Be Legendary.

Release Date: 11/15/2022
Director Lynn Helms

Director's Cut
September 2022 Production

Oil Production

August 33,334,503 barrels = 1,075,307 barrels/day (final)
(New Mexico) **47,590,362 barrels = 1,535,173 barrels/day (+.8%)**

September 33,581,380 barrels = 1,119,379 barrels/day **(+4.1%) (RF + 12%)**
1,078,594 barrels/day or 96% from Bakken and Three Forks
40,786 barrels/day or 4% from legacy pools

1,519,037 all-time North Dakota high Nov 2019

Revised Revenue Forecast **= 1,100,000 > 1,000,000 barrels/day**

Crude Price[1] ($/barrel)

	North Dakota Light Sweet	WTI	ND Market estimate
August	90.14	91.48	90.34 **(RF +81%)**
September	81.02	87.27	81.24 **(RF +63%)**
Today	83.75	85.87	84.81 **(Est. RF +70%)**
All-time high (6/2008)	$125.62	$134.02	$126.75

Revised Revenue Forecast **= $50.00**

Gas Production & Capture

August Production 95,728,721 MCF = 3,088,023 MCF/day
Gas Captured: 94% 89,796,283 MCF = 2,896,654 MCF/day

September Production 95,273,362 MCF = 3,175,779 MCF/day **(+2.8%)**
Gas Captured: 95% 90,581,506 MCF = 3,019,384 MCF/day
3,175,779 MCF/day all-time high production Sep 2022
3,019,384 MCF/day all-time high capture Sept 2022

Fort Berthold Reservation Activity

	Total	Fee Land	Trust Land
Oil Production (barrels/day)	187,153	70,735	116,418
Drilling Rigs	6	3	3
Active Wells	2,629	642	1,987
Waiting on Completion	17		
Approved Drilling Permits	261	49	212
Potential Future Wells	3,923	1,122	2,801

[1] Pricing References: WTI: EIA and CME Group; ND Light Sweet: Flint Hills Resources

Rigs & Wells

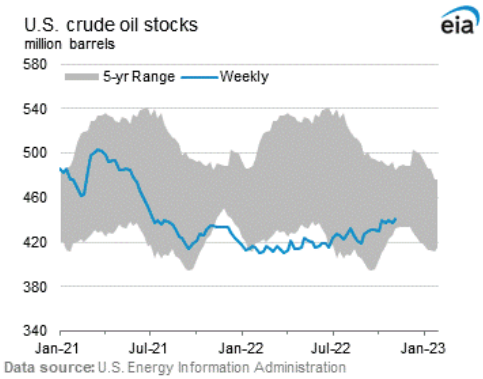
	August	September	October	Today
Rigs	46	45	43	39 New Mexico – 106 Federal Surface 6 All-time high – 218 (5/29/2012)
Permitted	102 drilling 0 seismic	65 drilling 0 seismic	77 drilling 1 seismic All-time high – 370 (10/2012)	-
Completed	66 (Preliminary)	81 (Preliminary)	54 (Preliminary) Revenue Forecast **30→40→<u>50</u>→60** **(RF+8%)**	-
Inactive[2]	1,714	1,447	-	-
Waiting on Completion[3]	477	474	-	-
Producing	17,632	17,759 (Preliminary) *NEW All-time high 17,759 9/22* *15,438 (87%) from unconventional Bakken – Three Forks* *2,321 (13%) from legacy conventional pools*	-	-

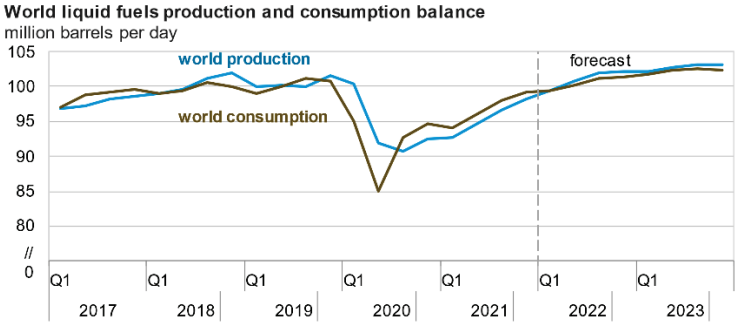
Drilling and Completions Activity & Crude Oil Markets

The drilling rig count has stalled in the low to mid-forties with a gradual increase expected over the next 2 years.

The number of active completion crews decreased to 17 this week.

OPEC+ decided to cut production quotas 2 million barrels per day which is approximately 1 million barrels per day less than current production. Russia sanctions have created significant price volatility in an already tight market. Lower transportation fuels and crude oil demand are resulting in a US crude oil stock build.





[2] Includes all well types on IA and AB statuses: **IA** = Inactive shut in >3 months and <12 months; **AB** = Abandoned (Shut in >12 months)
[3] The number of wells waiting on completions is an estimate on the part of the director based on idle well count and a typical five-year average. Neither the State of North Dakota, nor any agency officer, or employee of the State of North Dakota warrants the accuracy or reliability of this product and shall not be held responsible for any losses caused by this product. Portions of the information may be incorrect or out of date. Any person or entity that relies on any information obtained from this product does so at his or her own risk.

Crude oil transportation capacity, including rail deliveries to coastal refineries is adequate, but could be disrupted due to:

- US Appeals Court for the ninth circuit upholding of a lower court ruling protecting the Swinomish Indian Tribal Community's right to sue to enforce an agreement that restricts the number of trains that can cross its reservation in northwest Washington state.
- DAPL Civil Action No. 16-1534 continues, but the courts have now ruled that DAPL can continue normal operations until the USACOE EIS is completed.
- Potential railroad worker strike – reported that a tentative deal had been reached.

Drilling activity is expected to slowly increase with operators maintaining a permit inventory of approximately 12 months. A survey of operators by JPT revealed the following:

"The surge in the cost of services and supplies pushed the average oil price needed to justify drilling a new oil well in the Mid-Continent to $65/bbl, according to a survey of industry experts by the Federal Reserve Bank of Kansas City released on 8 July.

When they were asked what it would take to get them to substantially increase drilling, they put the number at $98/bbl, which was higher than the closing price for the WTI price in futures trading on 14 July."

Gas Capture

U.S. natural gas storage is 2% below the five-year average. Both US and world crude oil inventories remain below normal. U.S. strategic petroleum reserve is at the lowest level since 1984.

The price of natural gas delivered to Northern Border at Watford City has returned to an elevated level of $3.56/MCF today for a current oil to gas price ratio of 24 to 1. The state-wide gas flared volume from August to September decreased 35 MCFD to 156,396 MCF per day, the statewide percent flared was unchanged at 4.8% while Bakken gas capture percentage decreased to 94%. The historical high flared percent was 36% in 09/2011.

Gas capture details are as follows:

Statewide	95%
Statewide Bakken	96%
Non-FBIR Bakken	96%
FBIR Bakken	95%
Trust FBIR Bakken	96%
Fee FBIR	88%
Big Bend	83%
Deep Water Creek Bay	87%
Twin Buttes	52%
Charleston	80%

The Commission established the following gas capture goals:

74%	October 1, 2014 - December 31, 2014
77%	January 1, 2015 - March 31, 2016
80%	April 1, 2016 - October 31, 2016
85%	November 1, 2016 - October 31, 2018
88%	November 1, 2018 - October 31, 2020
91%	November 1, 2020

Seismic

There are currently 0 active oil and gas seismic surveys.

Active Surveys	Recording	NDIC Reclamation Projects	Remediating	Suspended	Permitted
1	1	0	0	5	0

MONTHLY UPDATE

NOVEMBER 2022 PRODUCTION & TRANSPORTATION

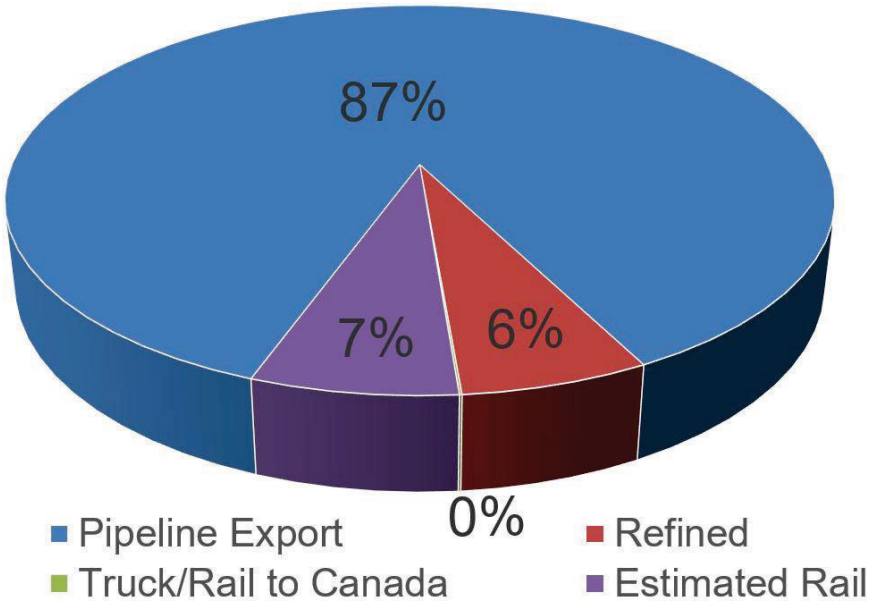
North Dakota Oil Production

Month	Monthly Total, BBL	Average, BOPD
Aug. 2022 - Final	33,334,503	1,075,307
Sep. 2022 - Prelim.	33,581,380	1,119,379

North Dakota Natural Gas Production

Month	Monthly Total, MCF	Average, MCFD
Aug. 2022 - Final	95,728,721	3,088,023
Sep. 2022 - Prelim.	95,273,362	3,175,779

Estimated Williston Basin Oil Transportation, Sep. 2022



CURRENT DRILLING ACTIVITY:

NORTH DAKOTA[1]

39 Rigs

EASTERN MONTANA[2]

3 Rigs

SOUTH DAKOTA[2]

0 Rigs

SOURCE (NOV 15, 2022):

1. ND Oil & Gas Division
2. Baker Hughes

PRICES:

Crude (WTI): $87.02

Crude (Brent): $94.16

NYMEX Gas: $6.05

SOURCE: BLOOMBERG (NOV 15, 2022 12:15P CST)

GAS STATS*

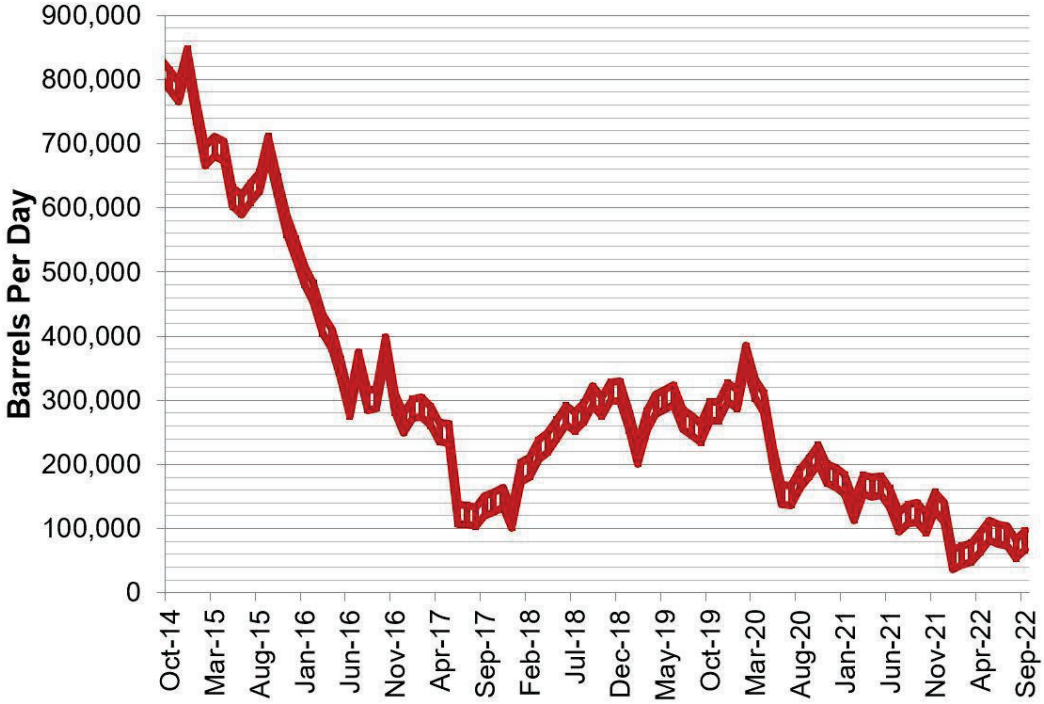
95% CAPTURED & SOLD

4% FLARED DUE TO CHALLENGES OR CONSTRAINTS ON EXISTING GATHERING SYSTEMS

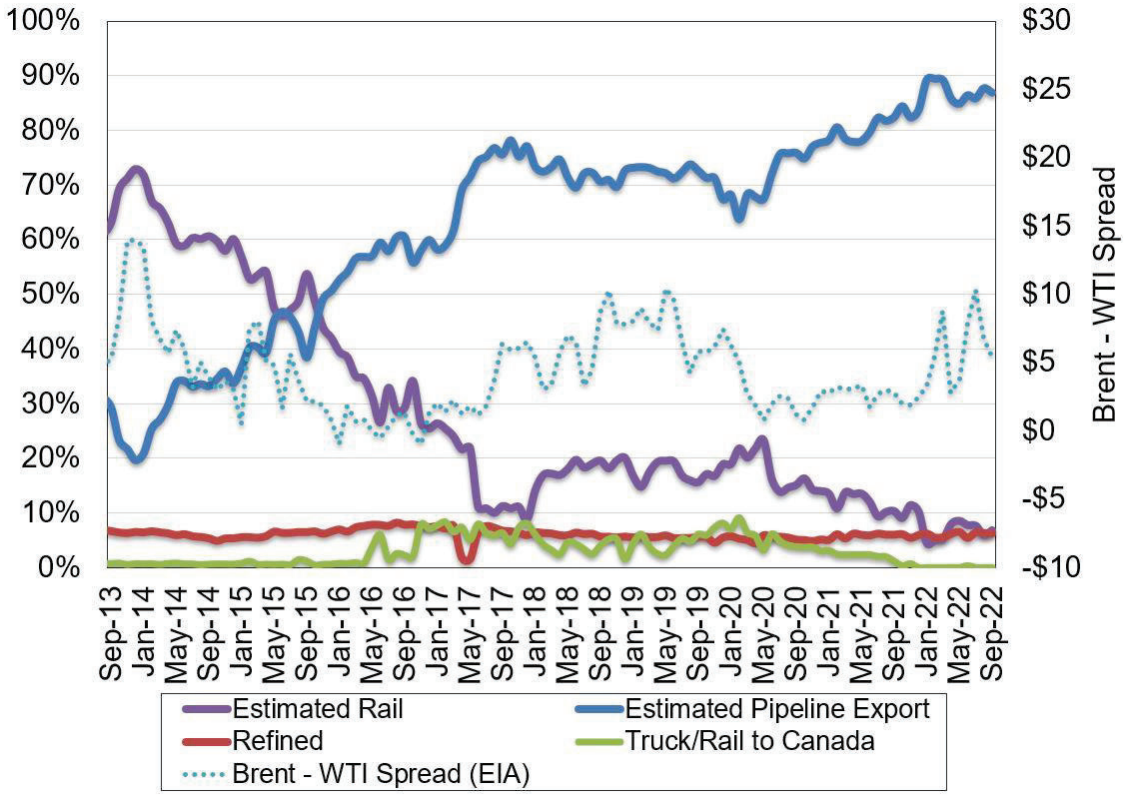
1% FLARED FROM WELL WITH ZERO SALES

SEP. 2022 NON-CONF DATA

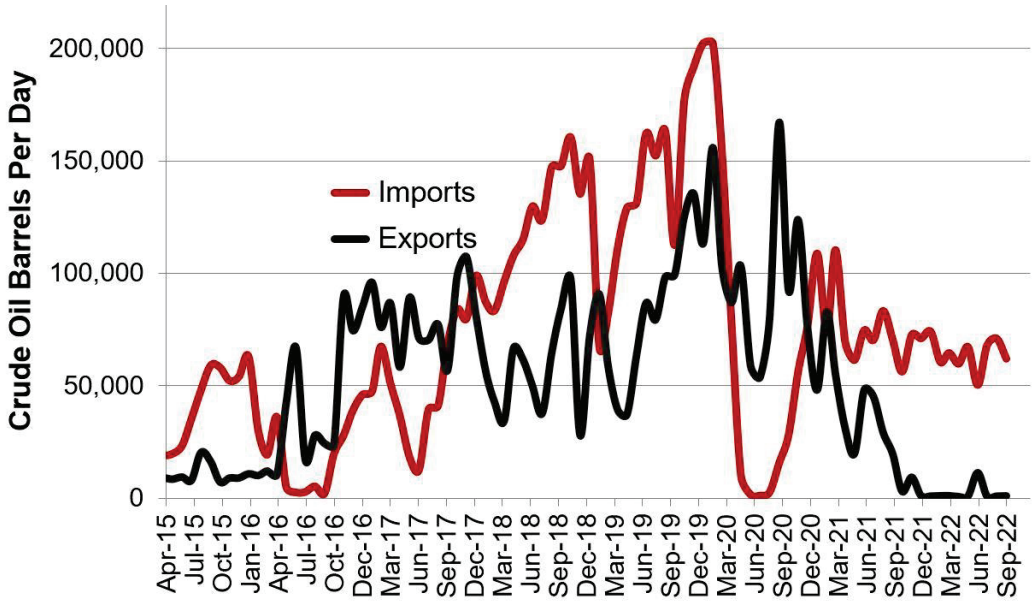
Estimated North Dakota Rail Export Volumes



Estimated Williston Basin Oil Transportation

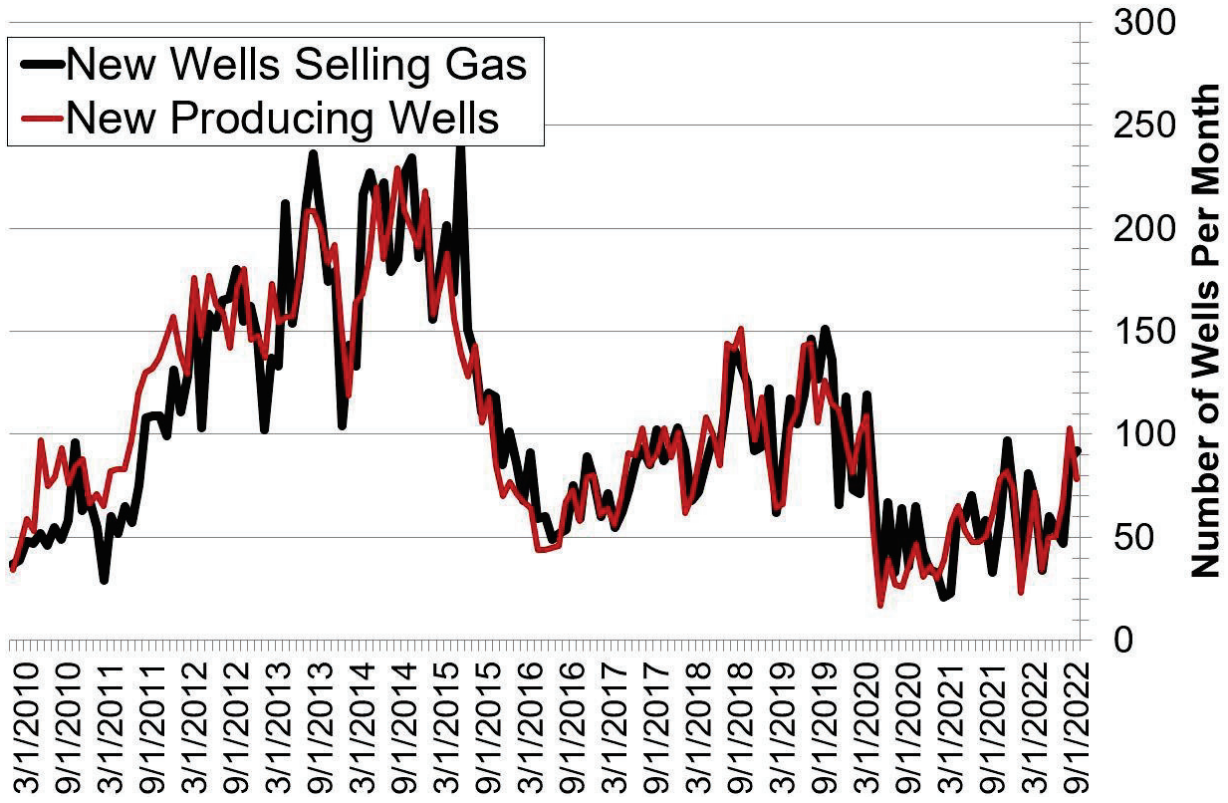


Williston Basin Truck/Rail Imports and Exports with Canada



Data for imports/exports chart is provided by the US International Trade Commission and represents traffic across US/Canada border in the Williston Basin area.

New Gas Sales Wells per Month



US Williston Basin Oil Production, BOPD

2021

MONTH	ND	EASTERN MT*	SD	TOTAL
January	1,147,724	50,433	2,874	1,201,031
February	1,083,820	48,246	2,828	1,134,894
March	1,109,005	49,523	2,744	1,161,273
April	1,121,776	48,440	2,644	1,172,860
May	1,129,785	47,273	2,640	1,179,698
June	1,134,758	44,101	3,103	1,181,962
July	1,078,883	43,758	2,884	1,125,525
August	1,108,084	47,285	2,892	1,158,261
September	1,113,963	50,412	2,847	1,167,222
October	1,110,828	48,953	2,853	1,162,634
November	1,158,553	48,585	2,780	1,209,918
December	1,144,999	47,957	2,717	1,195,673

2022

MONTH	ND	EASTERN MT*	SD	TOTAL
January	1,091,923	47,598	2,709	1,142,230
February	1,093,706	46,947	2,742	1,143,395
March	1,128,295	50,498	2,709	1,181,502
April	906,990	49,825	2,338	959,153
May	1,060,897	49,159	2,648	1,112,704
June	1,098,156	58,901	2,764	1,159,821
July	1,072,637	54,729	2,774	1,130,140
August	1,075,307	55,823	2,756	1,133,885
September	1,119,379			
October				
November				
December				

** Eastern Montana production composed of the following Counties: Carter, Daniels, Dawson, Fallon, McCone, Powder River, Prairie, Richland, Roosevelt, Sheridan, Valley, Wibaux*

https://www.kommersant.ru/doc/5669840?from=glavnoe_3

18.11.2022, 01:15

Rock while it's expensive

Russia grows barrels before the introduction of the oil embargo

According to Kommersant, less than three weeks before the entry into force of the EU embargo, Russian oil companies are increasing oil production, almost reaching the levels of the beginning of the year. Thus, by mid-November, the industry produces an average of 1.48 million tons per day, and also continues to increase oil refining. At the same time, exports to non-CIS countries have already begun to decline, falling by 5% to the level of the same days in October.

Expand to full screen

Photo: Konstantin Kokoshkin, Kommersant

Фото: Константин Кокошкин, Коммерсантъ

Russia in the first half of November increased oil and condensate production by 1% compared to last month, to 1.48 million tons per day, Kommersant sources familiar with the statistics told Kommersant.

> **Russian oil companies came close to the maximum annual level of production, which was observed in February-March (about 1.5 million tons per day).**

In particular, a significant increase in November was provided by the Sakhalin-1 project, which, after the resumption of production in October, reached a capacity of 19 thousand tons per day - this is about 20% lower than the planned capacity in 2022.

In April, Russia faced a sharp decline in oil production (to 1.37 million tons per day) due to serious problems with the sale of sea consignments, due to the refusal of large foreign traders to cooperate with Russian oil companies amid sanctions against the Russian Federation due to the outbreak of hostilities in Ukraine. Since May, the Russian Federation began to gradually restore production. After the EU countries, which accounted for about 85% of maritime oil supplies from the Russian Federation, reduced purchases, exports reoriented to other markets. On December 5, the European embargo on Russian oil comes into force, which will also make it impossible for European insurance of tankers for oil supplies from Russia to third countries.

Now the largest market for Russian oil is China, and it is rapidly catching up with India, which in October accounted for about 40% of offshore oil shipments from the Russian Federation. In India, Rosneft owns 49% of Nayara Energy, which includes a large refinery and a network of gas stations.

> **Exports of Russian oil by sea and oil pipelines to non-CIS countries by mid-November decreased by about 5%, to 610 thousand tons per day.**

Reuters reported on November 17 that not all Indian consumers are ready to buy oil from Russia after December 5: we are talking about Reliance Industries Ltd and Bharat Petroleum, while Nayara Energy and Indian Oil Corporation are ready to continue purchases. The agency expects a decrease in imports of Russian oil from Chinese refineries. This could mean a further decline in tanker shipments in the second half of November.

Against this background, Russian oil companies are increasing refining: in the first half of November, it increased by 2%, to 780 thousand tons per day. The growth of processing is supported by large payments from the budget on the damper, which this year may reach 2 trillion rubles.

> **The increase in oil production to almost the maximum level may be due to the uncertainty factor, believes Maxim Malkov from Kept, consumers in anticipation of the expected restriction on the supply of Russian oil are trying to maximize their reserves.**

The Russian Federation seeks to redistribute the flow of oil that goes by tankers by sea from the western directions to the east, the main volumes of the increase in supplies fell on China and India. For example, if during the summer months oil exports from Russia to China grew by 32%, then supplies to India increased by about four times, he adds. A decrease in oil exports from Russia may occur in December, when restrictions on the supply of Russian oil will begin to operate, the expert believes. In his opinion, oil production in Russia in 2023 may decrease by 7%.

According to the expectations of Sergey Kondratyev from the Institute of Energy and Finance, in December there may be a decline in production by 3-5% due to the introduction of a ban on oil supplies by sea. According to him, as the example of the coal embargo shows, although individual deliveries can be carried out even after the introduction of restrictions, a reduction in volumes is likely. He also draws attention to the fact that, as Platts data show, the spreads between the Emirati grade Dubai and the East Siberian ESPO, as well as between Urals and Brent, are not yet increasing, that is, Russian oil is not becoming cheaper relative to analogues, and this does not create incentives for Asian buyers to increase purchases.

Dmitry Kozlov

Oil Market Highlights

Crude Oil Price Movements

The OPEC Reference Basket (ORB) fell m-o-m by $1.70, or 1.8%, in October to average $93.62/b. The ICE Brent front-month rose $3.02, or 3.3%, to average $93.59/b, while NYMEX WTI increased by $3.23, or 3.9%, to average $87.03/b. The Brent/WTI futures spread narrowed m-o-m, contracting by 21¢ to average $6.56/b. The market structure of ICE Brent and NYMEX WTI strengthened and the first-to-third month spreads moved into stronger backwardation. The combined futures and options net long positions of hedge funds and other money managers increased in both ICE Brent and NYMEX WTI.

World Economy

The world economic growth forecast for 2022 and 2023 remains unchanged at 2.7% and 2.5%, respectively. This reflects the uncertainties that might affect GDP growth in 4Q22 and subsequent quarters. For the US, GDP growth in 2022 remained at 1.5%, while the forecast for 2023 is unchanged at 0.8%. Euro-zone economic growth for 2022 and 2023 are also unchanged at 3.0% and 0.3%, respectively. Japan's economic growth forecast remains at 1.5% for 2022 and 1% for 2023. China's 2022 growth forecast is unchanged at 3.1% for 2022 and 4.8% for 2023. The forecast for India is in line with the previous assessment for both 2022 and 2023 at 6.5% and 5.6%, respectively. Similarly, Brazil's economic growth forecast is unchanged at 1.5% for 2022 and 1% for 2023. Russia's GDP contraction in 2022 is estimated at 5.7%, followed by a growth of 0.2% in 2023, unchanged from last month's assessment. The global growth has clearly entered into a period of significant uncertainty and mounting challenges. This includes high inflation levels and the consequences of monetary tightening by major central banks, high sovereign debt levels in many regions and ongoing supply chain issues. Moreover, geopolitical risks persist and developments related to the COVID-19 pandemic, mainly in the Northern Hemisphere and China, remain a key uncertainty.

World Oil Demand

The world oil demand growth forecast for 2022 is revised down by 0.1 mb/d to now stand at 2.5 mb/d. Oil demand in the OECD is estimated to increase by around 1.3 mb/d, while the non-OECD is seen growing by about 1.3 mb/d. The second quarter of this year was revised slightly higher amid better-than-anticipated oil demand in the main OECD consuming countries. However, oil demand in 3Q22 and 4Q22 is revised lower due to the zero-COVID-19 policy in China, ongoing geopolitical uncertainties and weaker economic activities. For 2023, the global oil demand growth forecast is revised down by 0.1 mb/d from the previous assessment to stand at 2.2 mb/d. The OECD is expected to grow by 0.3 mb/d and the non-OECD by 1.9 mb/d. Oil demand growth is anticipated to be challenged by uncertainties related to economic activities, COVID-19 containment measures and geopolitical developments.

World Oil Supply

Non-OPEC liquids supply is forecast to grow by 1.9 mb/d in 2022, following a slight downward revision of 30 tb/d compared with the previous assessment. An upward revision to Latin America and Russia liquids production was more than offset by downward revisions to Other Eurasia, OECD Europe and Other Asia. The main drivers of liquids supply growth for 2022 are expected to be the US, Canada, Guyana, China and Brazil, while Norway and Thailand are set to contribute the largest declines. For 2023, the forecast for non-OPEC liquids supply growth remains broadly unchanged at 1.5 mb/d. The main drivers are expected to be the US, Norway, Brazil, Canada, Kazakhstan and Guyana, whereas oil production is forecast to decline primarily in Russia and Mexico. Nevertheless, considerable uncertainties persist regarding the potential for US shale production and the geopolitical situation in Eastern Europe, including the looming EU sanctions on imports of Russian oil. OPEC NGLs and non-conventional liquids are forecast to grow by 0.1 mb/d in 2022 to average 5.39 mb/d and in 2023 by 50 tb/d to average 5.44 mb/d. OPEC-13 crude oil production in October decreased by 210 tb/d m-o-m to average 29.49 mb/d, according to available secondary sources.

Product Markets and Refining Operations

Refinery margins increased globally in October and showed solid gains in line with market expectations and historic seasonal trends. This was the result of a significant reduction in refinery product output as maintenance interventions further intensified in the West and offline capacities reached a peak in October. The resulting contraction of product balances in the Atlantic Basin provided a profitable environment for Asia to capitalize on product exports that ultimately supported their refining economics too, although the gains in Asia were more limited. Over the month, global refinery processing rates declined further, in line with historical trends, dropping 960 tb/d in response to a rise in offline capacity amid peak autumn maintenance works. In the coming month, refinery intakes are expected to reverse course and recover. This will add nearly 1.5 mb/d m-o-m, according to preliminary data, as major turnarounds come to an end. The need to restock diesel inventories, mainly in the West, should lend further support.

Tanker Market

Dirty spot freight rates moved higher in October, with m-o-m gains seen on almost all major routes. Spot VLCC rates on the Middle East-to-East route rose 8%, while on the West Africa-to-East route they gained 10%. Rates on the midsize Suezmax and Aframax routes were broadly higher. Suezmax rates on the US Gulf Coast (USGC)-to-Europe route rose 16%, while Aframax spot rates on the Cross-Med route increased 30%. Only Aframax rates on the Indonesia-to-East route saw a decline, falling 11%. All monitored routes were well above the levels seen in the same month last year. Clean rates saw diverging trends, with losses East of Suez outweighing gains West of Suez. On the Middle East-to-East route, clean spot rates fell 38% m-o-m in October.

Crude and Refined Products Trade

Preliminary data show US crude imports fell to a six-month low in October at an average of 6.1 mb/d, while US crude exports remained close to record high levels at an average of 4.0 mb/d. US product imports recovered from the previous month's decline, while product exports fell back from the strong September levels to average 6.1 mb/d. Preliminary estimates show OECD Europe's crude imports have averaged around 9 mb/d over the last three months. Product imports into OECD Europe have risen gradually since August, amid higher flows from the Middle East and India. Japan's crude imports in September fell back from an over two-year high to average 2.8 mb/d, although flows still registered the 14th-month of consecutive y-o-y gains. Japan's product exports increased further in September, reaching the highest monthly figure since February. China's crude imports continued to recover in September, averaging 9.8 mb/d. Gains came as Chinese refiners began to boost product exports, particularly gasoil, amid tight regional demand and the availability of product export quotas. China's product imports jumped 26% on the back of higher inflows of LPG. Recently released October data shows China's crude imports increased to 10.2 mb/d, while product exports fell 21% amid improved domestic demand. India's crude imports continued to decline in September, reaching an 11-month low of 4.0 mb/d. This broke a seven consecutive months of y-o-y gains. India's product imports and exports were broadly stable m-o-m in September.

Commercial Stock Movements

Preliminary September data shows total OECD commercial oil stocks up 13.4 mb m-o-m. At 2,749 mb, inventories were 21 mb less than the same month a year ago, 198 mb lower than the latest five-year average and 218 mb below the 2015–2019 average. Within components, crude and product stocks rose 6.5 mb and 6.8 mb, respectively, compared with the previous month. At 1,335 mb, OECD crude stocks were 36 mb higher than the same month last year, 70 mb below the latest five-year average and 100 mb lower than the 2015–2019 average. OECD product stocks stood at 1,414 mb, representing a m-o-m deficit of 56 mb. This was 128 mb lower than the latest five-year average and 118 mb below the 2015–2019 average. In terms of days of forward cover, OECD commercial stocks remained unchanged m-o-m in September to stand at 58.4 days. This is 0.8 days below September 2021 levels, 5.0 days less than the latest five-year average and 4.1 days lower than the 2015–2019 average.

Balance of Supply and Demand

Demand for OPEC crude in 2022 is revised down by 0.1 mb/d from the previous month's assessment to stand at 28.6 mb/d, which is around 0.5 mb/d higher than in 2021. Demand for OPEC crude in 2023 is also revised down by 0.2 mb/d from the previous month's assessment to stand at 29.3 mb/d, which is 0.7 mb/d higher than in 2022.

Feature Article

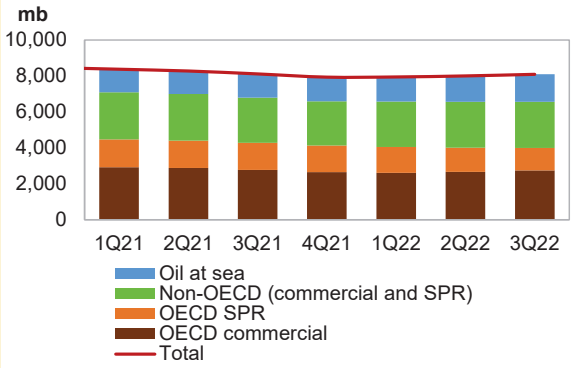
Global oil inventory developments

Global oil inventories consist of three major components. The first component is the total OECD oil stocks, commercial and Strategic Petroleum Reserves (SPRs), with OECD national government reporting systems providing data on their inventories. The second major component is non-OECD inventories, which have grown in importance in recent years as rising non-OECD oil demand – which has surpassed OECD oil demand levels – requires more stockpiling in these countries. Unfortunately, inventories in the non-OECD are hard to track due to incomplete data or the lack thereof. In the absence of regularly reported data, estimates are arrived at using information released by companies and ministries, as well as figures published in the Joint Organisations Data Initiative (JODI) database, which features official country data. The final component is oil at sea, which has increased in recent years, providing an important operational link between exporting and consumer countries.

Global oil inventories have increased since the beginning of this year by 158 mb and stood at 8,096 mb at the of September 2022. OECD commercial stocks, non-OECD stocks and oil at sea witnessed stock builds, while SPRs in the OECD registered significant stock draws.

Over this period, total OECD commercial stocks have increased by 98 mb. At the same time, non-OECD stocks and oil at sea rose by 111 mb and 184 mb, respectively. By contrast, SPRs were expected to register a significant draw of 236 mb over the first three quarters of this year, with the bulk coming from the US, amounting to a planned 176 mb ***(Graph 1),*** followed by OECD Europe drawing some 31 mb and OECD Asia Pacific 29 mb. These volumes are estimated to consist of 208 mb of crude and 28 mb of products, notably gasoline and middle distillates.

Graph 1: Global oil inventory stocks

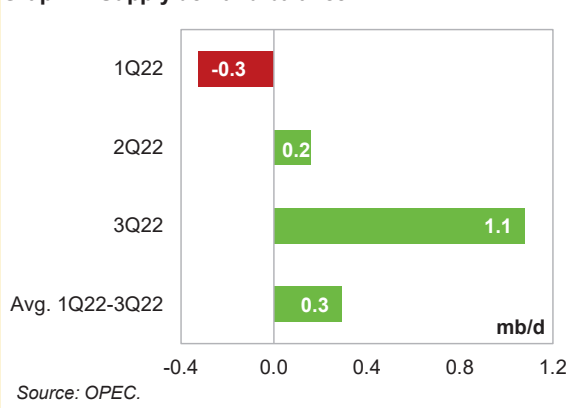


Sources: Argus Media, EIA, Euroilstock, IEA, METI and OPEC.

In 1Q22, global oil inventory levels continued the declining trend observed since late 2020, as total oil demand outpaced global oil supply by 0.3 mb/d ***(Graph 2)***. However, this trend was reversed in 2Q22 and 3Q22, as global oil supply outpaced total oil demand by 0.2 mb/d and 1.1 mb/d, respectively. This underlines the apparent move from a balance deficit to a surplus in terms of oil supply.

During the first three quarters of this year, the observed global oil stock build reflected that the global oil market saw a supply surplus of around 0.3 mb/d vis-à-vis total world oil demand. This supply surplus was confirmed by low crude refinery runs, which are an indicator of oil demand performance. The drop in oil demand occurred on the back of weakening economic activity, spurred by rising inflation, monetary tightening by major central banks, aggravated geopolitical tensions, tightening labour markets and additional supply chain constraints.

Graph 2: Supply/demand balance



Source: OPEC.

The significant uncertainty regarding the global economy, accompanied by fears of a global recession contributes to the downside risk for lowering global oil demand growth. In addition, China's strict adherence to the "zero COVID-19 policy" adds to this uncertainty, making the country's recovery path even more unpredictable. To address this significant uncertainty and heightened market volatility, the proactive and pre-emptive decisions taken by the OPEC and non-OPEC producing countries in the Declaration of Cooperation (DoC) will continue to contribute to global oil market stability.

World Oil Demand

World oil demand growth in 2022 has been revised down by 0.1 mb/d from the last month's assessment. The demand is now forecast at 2.5 mb/d y-o-y, reflecting observed trends and developments in various regions. These include the extension of China's zero-COVID-19 restrictions and some economic challenges in OECD Europe that have weighed on oil demand.

Total oil demand is projected to average 99.6 mb/d in 2022. In the OECD region, oil demand is anticipated to rise by about 1.3 mb/d to 46.1 mb/d y-o-y. OECD Americas demand is expected to rise the most in 2022, led by the US on the back of recovering gasoline and diesel demand. Light distillates are also projected to support demand growth this year.

In the non-OECD region, total oil demand for the year is anticipated to rise by nearly 1.3 mb/d to 53.5 mb/d. A steady increase in industrial and transportation fuel demand, supported by a potential recovery in economic activity is forecasted to boost the region's demand in 2022.

In 2023, world oil demand growth is also revised down by around 0.1 mb/d to stand at 2.2 mb/d to average 101.8 mb/d, supported by expected geopolitical improvements and the containment of COVID-19 in China. The OECD is projected to grow by 0.3 mb/d to 46.5 mb/d. OECD Americas is expected to climb firmly, with US oil demand, is expected to rise above 2019 levels mainly due to the recovery in transportation fuels and light distillate demand. However, OECD Europe and the Asia Pacific are not expected to rise above 2019 consumption levels.

In the non-OECD, oil demand is expexted to rise by 1.9 mb/d to 55.4 mb/d, with the largest growth seen in China and India, supported by a recovery in transportation fuels and firm industrial fuel demand, including petrochemical feedstock. Regions such as Other Asia, Latin America and the Middle East are also expected to see decent gains, supported by a positive economic outlook. In terms of fuels, gasoline and diesel are assumed to lead oil demand growth next year.

Table 4 - 1: World oil demand in 2022*, mb/d

							Change 2022/21	
World oil demand	**2021**	**1Q22**	**2Q22**	**3Q22**	**4Q22**	**2022**	**Growth**	**%**
Americas	24.33	24.78	25.00	25.04	25.21	25.01	0.68	2.78
of which US	*20.03*	*20.38*	*20.41*	*20.58*	*20.74*	*20.53*	*0.49*	*2.46*
Europe	13.13	13.15	13.41	14.03	13.90	13.63	0.50	3.79
Asia Pacific	7.38	7.85	6.99	7.31	7.81	7.49	0.11	1.44
Total OECD	**44.84**	**45.78**	**45.40**	**46.37**	**46.92**	**46.12**	**1.28**	**2.85**
China	14.97	14.74	14.56	14.69	15.44	14.86	-0.11	-0.73
India	4.77	5.18	5.16	4.95	5.35	5.16	0.39	8.11
Other Asia	8.63	9.09	9.27	8.76	8.85	8.99	0.36	4.20
Latin America	6.23	6.32	6.36	6.58	6.40	6.41	0.19	3.04
Middle East	7.79	8.06	8.13	8.52	8.17	8.22	0.43	5.49
Africa	4.22	4.51	4.15	4.27	4.53	4.37	0.14	3.39
Russia	3.61	3.67	3.42	3.45	3.59	3.53	-0.08	-2.32
Other Eurasia	1.21	1.22	1.16	1.00	1.21	1.15	-0.06	-5.07
Other Europe	0.75	0.79	0.75	0.73	0.80	0.77	0.01	1.63
Total Non-OECD	**52.18**	**53.58**	**52.95**	**52.94**	**54.33**	**53.45**	**1.27**	**2.43**
Total World	**97.03**	**99.36**	**98.35**	**99.32**	**101.25**	**99.57**	**2.55**	**2.62**
Previous Estimate	97.03	99.36	98.34	99.33	101.64	99.67	2.64	2.72
Revision	0.00	0.00	0.02	-0.02	-0.39	-0.10	-0.10	-0.10

*Note: * 2022 = Forecast. Totals may not add up due to independent rounding. Source: OPEC.*

Table 4 - 2: World oil demand in 2023*, mb/d

World oil demand	2022	1Q23	2Q23	3Q23	4Q23	2023	Change 2023/22 Growth	Change 2023/22 %
Americas	25.01	25.01	25.26	25.34	25.47	25.27	0.26	1.05
of which US	*20.53*	*20.51*	*20.52*	*20.82*	*20.87*	*20.68*	*0.15*	*0.74*
Europe	13.63	13.19	13.44	14.06	13.95	13.66	0.03	0.24
Asia Pacific	7.49	7.88	7.04	7.35	7.83	7.52	0.04	0.48
Total OECD	**46.12**	**46.08**	**45.73**	**46.75**	**47.24**	**46.46**	**0.33**	**0.72**
China	14.86	15.03	15.41	15.24	15.84	15.38	0.52	3.53
India	5.16	5.41	5.44	5.21	5.59	5.41	0.25	4.94
Other Asia	8.99	9.42	9.61	9.12	9.20	9.33	0.35	3.85
Latin America	6.41	6.48	6.48	6.74	6.54	6.56	0.15	2.29
Middle East	8.22	8.45	8.46	8.85	8.46	8.55	0.33	4.05
Africa	4.37	4.71	4.34	4.46	4.72	4.56	0.19	4.36
Russia	3.53	3.65	3.44	3.62	3.77	3.62	0.09	2.52
Other Eurasia	1.15	1.22	1.16	1.02	1.22	1.16	0.01	0.72
Other Europe	0.77	0.80	0.76	0.75	0.82	0.78	0.02	2.32
Total Non-OECD	**53.45**	**55.17**	**55.09**	**55.01**	**56.15**	**55.36**	**1.91**	**3.58**
Total World	**99.57**	**101.26**	**100.83**	**101.76**	**103.40**	**101.82**	**2.24**	**2.25**
Previous Estimate	99.67	101.33	100.94	101.91	103.88	102.02	2.34	2.35
Revision	-0.10	-0.07	-0.11	-0.14	-0.48	-0.20	-0.10	-0.10

*Note: * 2022 and 2023 = Forecast. Totals may not add up due to independent rounding. Source: OPEC.*

OECD

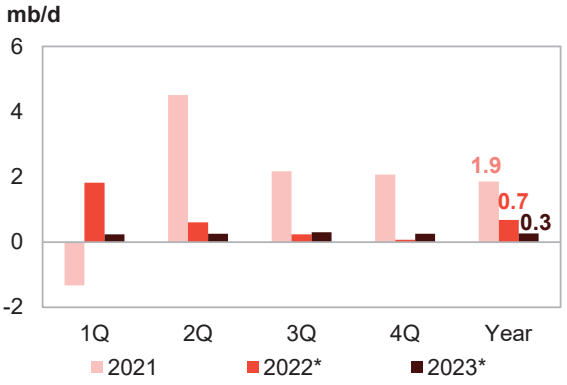
OECD Americas

Update on the latest developments

Oil demand in the US weakened further and was almost flat at 0.03 mb/d y-o-y growth in August compared with 0.2 y-o-y growth in July, partly attributable to the strong baseline of comparison. However, Mexico and Canada recorded healthy y-o-y growth of 0.3 mb/d and 0.2 mb/d, respectively.

Demand in the US was mostly affected by high inflation and interest rates eating into consumers' purchasing power and rising manufacturing production costs. The US inflation rate slipped to 8.5% in August, with average policy rates at about 4% in 2022. According to the US Department of Transportation's Federal Highway Administration (FHA), travel on all roads and streets in the US grew by 0.7% (+1.9 billion vehicle miles) for August 2022 compared with August 2021.

Graph 4 - 1: OECD Americas oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

Oil demand in August was driven by other fuels, which posted growth of 0.3 mb/d y-o-y. On the back of stable air travel activity in the US, jet/kerosene posted growth of 0.1 mb/d (19%) y-o-y. According to the International Air Transport Association (IATA) Air Passenger Market Analysis, US airline revenue passenger kilometres (RPKs) and available seat kilometres (ASKs) in August increased by 7.0% and 3.3% y-o-y, respectively. Similarly, residual fuels posted a marginal increase of 0.03 mb/d y-o-y. Gasoline demand has shown signs of improvement, going from a strong decline of 0.6 mb/d in July to a decline of 0.1 mb/d y-o-y in August.

Table 4 - 3: US oil demand, mb/d

By product	Aug 21	Aug 22	Change Growth	Aug 22/Aug 21 %
LPG	3.38	3.31	-0.07	-2.1
Naphtha	0.18	0.12	-0.07	-35.3
Gasoline	9.18	9.08	-0.10	-1.1
Jet/kerosene	1.57	1.65	0.09	5.5
Diesel	3.98	3.87	-0.11	-2.8
Fuel oil	0.34	0.37	0.03	7.6
Other products	2.22	2.49	0.27	12.0
Total	**20.86**	**20.89**	**0.03**	**0.1**

Note: Totals may not add up due to independent rounding. Sources: EIA and OPEC.

Near-term expectations

In 4Q22, the US GDP is projected to decline. Rising inflation and limited household spending due to recent hikes in interest rates will weigh on consumers' purchasing power, potentially dampening oil demand. In 4Q22, oil demand is expected to grow by 0.06 mb/d y-o-y. Gasoline demand is due for a slight rebound following a steady and expected further decline in retail prices. The beginning of winter in 4Q22 will aid demand for heating fuels. In addition, on the back of continued steady improvements in air travel demand, jet/kerosene will remain positive. However, the risk is skewed to downside.

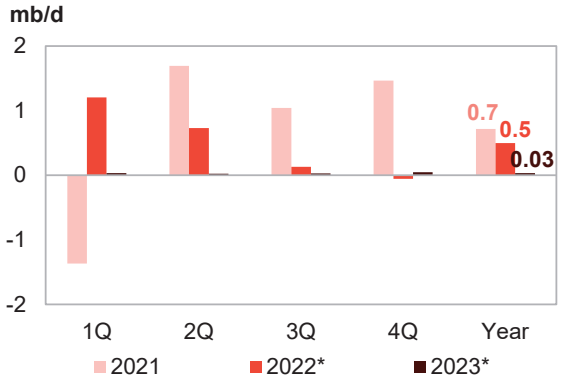
In 1Q23, the US GDP growth forecast is to rebound. However, economic activity is not expected to significantly improve due to the factors mentioned for 4Q22. In addition, industrial output is on a downward trend. Oil demand is projected to grow by 0.1 mb/d y-o-y, mostly supported by distillates and heating fuels, while improvements in air travel will support jet/kerosene demand. Road mobility activity is expected to soften due to reduced economic activity in the winter, thus dampening gasoline demand. The risks are still skewed to the downside in 1Q23.

OECD Europe

Update on the latest developments

Oil demand in OECD Europe improved from 0.08 mb/d y-o-y growth in July to 0.2 mb/d y-o-y growth in August. The demand was driven by robust improvements in the region's aviation as European airline operations sustained growth of 78.8% y-o-y in international RPKs, according to IATA's Air Passenger Market Analysis for August 2022. Consequently, jet/kerosene posted y-o-y growth of 0.3 mb/d (32%). Utility demand for residual fuels remains high in OECD Europe due to high natural gas prices, with the demand for residual fuel growing by 0.1 mb/d y-o-y in August. Improved mobility in the region helped gasoline demand recover from a decline of 0.07 mb/d in July to a growth of 0.01 mb/d y-o-y in August.

Graph 4 - 2: OECD Europe's oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

Similarly, LPG has also improved from a decline of 0.02 mb/d y-o-y in July to a growth of 0.02 mb/d y-o-y in August. LPG recorded a marginal improvement to post growth of 0.02 mb/d y-o-y as naphtha declined further to 0.2 mb/d y-o-y in August.

However, manufacturing activity in the region continued to weaken due to a slowdown in economic activity and trade-related bottlenecks stemming from geopolitical tensions. According to S&P Global and Haver Analytics, the August manufacturing PMI in Euro-zone was 49.5, compared to 48.5 in July. Furthermore, the euro area's annual inflation rate reached 9.1% in August 2022, up from 8.9% in July. These and other factors weighed on diesel demand, which fell by 0.06 mb/d y-o-y.

Table 4 - 4: Europe's Big 4* oil demand, mb/d

By product	Aug 21	Aug 22	Change Aug 22/Aug 21 Growth	%
LPG	0.41	0.38	-0.02	-5.2
Naphtha	0.52	0.35	-0.17	-33.3
Gasoline	1.23	1.27	0.04	3.1
Jet/kerosene	0.53	0.78	0.25	47.4
Diesel	3.13	3.12	-0.01	-0.2
Fuel oil	0.16	0.22	0.06	37.1
Other products	0.45	0.49	0.04	7.9
Total	**6.43**	**6.61**	**0.18**	**2.9**

*Note: * Germany, France, Italy and the UK. Totals may not add up due to independent rounding.*

Sources: JODI, UK Department for Business, Energy & Industrial Strategy, Unione Petrolifera and OPEC.

Near-term expectations

The region's GDP is expected to decline in 4Q22. The ongoing geopolitical tension as well as a counter-seasonal slowdown in mobility activity during the winter are expected to weigh on the region's gasoline and diesel demand in 4Q22. However, rising natural gas prices are expected to lead to gas to oil switching, particularly during the winter. Accordingly, demand for fuel oil and residuals are expected to rise due to switching. Furthermore, sustained growth in both international and regional air travel will boost demand for jet/kerosene during 4Q22. Accordingly, oil demand is projected to decline by 0.05 mb/d y-o-y, but the consumption level will reach 13.90 mb/d.

The outlook for European oil demand in 1Q23 is not expected to improve as the region's GDP growth is projected to decline. Additionally, rising energy prices, geopolitical tension and supply-chain bottlenecks are likely to continue weighing on the input costs in the manufacturing sector. This will potentially lead to slackening oil demand in the region's manufacturing sector in 1Q23. Nevertheless, expected high heating demand amidst the natural gas crisis will continue favouring gas-to-oil switching that will increase regional demand for distillate and fuel oil. In addition, healthy air travel will aid jet/kerosene demand. Accordingly, oil demand in OECD Europe is projected to rise by a slight 0.03 mb/d annually in 1Q23.

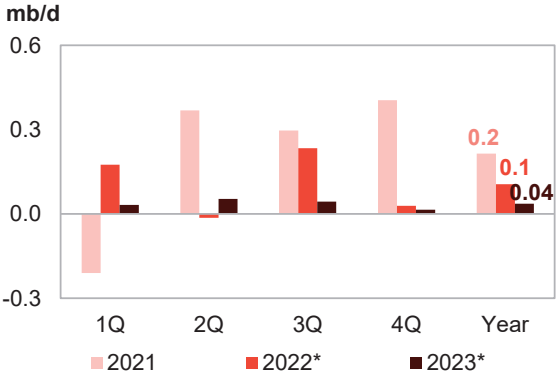
OECD Asia Pacific

Update on the latest developments

OECD Asia Pacific posted very robust oil demand growth in August, rising 0.2 mb/d y-o-y in July to a historic high of 0.6 mb/d y-o-y in August. This was driven by strong demand from Japan and Australia, where strong manufacturing activity supported diesel demand growth of 0.1 mb/d y-o-y in the region compared to 0.04 mb/d y-o-y in July. Data from Haver Analytics and S&P Global indicates that the manufacturing PMI in Japan and Australia in August were 52.2 and 53.07, respectively.

On the back of strong mobility improvements, gasoline posted growth of 0.1 mb/d y-o-y as compared to 0.09 mb/d in July. Air travel in both Japan and Australia rose, according to IATA's Air Passenger Market Analysis, with air traffic volumes in Japan up 112.3% y-o-y and RPKs were close to pre-pandemic levels.

Graph 4 - 3: OECD Asia Pacific oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

Similarly, the air domestic market in Australia recorded a 449.0% y-o-y increase. Accordingly, jet/kerosene demand grew by 0.1 mb/d y-o-y compared to 0.08 mb/d y-o-y in July. Naphtha demand also increased by 0.1 mb/d y-o-y, and LPG recovered by 0.04 mb/d y-o-y as compared to a decline of 0.2 mb/d y-o-y in July. Other products posted growth of 0.1 mb/d y-o-y compared to 0.02 mb/d y-o-y growth in July.

Table 4 - 5: Japan's oil demand, mb/d

By product	Sep 21	Sep 22	Change Growth	Sep 22/Sep 21 %
LPG	0.38	0.27	-0.10	-27.6
Naphtha	0.75	0.57	-0.18	-23.9
Gasoline	0.74	0.72	-0.02	-2.5
Jet/kerosene	0.24	0.24	0.01	2.8
Diesel	0.75	0.72	-0.02	-3.1
Fuel oil	0.22	0.28	0.05	24.1
Other products	0.24	0.26	0.02	9.1
Total	**3.31**	**3.07**	**-0.24**	**-7.3**

Note: Totals may not add up due to independent rounding. Sources: JODI, METI and OPEC.

Near-term expectations

As COVID-19 gradually wanes on a regional basis, its effects are becoming more localised. Therefore, mobility and other economic activity have started to improve, as the July data shows. The gradual resumption of economic activity is expected to support consumer confidence and the mobility recovery in the region. In 4Q22, Japanese economy is projected to grow by 1.5%. Furthermore, improvements in the region's aviation operations could boost demand for transportation fuels, including jet/kerosene, and petrochemical feedstock. Accordingly, oil demand is projected to grow by 0.03 mb/d y-o-y, reaching 7.81 mb/d.

In 1Q23, the pace of the economic recovery is expected to grow further. Japan, the region's largest economy, is forecast to grow by almost 2% on a yearly base in 1Q23. However, geopolitical-induced bottlenecks are additional challenges that are spilling over into the economy of the region and will weigh on oil demand in 2023. On average, oil demand is expected to remain at about 0.03 mb/d in 1Q23.

Nevertheless, many governments in the region are under pressure to increase spending to provide relief from rising inflation, which should boost consumers' purchasing power. Additionally, the South Korean government's subsidy rate hike and current Japanese subsidies on gasoline will bring succour to oil demand in the region in the short term.

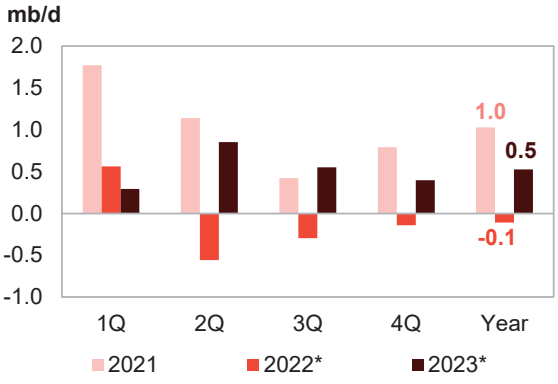
Non-OECD

China

Update on the latest developments

Against some expectations, **oil demand in China** bounced back in September despite the zero-COVID-19 policy. Oil demand recorded a strong growth of 0.6 mb/d, y-o-y, compared to a decline of 0.5 mb/d y-o-y in August. S&P Global and Haver Analytics reported an improvement in China's manufacturing PMI, which stood at 50.1 in September compared with 49.5 in August. Diesel led the September demand recovery with 0.8 mb/d y-o-y growth, while naphtha and LPG grew by 0.3 mb/d y-o-y. Demand for the latter two products was supported by petrochemical plant requirements for feedstock as several propane dehydrogenation plants opened, causing the propylene margin to rebound.

Graph 4 - 4: China's oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

However, the demand for jet/kerosene softened from 0.02 mb/d y-o-y in August to a decline of 0.3 mb/d in September, despite reported improvements in airline activity in August. Moreover, as COVID-19 mobility restrictions continued, several cities in China went into full or partial lockdowns, and gasoline demand weakened by 0.2 mb/d y-o-y. Other products also declined by 0.2 mb/d y-o-y.

Table 4 - 6: China's oil demand*, mb/d

By product	Sep 21	Sep 22	Change Growth	Sep 22/Sep 21 %
LPG	2.40	2.65	0.25	10.6
Naphtha	1.34	1.66	0.32	24.0
Gasoline	3.45	3.24	-0.21	-6.0
Jet/kerosene	0.48	0.22	-0.26	-54.0
Diesel	3.22	4.00	0.78	24.3
Fuel oil	0.73	0.65	-0.08	-11.0
Other products	1.65	1.43	-0.22	-13.6
Total	**13.26**	**13.85**	**0.59**	**4.4**

*Note: * Apparent oil demand. Totals may not add up due to independent rounding.*
Sources: Argus Global Markets, China OGP (Xnhua News Agency), Facts Global Energy, JODI, National Bureau of Statistics China and OPEC.

Near-term expectations

September data suggest that Chinese oil demand is likely to remain healthy throughout 4Q22. With projected GDP growth of 3.1%, demand is expected to rise as COVID-19 restrictions are eased further. Air travel has also staged a gradual recovery. There is also expected increased demand from the petrochemical industry as several propane dehydrogenation plants are expected to open in 4Q22. Following a decline in 3Q22, oil demand is projected to soften by 0.1 mb/d y-o-y at 15.44 mb/d.

In 2023, China's economy is projected to grow by 4.8% as the COVID-19 situation improves. The gradual easing of lockdowns will pave the way for a rise in mobility and manufacturing activity. Similarly, domestic and international air travel should improve considerably in 1Q23. Accordingly, oil demand is projected to grow by 0.3 mb/d y-o-y to 15.03 mb/d.

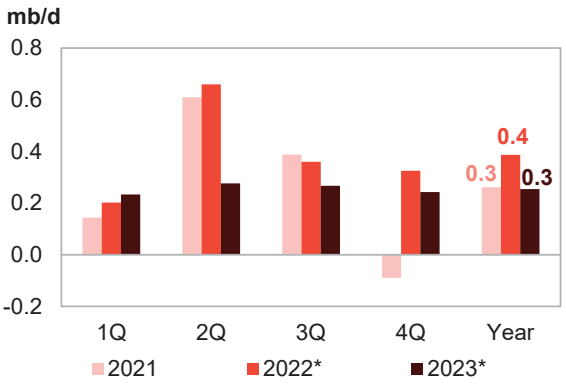
India

Update on the latest developments

India's September oil demand growth remained healthy at 0.3 mb/d (6.2%) y-o-y, supported by strong economic activity that aided mobility and social activity. Furthermore, strong growth in factory activity for the fifth month and post-monsoon agricultural and construction activity supported oil demand growth.

Oil demand in September was led by gas oil, which posted growth of 0.2 mb/d (11%) y-o-y. Diesel consumption was boosted by the rise in economic activity around the festival period, the end of the monsoon season and the corresponding rise in agricultural activity, resulting in greater use of irrigation pumps and tractors and the harvest season in some states. Historically high manufacturing activity, as suggested by the manufacturing PMI of 55.1, also supported diesel demand in September.

Graph 4 - 5: India's oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

On the back of strong mobility due to a rise in economic activity and the heavy influx of travellers in September, gasoline posted a growth of 0.06 mb/d y-o-y. India's Petroleum Planning & Analysis Cell reported that the sale of passenger and utility vehicles grew by 9.7% y-o-y in September 2022 as compared to the same month in 2021. The combined effects of these factors contributed to the rise in gasoline demand in the month. LPG posted growth of 0.03 mb/d (3%) y-o-y. India's LPG demand is mainly driven by cooking (89%), small-scale petrochemical industries, and fuel for three- and four-wheel vehicles. With regard to other fuels, jet fuel demand was up 18%, or 0.02 mb/d y-o-y, while demand for naphtha fell by 0.02 mb/d year. Aviation fuel benefited from improvements in air travel, while naphtha was affected by softening demand in the petrochemical and power-generation industries.

Table 4 - 7: India's oil demand, mb/d

By product	Sep 21	Sep 22	Change Growth	Sep 22/Sep 21 %
LPG	1.01	1.04	0.03	3.2
Naphtha	0.29	0.27	-0.02	-7.1
Gasoline	0.78	0.85	0.06	8.3
Jet/kerosene	0.13	0.16	0.02	18.1
Diesel	1.60	1.78	0.17	10.8
Fuel oil	0.22	0.23	0.01	6.1
Other products	0.80	0.82	0.01	1.9
Total	**4.84**	**5.14**	**0.30**	**6.2**

Note: Totals may not add up due to independent rounding.

Sources: JODI, Petroleum Planning and Analysis Cell of India and OPEC.

Near-term expectations

India's oil demand outlook in 4Q22 should continue to benefit from strong annual GDP growth of 6.5% in 2022 and robust manufacturing activity. An expected rise in consumer confidence will support mobility and demand for industrial products. Furthermore, the post-monsoon kharif harvesting season and construction activity are also expected to support demand growth. Accordingly, oil demand in 4Q22 is projected to grow by 0.3 mb/d y-o-y.

Distillates are expected to be supported by harvesting, construction and manufacturing activity in October. Additionally, annual traditional festivities and an influx of travellers will support mobility and boost gasoline demand, and improvements in air travel will aid jet/kerosene demand. Finally, rising natural gas prices will lead to gas-to-oil switching in power generation and the industrial sector, thus improving the demand for fuel oil and distillates.

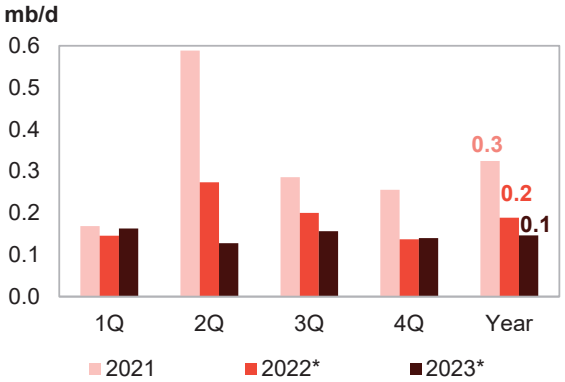
In 1Q23, India's oil demand is expected to remain on a positive trajectory, growing on average at 0.2 mb/d y-o-y. In 1Q23, gas-to-oil switching is expected to continue. Similarly, zaid crops are sown and harvested between March and July. Given these factors, combined with healthy annual GDP growth of 5.6% in 2023, the total demand in 1Q23 is expected to remain healthy. The improvement in demand growth will be aided by mobility and steady demand for distillates in manufacturing and construction. The residential and petrochemical sectors' demand for light distillates will also remain steady amidst the aviation sector's demand for jet/kerosene.

Latin America

Update on the latest developments

Oil demand in Latin America posted healthy growth of 0.3 mb/d y-o-y in August, driven by requirements in Venezuela and supported by Brazil and Argentina. The demand improvement was led by residual and other fuels posting annual growth of 0.1 mb/d y-o-y each, while gasoline improved and grew by 0.05 mb/d y-o-y. Airlines in Latin America recorded y-o-y growth in RPKs of 110.4%, and international RPKs for regional carriers were at 77.3% of the pre-pandemic level. Accordingly, jet/kerosene grew by 0.05 mb/d y-o-y in August. Furthermore, diesel posted growth of 0.05 mb/d y-o-y as the manufacturing PMI in Brazil remains relatively healthy at 51.86. Finally, LPG grew by a marginal 0.01 mb/d, and naphtha declined by 0.01 mb/d y-o-y.

Graph 4 - 6: Latin America's oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

Near-term expectations

Oil demand in the region is expected to continue to improve in 4Q22, supported by projected healthy annual GDP growth of 2.7% in 2022. The improved manufacturing PMI amidst a decline in COVID-19 in big consuming countries will support oil demand recovery in the region. Accordingly, oil demand growth in the region is expected to increase by 0.1 mb/d y-o-y in 4Q22 to 6.40 mb/d, about 0.14 mb/d above the 3Q21 level.

In 2023, oil demand growth is forecast to remain at 0.2 mb/d to 6.48 mb/d in 1Q23, about 0.14 mb/d above the same period in 2022. Demand will be supported by annual GDP growth of 1.6 % in 2023, combined with continuous improvements in the COVID-19 situation in the region as vaccination programmes accelerate. Nonetheless, the prospects for oil demand still largely hinge on the strength of the region's economic recovery and containment of the pandemic, as well as spill-over from the slowdown in the global economy.

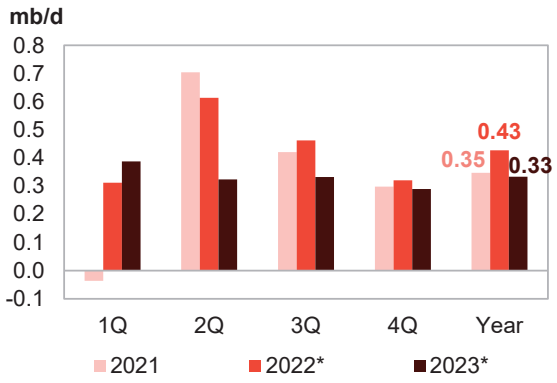
Middle East

Update on the latest developments

Oil demand growth in the Middle East remained strong at 0.6 mb/d y-o-y in August. Requirements for power generation, diesel and other fuels supported demand, with other products posting growth of 0.2 mb/d y-o-y while diesel grew by 0.2 mb/d y-o-y. Demand in the Saudi Arabian and Iraqi power generation sectors due to hot weather are the main driver of the region's demand growth for residual fuels and diesel. Residual fuels remain on a positive growth trajectory at 0.04 mb/d y-o-y.

Furthermore, mobility in the region remains very strong, with gasoline demand growing by 0.1 mb/d y-o-y. IATA's Air Passenger Market Analysis for August suggests that airline activity continues on a strong positive trend in the Middle East, with jet/kerosene growing by 0.02 mb/d y-o-y in August.

Graph 4 - 7: Middle East's oil demand, y-o-y change



*Note: * 2022-2023 = Forecast. Source: OPEC.*

LPG has remained at 0.02 mb/d y-o-y, the same as in July. However, naphtha improved from a y-o-y decline of 0.01 mb/d.

The latest data on Iraq indicates strong growth of 0.3 mb/d y-o-y in September. Other fuels posted growth of 0.2 mb/d y-o-y. Similarly, residuals grew by 0.04 mb/d y-o-y as gasoline posted growth of 0.02 mb/d y-o-y.

Table 4 - 8: Saudi Arabia's oil demand, mb/d

By product	Sep 21	Sep 22	Change Growth	Sep 22/Sep 21 %
LPG	0.04	0.05	0.00	10.8
Gasoline	0.52	0.53	0.01	2.3
Jet/kerosene	0.06	0.08	0.01	22.5
Diesel	0.56	0.63	0.07	12.4
Fuel oil	0.65	0.68	0.03	4.2
Other products	0.63	0.61	-0.02	-2.5
Total	**2.46**	**2.57**	**0.11**	**4.5**

Note: Totals may not add up due to independent rounding.

Sources: JODI and OPEC.

Near-term expectations

Strong economic activity in the region will continue to support oil demand in the near future. Saudi Arabia's economy is expected to expand by 9% in 2022. Similarly, the United Arab Emirates (UAE) is optimistic its economy will grow robustly this year as it continues to recover from the pandemic. The anticipated robust economic growth in the region is expected to support consumer spending as well as accelerate mobility and industrial activity. In addition, the hot season is expected to boost electricity demand due to the requirements for air conditioning. Hence, demand for residual and fuel oil will continue to accelerate in 4Q22.

Accordingly, oil demand in the region is projected to increase by 0.3 mb/d y-o-y. Similarly, jet/kerosene demand will further support the region's oil demand growth as the recovery in international air traffic remains on an upward trajectory.

In 2023, the oil demand momentum will increase from the pace of 4Q22 and is projected to grow by 0.4 mb/d y-o-y in 1Q23. Economic growth in the region is expected to be stable and support consumer confidence, which will spur the region's demand for social services and consumer goods. Gasoline, transportation diesel and jet/kerosene are expected to lead oil demand growth. Gasoil/diesel and fuel oil demand for power generation are also expected to play a significant role in demand growth.

World Oil Supply

Non-OPEC liquids supply in 2022 (including processing gains) is estimated to grow by 1.9 mb/d to average 65.6 mb/d. This is revised down slightly by 30 tb/d compared with the previous assessment. Upward revisions to liquids production in Latin America and Russia were more than offset by downward revisions to Other Eurasia, OECD Europe and Other Asia. It should be noted, however, that considerable uncertainty remains with regard to Russia's liquid output in 4Q22.

In the US, drilling and completion activities have expanded, with movement no longer limited to core areas. However, supply chain issues and higher costs related to inflation remain challenges for equipment and service demand. Although higher crude oil production was broadly offset by lower non-crude oil output in August, US liquids production is expected to rise at a slow and steady rate in the coming months. Accordingly, the US liquids supply growth forecast for 2022 is unchanged at 1.1 mb/d. The production forecast for Other Eurasia was revised down, due to lower-than-expected output in Azerbaijan, as well as on emergency repairs at an export terminal and planned maintenance in Kazakhstan. Extended maintenance on North Sea platforms also reduced 3Q22 output in the region. The main drivers of liquids supply growth for 2022 are expected to be the US, Canada, Guyana, China and Brazil, while production is expected to see the largest declines in Norway and Thailand.

Non-OPEC liquids production growth in 2023 is forecast to grow by 1.5 mb/d to average 67.1 mb/d, broadly unchanged from last month. Liquids supply in OECD countries is forecast to increase by 1.7 mb/d, while the non-OECD region is expected to show a decline of 0.2 mb/d. The main growth drivers are expected to be the US, Norway, Brazil, Canada, Kazakhstan and Guyana, whereas oil production is forecast to see declines in Russia and Mexico. Nevertheless, large uncertainties persist around US shale production potential, as well as the development of the geopolitical situation in Eastern Europe, particularly the looming EU sanctions on Russian oil imports.

OPEC NGLs and non-conventional liquids production in 2022 are forecast to grow by 0.1 mb/d to average 5.4 mb/d and to grow by 50 tb/d to average 5.4 mb/d in 2023. OPEC-13 crude oil production in October decreased by 210 tb/d m-o-m to average 29.49 mb/d, according to available secondary sources.

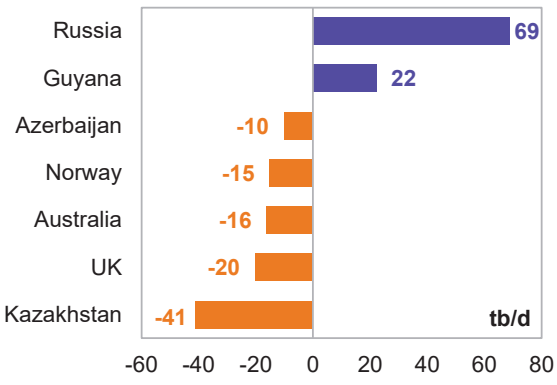
Non-OPEC liquids production in October, including OPEC NGLs, is estimated to have increased m-o-m by 0.9 mb/d to average 72.0 mb/d, up by 2.0 mb/d y-o-y. As a result, preliminary data indicates that October's global oil supply increased by 0.7 mb/d m-o-m to average 101.5 mb/d, up by 4.0 mb/d y-o-y.

The **non-OPEC liquids supply forecast for 2022** was revised down slightly by 24 tb/d to average 65.6 mb/d. Y-o-y growth averaged 1.9 mb/d, which is lower by 30 tb/d compared to the previous month.

The **OECD** supply growth forecast for 2022 was revised down by 39 tb/d. OECD Europe and OECD Asia Pacific saw downward revisions, while OECD Americas was revised up from the previous month's assessment.

The **non-OECD** supply growth forecast for 2022 was revised up by a minor 9 tb/d. A downward revision to Other Eurasia and Other Asia was offset by upward revisions to Latin America and Russia.

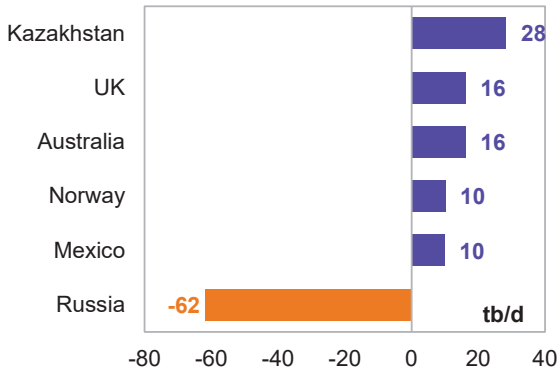
Graph 5 - 1: Major revisions to annual supply change forecast in 2022*, MOMR Nov 22/Oct 22



*Note: * 2022 = Forecast. Source: OPEC.*

Non-OPEC liquids production growth in 2023 was revised up by a minor 16 tb/d compared with the previous month's assessment, mainly due to higher expected growth in Kazakhstan and the North Sea.

Graph 5 - 2: Major revisions to annual supply change forecast in 2023*, MOMR Nov 22/Oct 22

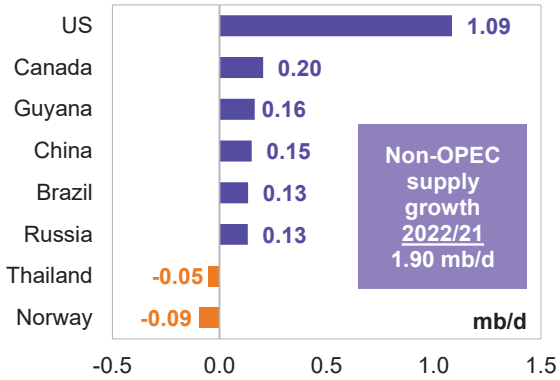


*Note: * 2023 = Forecast. Source: OPEC.*

Key drivers of growth and decline

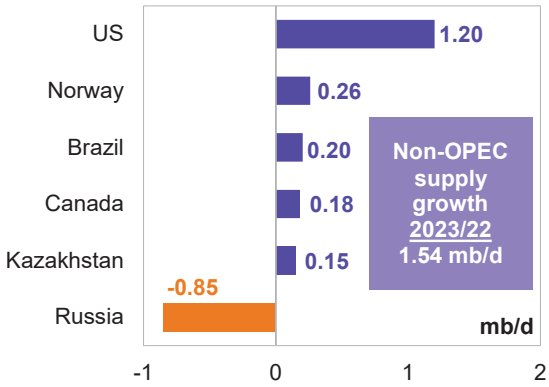
The **key drivers of non-OPEC liquids supply growth in 2022** are projected to be the US, Canada, Guyana, China and Brazil, while oil production is expected to see the largest declines in Norway and Thailand.

Graph 5 - 3: Annual liquids production changes for selected countries in 2022*



*Note: * 2022 = Forecast. Source: OPEC.*

Graph 5 - 4: Annual liquids production changes for selected countries in 2023*



*Note: * 2023 = Forecast. Source: OPEC.*

For **2023**, the key drivers of non-OPEC supply growth are forecast to be the US, Norway, Brazil, Canada, Kazakhstan and Guyana, while oil production is projected to decline, mainly in Russia and Mexico.

Non-OPEC liquids production in 2022 and 2023

Table 5 - 1: Non-OPEC liquids production in 2022*, mb/d

Non-OPEC liquids production	2021	1Q22	2Q22	3Q22	4Q22	2022	Change 2022/21 Growth	Change 2022/21 %
Americas	25.25	25.86	26.27	26.93	27.29	26.59	1.34	5.31
of which US	*17.85*	*18.27*	*18.83*	*19.19*	*19.44*	*18.93*	*1.09*	*6.08*
Europe	3.76	3.73	3.43	3.51	3.87	3.64	-0.12	-3.13
Asia Pacific	0.51	0.49	0.51	0.43	0.53	0.49	-0.02	-4.11
Total OECD	**29.52**	**30.08**	**30.22**	**30.88**	**31.69**	**30.72**	**1.20**	**4.08**
China	4.31	4.51	4.52	4.38	4.43	4.46	0.15	3.51
India	0.78	0.78	0.77	0.75	0.80	0.78	0.00	-0.27
Other Asia	2.41	2.35	2.30	2.25	2.38	2.32	-0.09	-3.56
Latin America	5.95	6.11	6.18	6.44	6.56	6.32	0.37	6.18
Middle East	3.24	3.29	3.33	3.37	3.37	3.34	0.10	3.08
Africa	1.35	1.33	1.31	1.33	1.32	1.32	-0.03	-1.89
Russia	10.80	11.33	10.63	11.01	10.77	10.93	0.13	1.23
Other Eurasia	2.93	3.05	2.77	2.62	3.08	2.88	-0.05	-1.59
Other Europe	0.11	0.11	0.11	0.10	0.10	0.11	-0.01	-6.36
Total Non-OECD	**31.87**	**32.85**	**31.92**	**32.25**	**32.81**	**32.46**	**0.58**	**1.84**
Total Non-OPEC production	61.39	62.93	62.14	63.13	64.50	63.18	1.79	2.91
Processing gains	2.29	2.40	2.40	2.40	2.40	2.40	0.11	4.90
Total Non-OPEC liquids production	**63.68**	**65.33**	**64.54**	**65.53**	**66.90**	**65.58**	**1.90**	**2.98**
Previous estimate	63.67	65.34	64.51	65.77	66.78	65.60	1.93	3.03
Revision	0.01	0.00	0.03	-0.24	0.12	-0.02	-0.03	-0.05

*Note: * 2022 = Forecast. Totals may not add up due to independent rounding. Source: OPEC.*

Table 5 - 2: Non-OPEC liquids production in 2023*, mb/d

Non-OPEC liquids production	2022	1Q23	2Q23	3Q23	4Q23	2023	Change 2023/22 Growth	Change 2023/22 %
Americas	26.59	27.60	27.70	28.05	28.43	27.95	1.35	5.09
of which US	*18.93*	*19.75*	*20.05*	*20.24*	*20.47*	*20.13*	*1.20*	*6.33*
Europe	3.64	3.97	3.95	3.84	3.97	3.93	0.29	8.10
Asia Pacific	0.49	0.51	0.48	0.50	0.49	0.50	0.00	0.97
Total OECD	**30.72**	**32.08**	**32.13**	**32.40**	**32.89**	**32.38**	**1.65**	**5.38**
China	4.46	4.51	4.50	4.47	4.47	4.49	0.03	0.64
India	0.78	0.80	0.79	0.78	0.77	0.79	0.01	1.12
Other Asia	2.32	2.38	2.38	2.35	2.37	2.37	0.05	2.16
Latin America	6.32	6.47	6.65	6.71	6.78	6.66	0.33	5.27
Middle East	3.34	3.35	3.36	3.39	3.39	3.37	0.03	0.99
Africa	1.32	1.32	1.34	1.35	1.37	1.35	0.02	1.87
Russia	10.93	9.92	10.07	10.14	10.19	10.08	-0.85	-7.78
Other Eurasia	2.88	3.10	3.07	3.04	3.08	3.07	0.19	6.65
Other Europe	0.11	0.10	0.10	0.10	0.10	0.10	0.00	-2.83
Total Non-OECD	**32.46**	**31.96**	**32.26**	**32.33**	**32.53**	**32.27**	**-0.18**	**-0.57**
Total Non-OPEC production	63.18	64.04	64.39	64.73	65.42	64.65	1.47	2.33
Processing gains	2.40	2.47	2.47	2.47	2.47	2.47	0.07	2.96
Total Non-OPEC liquids production	**65.58**	**66.51**	**66.86**	**67.20**	**67.89**	**67.12**	**1.54**	**2.35**
Previous estimate	65.60	66.56	66.83	67.23	67.88	67.13	1.52	2.32
Revision	-0.02	-0.04	0.04	-0.03	0.01	-0.01	0.02	0.02

*Note: * 2022-2023 = Forecast. Totals may not add up due to independent rounding. Source: OPEC.*

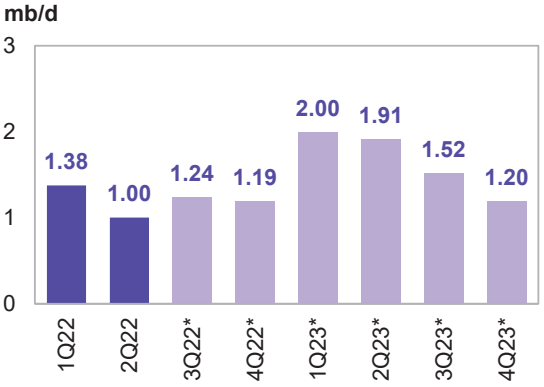
OECD

OECD liquids production in 2022 is forecast to increase by 1.2 mb/d y-o-y to average 30.7 mb/d. This has been revised down by 38 tb/d compared with a month earlier, due to downward revisions for OECD Europe and Australia.

OECD Americas was revised up slightly by 13 tb/d compared with last month's assessment and is now expected to grow by 1.3 mb/d to average 26.6 mb/d. OECD Europe is anticipated to decline y-o-y by 0.1 mb/d to average 3.6 mb/d. OECD Asia Pacific is forecast to drop by 21 tb/d y-o-y to average 0.5 mb/d.

For **2023**, oil production in the OECD is forecast to grow by 1.7 mb/d to average 32.4 mb/d. Growth is led by OECD Americas at 1.4 mb/d to average 27.9 mb/d. Yearly liquids production in OECD Europe is anticipated to grow by 0.3 mb/d to average 3.9 mb/d, while OECD Asia Pacific is expected to remain broadly unchanged, to average 0.5 mb/d.

Graph 5 - 5: OECD quarterly liquids supply, y-o-y changes



*Note: * 3Q22-4Q23 = Forecast. Source: OPEC.*

OECD Americas

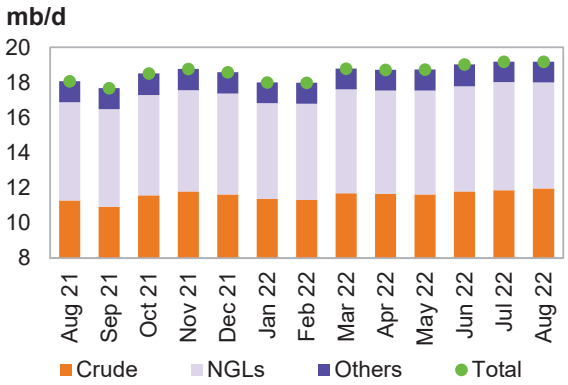
US

US liquids production remained broadly unchanged m-o-m in **August 2022** to average 19.2 mb/d, albeit up by 1.1 mb/d compared with August 2021.

Crude oil and condensate production rose m-o-m by 102 tb/d in **August 2022** to average 12.0 mb/d, up by 0.7 mb/d y-o-y.

In terms of the **crude and condensate production breakdown by region (PADDs)**, production increased mainly in the US Gulf Coast (USGC). The region was up by 104 tb/d to average 8.6 mb/d. Production in the Rocky Mountain region rose by 17 tb/d, while the West Coast showed a slight decrease of 19 tb/d. The Midwest and the East Coast remained broadly unchanged m-o-m. Production growth in the main regions was primarily driven by higher completion and fracking activities and a recovery in Gulf of Mexico (GoM) production to normal levels.

Graph 5 - 6: US monthly liquids output by key component



Source: OPEC.

NGLs production was down by 113 tb/d m-o-m to average 6.0 mb/d in August, but this was higher y-o-y by 0.4 mb/d. Production of **non-conventional liquids** (mainly ethanol) increased by 8 tb/d m-o-m to average 1.2 mb/d in August, according to the US Department of Energy (DoE). Preliminary estimates see non-conventional liquids averaging 1.1 mb/d in September 2022, down by 80 tb/d compared with the previous month.

GoM production rose m-o-m by 21 tb/d in August to average 1.8 mb/d, as maintenance wrapped up in the Gulf Coast offshore platforms. In the **onshore Lower 48**, August production increased m-o-m by 100 tb/d to average 9.8 mb/d.

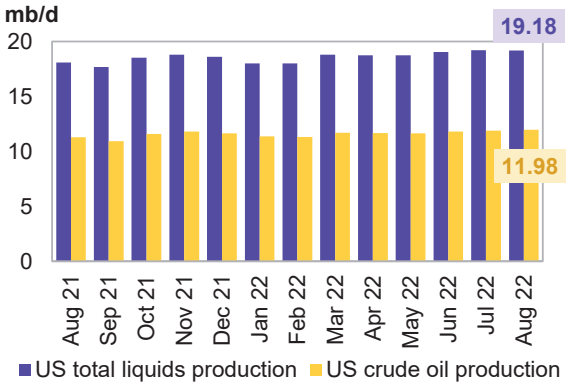
Looking at **individual states**, New Mexico's oil production increased by a minor 9 tb/d m-o-m to average 1.6 mb/d, which is 203 tb/d higher than a year ago. Texas production was up by 78 tb/d to average 5.1 mb/d, which is 231 tb/d higher than a year ago. In the Midwest, North Dakota production dropped m-o-m by just 6 tb/d to average 1.1 mb/d, down by 39 tb/d y-o-y, while Oklahoma's production was up by 7 tb/d to average 0.4 mb/d. Alaska's output was down by 19 tb/d m-o-m, and in Colorado, production dropped by a minor 6 tb/d.

Table 5 - 3: US crude oil production by selected state and region, tb/d

State	Aug 21	Jul 22	Aug 22	Change m-o-m	Change y-o-y
Texas	4,865	5,018	5,096	*78*	*231*
Gulf of Mexico (GOM)	1,549	1,762	1,783	*21*	*234*
New Mexico	1,378	1,572	1,581	*9*	*203*
North Dakota	1,098	1,065	1,059	*-6*	*-39*
Colorado	418	431	425	*-6*	*7*
Alaska	409	432	413	*-19*	*4*
Oklahoma	385	406	413	*7*	*28*
Total	**11,277**	**11,873**	**11,975**	***102***	***698***

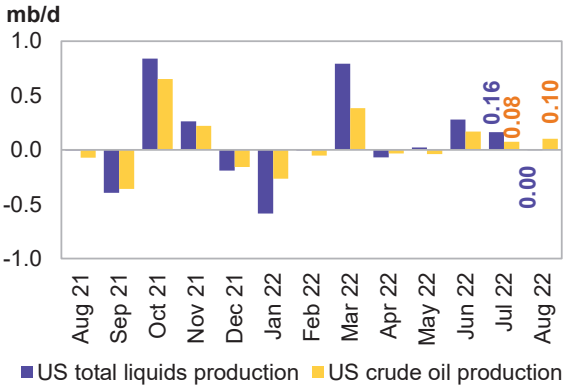
Sources: EIA and OPEC.

Graph 5 - 7: US monthly crude oil and total liquids supply



Sources: EIA and OPEC.

Graph 5 - 8: US monthly crude oil and total liquids supply, m-o-m changes



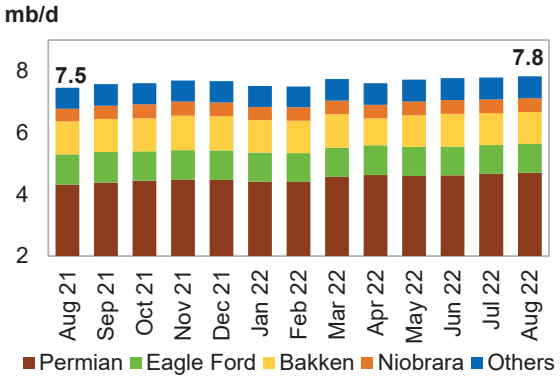
Sources: EIA and OPEC.

US tight crude output in **August 2022** is estimated to have risen by 38 tb/d m-o-m to average 7.8 mb/d, according to data from the Energy Information Administration (EIA). This was 0.4 mb/d higher than in the same month a year earlier.

The m-o-m increase from shale and tight formations using horizontal wells came mainly from the Permian, which increased by 42 tb/d to average 4.7 mb/d. This was up by 0.4 mb/d y-o-y.

In the Williston Basin, Bakken shale production remained broadly unchanged m-o-m to average 1.0 mb/d. This is down by 36 tb/d y-o-y. Tight crude output at Eagle Ford in Texas fell marginally by 5 tb/d to average 0.9 mb/d. This is down by 53 tb/d y-o-y. Production in Niobrara-Codell in Colorado and Wyoming was unchanged to average 0.45 mb/d.

Graph 5 - 9: US tight crude output breakdown



Sources: EIA, Rystad Energy and OPEC.

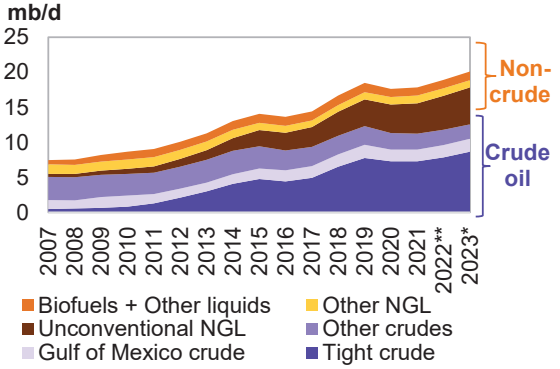
US liquids production in 2022, excluding processing gains, is forecast to expand y-o-y by 1.1 mb/d to average 18.9 mb/d, unchanged compared with the previous assessment. Tight crude is forecast to expand by 0.6 mb/d in 2022 to average 7.9 mb/d. In addition, NGLs (mainly from unconventional basins) are projected to grow by 0.5 mb/d to average 5.9 mb/d, and production in the GoM is anticipated to increase by 20 tb/d. Non-conventional liquids are projected to expand by 40 tb/d to average 1.2 mb/d. However, the expected growth is likely to be partially offset by y-o-y natural declines of 0.1 mb/d in onshore conventional fields.

Given the current pace of oil field drilling and well completions, **crude oil and condensate production** is forecast to grow by 0.5 mb/d y-o-y to average 11.8 mb/d in 2022. This forecast assumes continued capital discipline, current inflation rates, continuing supply chain issues and oil field service limitations (labour and equipment). Tightness in the hydraulic fracking market has been one of the biggest issues for US producers in recent months.

US liquids production in 2023, excluding processing gains, is forecast to grow by 1.2 mb/d y-o-y to average 20.1 mb/d, unchanged from the previous assessment. Higher drilling activities and fewer supply chain/logistical issues in the prolific Permian, Eagle Ford and Bakken shale sites are assumed for 2023. Crude oil output is anticipated to increase by 0.8 mb/d y-o-y to average 12.6 mb/d. Average tight crude output in 2023 is forecast at 8.7 mb/d, up by 0.8 mb/d y-o-y.

At the same time, NGLs production and non-conventional liquids, particularly ethanol, are forecast to increase y-o-y by 0.35 mb/d and 40 tb/d, to average 6.3 mb/d and 1.3 mb/d, respectively.

Graph 5 - 10: US liquids supply developments by component



*Note: * 2022-2023 = Forecast.*
Source: OPEC.

Table 5 - 4: US liquids production breakdown, mb/d

US liquids	2021	Change 2021/20	2022*	Change 2022/21	2023*	Change 2023/22
Tight crude	7.28	-0.03	7.87	0.59	8.67	0.80
Gulf of Mexico crude	1.71	0.04	1.73	0.02	1.83	0.10
Conventional crude oil	2.27	-0.07	2.19	-0.08	2.10	-0.09
Total crude	**11.25**	**-0.06**	**11.78**	**0.53**	**12.59**	**0.81**
Unconventional NGLs	4.30	0.22	4.86	0.55	5.26	0.40
Conventional NGLs	1.12	0.03	1.10	-0.03	1.04	-0.05
Total NGLs	**5.42**	**0.25**	**5.95**	**0.53**	**6.30**	**0.35**
Biofuels + Other liquids	1.17	0.02	1.21	0.04	1.25	0.04
US total supply	**17.85**	**0.21**	**18.94**	**1.09**	**20.13**	**1.20**

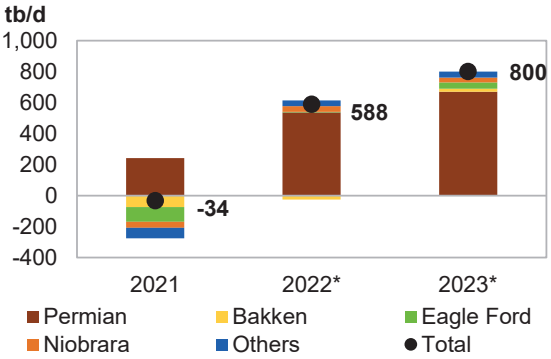
*Note: * 2022-2023 = Forecast. Sources: EIA, OPEC and Rystad Energy.*

US tight crude production in the **Permian** in 2022 is estimated to increase y-o-y by 0.5 mb/d to 4.7 mb/d and then forecast to grow by 0.7 mb/d y-o-y to average 5.4 mb/d in 2023.

The **Bakken** shale production decline that occurred in 2020 and 2021 is expected to continue in 2022. Tight crude production in the Bakken is estimated to drop by 25 tb/d in 2022 to average 1.1 mb/d, which is lower than the pre-pandemic average output of 1.4 mb/d. Drilling activities in North Dakota and available DUC wells are lower than the required levels to revive output. In 2023, growth is forecast to resume at 21 tb/d to average 1.1 mb/d.

The **Eagle Ford** in Texas saw output of 1.2 mb/d in 2019 but then declined in 2020 and 2021. It is estimated to grow in 2022 by a minor 5 tb/d to average 1.0 mb/d. Growth of 40 tb/d is then forecast for 2023, to average just over 1.0 mb/d.

Graph 5 - 11: US tight crude output by shale play, y-o-y changes



*Note: * 2022-2023 = Forecast.*
Sources: EIA, Rystad Energy and OPEC.

Niobrara production is estimated to grow y-o-y by 37 tb/d in 2022 and forecast to increase by 30 tb/d in 2023 to average 450 tb/d and 480 tb/d, respectively. Other shale plays are expected to show marginal increases totalling 36 tb/d and 40 tb/d in 2022 and 2023, given current drilling and completion activities.

Table 5 - 5: US tight oil production growth, mb/d

US tight oil	2021	Change 2021/20	2022*	Change 2022/21	2023*	Change 2023/22
Permian tight	4.15	0.24	4.69	0.54	5.36	0.67
Bakken shale	1.08	-0.07	1.05	-0.03	1.08	0.02
Eagle Ford shale	0.96	-0.09	0.97	0.00	1.01	0.04
Niobrara shale	0.41	-0.04	0.45	0.04	0.48	0.03
Other tight plays	0.67	-0.07	0.71	0.04	0.75	0.04
Total	**7.28**	**-0.03**	**7.87**	**0.59**	**8.67**	**0.80**

*Note: * 2022-2023 = Forecast. Source: OPEC.*

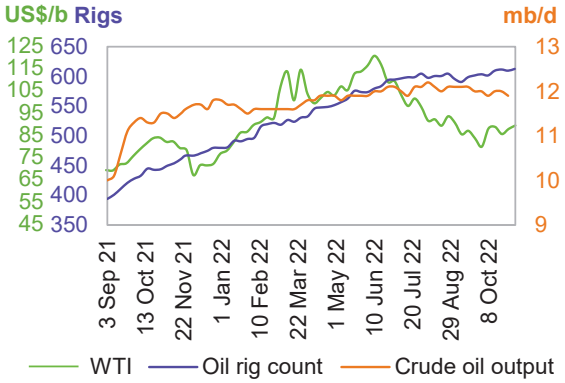
US rig count, spudded, completed, DUC wells and fracking activity

Total **US active drilling rigs** increased by two units to 770 rigs in the week ending 4 November. This was up by 220 rigs compared with a year ago. The number of active offshore rigs remained unchanged w-o-w at 14, up from 13 in the same month a year earlier. Onshore oil and gas rigs increased by two w-o-w to stand at 754 rigs, up by 219 rigs y-o-y, with two rigs in inland waters.

The **US horizontal rig count** rose by two w-o-w to 705, compared with 492 horizontal rigs a year ago. The number of drilling rigs for oil rose w-o-w by three to 613, while gas-drilling rigs fell by one to 155.

The Permian's rig count remained unchanged w-o-w at 346 rigs. This was also the case in the Eagle Ford, Cana Woodford and DJ-Niobrara at 70, 28 and 20, respectively. However, the rig count increased w-o-w by two in the Williston to 41. There have been just three operating oil rigs in the Barnett basin since mid-September.

Graph 5 - 12: US weekly rig count vs. US crude oil output and WTI price



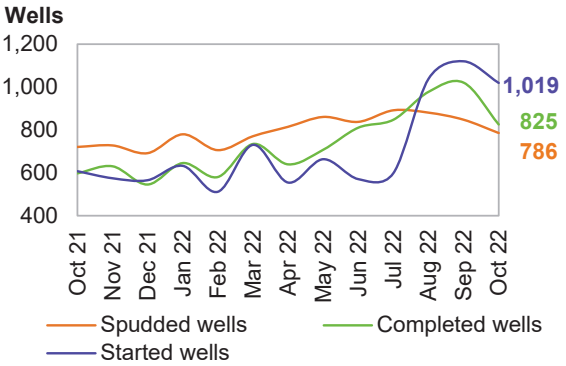
Sources: Baker Hughes, EIA and OPEC.

Drilling and completion (D&C) activities for spudded, completed and started wells in all US shale plays, based on the EIA-DPR regions, saw 848 horizontal wells spudded in September 2022 (as per preliminary data). This is down by 33 m-o-m but 28% higher than in September 2021.

In September 2022, preliminary data indicates a higher number of completed wells at 1,020. This is up 80% y-o-y. Moreover, the number of started wells was estimated at 1,120, which is 115% higher than a year earlier.

Preliminary data for October estimates 786 spudded, 825 completed and 1,019 started wells, according to Rystad Energy.

Graph 5 - 13: Spudded, completed and started wells in US shale plays

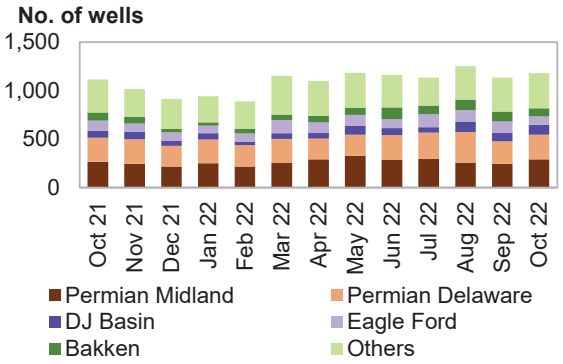


Note: Sep 22-Oct 22 = Preliminary data.
Sources: Rystad Energy and OPEC.

In terms of identified **US oil and gas fracking operations by region**, Rystad Energy reported that 1,251 wells were fracked in August 2022. In September and October, it stated that 1,134 and 1,179 wells started fracking, respectively. These preliminary numbers are based on an analysis of high-frequency satellite data.

Preliminary September data on fracking showed that 244 and 234 wells were fracked in the Permian Midland Tight and Permian Delaware Tight, respectively. In comparison with August, there was a decline of 14 wells fracked in the Midland and a drop of 83 wells fracked in the Delaware tight, according to preliminary data. Data also indicated that 90 wells were fracked in the DJ Basin, 114 in the Eagle Ford and 103 in the Bakken during August.

Graph 5 - 14: Fracked wells count per month



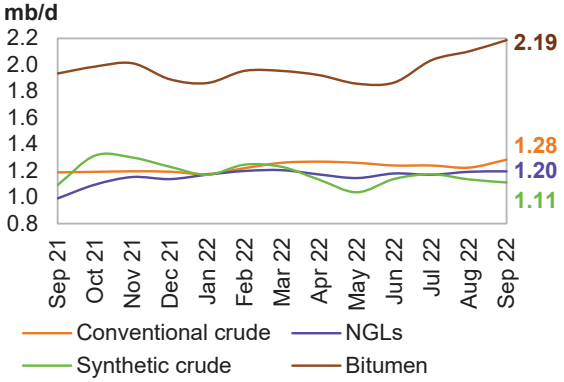
Note: Sep 22-Oct 22 = Preliminary data.
Sources: Rystad Energy Shale Well Cube and OPEC.

Canada

Canada's liquids production in September is estimated to have increased m-o-m by 124 tb/d to average 5.8 mb/d, as seasonal 2Q22 maintenance was completed. This was the highest Canadian production on record.

Crude bitumen production output fell m-o-m by 23 tb/d in August, while synthetic crude increased by 84 tb/d. Taken together, crude bitumen and synthetic crude production rose by 61 tb/d to 3.3 mb/d. Conventional crude production increased by 60 tb/d m-o-m to average 1.3 mb/d. NGLs output remained broadly unchanged m-o-m to average 1.2 mb/d.

Graph 5 - 15: Canada's monthly liquids production development by type

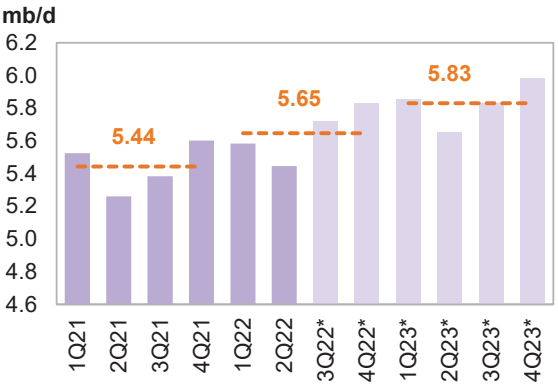


Sources: National Energy Board and OPEC.

Canada's liquids supply in **2022** is forecast to expand by 0.2 mb/d to average 5.6 mb/d, up by a minor 9 tb/d from the previous assessment. Canada's production is forecast to grow in 4Q22, as upgraders return from maintenance and oil sands optimizations and ramp-ups continue. Fort Hills is set to undergo maintenance near the end of the year , and the facility will only be operating one train. Imperial's Kearl Lake production is expected to remain steady for the remainder of the year, partially offsetting the expected December decline from Fort Hills. Additionally, the Terra Nova FPSO is expected to resume production by the end of the year, adding 30 tb/d of supply.

For **2023**, Canada's liquids production is forecast to increase gradually at a pace similar to 2022, rising by 0.2 mb/d to average 5.8 mb/d. Incremental production will come mainly from Alberta's oil sands, which saw an average output of 3.1 mb/d from January to September 2022.

Graph 5 - 16: Canada's quarterly liquids production and forecast



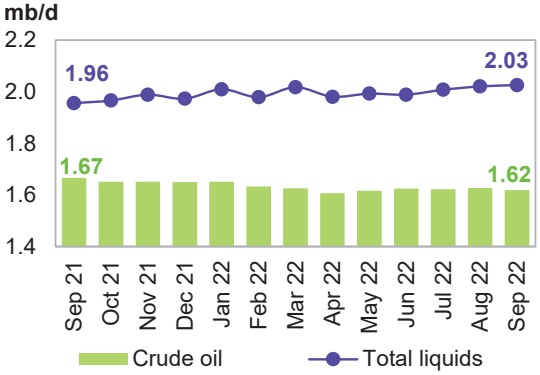
*Note: * 3Q22-4Q23 = Forecast. Source: OPEC.*

Mexico

Mexico's crude output remained largely flat m-o-m in **September** to average 1.6 mb/d, while NGLs output increased by 12 tb/d due to the extended ramp-up of condensate fields like Quesqui. This saw Mexico's total September liquids output increase by a minor 5 tb/d m-o-m to average 2.0 mb/d, according to Pemex.

For **2022**, liquids production in Mexico is forecast to average 2.0 mb/d, broadly unchanged from the previous month. The 50 tb/d growth in 2022 is expected to be driven by foreign-operated fields, while minor growth is also anticipated in Pemex-operated fields. High decline rates in mature fields like Ku-Maloob-Zaap and Xanab are expected to be partially offset by the ramp up of the Quesqui and Tulpico fields in 4Q22.

Graph 5 - 17: Mexico's monthly liquids and crude production development



Sources: PEMEX and OPEC.

For **2023**, liquids production is forecast to decline by 29 tb/d to average 1.98 mb/d, although this is10 tb/d higher than the previous assessment, due to expected higher output from Pemex-operated fields. Nevertheless, the total crude production decline in Pemex's mature fields is projected to outweigh production ramp-ups from other fields.

OECD Europe

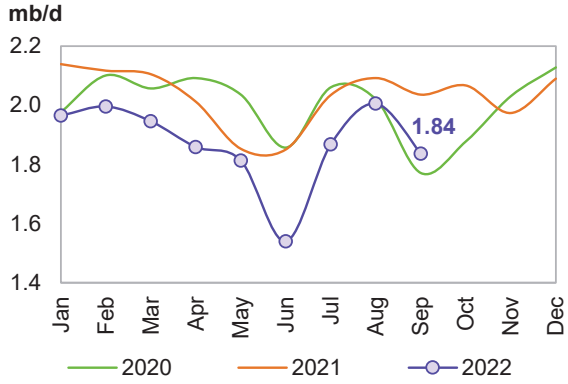
Norway

Norwegian liquids production in **September** declined by 170 tb/d m-o-m, to average 1.8 mb/d. Some offshore fields returned from summer maintenance, but this was outweighed by September maintenance in the Oseberg and Troll fields.

Norway's crude production fell by 141 tb/d m-o-m in September to average 1.6 mb/d, down by 137 tb/d y-o-y. Monthly oil production was 9.5% lower than the Norwegian Petroleum Directorate's (NPD) forecast.

At the same time, the production of NGLs and condensates decreased by 29 tb/d m-o-m to average 0.2 mb/d, according to NPD data.

Graph 5 - 18: Norway's monthly liquids production development



Sources: NPD and OPEC.

For **2022**, production growth is revised down by 15 tb/d y-o-y to average 1.9 mb/d. This is mainly due to the downward revision in 3Q22 output on the back of maintenance at a number of key fields, including Oseberg and Troll. In addition, for October, unspecified production issues at Troll are expected to impact production levels. However, further growth from some small start-ups is expected in 4Q22, in addition to some fields returning from maintenance and the potential start of production from Phase 2 of the Johan Sverdrup field development. Equinor has not yet provided a firm start-up date for this phase beyond a fourth-quarter window.

For **2023**, Norwegian liquids production is forecast to expand by 0.3 mb/d, revised up by 10 tb/d compared with the previous month, to average 2.2 mb/d. A number of small-to-large projects are scheduled to ramp up in 2023. Importantly, the Johan Sverdrup Phase 2 ramp-up is projected to be the main source of increased output for the year, accounting for roughly 35% of Norway's total crude and condensate production.

It should be noted that the Norwegian government has announced plans to hike tax rates for the country's oil and gas industry, citing the surge in crude and gas prices as the driver. However, the higher rate is not expected to negatively impact future offshore developments as operators were already aware that the previous temporary tax package would expire by the end of the year.

UK

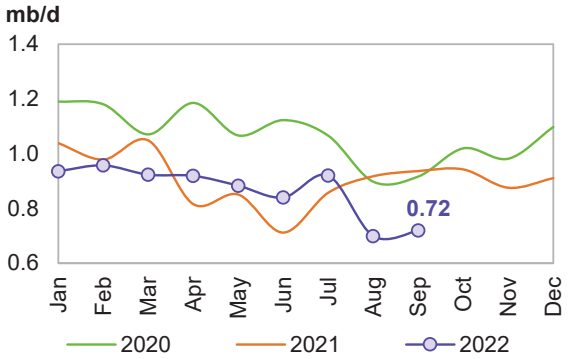
UK liquids production increased m-o-m in **September** by 21 tb/d to average 0.7 mb/d. Crude oil output increased by 16 tb/d m-o-m to average 0.6 mb/d, according to official data, but was lower by 222 tb/d y-o-y. NGLs output declined by a minor 5 tb/d to average 84 tb/d. UK liquids output in September was down 23% from the same month a year earlier, which was mainly due to extended maintenance.

For **2022**, UK liquids production is forecast to decline by 29 tb/d to average 0.9 mb/d. This was revised down by 20 tb/d from the previous assessment, owing to lower-than-expected production in 3Q22 and a lower forecast for 4Q22.

For **2023**, UK liquids production is forecast to increase by 30 tb/d to average 0.9 mb/d. After repeated delays, the Penguins FPSO delivery date has been confirmed for November 2022. Shell indicated that peak production from the redeveloped Penguins field is expected to reach 28 tboe/d, given a one-year ramp up period after first oil.

Project sanctioning will be essential to maintain future oil and gas output, as UK output has been in long-term decline. Therefore, a number of larger-sized projects would need to be implemented, just to maintain UK oil production levels.

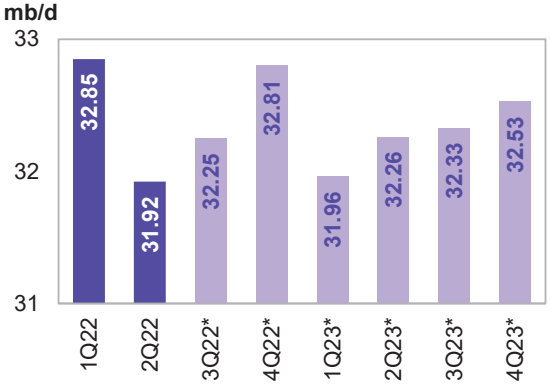
Graph 5 - 19: UK monthly liquids production development



Sources: Department of Energy & Climate Change and OPEC.

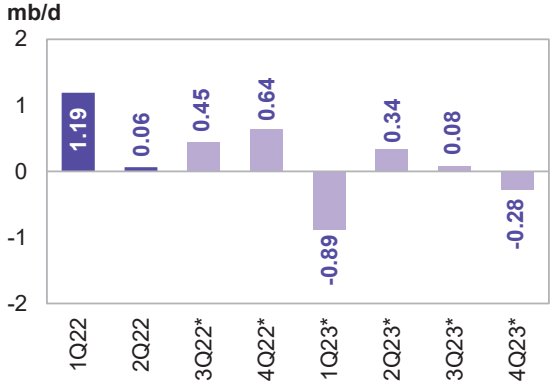
Non-OECD

Graph 5 - 20: Non-OECD quarterly liquids production and forecast



*Note: * 3Q22-4Q23 = Forecast. Source: OPEC.*

Graph 5 - 21: Non-OECD quarterly liquids supply, y-o-y changes



*Note: * 3Q22-4Q23 = Forecast. Source: OPEC.*

China

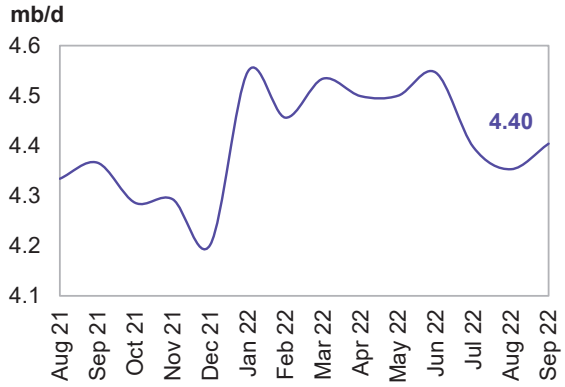
China's liquids production increased m-o-m in **September** by 51 tb/d to average 4.4 mb/d, which was up by 38 tb/d y-o-y, according to official data. Crude oil output in September averaged 4.0 mb/d, up by 53 tb/d compared with the previous month, but stood at the same level y-o-y. Liquids production over the first nine months of 2022 averaged 4.5 mb/d, higher by 3.4% compared with the same period last year.

For **2022**, growth of 151 tb/d is estimated for an average of 4.5 mb/d. This is revised down by a minor 9 tb/d from the previous assessment, mainly due to data revisions in 3Q22. Natural decline rates are expected to be offset by additional growth through more infill wells and enhanced oil recovery projects amid efforts by state-owned oil companies to ensure energy supply security.

For **2023**, y-o-y growth of 30 tb/d is forecast for an average of 4.5 m/d, broadly unchanged from last month's assessment. New projects will slightly offset declines from the mature onshore production base. According to China's latest Five-Year Plan (FYP) and guidelines, from 2021 to 2025, the country aims to maintain liquids production well above 4 mb/d. To achieve this target, China will need to compensate for declining output rates at producing fields and accelerate the exploitation of deepwater reservoirs and challenging resources through

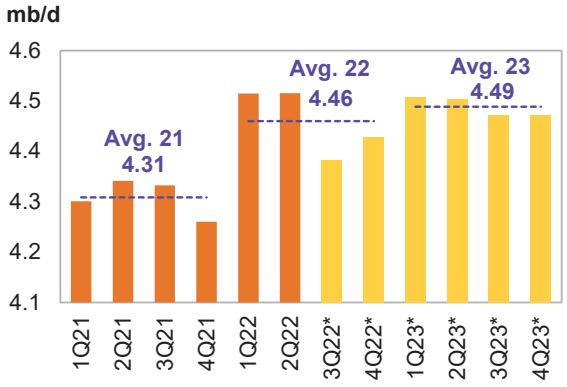
infill drilling and expansion projects. Besides, China is anticipated to invest further in high-risk exploration activities in the central and western offshore regions where commercial discoveries have been made.

Graph 5 - 22: China's monthly liquids production development



Sources: CNPC and OPEC.

Graph 5 - 23: China's quarterly liquids production and forecast



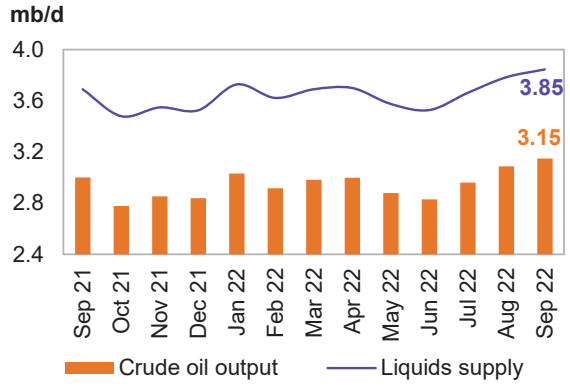
*Note: * 3Q22-4Q23 = Forecast. Sources: CNPC and OPEC.*

Latin America

Brazil

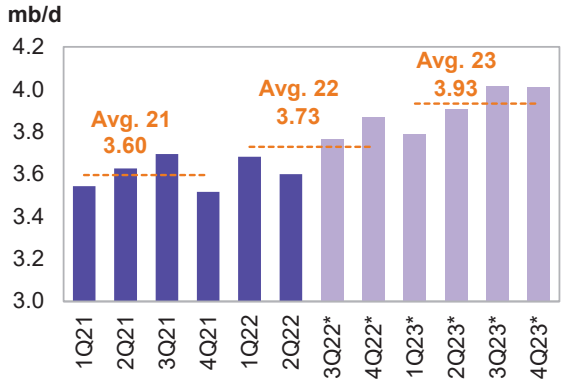
Brazil's crude output in **September** increased m-o-m by 61 tb/d, to average 3.1 mb/d. NGLs production was largely unchanged at an average of 84 tb/d and is expected to remain flat in October. Biofuels output (mainly ethanol) was flat in September to average 612 tb/d, with preliminary data showing a flat trend in October, as well. Total liquids production increased by 62 tb/d in September to average 3.8 mb/d, which is up by 156 tb/d y-o-y. Crude and condensate production rose for the third consecutive month through September, as offshore maintenance eased and new projects, mostly fields under production-sharing contracts, continued to ramp up production.

Graph 5 - 24: Brazil's monthly liquids production development by type



Sources: ANP, Petrobras and OPEC.

Graph 5 - 25: Brazil's quarterly liquids production



*Note: * 3Q22-4Q23 = Forecast. Sources: ANP and OPEC.*

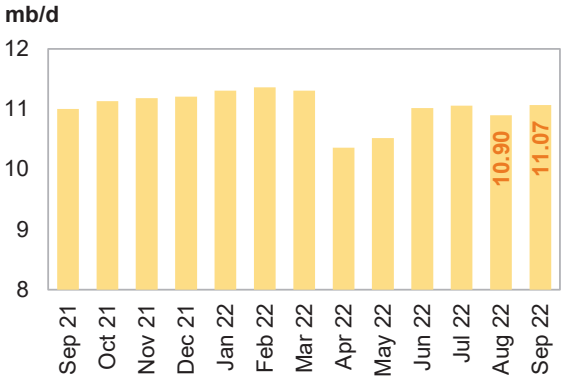
For **2022,** Brazil's liquids supply, including biofuels, is forecast to increase by 0.1 mb/d y-o-y to average 3.7 mb/d. This is up by a minor 8 tb/d from the previous month's assessment, due to output growth in 3Q22. Equinor pumped first oil from a newly installed third production platform at the Peregrino heavy oil field, which is part of an expansion project to boost the field's output to a peak of 110 tb/d. Growth in 2022 is being driven by the continued ramp up of the Sepia field and the start-up of Mero 1 in the pre-salt Santos basin, as well as Peregrino (Phases 1 and 2) in the Campos basin.

For **2023**, Brazil's liquids supply, including biofuels, is forecast to increase by 0.2 mb/d y-o-y to average 3.9 mb/d, broadly unchanged from the previous forecast. Crude oil output is set to increase through production ramp ups in the Mero (Libra NW), Buzios (Franco), Tupi (Lula), Peregrino, Sepia, Marlim and Itapu (Florim) fields. However, offshore maintenance is expected to cause interruptions in major fields. Much of Brazil's production growth will be from the sub-salt frontier, where highly productive reservoirs containing light and low sulphur oil have been explored.

Russia

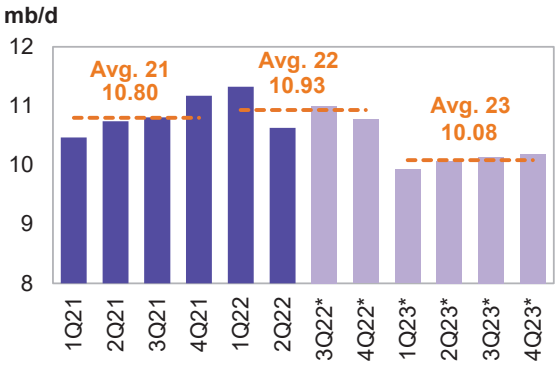
Russia's liquids production in September increased m-o-m by 169 tb/d to average 11.1 mb/d. This includes 9.8 mb/d of crude oil and 1.3 mb/d of NGLs and condensate.

Graph 5 - 26: Russia's monthly liquids production



Sources: Nefte Compass and OPEC.

Graph 5 - 27: Russia's quarterly liquids production



*Note: * 3Q22-4Q23 = Forecast.*
Sources: Nefte Compass and OPEC.

Russian liquids output in **2022** is forecast to increase y-o-y by 133 tb/d to average 10.9 mb/d. This is revised up by 69 tb/d from the previous month's assessment, mainly due to higher output in September and higher-than-expected preliminary production data in October.

For **2023**, Russian liquids production is forecast to drop by 0.85 mb/d to average 10.1 mb/d. This is revised down by 62 tb/d from the previous assessment, due to base changes in 2022. It should be noted that Russia's oil forecast remains subject to high uncertainty.

Caspian

Kazakhstan & Azerbaijan

Liquids output in Kazakhstan fell by 50 tb/d to average 1.5 mb/d in **September**. Crude production was up by 72 tb/d m-o-m to average 1.3 mb/d, while NGLs declined by 122 tb/d to average 0.2 mb/d. Higher oil output was due to the gradual Kashagan oil field ramp up, while planned maintenance in the Karachaganak gas condensate field, as well as emergency repairs at the Caspian Pipeline Consortium (CPC) terminal on Russia's Black Sea coast, reduced total monthly liquids output.

Kazakhstan's liquids supply for **2022** is now forecast to decline by 25 tb/d y-o-y to average 1.8 mb/d. This is down by 41 tb/d compared with the previous month's assessment, due to downward revisions applied to 3Q22 and 4Q22. According to preliminary estimates by the Kazakh Energy Ministry, output was supposed to be fully restored by the end of October. According to CPC, however, as of 21 October, emergency repairs at the CPC crude terminal were delayed due to stormy weather. No revised timeline has been given for completion of the work.

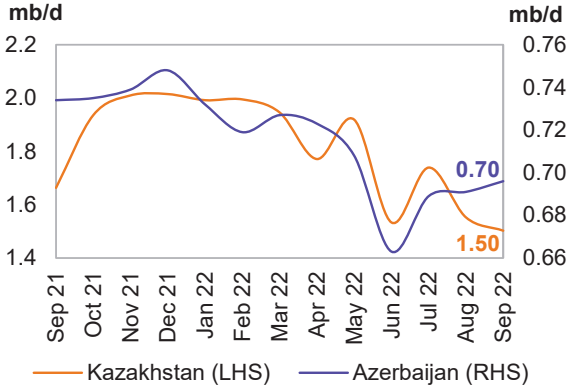
For **2023**, liquids supply is forecast to increase by 146 tb/d, up by 28 tb/d compared to the previous forecast, due to production ramp-ups at Kashagan. Oil production in the Tengiz field and gas condensate output in the Karachaganak field are also expected to rise marginally.

Azerbaijan's liquids production in September increased m-o-m by a minor 5 tb/d to average 0.7 mb/d, but this was down by 38 tb/d y-o-y. Crude production averaged 558 tb/d, while NGLs output averaged 138 tb/d, according to official sources.

For **2022**, liquids supply in Azerbaijan is estimated to decline marginally by 6 tb/d y-o-y to average 0.7 mb/d. This has been revised down by 10 tb/d because of lower-than-expected production in major oil fields in 3Q22. No new projects are expected to come online in the country in 2022, and the main declines in legacy fields are expected to be offset by ramp-ups in other fields.

Azerbaijan's liquids supply for **2023** is forecast to rise by 49 tb/d to average 0.8 mb/d, according to the voluntary production adjustments agreed on at the 33rd OPEC and non-OPEC Ministerial Meeting. Growth is forecast to come from the Shah Deniz and Absheron condensate projects and the Azeri Central East project.

Graph 5 - 28: Caspian monthly liquids production development by selected country



Sources: Nefte Compass and OPEC.

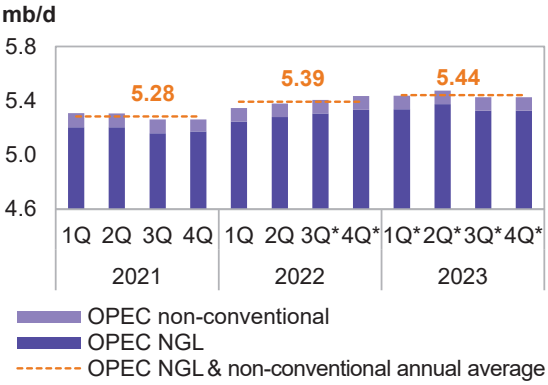
OPEC NGLs and non-conventional oils

OPEC NGLs and non-conventional liquids in 2022 are estimated to grow by 0.1 mb/d to average 5.4 mb/d, unchanged from the previous assessment.

NGLs output in 3Q22 is estimated to have averaged 5.31 mb/d, while OPEC non-conventional output remained steady at 0.1 mb/d. Taken together, 5.4 mb/d is expected for September, according to preliminary data.

In 2023, **OPEC NGLs and non-conventional liquids 2023** are forecast to grow by around 50 tb/d for an average of 5.4 mb/d. NGLs production is projected to grow by 50 tb/d to average 5.3 mb/d, while non-conventional liquids are projected to remain unchanged at 0.1 mb/d.

Graph 5 - 29: OPEC NGLs and non-conventional liquids quarterly production and forecast



*Note: * 3Q22-4Q23 = Forecast. Source: OPEC.*

Table 5 - 6: OPEC NGL + non-conventional oils, mb/d

OPEC NGL and non-coventional oils	2021	Change 21/20	2022	Change 22/21	1Q23	2Q23	3Q23	4Q23	2023	Change 23/22
OPEC NGL	**5.18**	*0.12*	**5.29**	*0.11*	5.34	5.37	5.33	5.33	**5.34**	*0.05*
OPEC non-conventional	**0.10**	*0.00*	**0.10**	*0.00*	0.10	0.10	0.10	0.10	**0.10**	*0.00*
Total	**5.28**	***0.12***	**5.39**	***0.11***	**5.44**	**5.47**	**5.43**	**5.43**	**5.44**	***0.05***

Note: 2022-2023 = Forecast. Source: OPEC.

OPEC crude oil production

According to secondary sources, total **OPEC-13 crude oil production** averaged 29.49 mb/d in October 2022, lower by 210 tb/d m-o-m. Crude oil output increased mainly in Nigeria and Iraq, while production in Saudi Arabia and Angola declined.

Table 5 - 7: OPEC crude oil production based on *secondary sources*, tb/d

Secondary sources	2020	2021	1Q22	2Q22	3Q22	Aug 22	Sep 22	Oct 22	*Change* Oct/Sep
Algeria	904	912	984	1,015	1,038	1,042	1,040	1,036	*-4*
Angola	1,245	1,117	1,152	1,171	1,160	1,170	1,145	1,067	*-78*
Congo	289	265	263	268	266	264	276	257	*-19*
Equatorial Guinea	114	96	90	89	90	85	88	74	*-14*
Gabon	191	182	199	190	199	197	202	214	*12*
IR Iran	1,991	2,392	2,529	2,555	2,562	2,571	2,549	2,548	*-1*
Iraq	4,076	4,049	4,286	4,440	4,540	4,543	4,551	4,572	*20*
Kuwait	2,439	2,419	2,612	2,690	2,801	2,810	2,822	2,804	*-18*
Libya	367	1,143	1,063	751	992	1,135	1,157	1,163	*6*
Nigeria	1,578	1,372	1,376	1,211	1,067	1,043	1,025	1,057	*33*
Saudi Arabia	9,204	9,114	10,165	10,450	10,885	10,930	10,987	10,838	*-149*
UAE	2,804	2,727	2,954	3,045	3,168	3,182	3,192	3,186	*-7*
Venezuela	512	555	684	714	670	681	669	679	*9*
Total OPEC	**25,713**	**26,344**	**28,357**	**28,588**	**29,438**	**29,653**	**29,704**	**29,494**	***-210***

Notes: Totals may not add up due to independent rounding, given available secondary sources to date. Source: OPEC.

Table 5 - 8: OPEC crude oil production based on *direct communication*, tb/d

Direct communication	2020	2021	1Q22	2Q22	3Q22	Aug 22	Sep 22	Oct 22	*Change* Oct/Sep
Algeria	899	911	984	1,016	1,050	1,053	1,058	1,060	*2*
Angola	1,271	1,124	1,161	1,173	1,151	1,179	1,091	1,051	*-40*
Congo	300	267	267	258	261	262	271	267	*-3*
Equatorial Guinea	114	93	95	91	83	85	75	57	*-18*
Gabon	207	181	197	184	198	212	191	..	..
IR Iran	..	..	..	..	..	..	..	..	..
Iraq	3,997	3,971	4,188	4,472	4,632	4,651	4,662	4,651	*-11*
Kuwait	2,438	2,415	2,612	2,694	2,799	2,811	2,818	2,811	*-7*
Libya	389	1,207	1,151	..	..	..	..	..	..
Nigeria	1,493	1,323	1,299	1,133	999	972	938	1,014	*77*
Saudi Arabia	9,213	9,125	10,224	10,542	10,968	11,051	11,041	10,957	*-84*
UAE	2,779	2,718	2,949	3,042	3,170	3,184	3,193	3,188	*-5*
Venezuela	569	636	756	745	673	723	666	717	*51*
Total OPEC	..	..	..	..	..	..	..	..	..

Notes: .. Not available. Totals may not add up due to independent rounding. Source: OPEC.

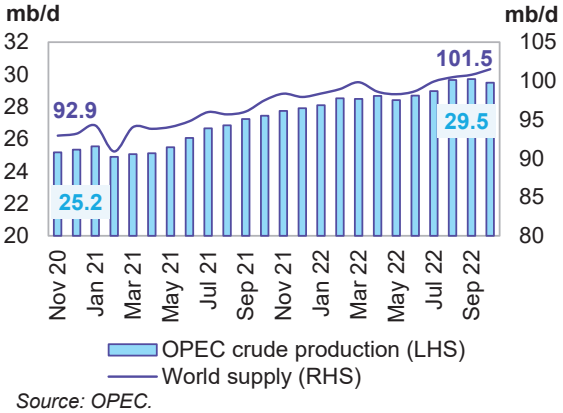
World oil supply

Preliminary data indicates that **global liquids production in October** increased by 0.7 mb/d to average 101.5 mb/d compared with the previous month.

Non-OPEC liquids production (including OPEC NGLs) is estimated to have increased in October by 0.9 mb/d m-o-m to average 72.0 mb/d. This was higher by 2.0 mb/d y-o-y. Preliminary estimated production increases in October were mainly driven by Other Eurasia, OECD Europe and Other Asia, which was partially offset by declines seen in Latin America.

The **share of OPEC crude oil in total global production** decreased by 0.4 pp to 29.1% in October compared with the previous month. Estimates are based on preliminary data from direct communication for non-OPEC supply, OPEC NGLs and non-conventional oil, while estimates for OPEC crude production are based on secondary sources.

Graph 5 - 30: OPEC crude production and world oil supply development



Source: OPEC.

Product Markets and Refinery Operations

In October, refinery margins increased globally to show solid gains in line with market expectations and historical seasonal trends. This was a result of significant reductions in refinery product output as refinery maintenance interventions further intensified in the West and maintenance volumes reached a peak in October. The resulting contraction of product balances in the Atlantic Basin provided a profitable environment for Asia to capitalize on product exports, which ultimately supported their refining economics as well, although Asian gains were much more limited.

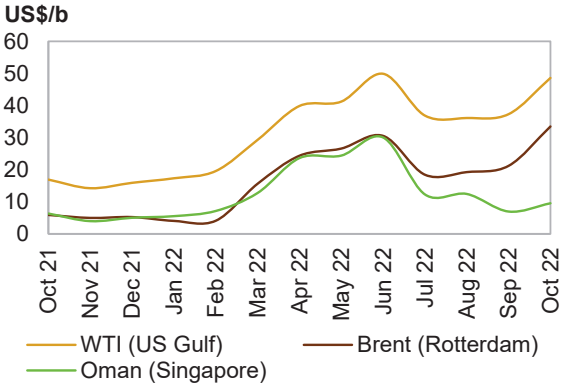
Over the month, global refinery processing rates declined further, in line with historical trends, and dropped by 960 tb/d m-o-m, according to preliminary data, in response to a rise in offline capacity amid peak Autumn maintenance works.

In the coming month, refinery intakes are expected to reverse course and start to recover, adding nearly 1.5 mb/d m-o-m, according to preliminary data, as major turnarounds come to an end. Moreover, the need to restock middle distillates, particularly diesel inventories, mainly in the West, is expected to lend further support.

Refinery margins

USGC refining margins against WTI jumped to settle at just $1.30 below the record-breaking high level registered in June. This represented the second-highest mark, y-t-d. The notable improvement in US refining economics is attributed to a significant decline in product output levels as refineries in the country dropped due to heavy maintenance works. As a result, product balances contracted further and strengthened product prices, with the exception of fuel oil. According to preliminary estimates, refinery intake in the US extended its downward trend in October and lost 380 tb/d m-o-m to average 15.98 mb/d in October. However, going forward, intakes are expected to reverse course and begin to recover, which should help limit the product balance contraction in the coming months.

Graph 6 - 1: Refining margins



Sources: Argus and OPEC.

In addition, refinery issues and maintenance works in Brazil and Mexico amid relatively suppressed fuel prices due to government subsidies led to robust US product exports to Latin America. This contributed further to the positive performance of US refinery margins. USGC margins against WTI averaged $48.61/b in October, up by $11.30 m-o-m and $31.72 y-o-y.

Refinery margins in Rotterdam against Brent rallied in October to show the largest monthly gain compared with other main trading hubs. The onset of the maintenance season in Europe and the subsequent reduction in processing rates and product output further weighed on regional product availability. Furthermore, the impact of the strike in France's refining sector, which started on September 20, had a more pronounced effect on European throughputs in October compared with the previous month. With the loss of nearly 45% of the country's refining capacity due to the strike, France's refinery intakes declined in October by nearly 300 tb/d m-o-m and contributed to product shortages at refuelling stations in parts of the country. Although the strike ended at three refineries as of the end of October and runs are gradually being restored, a considerable amount of capacity remained offline. Consequently, product imports into Europe, particularly that of diesel and gasoil, soared in October to a multi-year record high on a wide arbitrage window with flows from East of Suez. This led to a reflection of the strength in European product markets on to product markets in other regions as well.

Refinery throughput in Europe declined by 450 tb/d due to planned and unplanned outages, to average 9.42 mb/d according to preliminary data. Refinery margins against Brent in Europe averaged $33.50/b in Octoberber, up by $12.28/b compared with a month earlier and higher by $27.60 y-o-y.

Singapore refining margins against Oman rose, albeit by a much more limited extent compared to the other regions, with positive performances registered in the naphtha and middle distillate markets. In China, product exports were reported to have declined in October from the 14-month high registered in the previous month.

Commercial Stock Movements

Preliminary September data sees total OECD commercial oil stocks up m-o-m by 13.4 mb. At 2,749 mb, they were 21 mb less than the same time one year ago, 198 mb lower than the latest five-year average and 218 mb below the 2015-2019 average. Within the components, crude and product stocks rose m-o-m by 6.5 mb and 6.8 mb, respectively.

At 1,335 mb, OECD crude stocks were 35.5 mb higher than the same time a year ago, 69.9 mb lower than the latest five-year average and 99.9 mb lower than the 2015-2019 average.

OECD product stocks stood at 1,414 mb, representing a deficit of 56.1 mb from the same time a year ago, 128.0 mb lower than the latest five-year average and 117.9 mb below the 2015-2019 average.

In terms of days of forward cover, OECD commercial stocks remained unchanged m-o-m in September to stand at 58.4 days. This is 0.8 days below September 2021 levels, 5.0 days less than the latest five-year average and 4.1 days lower than the 2015-2019 average.

Preliminary data for October showed that total US commercial oil stocks rose by 3.1 mb m-o-m to stand at 1,224 mb. This is 28.9 mb lower than the same month in 2021 and 66.8 mb below the latest five-year average. Crude stocks rose by 7.6 mb, while product stocks fell by 4.5 mb.

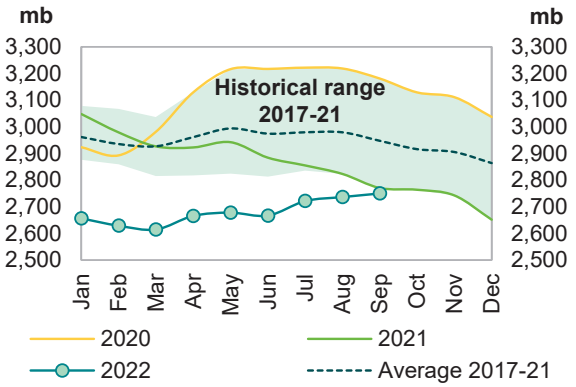
OECD

Preliminary **September** data sees **total OECD commercial oil stocks** up m-o-m by 13.4 mb. At 2,749 mb, they were 21 mb less than the same time one year ago, 198 mb lower than the latest five-year average and 218 mb below the 2015-2019 average.

Within the components, crude and product stocks rose m-o-m by 6.5 mb and 6.8 mb, respectively. Total commercial oil stocks in September rose in OECD Americas and OECD Asia Pacific, while OECD Europe saw a stock draw.

OECD commercial **crude stocks** stood at 1,335 mb in September. This is 35.5 mb higher than the same time a year ago, 69.9 mb lower than the latest five-year average and 99.9 mb lower than the 2015-2019 average.

Graph 9 - 1: OECD commercial oil stocks



Sources: Argus, EIA, Euroilstock, IEA, METI and OPEC.

Compared with the previous month, OECD Europe saw a stock draw of 6.1 mb, OECD Americas stocks rose by 9.5 mb, and stocks in OECD Asia Pacific increased by 3.2 mb.

Total product inventories stood at 1,414 mb in September. This is 56.1 mb below the same time a year ago, 128.0 mb lower than the latest five-year average and 117.9 mb below the 2015-2019 average. Product stocks in OECD Americas and OECD Asia Pacific rose by 6.8 mb and 2.0 mb, respectively, while they fell m-o-m by 2.0 mb in OECD Europe.

Table 9 - 1: OECD's commercial stocks, mb

OECD stocks	Sep 21	Jul 22	Aug 22	Sep 22	Change Sep 22/Aug 22
Crude oil	1,300	1,318	1,329	1,335	*6.5*
Products	1,470	1,402	1,407	1,414	*6.8*
Total	**2,770**	**2,721**	**2,736**	**2,749**	***13.4***
Days of forward cover	**59.1**	**58.1**	**58.3**	**58.4**	***0.0***

Note: Totals may not add up due to independent rounding.

Sources: Argus, EIA, Euroilstock, IEA, METI and OPEC.

In terms of **days of forward cover**, OECD commercial stocks remained unchanged m-o-m in September to stand at 58.4 days. This is 0.8 days below September 2021 levels, 5.0 days less than the latest five-year average and 4.1 days lower than the 2015-2019 average.

All three OECD regions were below the latest five-year average: the Americas by 4.6 days at 59.1 days; the Asia Pacific by 6.7 days at 43.5 days; and Europe by 5.2 days at 65.4 days.

OECD Americas

OECD Americas total commercial stocks rose by 16.3 mb m-o-m in September to settle at 1,493 mb. This is 30.5 mb less than the same month in 2021 and 83.3 mb lower than the latest five-year average.

Commercial **crude oil stocks** in OECD Americas rose m-o-m by 9.5 mb in September to stand at 744 mb, which is 6.7 mb lower than in September 2021 and 25.1 mb less than the latest five-year average. The monthly build in crude oil stocks can be attributed to higher imports, as well as additional barrels released from strategic petroleum reserves (SPRs).

Total product stocks in OECD Americas also rose m-o-m by 6.8 mb in September to stand at 749 mb. This was 23.8 mb lower than the same month in 2021 and 58.2 mb below the latest five-year average. Lower total consumption in the region was behind the product stock build.

OECD Europe

OECD Europe total commercial stocks fell m-o-m by 8.2 mb in September to settle at 915 mb. This is 24.1 mb higher than the same month in 2021, but 57.2 mb below the latest five-year average.

OECD Europe's **commercial crude stocks** fell by 6.1 mb m-o-m to end the month of September at 414 mb, which is 36.1 mb higher than one year ago but 7.6 mb below the latest five-year average. The drop in crude oil inventories came despite lower m-o-m refinery throughput in the EU-14, plus the UK and Norway.

Europe's **product stocks** also fell m-o-m by 2.0 mb to end September at 501 mb. This is 11.9 mb lower than a year ago and 49.5 mb below the latest five-year average.

OECD Asia Pacific

OECD Asia Pacific's total commercial oil stocks rose m-o-m by 5.3 mb in September to stand at 341 mb. This is 14.2 mb lower than a year ago and 57.4 mb below the latest five-year average.

OECD Asia Pacific's **crude inventories** rose by 3.2 mb m-o-m to end September at 177 mb, which is 6.1 mb higher than one year ago and 37.1 mb below the latest five-year average.

OECD Asia Pacific's **total product inventories** also rose m-o-m by 2.0 mb to end September at 164 mb. This is 20.3 mb lower than the same time a year ago and 20.3 mb below the latest five-year average.

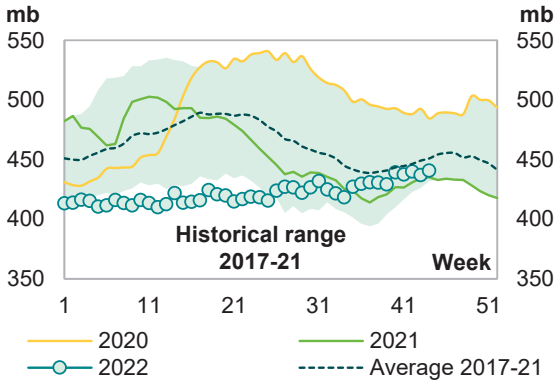
US

Preliminary data for October showed that **total US commercial oil stocks** rose by 3.1 mb m-o-m to stand at 1,224 mb. This is 28.9 mb, or 2.3%, lower than the same month in 2021 and 66.8 mb, or 5.2%, below the latest five-year average. Crude stocks rose by 7.6 mb, while product stocks fell by 4.5 mb.

US commercial crude stocks in October stood at 436.8 mb. This is 0.3 mb, or 0.1%, higher than the same month of the previous year, but 16.7 mb, or 3.7%, below the latest five-year average. The monthly build in crude oil stocks can be attributed to lower crude runs, which fell by 0.4 mb/d to 15.98 mb/d.

By contrast, **total product stocks** fell in October to stand at 787.3 mb. This is 29.1 mb, or 3.6%, below October 2021 levels and 50.2 mb, or 6.0%, lower than the latest five-year average. The stock draw was mainly driven by higher product consumption.

Graph 9 - 2: US weekly commercial crude oil inventories



Sources: EIA and OPEC.

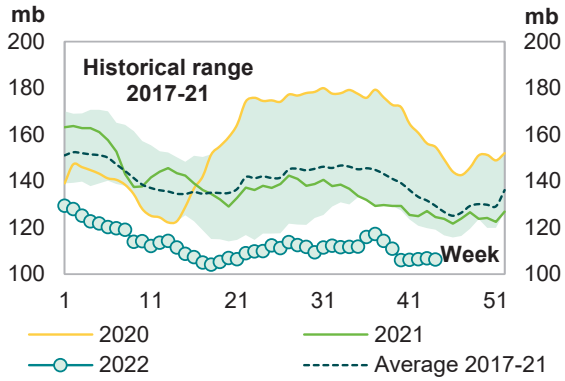
Gasoline stocks fell m-o-m by 0.8 mb to settle at 206.6 mb. This is 10.1 mb, or 4.6% lower than in the same month in 2021 and 16.8 mb, or 7.5%, lower than the latest five-year average.

Distillate stocks also decreased m-o-m in October by 4.1 mb to stand at 106.8 mb. This is 26.0 mb, or 19.6%, lower than the same month of the previous year and 26.0 mb, or 19.6%, below the latest five-year average.

By contrast, **jet fuel stocks** rose m-o-m by 0.2 mb, ending October at 36.4 mb. This is 4.0 mb, or 9.8%, lower than the same month in 2021 and 4.0 mb, or 9.9%, below the latest five-year average.

Residual fuel oil stocks also rose by 1.6 mb m-o-m in October. At 30.3 mb, this was 1.6 mb, or 5.5%, higher than a year earlier, and 0.5 mb, or 1.8%, above the latest five-year average.

Graph 9 - 3: US weekly distillate inventories



Sources: EIA and OPEC.

Table 9 - 2: US commercial petroleum stocks, mb

US stocks	Oct 21	Aug 22	Sep 22	Oct 22	Change Oct 22/Sep 22
Crude oil	**436.6**	**419.7**	**429.2**	**436.8**	***7.6***
Gasoline	216.7	215.6	207.5	206.6	*-0.8*
Distillate fuel	132.8	113.3	110.9	106.8	*-4.1*
Residual fuel oil	28.7	28.6	28.7	30.3	*1.6*
Jet fuel	40.4	38.4	36.2	36.4	*0.2*
Total products	**816.4**	**792.6**	**791.8**	**787.3**	***-4.5***
Total	**1,253.0**	**1,212.4**	**1,221.0**	**1,224.1**	***3.1***
SPR	**610.6**	**445.1**	**416.4**	**399.8**	***-16.6***

Sources: EIA and OPEC.

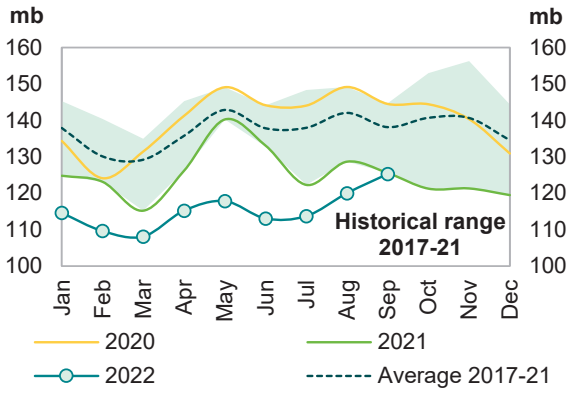
Japan

In **Japan**, **total commercial oil stocks** in September rose m-o-m by 5.3 mb to settle at 125.3 mb. This is 0.3 mb, or 0.3%, lower than the same month in 2021 and 12.8 mb, or 9.3%, below the latest five-year average. Crude and product stocks rose m-o-m by 3.2 mb and 2.0 mb, respectively.

Japanese **commercial crude oil stocks** rose in September to stand at 67.5 mb. This is 5.5 mb, or 8.8% higher than the same month of the previous year, but 6.8 mb, or 9.1%, lower than the latest five-year average. The build came of the back of lower crude runs.

Japan's **total product inventories** also rose m-o-m by 2.0 mb to end September at 57.8 mb. This is 5.8 mb, or 9.1%, lower than the same month in 2021 and 6.1 mb, or 9.5%, below the latest five-year average.

Graph 9 - 4: Japan's commercial oil stocks



Sources: METI and OPEC.

Gasoline stocks rose by 0.1 mb m-o-m to stand at 9.8 mb in September. This was 0.5 mb, or 4.5% lower than a year earlier and 0.8 mb, or 7.1%, lower than the latest five-year average. The build came on lower gasoline sales by 10.4% m-o-m.

Distillate stocks also rose m-o-m by 0.4 mb to end September at 27.0 mb. This is 4.4 mb, or 14.1%, lower than the same month in 2021 and 4.4 mb, or 14%, below the latest five-year average. Within distillate components, kerosene stocks went up by 15.7%, while jet fuel and kerosene fell by 9.8% and 10.7%, respectively.

Total residual fuel oil stocks rose m-o-m by 0.1 mb to end September at 11.5 mb. This is 1.0 mb, or 7.7%, lower than in the same month of the previous year and 1.1 mb, or 8.7%, below the latest five-year average. Within the components, fuel oil A and fuel oil BC stocks rose by 1.5% and 0.1%, m-o-m, respectively.

Table 9 - 3: Japan's commercial oil stocks*, mb

Japan's stocks	Sep 21	Jul 22	Aug 22	Sep 22	Change Sep 22/Aug 22
Crude oil	**62.0**	**60.1**	**64.2**	**67.5**	***3.2***
Gasoline	10.3	8.9	9.7	9.8	*0.1*
Naphtha	9.4	9.3	8.1	9.5	*1.4*
Middle distillates	31.4	24.7	26.6	27.0	*0.4*
Residual fuel oil	12.5	10.8	11.4	11.5	*0.1*
Total products	**63.6**	**53.6**	**55.8**	**57.8**	***2.0***
Total**	**125.6**	**113.7**	**120.0**	**125.3**	***5.3***

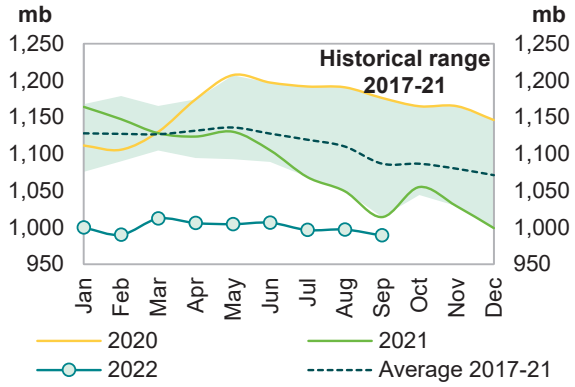
*Note: * At the end of the month. ** Includes crude oil and main products only.*
Sources: METI and OPEC.

EU-14 plus UK and Norway

Preliminary data for September showed that **total European commercial oil stocks** fell m-o-m by 8.2 mb to stand at 989.2 mb. At this level, they were 25.2 mb, or 2.5%, below the same month a year earlier and 97.5 mb, or 9.0% lower than the latest five-year average. Crude and product stocks fell m-o-m by 6.1 mb and 2.0 mb, respectively.

European **crude inventories** fell in September to stand at 430.7 mb. This is 5.1 mb, or 1.2%, higher than the same month in 2021 and 36.2 mb, or 7.8%, below the latest five-year average. The drop in crude oil inventories came despite lower m-o-m refinery throughput in the EU-14, plus the UK and Norway.

Graph 9 - 5: EU-14 plus UK and Norway's total oil stocks



Sources: Argus, Euroilstock and OPEC.

Total European product stocks also fell m-o-m by 2.0 mb to end September at 558.5 mb. This is 30.2 mb, or 5.1%, lower than the same month of the previous year and 61.3 mb, or 9.9%, below the latest five-year average.

Gasoline stocks fell m-o-m by 1.4 mb in September to stand at 108.9 mb. At this level, they were 10.5 mb, or 10.7%, higher than the same time a year earlier, and 2.8 mb/d, or 2.6%, above the latest five-year average.

Distillate stocks also fell m-o-m by 0.8 mb in September to stand at 360.5 mb. This is 46.4 mb, or 11.4%, below the same month in 2021 and 62.8 mb, or 14.8%, less than the latest five-year average.

Naphtha stocks dropped by 0.6 mb in September, ending the month at 29.9 mb. This is 7.7 mb, or 34.5%, higher than September 2021 levels and 2.9 mb, or 10.7%, higher than the latest five-year average.

In contrast, **residual fuel stocks** rose m-o-m by 0.8 mb in September to stand at 59.2 mb. This is 2.0 mb, or 3.3%, lower than the same month in 2021 and 4.2 mb, or 6.6%, below the latest five-year average.

Table 9 - 4: EU-14 plus UK and Norway's total oil stocks, mb

EU stocks	Sep 21	Jul 22	Aug 22	Sep 22	*Change* Sep 22/Aug 22
Crude oil	**425.6**	**432.8**	**436.8**	**430.7**	***-6.1***
Gasoline	98.4	108.7	110.3	108.9	*-1.4*
Naphtha	22.3	29.9	30.5	29.9	*-0.6*
Middle distillates	406.9	365.5	361.3	360.5	*-0.8*
Fuel oils	61.3	59.7	58.4	59.2	*0.8*
Total products	**588.7**	**563.8**	**560.5**	**558.5**	***-2.0***
Total	**1,014.3**	**996.6**	**997.3**	**989.2**	***-8.2***

Sources: Argus, Euroilstock and OPEC.

Singapore, Amsterdam-Rotterdam-Antwerp (ARA) and Fujairah

Singapore

In September, **total product stocks in Singapore** fell m-o-m by 0.9 mb to 45.8 mb. This is 4.5 mb, or 10.8%, higher than the same month in 2021.

Light distillate stocks fell m-o-m by 0.5 mb in September to stand at 15.8 mb. This is 4.0 mb, or 33.7%, higher than the same month of the previous year.

Middle distillate stocks fell m-o-m by 0.2 mb in September to stand at 7.5 mb. This is 3.0 mb, or 28.5%, lower than a year earlier.

Residual fuel oil stocks also dropped m-o-m by 0.2 mb, ending September at 22.5 mb. This is 3.5 mb, or 18.3%, higher than September 2021.

ARA

Total product stocks in ARA fell m-o-m in September by 1.2 mb. At 39.9 mb, they were 0.6 mb, or 1.4%, higher than the same month in 2021.

Gasoline stocks in September fell by 0.7 mb m-o-m to stand at 10.8 mb, which is 3.8 mb, or 55.2%, higher than the same month of the previous year.

Fuel oil stocks also fell by 0.7 mb m-o-m in September to stand at 6.8 mb, which is 0.7 mb, or 9.3%, lower than in September 2021.

By contrast, **gasoil stocks** rose by 0.9 mb m-o-m, ending September at 13.6 mb. This is 1.3 mb, or 9.0%, lower than levels seen in September 2021.

Jet oil stocks also rose by 0.4 mb m-o-m to stand at 6.2 mb. This is 1.3 mb, or 17.3%, lower than levels seen in September 2021.

Fujairah

During the week ending 31 October 2022, **total oil product stocks in Fujairah** fell w-o-w by 0.58 mb to stand at 21.95 mb, according to data from Fed Com and S&P Global Platts. At this level, total oil stocks were 6.37 mb higher than at the same time a year ago.

Heavy distillate stocks rose by 0.56 mb w-o-w to stand at 12.91 mb in the week to 31 October 2022, which is 5.52 mb higher than the same period a year ago. By contrast, **light distillate stocks** fell by 0.94 mb to stand at 6.35 mb, which is 1.44 mb higher than a year ago. **Middle distillate stocks** also fell w-o-w by 0.20 mb to stand at 2.69 mb, which is 0.59 mb lower than the same time last year.

Balance of Supply and Demand

Demand for OPEC crude in 2022 is revised down by 0.1 mb/d from the previous month's assessment to stand at 28.6 mb/d, which is around 0.5 mb/d higher than in 2021.

According to secondary sources, OPEC crude production averaged 28.4 mb/d in 1Q22, which is 0.3 mb/d lower than the demand for OPEC crude. In 2Q22, OPEC crude production averaged 28.6 mb/d, which is 0.2 mb/d higher than demand for OPEC crude. In 3Q22, OPEC crude oil production averaged 29.5 mb/d, which is 1.1 mb/d higher than demand for OPEC crude.

Demand for OPEC crude in 2023 is also revised down by 0.2 mb/d from the previous assessment to stand at 29.3 mb/d, which is around 0.7 mb/d higher than in 2022.

Balance of supply and demand in 2022

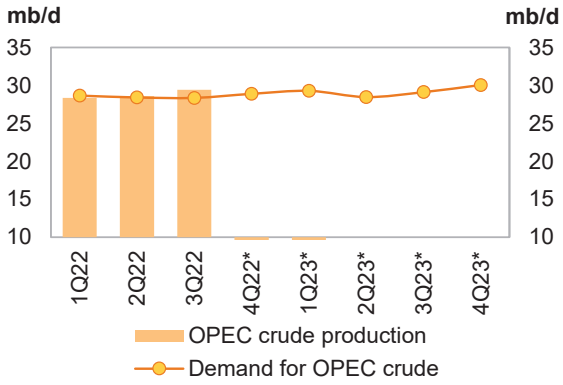
Demand for OPEC crude in 2022 is revised down by 0.1 mb/d from the previous MOMR to stand at 28.6 mb/d, which is around 0.5 mb/d higher than in 2021.

Compared with the previous, assessment 3Q22 was revised up by 0.2 mb/d, while 4Q22 was revised down by 0.5 mb/d. Meanwhile, both 1Q22 and 2Q22 remained unchanged compared with the previous month.

Compared with the same quarters in 2021, demand for OPEC crude in 1Q22 and 2Q22 is estimated to be higher by 2.4 mb/d and 1.4 mb/d, respectively, while both 3Q22 and 4Q22 are expected to be lower by 0.3 mb/d and 1.3 mb/d, respectively.

According to secondary sources, OPEC crude production averaged 28.4 mb/d in 1Q22, which is 0.3 mb/d lower than the demand for OPEC crude. In 2Q22, OPEC crude production averaged 28.6 mb/d, which is in 0.2 mb/d higher than demand for OPEC crude. In 3Q22, OPEC crude oil production averaged 29.5 mb/d, which is 1.1 mb/d higher than demand for OPEC crude.

Graph 10 - 1: Balance of supply and demand, 2022–2023*



*Note: * 4Q22-4Q23 = Forecast. Source: OPEC.*

Table 10 - 1: Supply/demand balance for 2022*, mb/d

	2021	1Q22	2Q22	3Q22	4Q22	2022	Change 2022/21
(a) World oil demand	**97.03**	**99.36**	**98.35**	**99.32**	**101.25**	**99.57**	***2.55***
Non-OPEC liquids production	63.68	65.33	64.54	65.53	66.90	65.58	*1.90*
OPEC NGL and non-conventionals	5.28	5.35	5.38	5.41	5.43	5.39	*0.11*
(b) Total non-OPEC liquids production and OPEC NGLs	**68.96**	**70.68**	**69.92**	**70.94**	**72.33**	**70.97**	***2.01***
Difference (a-b)	**28.06**	**28.68**	**28.43**	**28.38**	**28.92**	**28.60**	***0.54***
OPEC crude oil production	**26.34**	**28.36**	**28.59**	**29.44**			
Balance	**-1.72**	**-0.32**	**0.15**	**1.06**			

*Note: * 2022 = Forecast. Totals may not add up due to independent rounding. Source: OPEC.*

Table 11 - 1: World oil demand and supply balance, mb/d

World oil demand and supply balance	2019	2020	2021	1Q22	2Q22	3Q22	4Q22	2022	1Q23	2Q23	3Q23	4Q23	2023
World demand													
Americas	25.42	22.47	24.33	24.78	25.00	25.04	25.21	25.01	25.01	25.26	25.34	25.47	25.27
of which US	*20.58*	*18.35*	*20.03*	*20.38*	*20.41*	*20.58*	*20.74*	*20.53*	*20.51*	*20.52*	*20.82*	*20.87*	*20.68*
Europe	14.31	12.41	13.13	13.15	13.41	14.03	13.90	13.63	13.19	13.44	14.06	13.95	13.66
Asia Pacific	7.95	7.17	7.38	7.85	6.99	7.31	7.81	7.49	7.88	7.04	7.35	7.83	7.52
Total OECD	**47.68**	**42.05**	**44.84**	**45.78**	**45.40**	**46.37**	**46.92**	**46.12**	**46.08**	**45.73**	**46.75**	**47.24**	**46.46**
China	13.81	13.94	14.97	14.74	14.56	14.69	15.44	14.86	15.03	15.41	15.24	15.84	15.38
India	4.99	4.51	4.77	5.18	5.16	4.95	5.35	5.16	5.41	5.44	5.21	5.59	5.41
Other Asia	9.06	8.13	8.63	9.09	9.27	8.76	8.85	8.99	9.42	9.61	9.12	9.20	9.33
Latin America	6.59	5.90	6.23	6.32	6.36	6.58	6.40	6.41	6.48	6.48	6.74	6.54	6.56
Middle East	8.20	7.45	7.79	8.06	8.13	8.52	8.17	8.22	8.45	8.46	8.85	8.46	8.55
Africa	4.34	4.05	4.22	4.51	4.15	4.27	4.53	4.37	4.71	4.34	4.46	4.72	4.56
Russia	3.57	3.39	3.61	3.67	3.42	3.45	3.59	3.53	3.65	3.44	3.62	3.77	3.62
Other Eurasia	1.19	1.07	1.21	1.22	1.16	1.00	1.21	1.15	1.22	1.16	1.02	1.22	1.16
Other Europe	0.76	0.70	0.75	0.79	0.75	0.73	0.80	0.77	0.80	0.76	0.75	0.82	0.78
Total Non-OECD	**52.52**	**49.13**	**52.18**	**53.58**	**52.95**	**52.94**	**54.33**	**53.45**	**55.17**	**55.09**	**55.01**	**56.15**	**55.36**
(a) Total world demand	**100.20**	**91.19**	**97.03**	**99.36**	**98.35**	**99.32**	**101.25**	**99.57**	**101.26**	**100.83**	**101.76**	**103.40**	**101.82**
Y-o-y change	***1.00***	***-9.01***	***5.84***	***5.13***	***2.68***	***1.64***	***0.79***	***2.55***	***1.90***	***2.47***	***2.45***	***2.15***	***2.24***
Non-OPEC liquids production													
Americas	25.84	24.75	25.25	25.86	26.27	26.93	27.29	26.59	27.60	27.70	28.05	28.43	27.95
of which US	*18.49*	*17.64*	*17.85*	*18.27*	*18.83*	*19.19*	*19.44*	*18.93*	*19.75*	*20.05*	*20.24*	*20.47*	*20.13*
Europe	3.70	3.89	3.76	3.73	3.43	3.51	3.87	3.64	3.97	3.95	3.84	3.97	3.93
Asia Pacific	0.52	0.52	0.51	0.49	0.51	0.43	0.53	0.49	0.51	0.48	0.50	0.49	0.50
Total OECD	**30.07**	**29.16**	**29.52**	**30.08**	**30.22**	**30.88**	**31.69**	**30.72**	**32.08**	**32.13**	**32.40**	**32.89**	**32.38**
China	4.05	4.15	4.31	4.51	4.52	4.38	4.43	4.46	4.51	4.50	4.47	4.47	4.49
India	0.83	0.78	0.78	0.78	0.77	0.75	0.80	0.78	0.80	0.79	0.78	0.77	0.79
Other Asia	2.72	2.51	2.41	2.35	2.30	2.25	2.38	2.32	2.38	2.38	2.35	2.37	2.37
Latin America	6.08	6.03	5.95	6.11	6.18	6.44	6.56	6.32	6.47	6.65	6.71	6.78	6.66
Middle East	3.19	3.19	3.24	3.29	3.33	3.37	3.37	3.34	3.35	3.36	3.39	3.39	3.37
Africa	1.51	1.41	1.35	1.33	1.31	1.33	1.32	1.32	1.32	1.34	1.35	1.37	1.35
Russia	11.51	10.54	10.80	11.33	10.63	11.01	10.77	10.93	9.92	10.07	10.14	10.19	10.08
Other Eurasia	3.07	2.91	2.93	3.05	2.77	2.62	3.08	2.88	3.10	3.07	3.04	3.08	3.07
Other Europe	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.10
Total Non-OECD	**33.09**	**31.67**	**31.87**	**32.85**	**31.92**	**32.25**	**32.81**	**32.46**	**31.96**	**32.26**	**32.33**	**32.53**	**32.27**
Total Non-OPEC production	63.16	60.83	61.39	62.93	62.14	63.13	64.50	63.18	64.04	64.39	64.73	65.42	64.65
Processing gains	2.37	2.16	2.29	2.40	2.40	2.40	2.40	2.40	2.47	2.47	2.47	2.47	2.47
Total Non-OPEC liquids production	**65.53**	**62.98**	**63.68**	**65.33**	**64.54**	**65.53**	**66.90**	**65.58**	**66.51**	**66.86**	**67.20**	**67.89**	**67.12**
OPEC NGL + non-conventional oils	5.21	5.17	5.28	5.35	5.38	5.41	5.43	5.39	5.44	5.47	5.43	5.43	5.44
(b) Total non-OPEC liquids production and OPEC NGLs	**70.74**	**68.15**	**68.96**	**70.68**	**69.92**	**70.94**	**72.33**	**70.97**	**71.95**	**72.34**	**72.63**	**73.31**	**72.56**
Y-o-y change	***2.18***	***-2.60***	***0.82***	***2.72***	***1.25***	***1.95***	***2.12***	***2.01***	***1.27***	***2.42***	***1.69***	***0.98***	***1.59***
OPEC crude oil production (secondary sources)	29.36	25.71	26.34	28.36	28.59	29.44							
Total liquids production	100.11	93.86	95.31	99.04	98.51	100.38							
Balance (stock change and miscellaneous)	-0.09	2.68	-1.72	-0.32	0.15	1.06							
OECD closing stock levels, *mb*													
Commercial	2,894	3,036	2,651	2,614	2,666	2,749							
SPR	1,535	1,541	1,484	1,442	1,343	1,254							
Total	**4,429**	**4,578**	**4,134**	**4,056**	**4,010**	**4,003**							
Oil-on-water	1,033	1,148	1,202	1,222	1,290	1,386							
Days of forward consumption in OECD, *days*													
Commercial onland stocks	69	68	57	58	57	59							
SPR	37	34	32	32	29	27							
Total	**105**	**102**	**90**	**89**	**86**	**85**							
Memo items													
(a) - (b)	**29.46**	**23.04**	**28.06**	**28.68**	**28.43**	**28.38**	**28.92**	**28.60**	**29.31**	**28.49**	**29.14**	**30.08**	**29.26**

Note: Totals may not add up due to independent rounding.
Source: OPEC.

https://www.iea.org/reports/oil-market-report-november-2022

Oil Market Report - November 2022

Part of Oil Market Report
Flagship report
November 2022

About this report

IEA Oil Market Report (OMR) is one of the world's most authoritative and timely sources of data, forecasts and analysis on the global oil market – including detailed statistics and commentary on oil supply, demand, inventories, prices and refining activity, as well as oil trade for IEA and selected non-IEA countries.

Highlights

- Demand growth will slow to 1.6 mb/d in 2023, down from 2.1 mb/d this year, as mounting economic headwinds impede gains. The GDP outlook has worsened and 4Q22 global oil use will contract (-240 kb/d) compared with last year. China's persistently weak economy, Europe's energy crisis, burgeoning product cracks and the strong US dollar are all weighing heavily on consumption.

- World oil supply rose 410 kb/d in October to 101.7 mb/d but is forecast to fall by 1 mb/d for the remainder of the year as OPEC+ cuts and an EU ban on Russian crude come into effect. Annual growth of 4.6 mb/d this year is set to boost global production to 99.9 mb/d. Modest gains of just 740 kb/d in 2023 will push supply to 100.7 mb/d.

- Global refinery throughputs in October fell by 500 kb/d m-o-m to 80.4 mb/d, with a 1.1 mb/d decline in the Atlantic Basin partly offset by higher runs East of Suez. New refinery capacity coming online will go some way to offset potential losses from Russia. Refinery runs are forecast to increase by 2.3 mb/d in 2022 and 1.4 mb/d next year. Diesel cracks surged to new records, keeping margins at elevated levels.

- Russian oil exports rose by 165 kb/d to 7.7 mb/d in October as shipments to the EU, China and India held up and lower flows to Türkiye were more than offset by increases to yet to be identified destinations. Crude oil exports to the EU crude were 1.5 mb/d, 1 mb/d below pre-war levels. Product exports were down 300 kb/d, to 1 mb/d, including 600 kb/d of diesel. Export revenues rose by $1.7 bn to $17.3 bn.

- Global observed inventories fell by 14.2 mb in September as OECD and non-OECD stocks plunged by 45.5 mb and 19.3 mb, respectively, but were partially offset by a surge in oil on the water of 50.6 mb. OECD industry oil stocks declined by 8 mb, while government stocks drew by 37.4 mb. OECD total oil stocks fell below 4 000 mb for the first time since 2004.

- In October, North Sea Dated posted its first increase in four months, rising $3.35/bbl to $93.11/bbl as signs of a tight market prevailed over economic uncertainty. Oil prices remain about 30% below their June peak. Brent backwardation weakened slightly while open interest continued to languish near seven-year lows. Freight rates rose on higher exports and as the shift away from Russian barrels increased tension on available fleet capacity.

Diesel tensions

Oil markets remain finely balanced going into the winter months, with OECD stocks trending at the lowest levels since 2004. The approaching EU embargoes on Russian crude and oil product imports and a ban on maritime services will add further pressure on global oil balances, and, in particular, on already exceptionally tight diesel markets. A proposed oil price cap may help alleviate tensions, yet a myriad of uncertainties and logistical challenges remain.

Diesel prices and cracks (differential to crude oil price) surged to record levels in October, and are now 70% and 425% higher, respectively, than year-ago levels while benchmark Brent prices increased just 11% during the same period. Distillate inventories are at multi-decade lows. French refinery strikes last month and upcoming embargoes propelled diesel prices in Rotterdam, Europe's main trading hub, to more than $80/bbl above North Sea Dated at one point, before easing somewhat. Diesel premiums in the United States have also soared ahead of the winter heating season in the Northeast.

High diesel prices are fuelling inflation, adding pressure on the global economy and world oil demand, which is now expected to contract by 240 kb/d in 4Q22. Demand is forecast to expand by 2.1 mb/d in 2022 before slowing to 1.6 mb/d next year. Growth will come from jet fuel and LPG/ethane for petrochemicals. But global diesel/gasoil growth is forecast to ease from 1.5 mb/d in 2021, to 400 kb/d in 2022 before posting a small decline in 2023 under the weight of persistently high prices, a slowing economy and despite increased gas-to-oil switching.

Diesel markets were already in deficit before Russia's invasion of Ukraine due to the closure of 3.5 mb/d refinery distillation capacity since the start of the Covid-19 pandemic, resulting in a net decline of 1 mb/d. With the post pandemic recovery in 2021, demand jumped for diesel and gasoil - the main engines of industrial activity and economic growth. Lower Chinese product exports also tightened the market, but a recent change in policy is making more diesel available. A net 2.7 mb/d of new distillation capacity is slated to come online globally from 4Q22 to end-2023, which could offset lower exports from Russia following the embargo.

By October, EU countries had reduced Russian crude oil imports by 1.1 mb/d to 1.4 mb/d, and diesel flows by 50 kb/d to 560 kb/d. When the crude and product embargoes come into full force in December and February, respectively, an additional 1.1 mb/d of crude and 1 mb/d of diesel, naphtha and fuel oil will have to be replaced. For crude oil, no significant buying from Russia outside China, India, and Türkiye has appeared despite massive discounts. A further rerouting of trade should help ease pressures but a shortage of tankers is a major concern, especially for ice-class vessels required to load out of Baltic ports during winter.

The competition for non-Russian diesel barrels will be fierce, with EU countries having to bid cargoes from the US, Middle East and India away from their traditional buyers. Increased refinery capacity will eventually help ease diesel tensions. However, until then, if prices go too high, further demand destruction may be inevitable for the market imbalances to clear.

OPEC+ crude oil production[1]

million barrels per day

	Sep 2022 Supply	Oct 2022 Supply	Oct Prod vs Target	Oct 2022 Target	Sustainable Capacity[2]	Eff Spare Cap vs Oct[3]
Algeria	1.03	1.04	-0.01	1.06	1.0	0.0
Angola	1.09	1.05	-0.48	1.53	1.2	0.1
Congo	0.27	0.25	-0.08	0.33	0.3	0.0
Equatorial Guinea	0.08	0.07	-0.06	0.13	0.1	0.0
Gabon	0.20	0.22	0.03	0.19	0.2	0.0
Iraq	4.55	4.60	-0.05	4.65	4.7	0.1
Kuwait	2.82	2.80	-0.01	2.81	2.8	0.0
Nigeria	0.96	1.01	-0.82	1.83	1.3	0.3
Saudi Arabia	11.03	10.90	-0.10	11.00	12.2	1.3
UAE	3.48	3.46	0.28	3.18	4.1	0.7
Total OPEC-10	**25.51**	**25.40**	**-1.29**	**26.69**	**28.0**	**2.6**
Iran[4]	2.49	2.51			3.8	
Libya[4]	1.16	1.18			1.2	0.0
Venezuela[4]	0.67	0.71			0.8	0.0
Total OPEC	**29.83**	**29.80**			**33.7**	**2.7**
Azerbaijan	0.54	0.55	-0.17	0.72	0.6	0.0
Kazakhstan	1.36	1.46	-0.25	1.71	1.7	0.2
Mexico[5]	1.62	1.64		1.75	1.7	0.0
Oman	0.88	0.88	0.00	0.88	0.9	0.0
Russia	9.74	9.72	-1.29	11.00	10.2	
Others[6]	0.88	0.87	-0.23	1.11	0.9	0.1
Total Non-OPEC	**15.02**	**15.12**	**-1.94**	**17.16**	**15.9**	**0.3**
OPEC+ 19 in cut deal[4]	**38.92**	**38.88**	**-3.22**	**42.10**	**42.2**	**2.9**
Total OPEC+	**44.85**	**44.92**			**49.6**	**3.0**

1. Excludes condensates. 2. Capacity levels can be reached within 90 days and sustained for an extended period. 3. Excludes shut in Iranian, Russian crude. 4. Iran, Libya, Venezuela exempt from cuts. 5. Mexico excluded from OPEC+ compliance. Only cut in May, June 2020. 6. Bahrain, Brunei, Malaysia, Sudan and South Sudan.

IEA World Oil Supply and Demand Forecasts: Summary (Table)

2022-11-15 09:00:00.0 GMT

By Kristian Siedenburg

(Bloomberg) -- Following is a summary of world oil supply and demand forecasts from the International Energy Agency in Paris:

	4Q 2023	3Q 2023	2Q 2023	1Q 2023	4Q 2022	3Q 2022	2Q 2022	1Q 2022	2023	2022
	Demand									
Total Demand	103.0	102.3	100.5	99.6	100.7	100.3	98.7	99.4	101.4	99.8
Total OECD	47.0	46.9	45.7	46.1	46.7	46.6	45.4	45.8	46.4	46.1
Americas	25.2	25.4	25.1	24.7	25.0	25.3	25.0	24.8	25.1	25.0
Europe	13.9	14.1	13.5	13.4	14.0	14.1	13.4	13.2	13.7	13.7
Asia Oceania	7.9	7.4	7.1	8.0	7.8	7.2	7.0	7.9	7.6	7.4
Non-OECD countries	56.1	55.4	54.8	53.6	54.0	53.7	53.3	53.6	55.0	53.7
FSU	4.8	4.9	4.6	4.6	4.9	5.1	4.7	4.7	4.7	4.9
Europe	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
China	16.5	15.8	15.6	15.0	15.2	14.8	14.4	15.4	15.7	15.0
Other Asia	14.8	14.1	14.4	14.5	14.0	13.4	14.0	14.1	14.5	13.9
Americas	6.2	6.2	6.1	5.9	6.1	6.1	6.1	5.9	6.1	6.1
Middle East	8.8	9.6	9.2	8.6	8.7	9.5	9.2	8.5	9.0	9.0
Africa	4.2	4.1	4.1	4.1	4.2	4.0	4.1	4.2	4.1	4.1
	Supply									
Total Supply	n/a	n/a	n/a	n/a	n/a	101.0	98.8	98.7	n/a	n/a
Non-OPEC	66.6	66.5	65.9	65.4	66.5	66.1	64.7	64.9	66.1	65.5
Total OECD	31.3	30.9	30.5	30.3	30.2	29.6	28.9	28.8	30.8	29.4
Americas	27.4	27.1	26.7	26.5	26.5	26.1	25.4	25.0	26.9	25.7
Europe	3.5	3.3	3.4	3.4	3.2	3.1	3.0	3.3	3.4	3.2
Asia Oceania	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5
Non-OECD	29.9	29.8	29.9	30.2	31.0	30.9	30.5	31.4	30.0	30.9
FSU	12.4	12.4	12.5	12.8	13.8	13.7	13.4	14.4	12.5	13.8
Europe	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
China	4.1	4.2	4.2	4.3	4.1	4.1	4.2	4.2	4.2	4.2
Other Asia	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.8	2.6	2.7
Americas	6.1	6.0	6.0	5.9	5.8	5.7	5.5	5.4	6.0	5.6
Middle East	3.2	3.2	3.2	3.2	3.2	3.3	3.2	3.2	3.2	3.2
Africa	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Processing Gains	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3
Total OPEC	n/a	n/a	n/a	n/a	n/a	34.9	34.1	33.8	n/a	n/a
Crude	n/a	n/a	n/a	n/a	n/a	29.5	28.7	28.5	n/a	n/a
Natural gas liquids NGLs	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.3	5.4	5.3
Call on OPEC crude and stock change *	30.9	30.3	29.2	28.8	28.8	28.9	28.6	29.2	29.8	28.9

NOTE: Figures are in million of barrels per day. (*) equals total demand minus non-OPEC supply and OPEC natural gas liquids.

IEA changed the way it measures OPEC supply, adopting the industry-standard approach of counting most of Venezuela's Orinoco heavy oil as "crude oil."

SOURCE: International Energy Agency

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Mark Evans

IEA: October Crude Oil Production in OPEC Countries (Table)
2022-11-15 09:00:00.2 GMT
By Kristian Siedenburg
(Bloomberg) -- Following is a summary of oil production in OPEC countries from the International Energy Agency in Paris:

	Oct. 2022	Sept. 2022	Oct. MoM
Total OPEC	29.80	29.83	-0.03
Total OPEC10	25.40	25.51	-0.11
Algeria	1.04	1.03	0.01
Angola	1.05	1.09	-0.04
Congo	0.25	0.27	-0.02
Equatorial Guinea	0.07	0.08	-0.01
Gabon	0.22	0.20	0.02
Iraq	4.60	4.55	0.05
Kuwait	2.80	2.82	-0.02
Nigeria	1.01	0.96	0.05
Saudi Arabia	10.90	11.03	-0.13
UAE	3.46	3.48	-0.02
Iran	2.51	2.49	0.02
Libya	1.18	1.16	0.02
Venezuela	0.71	0.67	0.04

NOTE: Figures are in million of barrels per day. Monthly level change calculated by Bloomberg. Production data excludes condensates.
OPEC10 excludes Iran, Libya and Venezuela.
SOURCE: International Energy Agency

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IEA REPORT WRAP: Oil Strained by Stockpiles; Russia Drop; Diesel
2022-11-15 09:21:21.840 GMT
By Alex Longley
(Bloomberg) -- Summary of stories from the International Energy Agency's monthly Oil Market Report issued Tuesday:
* Oil Markets Face Strain With Stockpiles at 18-Year Low
** Diesel supplies are "exceptionally tight" amid Russia crisis
** Inventories to be depleted by sanctions on Russia, OPEC+ cuts
* IEA Sees Russia 2023 Oil Output Nosedive on Lack of New

Markets
** Russia's output next year may shrink to 9.6 million b/d
** China, India and Turkey stabilized their purchases of Russian oil
* Unprecedented diesel prices mean that demand destruction for the fuel is probable
* See summary of key IEA world oil supply/demand forecasts
** Click here for detailed quarterly forecast table
* Other stories include:
** Russia Oil Exports to Suffer Losses Once EU Ban Kicks in
** OPEC Crude Output Slid 30k B/D in October on Saudi Pullback
* NOTE: OPEC issued its own monthly report Monday in which it cut the global oil demand outlook

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IEA World Oil Supply/Demand Key Forecasts
2022-11-15 09:00:00.6 GMT
By Kristian Siedenburg
(Bloomberg) -- World oil demand 2023 forecast was revised to 101.4m b/d from 101.3m b/d in Paris-based Intl Energy Agency's latest monthly report.
* 2022 world demand was revised to 99.8 from 99.6m b/d
* Demand change in 2023 est. 1.6% y/y or 1.6m b/d
* Non-OPEC supply 2023 was revised to 66.1m b/d from 66.0m b/d
* Call on OPEC crude 2023 was unrevised at 29.8m b/d
* Call on OPEC crude 2022 was revised to 28.9 m b/d from 28.8m b/d
** OPEC crude production in Oct. fell by 30k b/d on the month to 29.80m b/d
* Detailed table: FIFW NSN RLDPJIGEZ1FK <GO>
* NOTE: Fcasts based off IEA's table providing one decimal point

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OPEC Crude Output Slid 30k B/D in October on Saudi Pullback: IEA
2022-11-15 09:00:00.4 GMT
By Amanda Jordan
(Bloomberg) -- OPEC's October crude output slipped 30k b/d from a month earlier to 29.8m b/d as a decline in Saudi volumes offset increased flows from Iraq and Nigeria, the IEA said in its monthly market report.
* Saudi production fell 130k b/d to 10.9m b/d
* UAE output edged down to 3.46m b/d, still above its OPEC+ quota
* Kuwaiti volumes eased to 2.8m b/d
* Iraqi supply rose by 50k b/d to 4.6m b/d, while production in Iran -- exempt from the OPEC+ supply agreement -- inched up to 2.51m b/d
* Nigerian supply grew by 50k b/d to 1.01m b/d after the Forcados grade returned following a three-month halt and Bonny Light "showed signs of life"
* Libyan output edged up to 1.18m b/d, the highest since July 2021
* Angolan supply fell 40k b/d to 1.05m b/d due to operational issues and field maintenance
* NOTE: On Monday, OPEC released its own production figures for October, estimating its 13 members pumped 29.49m b/d

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Oil Markets Face Strain With Stockpiles at 18-Year Low, IEA Says
2022-11-15 09:00:00.19 GMT
By Grant Smith
(Bloomberg) -- Oil inventories in developed nations have sunk to the lowest since 2004, leaving global markets vulnerable as sanctions on Russian exports take effect, according to the International Energy Agency.
Supplies of diesel fuel, used in trucks, are "exceptionally tight" and prices may need to climb further in order to rein in

demand, the Paris-based agency said in its monthly report.
"Oil markets remain finely balanced going into the winter months," said the IEA, which advises most major economies. "The approaching EU embargoes on Russian crude and oil products, and a ban on maritime services, will add further pressure on global oil balances."
International oil prices remain above $90 a barrel even after a recent pullback, stoking inflation and posing a headwind for economic activity. The OPEC+ alliance led by Saudi Arabia has nonetheless announced production cuts this month and next, a move the IEA has said the producers' group should reconsider.
Fuel consumption is already showing signs of strain from elevated prices, with global demand poised to contract 240,000 barrels a day this quarter compared with a year ago, the agency estimated. Demand will average 100.7 million barrels a day in the period.
Combined government and industry oil stockpiles in developed nations have fallen below 4 billion barrels for the first time in 18 years, having declined by 177 million barrels this year as the US and other consumers tapstrategic reserves to keep fuel prices in check.
Stocks of distillates, which include diesel, are at the lowest in several decades. Supplies of the fuel, already strained refinery closures and the post-Covid rebound in demand, have been pressured further by disruption to Russian shipments.
"Increased refinery capacity will eventually help ease diesel tensions," the IEA said. "However, until then, if prices go too high, further demand destruction may be inevitable for the market imbalances to clear."

Russia Sanctions

Oil inventories may be depleted further with the onset next month of European Union measures intended to punish Russia over its invasion of Ukraine, the IEA warned.
Russian output is on track to slump a further 15% early next year, the agency forecasts. Still, output has so far remained relatively robust near 11 million barrels a day in defiance of IEA predictions, and exports even rose in October.
Supplies from Russia's counterparts in the OPEC+ alliance are also due to fall after the group announced hefty production cuts on Oct. 5, which take effect this month and next.
The coalition's decision drew fierce criticism from US President Joe Biden, who accused group leader Saudi Arabia of endangering global growth and abetting the Kremlin's war in Ukraine. IEA Executive Director Fatih Birol said last week that OPEC+ should "re-think" its actions.
Roughly half of the 2 million barrel-a-day cut pledged by the Organization of Petroleum Exporting Countries and its allies will be implemented, as most members are already pumping below

their output targets, according to the IEA. Saudi Arabia and neighboring United Arab Emirates will make the biggest reductions.

Saudi Energy Minister Prince Abdulaziz bin Salman has defended the cutbacks, saying last week at the COP27 climate talks in Egypt that they were needed to offset extreme economic uncertainties. OPEC's own monthly report, published on Monday, also back up that rationale by making a substantial to cut to its demand forecasts.

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IEA Sees Russia Oil Output Nosediving in 2023 on Lack of Markets

2022-11-15 09:00:00.37 GMT

By Bloomberg News

(Bloomberg) -- Russia may struggle to find new markets for its oil once a European import ban kicks in, potentially pushing the nation's average output below 10 million barrels a day next year, according to the International Energy Agency.

Russia has redirected more than a million barrels a day to India, China and Turkey since many of its traditional customers fell away following the invasion of Ukraine, the agency said Tuesday. Yet flows to those countries have steadied recently, raising speculation they may not be able to ramp up imports further.

Should their purchases remain stable, the rest of the world would need to triple Russian imports to around 3.3 million barrels a day by February, the IEA said in a report. "We do not think this is feasible," it said, predicting Russia may lose close to 2 million barrels a day of output by the end of March, compared with prewar levels, and pump an average of just 9.6 million barrels a day next year.

Russia's production in January through October averaged about 10.7 million barrels a day, according to Bloomberg calculations based on media reports and data from the Energy Ministry's CDU-TEK unit.

The European Union is set to ban imports of most Russian crude on Dec. 5 and refined products from Feb. 5. The move will not only create production risks for Russia, but exacerbate a supply headache for the region as alternative fuel sources may not be enough to fill the gap.

The bloc will also prohibit EU-flagged tankers from shipping Russian cargoes and ban the provision of maritime services, including insurance, to third-party vessels involved in the trade. That may further hamper the redirection of Russian

crude flows away from Europe.
Buyers and sellers of the barrels are set to expand their use of "shadow trade, including high-sea transshipments using 'dark' tankers," the IEA said.
Based on October data, the Kremlin will need to find new markets for roughly 1.5 million barrels a day of crude and 1 million barrels of oil products, according to the IEA.

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Diesel Demand Destruction Starting to Look Inevitable, IEA Says
2022-11-15 09:00:00.27 GMT
By Alaric Nightingale
(Bloomberg) -- Unprecedented diesel prices mean that demand destruction for the fuel is probable, the International Energy Agency said.
Both the outright price of the fuel and its trading level relative to crude oil rose to records in October, jumping 70% and 425% respectively year-on-year, the Paris-based adviser said in its monthly report on the state of the oil market.
With economic growth showing signs of weakening in the face of high inflation and energy costs, those high prices could well prove self-defeating, the agency said.
"This increasingly ominous global outlook, along with very high prices, is set to significantly curtail diesel demand in 2023," the IEA said.
The IEA forecast that global growth in diesel and gasoil will ease from 1.5 million barrels a day in 2021, to 400,000 in this year. In 2023, consumption will post a small decline "under the weight of persistently high prices, a slowing economy and despite increased gas-to-oil switching."
Even before Russia invaded Ukraine, diesel markets were in deficit because of a combination of halted refineries during Covid and then resurgent demand as countries dealt with the pandemic, the adviser to oil consuming nations said.
The war has led to the European Union announcing a ban on the purchase of Russian diesel that enters into force in February but is already an intense focal point for the market.
Russia Seaborne Fuel Exports Jump in Rush to Beat EU Ban
Russia remains the continent's biggest external supplier and Europe is likewise the top buyer from Moscow, creating uncertainty how global flows will be affected once the prohibition begins.
"The competition for non-Russian diesel barrels will be

fierce, with EU countries having to bid cargoes from the US, Middle East and India away from their traditional buyers," the IEA said. "Increased refinery capacity will eventually help ease diesel tensions. However, until then, if prices go too high, further demand destruction may be inevitable for the market imbalances to clear."

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Russia Oil Exports to Suffer Losses Once EU Ban Kicks in: IEA
2022-11-15 09:00:00.5 GMT
By Sherry Su
(Bloomberg) -- Russian oil exports rose slightly in October as shipments to the EU, China and India were largely unchanged but Russia will suffer losses once EU import ban kicks in due to difficulty in finding new destinations, the IEA said in its monthly Oil Market Report.
* Russian oil exports rose by 165k b/d in October to 7.7m b/d; crude oil shipments to the EU fell to just 1.5m b/d as a 140k b/d decline in Druzhba pipeline flows was partly offset by a small increase in seaborne flows
** Russian product exports to the EU rose slightly to 1m b/d in October from 900k b/d in September
* If China, India and Turkey do not increase their imports of Russian oil, the rest of the world, excluding sanctioned destinations, would need to triple their Russian oil imports to 3.3m b/d from about 1.2m b/d by February 2023, said IEA
** "We do not think this is feasible, therefore our crude oil and refinery throughputs forecasts for Russia incorporate sanctions-related losses"
* While Russia has been able to redirect all of the crude oil volumes, it has had to cut refined product exports by 400k b/d since the start of the year: IEA
* The so-called shadow trade, including high-sea transhipments using "dark" tankers with unclear ownership and record, is also likely to expand and could obstruct Russian trade analysis, according to IEA
** From next month, however, shippers of Russian oil outside the price cap may be incentivised to hide actual destinations
* In October, with high inflows from other suppliers, the share of Russian diesel in the EU imports dropped to an unprecedented

low level of just 40%, from 60% pre-war levels

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https://www.reuters.com/business/energy/iraq-targets-7-mln-bpd-oil-output-capacity-2027-somo-head-2022-11-16/
2 minute readNovember 16, 202211:53 AM MSTLast Updated 4 hours ago

Iraq targets 7-mln-bpd oil output capacity in 2027 – SOMO head
By Rowena Edwards

Nov 16 (Reuters) - Iraq plans to increase its oil production capacity to around 7 million barrels per day in 2027, head of state-owned oil marketer SOMO Alaa Alyasri told Reuters on Wednesday.

Iraq's current crude production capacity is close to 5 million barrels per day (bpd), but it produced 4.651 mln bpd in October, according to SOMO. This is in line with its production quota under the OPEC+ agreement. The capacity increase will come from Iraq's giant fields currently undergoing development including Rumaila, managed by a joint venture of BP Plc (BP.L) and PetroChina Co Ltd (601857.SS), as well as from Lukoil's West Qurna 2, Alyasri said.

BP discussed with Iraq's oil ministry in May boosting Rumaila's production to its peak capacity of 1.7 mln bpd. And last year, Iraq's then-oil minister Ihsan Abdul Jabbar said Lukoil plans to double West Qurna 2 production to 800,000 bpd in 2027.

There are also green fields that are still in development stages or early production, which have showed promising output potential, Alyasri added.

Iraq's oil ministry is looking to increase oil production rates and raise baseline exports, state news agency (INA) cited the head of state oil marketer SOMO, Alaa Alyasri as saying on Wednesday.

"The increase in these production rates will take place in coordination with OPEC and according to the decisions taken in line with oil market requirements," Alyasri said.

Reporting by Rowena Edwards; editing by Jonathan Oatis and Bernadette Baum

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Targeted approach key to containing pandemic

By Yan Lun (Chinadaily.com.cn) 15:03, November 18, 2022

After fighting the COVID-19 pandemic for almost three years, China has explored and adopted a largely different approach from some Western countries' laissez-faire system, taking into account a large population of more than 267 million Chinese people aged above 60, to improve the stretched and unbalanced healthcare system, meet people's high expectations in terms of public health and contain the COVID-19 pandemic.

But just as any debate on any subject relating to China, including the development model, the one on China's pandemic prevention and control measures, too, has sparked controversy abroad.

Despite such debates and criticisms, however, there is no denying that the seemingly harsh anti-pandemic policy has kept the numbers of confirmed cases and deaths relatively low, albeit at considerable economic and other costs. In comparison, the United States has reported about 100 million cases and 1.1 million deaths in spite of having a much smaller population than China's and the world's most advanced healthcare system.

However, some strict anti-pandemic policies such as city-wide lockdown, despite saving many people's lives, have slowed economic growth of many cities and regions, dealing a blow to many people's livelihoods and reducing their incomes. Perhaps there is a need to make the prevention and control measures more specific and targeted, so as to minimize their impact on economic growth or people's livelihoods.

That's why the introduction of the new pandemic-prevention rules, popularly called the "20 rules", on Nov 11 are a timely step toward fine-tuning the measures to contain the novel coronavirus, whose strains are becoming more infectious but less deadly.

How to implement the new rules, however, is an even bigger challenge for local authorities amid the resurgence of cases in many places.

To begin with, local governments need to explore ways to implement the new rules. For instance, Shijiazhuang, the capital city of Hebei province, stopped requiring people to show nucleic acid test results to enter public places from Tuesday and suddenly closed most of the nucleic acid test booths. In response to public queries, the local health authorities said nucleic acid test was still required for those working in key sectors.

The 20 new rules are being implemented to ease the strict pandemic-prevention measures and adopt a more targeted approach to containing the spread of the virus, in a bid to strike a delicate balance between economic development and protecting human lives. In fact, local governments have been given much room to experiment and make their own decisions depending on their governance capabilities and the reality on the ground.

But there are principles that still need to be followed in the strictest sense of the term.

First, the local authorities should always put people's well-being first. The forceful implementation of some extreme anti-pandemic measures, which in the past unnecessarily inconvenienced people, resulting in trauma, both physical and mental, and even deaths, should immediately stop.

Even when local government officials and community workers are in a dilemma over how to implement the rules, they should put people first. In fact, they would do better by establishing a scientific accountability system. Fulfilling their own duties in fighting the pandemic shouldn't be an excuse for them to refrain from helping those in urgent need.

To put people first, local governments also need to take people's emotions and opinions into consideration when introducing the anti-pandemic rules. They should avoid the sudden introduction or removal of crucial measures that have far-reaching effects on individuals. And if they have no choice but to implement such measures, they should give adequate and timely explanation to the public for doing so in order to reduce their fear and concerns.

Second, local governments should follow the new 20 rules both in letter and spirit. Though it's a huge test for local authorities to control the spread of the highly infectious variants while maintaining economic growth, they should consider doing away with the not-fully-scientific practice of locking down whole cities or counties on the basis of just a few confirmed cases.

According to the new 20 rules, local authorities should introduce targeted prevention and control measures but avoid upgrading them (that is, making them stricter) unnecessarily. And those local authorities not following the new rules in spirit should be held accountable for unnecessarily harming people's livelihoods, because lockdowns and/or large-scale quarantining are especially harmful to the economy and low-income people.

Because both the condition on the ground and the variants of the virus are constantly changing, gradual and progressive adjustments should be made to ensure the targeted measures prevent the further spread of the virus. Hopefully, by strictly and rightly following the new 20 rules, the local governments will improve their approach to containing the pandemic, and figure out better ways to protect people's lives and livelihoods, while maintaining healthy economic growth.

(Web editor: Cai Hairuo, Liang Jun)

https://www.globaltimes.cn/page/202211/1279295.shtml

China shortens quarantine period for intl arrivals, cancels 'circuit breaker' for inbound flights

By Global Times Published: Nov 11, 2022 01:56 PM

Chinese authorities on Friday released 20 optimized measures to further enhance scientific and precise work of epidemic prevention and control, one day after the Chinese leadership held a meeting to hear a report on the COVID-19 response, and discussed and arranged the 20 measures.

The newest steps include shortened quarantine period for international arrivals and close contacts of confirmed cases from 7+3 (seven days of centralized quarantine and three days of health observation at home) to 5+3.

The measures required timely screening of close contacts of confirmed cases, but required to stop screening close contacts of close contacts, or the secondary contacts.

Circuit breaker mechanism on inbound flights to China upon detecting positive cases on board has also been canceled. Passengers of inbound flights to China will only need to provide one negative nucleic acid testing result within past 48 hours instead of two, according to the latest measures.

Ct value of nucleic acid testing of international arrivals would have to be less than 35. Those showing Ct value of 35-40 have to accept evaluation on virus transmission risk, according to the measures.

Business people and athlete groups have to be transferred directly from where they arrived to closed-loop quarantine-exemption areas and should not leave the area. Chinese nationals have to accept booster shots before entering these closed-loop areas, the measures required.

Per the latest measures, places in China would only be identified as high risk and low risk in terms of epidemic transmission. The classification of medium-risk area would be canceled.

People coming from high-risk areas have to stay at home for seven days for health observation instead of seven days of centralized quarantine.

The latest measures also called for promotion of mass vaccination in China, especially the administration of booster shots among the elderly group.

The measures also urged accelerated research and development of broad spectrum vaccines and drugs.

The measures vowed to deal with excessive and one-size-fits-all measures seriously, banning unreasonable steps to lock down schools, suspend traffic or clinical service. Such violations would be punished seriously according to regulations and laws, read the measures.

Global Times

TomTom | Baidu

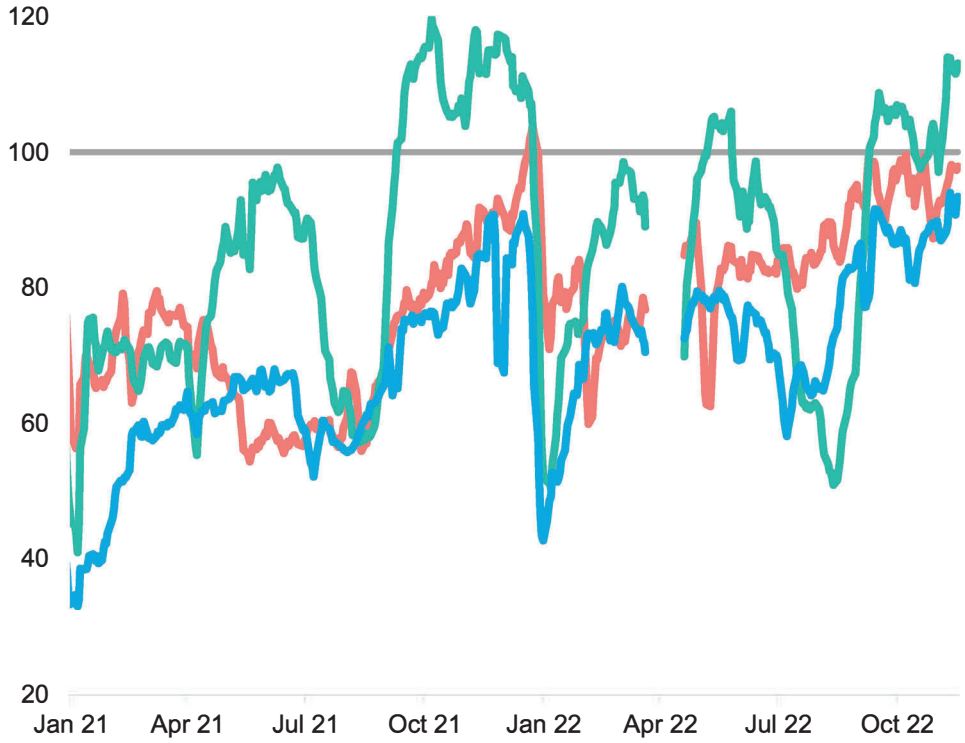
Google mobility data stopped updating in October 2022 and will therefore not be included in future updates.

Comparing the two mobility indicators

Congestion levels pick up everywhere except China

TomTom congestion index

Indexed to the peak congestion of the average week in 2019 (five-day weekday moving average)



	Latest	Week Δ	Four-week Δ
Europe	**113.1**	0.3 (+0.3%)	15.1 (+15.4%)
Asia Pacific	**97.8**	1.8 (+1.9%)	2.2 (+2.3%)
North America	**93.5**	1.1 (+1.2%)	7.3 (+8.5%)

Source: TomTom road congestion data, BloombergNEF. Note: ***Asia Pacific excludes China. Data updated to November 16, 2022.*** *Δ = change.*

China-15 (Baidu) congestion index

Daily peak congestion levels, indexed to January 2021 (seven-day moving average)

	Latest	Week Δ	Four-week Δ
China-15	**100.68**	-2.37 (-2.30%)	-2.14 (-2.08%)

Source: BloombergNEF, calculated from Baidu data. Note: Data updated to ***November 16, 2022****. Δ = change.*

BloombergNEF

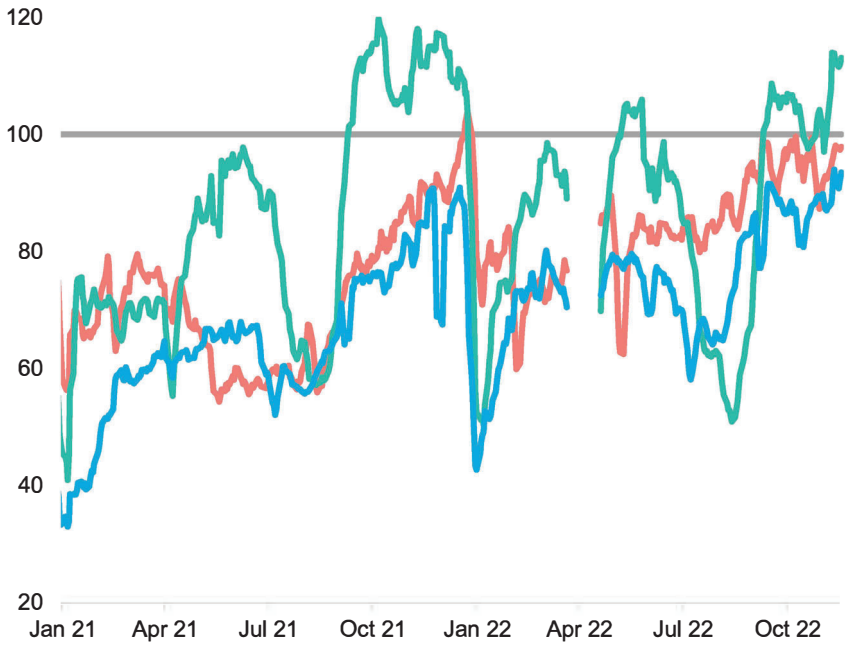
Apple Mobility reports were discontinued on April 14, 2022. We have resumed updating TomTom congestion data, which was previously updated to March 16.

TomTom congestion index

All regions see week-on-week uptick

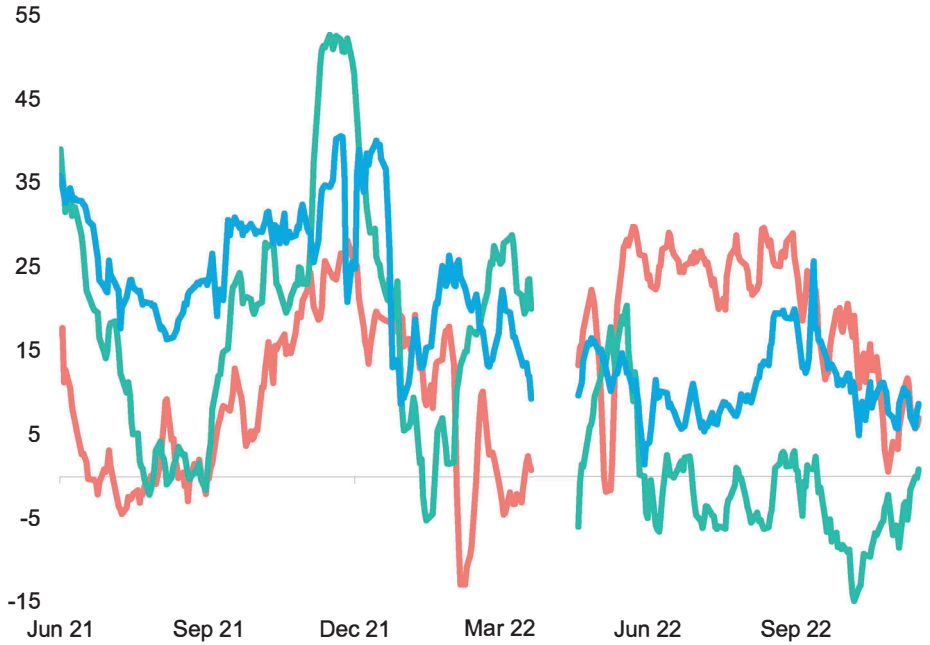
Regional road-congestion index

Indexed to the peak congestion of the average week in 2019 (five-day weekday moving average)



Index point change versus the previous year

Percentage point change vs the year before (seven-day moving average)



	Latest	Week Δ	Four-week Δ	Index point Δ vs year before	Index point Δ vs year before (last week)
Europe	**113.1**	0.3 (+0.3%)	15.1 (+15.4%)	-0.97	-5.43
Asia Pacific	**97.8**	1.8 (+1.9%)	2.2 (+2.3%)	7.57	8.17
North America	**93.5**	1.1 (+1.2%)	7.3 (+8.5%)	7.72	8.88

Source: TomTom Traffic Index, BloombergNEF. Note: ***Asia Pacific excludes China. Data updated to November 16, 2022,*** *with weekly addition from November 9, 2022. Index point change versus the previous year is obtained by averaging the latest weekly values. Δ = change.*

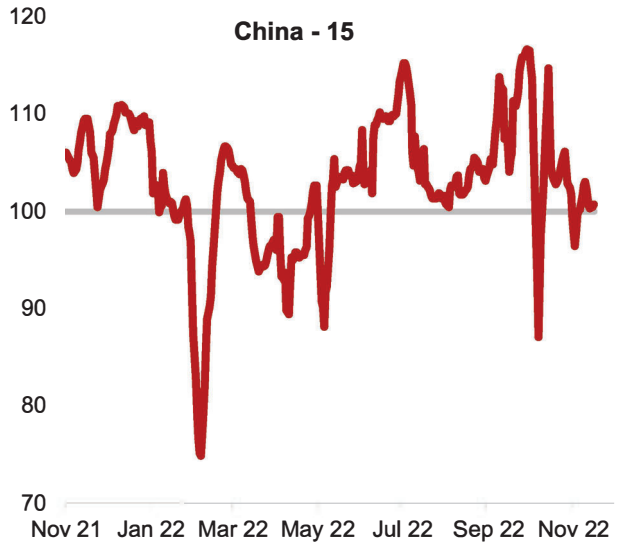
TomTom | Baidu

China (Baidu) congestion index

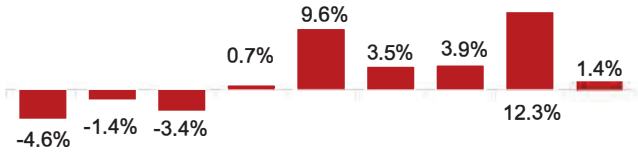
Congestion levels drop as Covid cases reach six-month high

China congestion index (calculated from Baidu data)

Daily peak congestion levels, indexed to January 2021 (seven-day moving average)



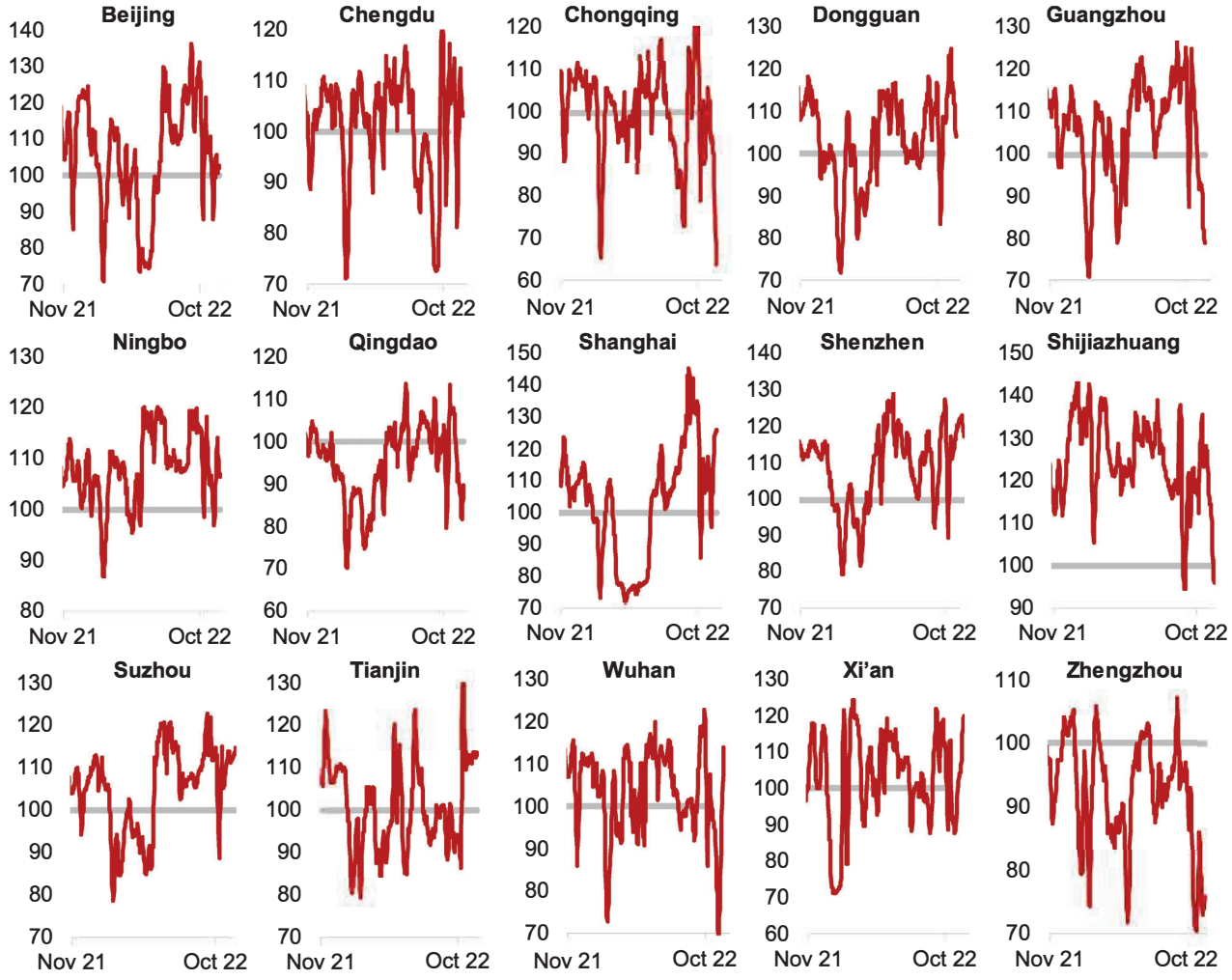
Monthly % change from January 2021 level



	Latest	Week Δ	Four-week Δ
China - 15	100.68	-2.37 (-2.30%)	-2.14 (-2.08%)

Road traffic in China in the week ending November 16 was down 2.37 percentage points to 100.68 of January 2021 levels.

Daily peak congestion levels, indexed to January 2021 (seven-day moving average)



Source: BloombergNEF, calculated from Baidu's data. Note: ***Data updated to November 16, 2022****. City-level charts display the 15 cities with the highest number of vehicle registrations (excluding two- and three-wheelers). The China-15 congestion level is calculated by taking the weighted average of the congestion levels in the 15 cities and their vehicle registration numbers. Δ = change.*

https://newsroom.aaa.com/2022/11/thanksgiving-travel-ticks-up-just-shy-of-pre-pandemic-levels/

WASHINGTON, D.C. (November 15, 2022) – AAA predicts 54.6 million people will travel 50 miles or more from home this Thanksgiving. That's a 1.5% increase over 2021 and 98% of pre-pandemic volumes. This year is projected to be the third busiest for Thanksgiving travel since AAA started tracking in 2000*.

"Families and friends are eager to spend time together this Thanksgiving, one of the busiest for travel in the past two decades," says Paula Twidale, AAA's Senior Vice President of Travel. "Plan ahead and pack your patience, whether you're driving or flying."

Most travelers will drive to their destinations, much like last year. Nearly 49 million people are expected to travel by car. While Thanksgiving road trips have slightly risen – up 0.4% from 2021 – car travel remains 2.5% below 2019 levels.

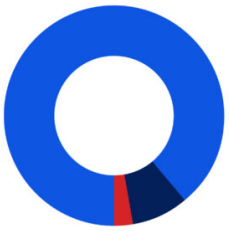
Air travel is up nearly 8% over 2021, with 4.5 million Americans flying to their Thanksgiving destinations this year. That's an increase of more than 330,000 travelers and nearly 99% of the 2019 volume. "Airport parking spaces fill up fast, so reserve a spot ahead of time and arrive early," Twidale suggests. "Anticipate long TSA lines. If possible, avoid checking a bag to allow for more flexibility if flights are delayed or you need to reschedule."

Americans are also ramping up travel by other modes of transportation. More than 1.4 million travelers are going out of town for Thanksgiving by bus, train, or cruise ship. That's an increase of 23% from 2021 and 96% of the 2019 volume. "With travel restrictions lifted and more people comfortable taking public transportation again, it's no surprise buses, trains, and cruises are coming back in a big way," Twidale adds. "Regardless of the mode of transportation you have chosen, expect crowds during your trip and at your destination. If your schedule is flexible, consider off-peak travel times during the holiday rush."

**2005 and 2019 have been the busiest years for Thanksgiving travel, respectively, since AAA started tracking in 2000.*

2022 Thanksgiving Holiday Travel Forecast

Share of Travelers by Mode



Auto	89.1%
Air	8.3%
Other	2.6%

Number of Travelers by Mode

	Auto	Air	Other	Total
2022 (forecast)	48.7M	4.51M	1.43M	54.6M
2021	48.5M	4.18M	1.16M	53.8M
2019	49.9M	4.58M	1.49M	56.0M
Growth* (2021 to 2022)	0.4%	7.9%	23.5%	1.5%
Growth* (2019 to 2022)	-2.54%	-1.38%	-3.92%	-2.49%

*Percentages may differ due to rounding.

Busiest Corridors and Best/Worst Times to Travel

INRIX expects severe congestion in several U.S. metro areas, with some drivers experiencing more than double normal delays. Highways in and around Atlanta, Chicago, New York City, and Los Angeles will be the busiest. To avoid the most hectic times, INRIX recommends traveling early in the morning on Wednesday or before 11am on Thanksgiving Day and avoiding travel between 4pm-8pm Friday, Saturday, and Sunday.

“Thanksgiving is one of the busiest holidays for road trips, and this year will be no different,” says Bob Pishue, Transportation Analyst, INRIX. “Although travel times will peak on Wednesday afternoon nationally, travelers should expect much heavier than normal congestion throughout the holiday weekend. Knowing when and where congestion will build can help drivers avoid the stress of sitting in traffic.”

Best & Worst Times to Travel (by car)

Date	Worst travel time	Best travel time
11/23/22	11:00 AM – 8:00 PM	Before 8:00 AM, After 8:00 PM
11/24/22	11:00 AM – 3:00 PM	Before 11:00 AM, After 6:00 PM
11/25/22	4:00 PM – 8:00 PM	Before 11:00 AM, After 8:00 PM
11/26/22	4:00 PM – 8:00 PM	Before 2:00 PM, After 8:00 PM
11/27/22	4:00 PM – 8:00 PM	Before 11:00 AM, After 8:00 PM

Peak Congestion by Metro

Metro	Corridor	Increase Over Typical Traffic	Peak Congestion
Atlanta	I-85 South; Clairmont Rd to MLK Jr Dr	105%	Wed, 11/23/22 – 1:30-3:30 PM
Boston	I-93 South; Albany St to MA-24	53%	Wed, 11/23/22 – 2:15-4:15 PM
Chicago	I-290 West; Morgan St to Wolf Rd	99%	Wed, 11/23/22 – 3:00-5:00 PM
Detroit	US-23 North; 8 Mile Rd to Lee Rd	32%	Wed, 11/23/22 – 2:00-4:00 PM
Houston	I-10 West; Sjolander Rd to TX-330	81%	Wed, 11/23/22 – 3:45-5:45 PM
Los Angeles	I-5 South; Colorado St to Florence Ave	144%	Wed, 11/23/22 – 5:30-7:30 PM
New York	I-278 South; I-495 to 6th Ave	158%	Wed, 11/23/22 – 2:45-4:45 PM
San Francisco	I-80 West; Maritime St to San Pablo Dam Rd	80%	Wed, 11/23/22 – 4:00-5:00 PM
Seattle	I-5 South; WA-18 to WA-7	86%	Wed, 11/23/22 – 4:15-6:15 PM
Washington DC	I-495 Counterclockwise; I-95 to VA-123	85%	Sun, 11/27/22 – 11:15 AM-1:15 PM

Expected Traffic by Metro & Corridor

Metro	Corridor	Increase over Typical Traffic	Day
Atlanta	I85 south J91 to J248A	105%	Wednesday, 11/23/22
	I75 north J205 to J227	64%	
	I85 clockwise J29 to J46	61%	
	I285 anti-clockwise J27 to J108	56%	
	US19 north J48 to J10	11%	
Boston	I93 south J20 to J4	76%	Wednesday, 11/23/22
	I93 north J23 to J34	53%	
	I95 south J208 to J10	30%	
	I90 west J20 to 11A	26%	
	MA3 J15 North to I93 J23	19%	
Chicago	I290 west J298 to J16	99%	Wednesday, 11/23/22
	I290 east J17 to J298	84%	
	I94 west J16 to J160	59%	
	I94 north J688B to J52B	35%	
	I294 J27B to J17B	14%	
Detroit	US23 north J53 to J60A	44%	Wednesday, 11/23/22
	I75 north J59 to J67	33%	
	I96 north J170 to J162	32%	
	I94 south J219 to J210	32%	
	I696 west J10 to J1	30%	
Houston	I10 west J796 to J787	81%	Wednesday, 11/23/22
	I69 east J123 to J132B	77%	
	I610 north J4A to J20	49%	
	I45 south J51 to J40B	33%	
	I69 south J136 to J115A	25%	
LA	I5 south J142 to J124	144%	Wednesday, 11/23/22
	I405 south J57 to J45	106%	
	I10 J19 to J38	88%	
	I405 J50 to I5	87%	
	I10 east J18 to J16A	86%	
New York	I278 south J35 to J22	158%	Wednesday, 11/23/22
	I495 east J13 to J32	97%	
	Bit Parkway west J17 to J3	77%	
	Bit Parkway east J3 to J17	66%	
	I495 west J44 to J16	21%	
San Francisco	I580 east J34 to J65	83%	Wednesday, 11/23/22
	I80 north J8A to J18	80%	
	I80 south J13 to J1A	63%	Saturday 26 Nov 2022
	I680 north J8 to J50	62%	Wednesday, 11/23/22
	US101 north J439 to J451	32%	
Seattle	I5 south J142B to J133	86%	Wednesday, 11/23/22
	I5 south J182 to J164	62%	
	I405 south J18 to J6	59%	
	I405 north J2 to J9	32%	
	I5 north J168B to J182	30%	
Washington DC	I95 south J170A to J160	85%	Sunday, 11/27/22
	I495 anticlockwise J27 to J45	51%	Wednesday, 11/23/22
	I95 north J170A to J22A	32%	
	I270 north J1 to J32	32%	
	I95 south J298 to J15	24%	

Holiday Forecast Methodology: A Brief Overview

Travel Forecast

In cooperation with AAA, S&P Global Market Intelligence developed a unique methodology to forecast actual domestic travel volumes. The economic variables used to forecast travel for the current holiday are leveraged from S&P Global Market Intelligence's proprietary databases. These data include macroeconomic drivers such as employment; output; household net worth; asset prices, including stock indices; interest rates; housing market indicators, and variables related to travel and tourism, including gasoline prices, airline travel, and hotel stays. AAA and S&P Global Market Intelligence have quantified holiday travel volumes going back to 2000.

Historical travel volume estimates come from DK SHIFFLET's TRAVEL PERFORMANCE/Monitorsm. The PERFORMANCE/Monitorsm is a comprehensive study measuring the travel behavior of U.S. residents. DK SHIFFLET contacts over 50,000 U.S. households each month to obtain detailed travel data, resulting in the unique ability to estimate visitor volume and spending, identify trends and forecast U.S. travel behavior—all after the trips have been taken.

The travel forecast is reported in person-trips. In particular, AAA and S&P Global Market Intelligence forecast the total U.S. holiday travel volume and expected mode of transportation. The travel forecast presented in this report was prepared the week of October 10, 2022.

Thanksgiving Holiday Travel Period

For purposes of this forecast, the Thanksgiving holiday travel period is defined as the five-day period from Wednesday, November 23 to Sunday, November 27. The Wednesday to Sunday period is consistent with previous years.

About AAA

Started in 1902 by automotive enthusiasts who wanted to chart a path for better roads in America and advocate for safe mobility, AAA has transformed into one of North America's largest membership organizations. Today, AAA provides roadside assistance, travel, discounts, financial and insurance services to enhance the life journey of 62 million members across North America, including 56 million in the United States. To learn more about all AAA has to offer or to become a member, visit AAA.com

About S&P Global Market Intelligence

At S&P Global Market Intelligence, we understand the importance of accurate, deep and insightful information. Our team of experts delivers unrivaled insights and leading data and technology solutions, partnering with customers to expand their perspective, operate with confidence, and make decisions with conviction.

S&P Global Market Intelligence is a division of S&P Global (NYSE: SPGI). S&P Global is the world's foremost provider of credit ratings, benchmarks, analytics and workflow solutions in the global capital, commodity and automotive markets. With every one of our offerings, we help many of the world's leading organizations navigate the economic landscape so they can plan for tomorrow, today. For more information, visit www.spglobal.com/marketintelligence.

About DKSA

DK SHIFFLET boasts the industry's most complete database on U.S. resident travel both in the U.S. and worldwide. Data is collected monthly from a U.S. representative sample, adding over 60,000 traveling households annually, and is used daily by leading travel organizations and their strategic planning groups. DK SHIFFLET is an MMGY Global company.

About INRIX

Founded in 2004, INRIX pioneered intelligent mobility solutions by transforming big data from connected devices and vehicles into mobility insights. This revolutionary approach enabled INRIX to become one of the leading providers of data and analytics into how people move. By empowering cities, businesses, and people with valuable insights, INRIX is helping to make the world smarter, safer, and greener. With partners and solutions spanning across the entire mobility ecosystem, INRIX is uniquely positioned at the intersection of technology and transportation – whether it's keeping road users safe, improving traffic signal timing to reduce delay and greenhouse gasses, optimizing last mile delivery, or helping uncover market insights. Learn more at INRIX.com

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2022 Thanksgiving Holiday Travel Forecast

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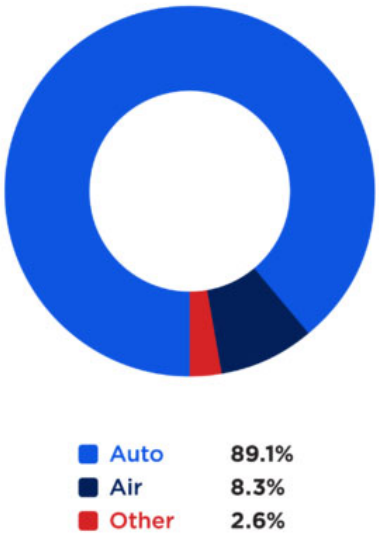

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Los Angeles	I-5 South; Colorado St to Florence Ave	144%	Wed, 11/23/22 – 5 7:30 PM
New York	I-278 South; I-495 to 6th Ave	158%	Wed, 11/23/22 – 2 4:45 PM
San Francisco	I-80 West; Maritime St to San Pablo Dam Rd	80%	Wed, 11/23/22 – 4 5:00 PM
Seattle	I-5 South; WA-18 to WA-7	86%	Wed, 11/23/22 – 4 6:15 PM
Washington DC	I-495 Counterclockwise; I-95 to VA-123	85%	Sun, 11/27/22 – 1 AM-1:15 PM

Expected Traffic by Metro & Corridor

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Boston	I93 south J20 to J4	76%	
	I93 north J23 to J34	53%	Wednesday, 11/23
	I95 south J20B to J10	30%	

	I90 west J20 to 11A	26%	
	MA3 J15 North to I93 J23	19%	
Chicago	I290 west J29B to J16	99%	Wednesday, 11/23
	I290 east J17 to J29B	84%	
	I94 west J16 to J160	59%	
	I94 north J68B to J52B	35%	
	I294 J27B to J17B	14%	
Detroit	US23 north J53 to J60A	44%	Wednesday, 11/23
	I75 north J59 to J67	33%	
	I96 north J170 to J162	32%	
	I94 south J219 to J210	32%	
	I696 west J10 to J1	30%	
Houston	I10 west J795 to J787	81%	Wednesday, 11/23
	I69 east J123 to J132B	77%	
	I610 north J4A to J20	49%	
	I45 south J51 to J40B	33%	
	I69 south J136 to J115A	25%	
LA	I5 south J142 to J124	144%	Wednesday, 11/23
	I405 south J57 to J45	106%	
	I10 J19 to J38	88%	
	I405 J50 to I5	87%	
	I10 east J1B to J16A	86%	
New York	I278 south J35 to J22	158%	Wednesday, 11/23
	I495 east J13 to J32	97%	
	Blt Parkway west J17 to J3	77%	
	Blt Parkway east J3 to J17	66%	
	I495 west J44 to J16	21%	
San Francisco	I580 east J34 to J65	83%	Wednesday, 11/23
	I80 north J8A to J18	80%	
	I80 south J13 to J1A	63%	Saturday 26 Nov 2
	I680 north J8 to J50	62%	Wednesday, 11/23
	US101 north J439 to J451	32%	
Seattle	I5 south J142B to J133	86%	Wednesday, 11/23
	I5 south J182 to J164	62%	
	I405 south J18 to J6	59%	
	I405 north J2 to J9	32%	
	I5 north J168B to J182	30%	

	I95 south J170A to J160	85%	Sunday, 11/27/22
	I495 anticlockwise J27 to J45	51%	
Washington DC	I95 north J170A to J22A	32%	Wednesday, 11/23
	I270 north J1 to J32	32%	
	I95 south J29B to J15	24%	

Holiday Forecast Methodology: A Brief Overview

Travel Forecast

In cooperation with AAA, S&P Global Market Intelligence developed a unique methodology to forecast actual domestic travel volumes. The economic variables used to forecast travel for the current holiday are leveraged from S&P Global Market Intelligence's proprietary databases. These data include macroeconomic drivers such as employment; output; household net worth; asset prices, including stock indices; interest rates; housing market indicators, and variables related to travel and tourism, including gasoline prices, airline travel, and hotel stays. AAA and S&P Global Market Intelligence have quantified holiday travel volumes going back to 2000.

Historical travel volume estimates come from DK SHIFFLET's TRAVEL PERFORMANCE/Monitorsm. The PERFORMANCE/Monitorsm is a comprehensive study measuring the travel behavior of U.S. residents. DK SHIFFLET contacts over 50,000 U.S. households each month to obtain detailed travel data, resulting in the unique ability to estimate visitor volume and spending, identify trends and forecast U.S. travel behavior—all after the trips have been taken.

The travel forecast is reported in person-trips. In particular, AAA and S&P Global Market Intelligence forecast the total U.S. holiday travel volume and expected mode of transportation. The travel forecast presented in this report was prepared the week of October 10, 2022.

Thanksgiving Holiday Travel Period

For purposes of this forecast, the Thanksgiving holiday travel period is defined as the five-day period from Wednesday, November 23 to Sunday, November 27. The Wednesday to Sunday period is consistent with previous years.

About AAA

Started in 1902 by automotive enthusiasts who wanted to chart a path for better roads in America and advocate for safe mobility, AAA has transformed into one of North America's largest membership organizations. Today, AAA provides roadside assistance, travel,

discounts, financial and insurance services to enhance the life journey of 62 million members across North America, including 56 million in the United States. To learn more about all AAA has to offer or to become a member, visit AAA.com

About S&P Global Market Intelligence

At S&P Global Market Intelligence, we understand the importance of accurate, deep and insightful information. Our team of experts delivers unrivaled insights and leading data and technology solutions, partnering with customers to expand their perspective, operate with confidence, and make decisions with conviction.

S&P Global Market Intelligence is a division of S&P Global (NYSE: SPGI). S&P Global is the world's foremost provider of credit ratings, benchmarks, analytics and workflow solutions in the global capital, commodity and automotive markets. With every one of our offerings, we help many of the world's leading organizations navigate the economic landscape so they can plan for tomorrow, today. For more information, visit www.spglobal.com/marketintelligence.

About DKSA

DK SHIFFLET boasts the industry's most complete database on U.S. resident travel both in the U.S. and worldwide. Data is collected monthly from a U.S. representative sample, adding over 60,000 traveling households annually, and is used daily by leading travel organizations and their strategic planning groups. DK SHIFFLET is an MMGY Global company.

About INRIX

Founded in 2004, INRIX pioneered intelligent mobility solutions by transforming big data from connected devices and vehicles into mobility insights. This revolutionary approach enabled INRIX to become one of the leading providers of data and analytics into how people move. By empowering cities, businesses, and people with valuable insights, INRIX is helping to make the world smarter, safer, and greener. With partners and solutions spanning across the entire mobility ecosystem, INRIX is uniquely positioned at the intersection of technology and transportation – whether it's keeping road users safe, improving traffic signal timing to reduce delay and greenhouse gasses, optimizing last mile delivery, or helping uncover market insights. Learn more at INRIX.com

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https://www.tipro.org/newsroom/tipro-news/tipro-analysis-shows-upstream-employment-growth-continued-in-october

NOVEMBER 18, 2022

TIPRO ANALYSIS SHOWS UPSTREAM EMPLOYMENT GROWTH CONTINUED IN OCTOBER

Austin, Texas - Citing the latest Current Employment Statistics (CES) report from the U.S. Bureau of Labor Statistics (BLS), the Texas Independent Producers and Royalty Owners Association (TIPRO) today highlighted new employment figures showing continued growth in monthly employment for the Texas upstream sector. According to TIPRO's analysis, direct Texas upstream employment for October 2022 totaled 207,000, an increase of 2,800 jobs from revised September employment numbers. Texas upstream employment in October 2022 represented the addition of 36,500 positions compared to October 2021, including an increase of 8,100 in oil and natural gas extraction and 28,400 jobs in the services sector.

TIPRO once again noted strong job posting data for upstream, midstream and downstream sectors for the month of October. According to the association, there were 11,904 active unique jobs postings for the Texas oil and natural gas industry in October, including 3,742 new job postings added in the month.

Among the 14 specific industry sectors TIPRO uses to define the Texas oil and natural gas industry, Support Activities for Oil and Gas Operations continued to dominate the rankings for unique job listings in October with 3,823 postings, followed by Crude Petroleum Extraction (1,573), and Petroleum Refineries (1,143), indicating a continued emphasis on increasing exploration and production activities in the state. The leading three cities by total unique oil and natural gas job postings were Houston (4,582), Midland (1,043) and Odessa (564), said TIPRO.

The top three companies ranked by unique job postings in October were John Wood Group with 820 positions, Baker Hughes (591) and KBR (468), according to TIPRO's analysis. Of the top ten companies listed by unique job postings last month, six companies were in the services sector, followed by two companies in oil and natural gas extraction and two midstream companies.

Top posted industry occupations for October included heavy tractor-trailer truck drivers (589), managers (342) and maintenance and repair workers (245). Top qualifications for unique job postings included Commercial Driver's License (CDL) (470), CDL Class A License (368) and Tanker Endorsement (157). When analyzing education requirements for unique industry job postings last month, TIPRO reports that 44 percent required a bachelor's degree, 34 percent a high school diploma or GED, and 23 percent had no education requirement listed as part of the criteria.

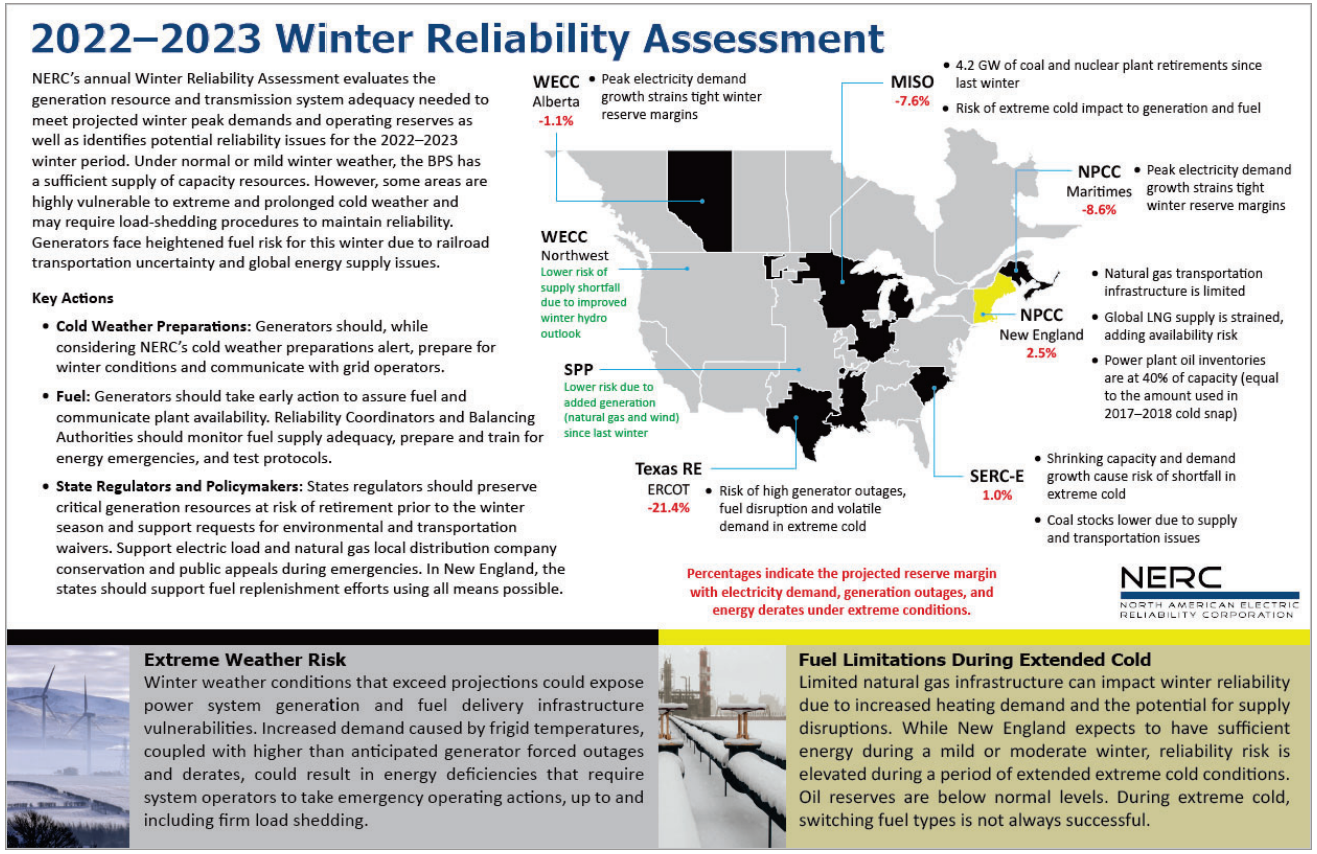
TIPRO also highlights new data released from the Texas comptroller's office showing production taxes paid by the oil and natural gas industry to the state of Texas generated close to $1 billion in tax revenue in October. According to the comptroller's data, in October, Texas oil producers paid $544 million in production taxes, up 31 percent from October 2021. Natural gas producers, meanwhile, last month paid $410 million in state taxes, up 59 percent from October 2021. Funding from oil and natural gas production taxes is used to directly support Texas schools, roads, infrastructure and other essential services.

Additionally, TIPRO reports that oil and gas production is anticipated to continue to grow in the coming months. Oil output in the Permian Basin is forecasted to hit a record 5.499 million barrels per day (bpd) in December, according to the U.S. Energy Information Administration (EIA). In the Eagle Ford Shale in South Texas, oil output will rise by 14,000 bpd next month to total 1.237 million bpd. Overall, U.S. crude oil production is expected to go up by 91,000 bpd and will top 9.191 million bpd in December, projects the EIA. Natural gas production in the Permian Basin will also rise by 125 million cubic feet per day (Mmcf/D) and will hit record highs in December at 21.3 billion cubic feet per day (bcf/d). Natural gas output in the Eagle Ford Shale is also forecasted to reach 7.390 bcf/d in December, up 79 Mmcf/d from November levels. Altogether, EIA forecasts natural gas production in the United States to grow to 95.7 bcf/d before the end of the year.

"The Texas oil and natural gas industry continues to provide unmatched support for the state economy and our nation's energy security," said Ed Longanecker, president of TIPRO. "Energy produced in Texas has also helped our European allies in a time of crisis. State and federal policies should reflect the need for reliable energy and growing global demand for oil and natural gas," concluded Longanecker.

About this Assessment

NERC's *2022–2023 Winter Reliability Assessment* (*WRA*) identifies, assesses, and reports on areas of concern regarding the reliability of the North American BPS for the upcoming winter season. In addition, the *WRA* presents peak electricity demand and supply changes and highlights any unique regional challenges or expected conditions that might impact the BPS. The reliability assessment process is a coordinated reliability evaluation between the Reliability Assessment Subcommittee (RAS), the Regional Entities, and NERC staff with demand and resource projections obtained from the assessment areas. This report reflects NERC's independent assessment and is intended to inform industry leaders, planners, operators, policy makers, and regulatory bodies so that they are better prepared to take necessary actions to ensure BPS reliability. This report also provides an opportunity for the industry to discuss plans and preparations to ensure reliability for the upcoming winter period. Below is a summary of this *WRA.*



Key Findings

This *WRA* covers the upcoming three-month (December–February) winter period. This assessment provides an evaluation of generation resource and transmission system adequacy necessary to meet projected winter peak demands and operating reserves. This assessment identifies potential reliability issues of interest and regional topics of concern. The following findings are NERC and the Regional Entities' (the ERO Enterprise's) independent evaluation of electricity generation and transmission capacity and potential operational concerns that may need to be addressed for the upcoming winter:

- **A large portion of the North American BPS is at risk of insufficient electricity supplies during peak winter conditions** (Figure 1). Higher peak-demand projections, inadequate generator weatherization, fuel supply risks, and natural gas infrastructure are contributing to risks seen in the following areas:
  - **Texas RE-ERCOT:** The risk of a significant number of generator forced outages in extreme and prolonged cold temperatures continues to threaten reliability where generators and fuel supply infrastructure are not designed or retrofitted for such conditions. Furthermore, a U.S. Environmental Protection Agency (EPA) decision regarding compliance with hazardous coal ash disposal regulations is expected before the end of 2022 that could impact the availability of two coal-fired generation units (combined total of 1,477 MW) in the last weeks of winter. These units could be important resources during extreme conditions, and an EPA decision can provide flexibility in scheduling outages for plant improvements. Demand volatility in Texas from extreme cold temperatures also contributes to energy shortfall risks.
  - **Midcontinent ISO (MISO):** Since the 2021/2022 winter, reserve margins in MISO have fallen by over 5%. Nuclear and coal-fired generation retirements total over 4.2 GW since the prior winter. Declining reserves are the result of few resource additions. An extreme cold-weather event that extends deep into MISO's area could lead to high generator outages from inadequate weatherization in southern units and unavailability of fuel for natural-gas-fired generators.
  - **SERC-East:** Like Texas RE-ERCOT and the southern parts of MISO, extreme cold could result in high generator outages and demand volatility. A rare cold weather event in the South could result in an energy emergency in this area.
  - **WECC-Alberta and NPCC-Maritimes:** Peak electricity demand is projected to grow in both of these winter-peaking systems. In Maritimes, this could strain capacity for normal winter peak conditions. Alberta has sufficient capacity for normal winter peak demand; however, extreme conditions that cause high generator forced outages are likely to cause energy emergencies.
  - **NPCC-New England:** The capacity of the natural gas transportation infrastructure could be constrained when cold temperatures cause peak demand for both electricity generation and consumer space-heating needs. Potential constraints on the fuel delivery systems and limited inventory of liquid fuels may exacerbate the risks for fuel-based generator outages and output reductions that result in energy emergencies during extreme weather.

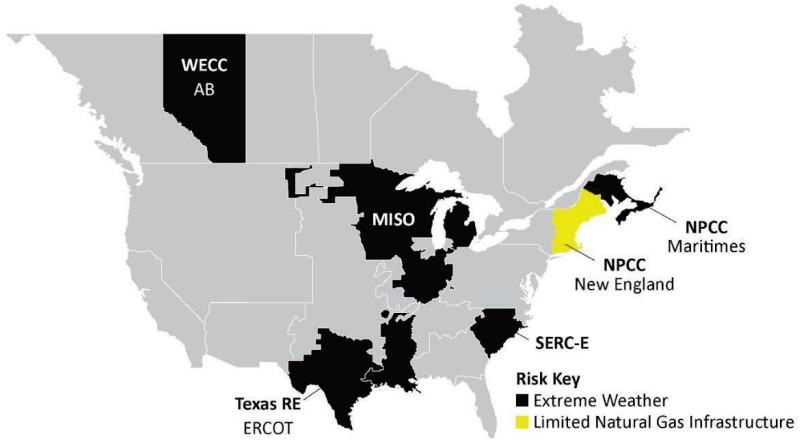


Figure 1: Winter Reliability Risk Area Summary

- **Generator Owners (GO) face additional fuel and supply risk.** Reliable operation of the thermal generating fleet is critical to winter reliability, and assured fuel supplies is an ongoing winter reliability concern. Current domestic and global affairs warrant even greater attention to generator fuel supplies, including natural gas, fuel oil, and coal for the upcoming winter. Inventories of coal and fuel oil in most areas are lower than usual due to a summer of high electricity demand and high natural gas prices that made other fuels more economically advantageous for electricity generation. Low fuel storage levels coupled with a range of potential fuel resupply challenges are creating additional risks for winter regional BPS reliability. Careful attention should be paid to periodic fuel surveys that provide early indication of fuel supply risks.

- **Steps have been taken since 2021's Winter Storm Uri to improve generator performance during extreme cold weather events.** The three areas hardest hit by the 2021 Winter Storm Uri[1]—Texas RE-ERCOT, SPP, and MISO—have implemented several improvements based on their operating experience. Texas weatherization standards for both generators and natural gas facilities designated as critical infrastructure aim to improve generator availability during extreme weather this winter. In SPP and MISO, where Winter Storm Uri impacts were less severe, a focus on operational coordination and situational awareness is intended to help operators ensure that sufficient resources are available for extreme conditions. While the risk of energy emergencies for the upcoming winter has not been eliminated, improvements—due to lessons learned from Winter Storm Uri—are expected to reduce the likelihood and lessen the severity of a future Winter Storm Uri scale event.
- **NERC's 2022 Level 2 Alert, *Cold Weather Preparations for Extreme Weather Events.*** In September 2022, the ERO issued a Level 2 NERC alert to Reliability Coordinators (RC), Balancing Authorities (BA), Transmission Operators (TOP), and GOs.[2] The alert includes recommendations as well as a series of questions to help evaluate the Bulk Electric System's winter readiness. The responses indicate the importance of grid operators being prepared to implement their operating plans to manage potential supply shortfalls in extreme weather.
- **Inadequate supply of distribution transformers could slow restoration efforts following winter storms.** The electricity industry is facing a shortage of distribution transformers as a result of production not keeping pace with demand. A survey by the American Public Power Association revealed that many utilities have low levels of emergency stocks that are used for responding to natural disasters and catastrophic events.[3] Severe winter storms often include high winds, icing, and precipitation that damage distribution power lines and transformers. Asset sharing programs used by utilities provide visibility and voluntary equipment sharing to maximize resources; however, electricity customers may experience delayed restoration of power following storms as crews must work to obtain new equipment.

Recommendations

To reduce the risks of energy shortfalls on the BPS this winter, NERC recommends the following:

- BAs and RCs should work with GOs to ensure fuel supplies are adequate for normal and extreme conditions prior to winter. Fill storage capacity, prepare fuel delivery systems, and coordinate with fuel providers to secure needed fuel as applicable. While short-term solutions are limited, firm supply arrangements should be pursued when feasible. Long-term solutions are needed to secure energy and maintain fuel assurance to support reliability and resilience. In addition, GOs should routinely and periodically keep BAs and RCs informed on fuel levels and readiness.
- RCs and BAs should implement fuel surveys early to monitor the adequacy of fuel supplies. They should prepare their operating plans to manage potential supply shortfalls and take proactive steps for generator readiness, fuel availability, load curtailment, and sustained operations in extreme conditions.
- State and province policy makers have the authority and jurisdiction to implement actions that preserve critical generation resources. State and provincial regulators should consider energy risks for the upcoming winter season and take steps to delay imminent generation retirements if essential to reliability. Additionally, state regulators can assist grid operators in advance of and during extreme cold weather by supporting requested environmental and transportation waivers as well as public appeals for electric load and natural gas conservation.
- Grid operators, GOs, and Generator Operators (GOP) should implement the mitigations identified in the NERC Level 2 alert*, Cold Weather Preparations for Extreme Weather Events–II*, and they should take recommended weatherization steps prior to winter.

[1] The February 2021 Cold Weather Outages in Texas and the South Central United States | FERC, NERC and Regional Entity Staff Report | Federal Energy Regulatory Commission

[2] https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20R-2022-09-12-01%20Cold%20Weather%20Events%20II.pdf

[3] https://www.publicpower.org/periodical/article/appa-survey-members-shows-distribution-transformer-production-not-meeting-demand

Risk Highlights

Additional Generator Fuel and Supply Risk

Reliable operation of the thermal generating fleet is critical to winter operations, and assured fuel supplies is an ongoing winter reliability concern. The current state of domestic and global affairs warrants even greater attention on generator fuel supplies, including natural gas, fuel oil, and coal. Low fuel storage levels coupled with a range of potential fuel resupply challenges are creating additional risks for winter regional BPS reliability.

Generator Fuel Supplies

Owners of coal, fuel oil, and dual-fueled generators in North America typically replenish stored fuels following the peak summer season in preparation for winter. Energy suppliers also increase inventories of natural gas, coal, and distillate fuels in preparation for high-demand winter periods. Several fuel supply challenges have emerged in the lead-up to the 2022–2023 winter that are being monitored by grid operators and GOs, including potential rail strikes, constrained and delayed rail deliveries, reduced stored natural gas and fuel oil inventories, and uncertainty from global markets in New England potentially impacting liquefied natural gas (LNG) deliveries. The following are two areas of concern:

Coal Inventories

Grid operators in the U.S. Southeast, MISO, and PJM are monitoring coal inventories (fuel and consumables) as GOs face limited stocks and resupply uncertainty. Across the United States, resupply by rail has been hampered throughout 2022 as staffing shortages and other issues have affected the rail industry. Some GOs in the Midwest and Southeast are experiencing delivery issues for coal and certain emissions-control chemicals. A small number of units currently have low coal inventory. Inventories in some areas are lower than typical following a summer of high electricity demand and high natural gas prices that made coal more economically advantageous. A milder fall in the Central and Eastern parts of North America has helped some coal stocks rebound. Monitoring performed by PJM, where coal-fired generation can be expected to contribute over 25% of peak demand needs, indicates that pre-winter coal supplies in November now exceed 85% of the levels reached at their peak in the prior winter (**Figure 2**).

Based on coal stock data from the Energy Information Administration,[4] fuel inventories have reached 96 days of bituminous supply and 81 days subbituminous across the coal generation fleet on average (**Figure 3**). Some plants reported as low as 15 days of supply during the past summer.

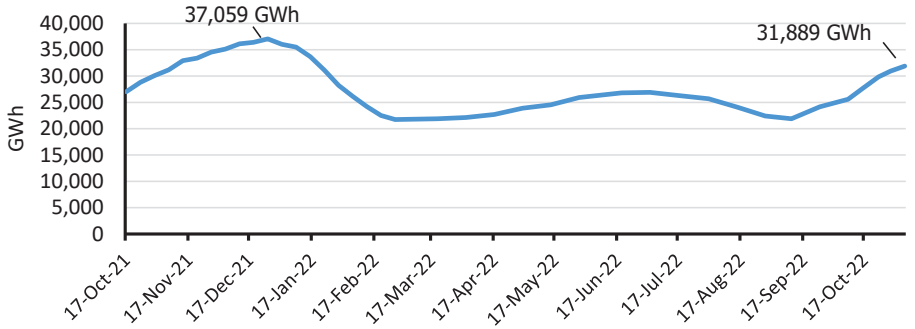


Figure 2: PJM Bi-weekly Fuel Inventory for October 10, 2022[5]

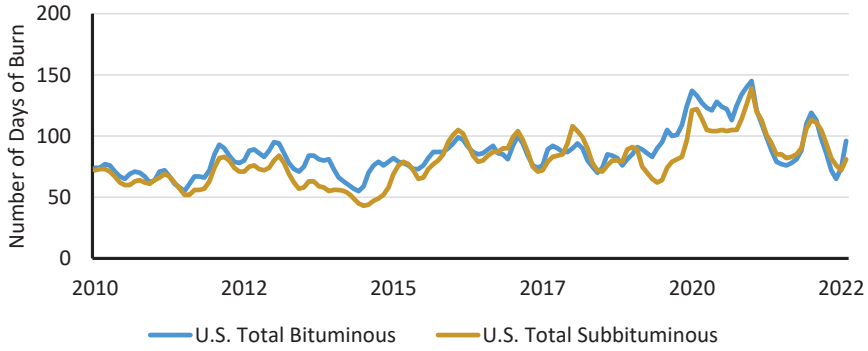


Figure 3: Days of Burn by Non-lignite Coal, January 2010–August 2022

[4] EIA Electric Power Sector Coal Stocks: Electricity Monthly Update - U.S. Energy Information Administration (EIA)

[5] Displays the fuel inventory in GWh calculated by PJM based on data provided through PJM's Fuel Inventory and Supply Data Request. Information is available on PJM's Operating Committee page: https://www.pjm.com/committees-and-groups/committees/oc

Shipping availability by rail this winter is uncertain, reinforcing the need to monitor generator coal stockpiles and act early to reach peak winter levels. RCs in affected areas are continuing to mitigate the coal supply issues by working with their BAs to limit run time of low-inventory plants, using economics, de-rating units, reducing loading at night, and monitoring coal supply.

LNG and Fuel Oil Availability

Low fuel availability elevates winter reliability risk. LNG is critical to meeting energy needs in New England during cold weather, and the continuing disturbance to global energy markets creates supply uncertainty. LNG terminals in New England help alleviate pipeline constraints by providing access points for LNG shipped in tankers to be vaporized and injected into pipelines that serve many natural-gas-fired generators.

As a global energy commodity, LNG is experiencing record high demand that is straining supplies and transportation as well as increasing the risk of disruption. Fuel oil stores are also an important generator fuel in New England as well as in neighboring New York and the Maritimes Provinces of Canada.

Fuel oil is used as either a primary fuel or as a backup to natural gas. Replenishment of on-site generator fuel oil stores since last winter is lagging, and levels remain below historical norms. In New England, the Independent System Operator (ISO) survey of generators in October indicates that on-site stored fuel oil used for electricity generation is just over 92 million gallons, or 40% of available storage capacity (**Figure 4**). Most oil-fired generating capacity (70%) in New England uses lighter distillate fuel oil (DFO). The remaining 30% of the oil-fired fleet capacity uses residual fuel oil (RFO). The current level of combined fuel oil in storage is far lower than the 54% peak level of the prior winter. It is also close to being insufficient for the kind of extreme winter events that could occur in the area. For instance, during a 13-day cold snap over the 2017–2018 winter, over 80 million gallons of fuel oil was used for electricity generation in the New England area. [6]

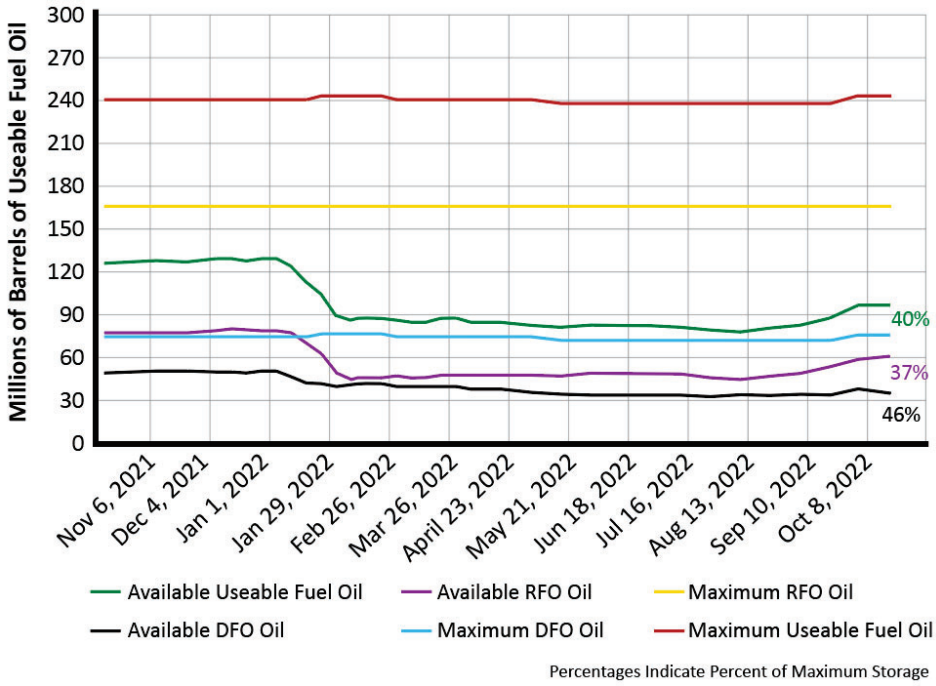


Figure 4: ISO New England 21-day Energy Assessment, Total Usable New England Fuel Oil Inventory Through October 8, 2022[7]

Assessment of Stored Fuel Risk

No specific issues have been identified that would prevent reaching the necessary fuel levels. However, weather, staffing, and general issues affecting transportation have the potential to either directly impact fuel delivery to generator storage sites or affect fuel production through disrupted chemical shipments. Careful attention to ISO's pre-winter and periodic fuel surveys is needed to provide early indication of fuel supply risks. Tools like ISO-New England's (ISO-NE) 21-day energy assessments can reduce these risks to operations.

[6] ISO-NE *Winter 2017/2018 Recap: Historic cold snap reinforces findings in Operational Fuel-Security Analysis*: https://isonewswire.com/2018/04/25/winter-2017-2018-recap-historic-cold-snap-reinforces-findings-in-operational-fuel-security-analysis/

[7] https://www.iso-ne.com/isoexpress/web/reports/operations/-/tree/21-Day-Energy-Assessment-Forecast-and-Report-Results

Seasonal Risk Scenario Margins

Seasonal risk scenarios for each assessment area are presented in the **Regional Assessments Dashboards** section. The on-peak reserve margins and seasonal risk scenario chart in each dashboard provide potential winter peak demand and resource condition information. The reserve margins on the right side of the dashboard pages provide a comparison to the previous year's assessment. The seasonal risk scenario charts present deterministic scenarios for further analysis of different demand and resource levels with adjustments for normal and extreme conditions. The assessment areas determined the adjustments to capacity and peak demand based on methods or assumptions that are summarized below the seasonal risk scenario charts; see the **Data Concepts and Assumptions** for more information about these chart.

The seasonal risk scenario charts can be expressed in terms of reserve margins. In **Table 1**, each assessment area's Anticipated Reserve Margins are shown alongside the reserve margins for a typical generation outage scenario (where applicable) and the extreme demand and resource conditions in their seasonal risk scenario. The typical outages reserve margin is comprised of anticipated resources, less the capacity that is likely to be in maintenance or forced outage at peak demand. If the typical maintenance or forced outage margin is the same as the anticipated reserve margin, it is because an assessment area has already factored typical outages into the anticipated resources. The extreme conditions margin includes all components of the scenario and represents the most severe operating conditions of an area's scenario. Note that any reserve margin below zero indicates that the resources fall below demand in the scenario.

Table 1: Seasonal Risk Scenario Margins

Assessment Area	Anticipated Reserve Margin	Typical Outages	Extreme Conditions
MISO	43.1%	14.0%	-7.6%
MRO-Manitoba	18.1%	16.2%	9.2%
MRO-SaskPower	28.7%	22.0%	12.6%
NPCC-Maritimes	17.5%	11.3%	-8.6%
NPCC-New England	72.0%	54.7%	2.5%
NPCC-New York	83.2%	58.9%	23.9%
NPCC-Ontario	24.3%	24.3%	9.5%
NPCC-Quebec	12.7%	12.7%	2.3%
PJM	45.9%	33.2%	16.0%
SERC-C	25.1%	18.4%	2.7%
SERC-E	23.9%	17.3%	1.0%
SERC-FP	36.7%	33.2%	27.1%
SERC-SE	31.7%	22.8%	8.4%
SPP	70.0%	44.5%	9.3%
TRE-ERCOT	36.4%	20.4%	-21.4%
WECC-AB	20.8%	18.3%	-1.1%
WECC-BC	16.2%	16.1%	6.4%
WECC-CAMX	49.7%	41.7%	18.6%
WECC-WPP	33.8%	31.3%	10.1%
WECC-SRSG	93.5%	84.7%	55.7%

Reliability Enhancements in Storm-Affected Assessment Areas

Industry, regulators, and the ERO Enterprise have taken significant actions to improve winter readiness following the devastating effects of the February 2021 Winter Storm Uri cold weather event. The first cold weather Reliability Standards, adopted by the NERC Board in June 2021, advance BPS reliability by requiring generators to implement plans for cold weather preparedness as well as to provide cold weather operating parameters to their RCs, TOPs, and BAs for use in operating plans. Though these requirements take effect in the United States in April 2023, just after the upcoming winter season, some reliability benefits of the new requirements may be realized sooner through cold weather planning and preparations that improve generator performance and operator coordination. Across industry, the recommendations of the FERC-NERC-Regional Entity staff report—*The February 2021 Cold Weather Outages in Texas and South Central United States.*—are shaping direction at ISO/RTOs, in technical committees and industry forums, and among industry planners and operators.

The three hardest-hit areas by the 2021 Winter Storm Uri—Texas RE-ERCOT, SPP, and MISO—have implemented several improvements based on their operating experience. Texas weatherization standards, applicable to generators and natural gas facilities designated as critical infrastructure, aim to improve generator availability during extreme weather this winter. In SPP and MISO, where Winter Storm Uri impacts were less severe, a focus on operational coordination and situational awareness should help operators prepare to have sufficient resources for extreme conditions.

Texas RE-ERCOT, SPP, and MISO continue to be at-risk for energy emergencies during the upcoming winter based on their expected resources, normal and extreme demand, and historical generator outage information. However, the enhancements described in the following Texas RE-ERCOT, SPP, and MISO sub-sections are expected to reduce the likelihood of emergencies and lessen the severity that an extreme winter cold weather event on the scale of Winter Storm Uri could cause.

Texas RE-ERCOT

Since February 2021, Texas regulators, ERCOT, and GOs have implemented winter preparedness programs and other reforms aimed at improving generator performance in extreme winter weather. These actions are expected to reduce generator outages in extreme conditions to reduce the likelihood of energy emergencies as well as to mitigate impacts to firm load should an energy emergency occur:

- Regulations in Texas require generator and transmission owners to winterize equipment and facilities. ERCOT conducts weather preparedness inspections of generation and transmission as well as tracks exceptions to requirements until completed.
- In August 2022 the Railroad Commission of Texas (RRC), which regulates the Texas fuel oil and natural gas industry, approved its Final Rule[8] on weather emergency preparedness standards for designated "critical [natural] gas facilities" in the state's new Electricity Supply Chain Map.[9] TRRC inspectors will begin inspecting facilities to determine compliance beginning December 1, 2022, based on submitted compliance attestations. Inspections will focus on infrastructure that produces, stores, processes, and/or transports large volumes of natural gas, and this TRRC effort will be prioritized by facility size.
- ERCOT procured over 2,900 MW of firm fuel supply resources for the upcoming winter. Under the new market product, the procured natural-gas-fired generators must have back-up fuel that would support operations for 48 hours in the event that natural gas supply is interrupted.
- ERCOT has reviewed load-shedding plans with area TOPs and conducts periodic training exercises. Additionally, they coordinate with TOPs to prepare enhanced manual load-shedding and rotating outage plans designed to minimize disruption to firm load.

SPP

SPP is implementing a set of actions—policy changes and assessments approved by the SPP Board of Directors—to address issues related to fuel assurance, resource planning and availability, emergency response, communications, and other critical areas. For the upcoming winter, these actions will improve generator preparedness and operator response:

- SPP held the Winter Preparedness Workshop to help inform members of forecasted conditions for the upcoming season and review SPP's seasonal preparedness steps outlined in its operating procedures.
- RC and BA staff have implemented a high risk scenario alerting system for managing risk periods. This system will identify and alert staff on potential upcoming records, such as load, wind, and wind penetration, to allow time for extra studies to be executed and analyzed as well as to be addressed by the SPP response team.

SPP established an Improved Resource Availability Task Force, which will take primary responsibility for addressing recommendations related to fuel assurance and resource planning as well as

[8] https://www.rrc.texas.gov/media/c5hdc4ga/rule-3-66.pdf
[9] https://www.puc.texas.gov/agency/resources/reports/mapping/2021_Mapping_Agency_Report.pdf

availability that is identified in SPP's *Comprehensive Review of SPP's Response to the February 2021 Winter Storm* report.[10]

MISO

MISO has implemented actions to provide situational awareness and early coordination for reducing risks from extreme winter weather:

- MISO continues to survey GOs and GOPs about unit preparedness and winter fuel sufficiency.
- Processes are in place for coordination with neighboring RCs and BAs on needs for firm or non-firm transfers to address extreme system conditions. Pre-season transfer studies for normal and extreme scenarios are underway.

For future years, MISO's new resource adequacy construct (filed with FERC for approval) is expected to deliver additional winter resource capacity by using a winter reserve margin and resource capacity accreditations that account for winter peak conditions.

MISO Neighboring Area Studies

During Winter Storm URI, other areas in the Eastern Interconnection experienced localized transmission emergencies resulting from the large transfers flowing across the transmission system from generators in PJM to the affected areas in MISO and SPP. Accordingly, the *FERC-NERC-Regional Entity staff Joint Report* recommended planners and operators study large power transfers during stressed conditions. Transfer studies have been conducted in SERC to help prepare for the upcoming winter. During extreme cold temperatures, there is the potential for significant transfers through the area as excess power is shipped to meet power demands in affected areas outside of SERC.

A SERC technical working group performed a 2022–2023 winter reliability study to determine the adequacy and reliability of the SERC transmission system using a 2022–2023 winter peak power flow model, which included 12 GW power transfer from PJM to MISO. The study also simulated the impacts of higher load demands due to colder than normal temperatures in each SERC sub-area by increasing generation throughout them all while simultaneously increasing load in a particular sub-area. SERC concluded that the transmission system was adequate for normal and extreme conditions and that localized transmission constraints, when observed, could be mitigated through system reconfiguration.

[10] https://www.spp.org/markets-operations/current-grid-conditions/2021-winter-storm-review/

Advance unedited version

Decision -/CP.27

Sharm el-Sheikh Implementation Plan

The Conference of the Parties,

Recalling decisions 1/CP.19, 1/CP.20, 1/CP.21, 1/CP.22, 1/CP.23, 1/CP.24, 1/CP.25 and 1/CP.26,

Noting decision -/CMA.4,[1]

Guided by science and principles,

Reaffirming the outcomes of all previous Conferences of the Parties, Conferences of the Parties serving as the meeting of the Parties to the Kyoto Protocol and Conferences of the Parties serving as the meeting of the Parties to the Paris Agreement, including decisions 1/CP.26, 1/CMP.17 and 1/CMA.3 (the Glasgow Climate Pact),

Also reaffirming the critical role of multilateralism based on United Nations values and principles, including in the context of the implementation of the Convention and the Paris Agreement, and the importance of international cooperation for addressing global issues, including climate change, in the context of sustainable development and efforts to eradicate poverty,

Noting the importance of transition to sustainable lifestyles and sustainable patterns of consumption and production for efforts to address climate change,

Also noting the importance of pursuing an approach to education that promotes a shift in lifestyles while fostering patterns of development and sustainability based on care, community and cooperation,

Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to a clean, healthy and sustainable environment, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity,

Noting the importance of ensuring the integrity of all ecosystems, including in forests, the ocean and the cryosphere, and the protection of biodiversity, recognized by some cultures as Mother Earth, and also noting the importance of 'climate justice', when taking action to address climate change,

Emphasizing that enhanced effective climate action should be implemented in a manner that is just and inclusive while minimizing negative social or economic impacts that may arise from climate action,

Recognizing the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change,

[1] Draft decision entitled "Sharm el-Sheikh Implementation Plan" proposed under agenda item 2 of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its fourth session.

Also recognizing the critical role of protecting, conserving and restoring water systems and water-related ecosystems in delivering climate adaptation benefits and co-benefits, while ensuring social and environmental safeguards,

Underlines the urgent need to address, in a comprehensive and synergetic manner, the interlinked global crises of climate change and biodiversity loss in the broader context of achieving the Sustainable Development Goals, as well as the vital importance of protecting, conserving, restoring and sustainably using nature and ecosystems for effective and sustainable climate action,[1]

Acknowledges that the impacts of climate change exacerbate the global energy and food crises, and vice versa, particularly in developing countries,

Stresses that the increasingly complex and challenging global geopolitical situation and its impact on the energy, food and economic situations, as well as the additional challenges associated with the socioeconomic recovery from the coronavirus pandemic, should not be used as a pretext for backtracking, backsliding or de-prioritizing climate action;

I. Science and urgency

1. *Welcomes* the contributions of Working Groups II[2] and III[3] to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change;

2. *Recognizes* the importance of the best available science for effective climate action and policymaking;

3. *Takes note* of the 2022 adaptation gap[4] and emissions gap[5] reports of the United Nations Environment Programme, and recent global and regional reports of the World Meteorological Organization on the state of the climate;[6]

4. *Reiterates* that the impacts of climate change will be much lower at the temperature increase of 1.5 °C compared with 2 °C[7] and *resolves* to pursue further efforts to limit the temperature increase to 1.5 °C;

5. *Recognizes* the impact of climate change on the cryosphere and the need for further understanding of these impacts, including of tipping points;

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[2] Intergovernmental Panel on Climate Change. 2022. *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. H Pörtner, D Roberts, M Tignor, et al. (eds.). Cambridge, United Kingdom: Cambridge University Press. Available at https://www.ipcc.ch/report/ar6/wg2/.

[3] Intergovernmental Panel on Climate Change. 2022. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. P Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press. Available at https://www.ipcc.ch/report/ar6/wg3/.

[4] See United Nations Environment Programme. 2022. *Adaptation Gap Report 2022: Too Little, Too Slow - Climate adaptation failure puts world at risk*. Nairobi: United Nations Environment Programme. Available at https://www.unep.org/resources/adaptation-gap-report-2022.

[5] See United Nations Environment Programme. 2022. Emissions Gap Report 2022: The Closing Window – Climate crisis calls for rapid transformation of societies. Nairobi: United Nations Environment Programme. Available at https://www.unep.org/resources/emissions-gap-report-2022.

[6] See, for example, World Meteorological Organization. 2022. *State of the Global Climate 2021*. Geneva: World Meteorological Organization. Available at https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate.

[7] Decision 1/CP.26, para. 16, and decision 1/CMA.3, para. 21.

II. Enhancing ambition and implementation

6. *Resolves* to implement ambitious, just, equitable and inclusive transitions to low-emission and climate-resilient development in line with the principles and objectives of the Convention, the Kyoto Protocol and the Paris Agreement, taking into account this decision, the Glasgow Climate Pact and other relevant decisions of the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement;

7. *Expresses appreciation* to the Heads of State and Government who participated in the Sharm el-Sheikh Climate Implementation Summit for their support in enhancing and accelerating the implementation of climate action;

III. Energy

8. *Emphasizes* the urgent need for immediate, deep, rapid and sustained reductions in global greenhouse gas emissions by Parties across all applicable sectors, including through increase in low-emission and renewable energy, just energy transition partnerships and other cooperative actions;

9. *Recognizes* that the unprecedented global energy crisis underlines the urgency to rapidly transform energy systems to be more secure, reliable, and resilient, including by accelerating clean and just transitions to renewable energy during this critical decade of action;

10. *Stresses* the importance of enhancing a clean energy mix, including low-emission and renewable energy, at all levels as part of diversifying energy mixes and systems, in line with national circumstances and recognizing the need for support towards just transitions;

IV. Mitigation

11. *Recognizes* that limiting global warming to 1.5 °C requires rapid, deep and sustained reductions in global greenhouse gas emissions of 43 per cent by 2030 relative to the 2019 level;

12. *Also recognizes* that this requires accelerated action in this critical decade, on the basis of equity and the best available scientific knowledge, reflecting common but differentiated responsibilities and respective capabilities, in the light of different national circumstances and in the context of sustainable development and efforts to eradicate poverty;

13. *Calls upon* Parties to accelerate the development, deployment and dissemination of technologies, and the adoption of policies, to transition towards low-emission energy systems, including by rapidly scaling up the deployment of clean power generation and energy efficiency measures, including accelerating efforts towards the phasedown of unabated coal power and phase-out of inefficient fossil fuel subsidies, while providing targeted support to the poorest and most vulnerable in line with national circumstances and recognizing the need for support towards a just transition;

14. *Reiterates*[8] its invitation to Parties to consider further actions to reduce by 2030 non-carbon dioxide greenhouse gas emissions, including methane;

15. *Emphasizes* the importance of protecting, conserving and restoring nature and ecosystems to achieve the Paris Agreement temperature goal, including through forests and

[8] Decision 1/CP.26, para. 19.

other terrestrial and marine ecosystems acting as sinks and reservoirs of greenhouse gases and by protecting biodiversity, while ensuring social and environmental safeguards;

16. *Recognizes* the importance of maximizing the positive and minimizing the negative economic and social impacts of the implementation of response measures, and *welcomes* the adoption of decisions -/CP.27,[9] -/CMP.27[10] and -/ CMA.4;[11]

V. Adaptation

17. *Notes with serious concern* the existing gap between current levels of adaptation and levels needed to respond to the adverse effect of climate change in line with findings from the contribution of Working Group II to the Intergovernmental Panel on Climate Change Sixth Assessment Report;

18. *Urges* Parties to adopt a transformational approach to enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change;

19. *Also urges* developed country Parties to urgently and significantly scale up their provision of climate finance, technology transfer and capacity-building for adaptation so as to respond to the needs of developing country Parties as part of a global effort, including for the formulation and implementation of national adaptation plans and adaptation communications;

20. *Highlights* the role of the Least Developed Countries Fund and the Special Climate Change Fund in supporting actions by developing countries to address climate change, *welcomes* the pledges made to the two Funds and *invites* developed countries to further contribute to the two Funds;

21. *Emphasizes* the importance of protecting, conserving and restoring water and water-related ecosystems, including river basins, aquifers and lakes, and *urges* Parties to further integrate water into adaptation efforts;

VI. Loss and damage

22. *Notes with grave concern*, according to information in the contributions of Working Groups II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, the growing gravity, scope and frequency in all regions of loss and damage associated with the adverse effects of climate change, resulting in devastating economic and non-economic losses, including forced displacement and impacts on cultural heritage, human mobility and the lives and livelihoods of local communities, and *underlines* the importance of an adequate and effective response to loss and damage;

23. *Expresses deep concern* regarding the significant financial costs associated with loss and damage for developing countries, resulting in a growing debt burden and impairing the realization of the Sustainable Development Goals;

[9] Draft decision entitled “Report of the forum on the impact of the implementation of response measures” proposed under agenda item 12 of the Conference of the Parties at its twenty-seventh session.

[10] Draft decision entitled “Report of the forum on the impact of the implementation of response measures” proposed under agenda item 9 of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol at its seventeenth session.

[11] Draft decision entitled “Report of the forum on the impact of the implementation of response measures” proposed under agenda item 12 of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its fourth session.

24. *Welcomes* the consideration, for the first time, of matters relating to funding arrangements responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage, under the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement and *also welcomes* the adoption of decisions -/CP.27[12] and -/CMA.4,[13] on matters relating to funding arrangements responding to loss and damage associated with the adverse effects of climate change;

25. *Further welcomes* the adoption of decisions -/CP.27[14] and -/CMA.4,[15] establishing the institutional arrangements of the Santiago network for averting, minimizing and addressing loss and damage associated with the adverse effects of climate change to enable its full operationalization, including supporting its mandated role in catalysing technical assistance for the implementation of the relevant approaches at the local, national and regional level in developing countries that are particularly vulnerable to the adverse effects of climate change, and *affirms* its determination to select the host of the secretariat of the Santiago network by 2023 through a selection process conducted in an open, transparent, fair and neutral manner in accordance with the process outlined in paragraphs 17–18 of decisions -/CMA.4[16] and -/CP.27;[17]

VII. Early warning and systematic observation

26. *Emphasizes* the need to address existing gaps in the global climate observing system, particularly in developing countries, and *recognizes* that one third of the world, including sixty per cent of Africa, does not have access to early warning and climate information services, as well as the need to enhance coordination of activities by the systematic observation community and the ability to provide useful and actionable climate information for mitigation, adaptation and early warning systems, as well as information to enable understanding of adaptation limits and of attribution of extreme events;

27. *Welcomes* and *reiterates* the United Nations Secretary-General's call made on World Meteorological Day on 23 March 2022 to protect everyone on Earth through universal coverage of early warning systems against extreme weather and climate change within the next five years and *invites* development partners, international financial institutions and the operating entities of the Financial Mechanism to provide support for implementation of the Early Warnings for All initiative;

[12] Draft decision entitled "Funding arrangements for responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage" proposed under agenda item 8(f) of the Conference of the Parties at its twenty-seventh session.

[13] Draft decision entitled "Funding arrangements for responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage " proposed under agenda item 8(f) of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its fourth session.

[14] Draft decision entitled "Santiago network for averting, minimizing and addressing loss and damage under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts" proposed under agenda item 7 of the Conference of the Parties at its twenty-seventh session.

[15] Draft decision entitled "Santiago network for averting, minimizing and addressing loss and damage under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts" proposed under agenda item 7 of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its fourth session.

[16] Draft decision entitled "Santiago network for averting, minimizing and addressing loss and damage under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts" proposed under agenda item 7 of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its fourth session.

[17] Draft decision entitled "Santiago network for averting, minimizing and addressing loss and damage under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts" proposed under agenda item 7 of the Conference of the Parties at its twenty-seventh session.

VIII. Implementation – pathways to just transition

28. *Affirms* that sustainable and just solutions to the climate crisis must be founded on meaningful and effective social dialogue and participation of all stakeholders and *notes* that the global transition to low emissions provides opportunities and challenges for sustainable economic development and poverty eradication;

29. *Emphasizes* that just and equitable transition encompasses pathways that include energy, socioeconomic, workforce and other dimensions, all of which must be based on nationally defined development priorities and include social protection so as to mitigate potential impacts associated with the transition, and *highlights* the important role of the instruments related to social solidarity and protection in mitigating the impacts of applied measures;

IX. Finance

30. *Highlights* that about USD 4 trillion per year needs to be invested in renewable energy up until 2030 to be able to reach net zero emissions by 2050,[18] and that, furthermore, a global transformation to a low-carbon economy is expected to require investment of at least USD 4–6 trillion per year;[19]

31. *Also highlights* that delivering such funding will require a transformation of the financial system and its structures and processes, engaging governments, central banks, commercial banks, institutional investors and other financial actors;

32. *Notes with concern* the growing gap between the needs of developing country Parties, in particular those due to the increasing impacts of climate change and their increased indebtedness, and the support provided and mobilized for their efforts to implement their nationally determined contributions, highlighting that such needs are currently estimated at USD 5.8–5.9 trillion[20] for the pre-2030 period;

33. *Expresses serious concern* that the goal of developed country Parties to mobilize jointly USD 100 billion per year by 2020 in the context of meaningful mitigation action and transparency on implementation has not yet been met and *urges* developed country Parties to meet the goal;[21]

34. *Emphasizes* that accelerated financial support for developing countries from developed countries and other sources is critical to enhancing mitigation action and addressing inequities in access to finance, including its costs, terms and conditions, and economic vulnerability to climate change for developing countries,[22] and that scaled-up public grants for mitigation and adaptation for vulnerable regions, in particular sub-Saharan Africa, would be cost-effective and have high social returns in terms of access to basic energy;

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[18] See https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf.

[19] As footnote 5 above.

[20] See https://unfccc.int/topics/climate-finance/workstreams/needs-report.

[21] See J0156_UNFCCC 100BN 2022 Report_Book_v3.2.pdf.

[22] IPCC. 2022. Summary for Policymakers. *In*: H Pörtner, D Roberts, M Tignor, et al. (eds.). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press. Available at https://www.ipcc.ch/report/ar6/wg2/.

35. *Notes* that global climate finance flows are small relative to the overall needs of developing countries, with such flows in 2019–2020 estimated to be USD 803 billion,[23] which is 31–32 per cent of the annual investment needed to keep the global temperature rise well below 2 °C or at 1.5 °C, and also below what would be expected in the light of the investment opportunities identified and the cost of failure to meet climate stabilization targets;

36. *Urges* developed country Parties to provide enhanced support, including through financial resources, technology transfer and capacity-building, to assist developing country Parties with respect to both mitigation and adaptation, in continuation of their existing obligations under the Convention, and *encourages* other Parties to provide or continue to provide such support voluntarily;

37. *Calls on* the shareholders of multilateral development banks and international financial institutions to reform multilateral development bank practices and priorities, align and scale up funding, ensure simplified access and mobilize climate finance from various sources and *encourages* multilateral development banks to define a new vision and commensurate operational model, channels and instruments that are fit for the purpose of adequately addressing the global climate emergency, including deploying a full suite of instruments, from grants to guarantees and non-debt instruments, taking into account debt burdens, and to address risk appetite, with a view to substantially increasing climate finance;

38. *Calls on* multilateral development banks to contribute to significantly increasing climate ambition using the breadth of their policy and financial instruments for greater results, including on private capital mobilization, and to ensure higher financial efficiency and maximize use of existing concessional and risk capital vehicles to drive innovation and accelerate impact;

39. *Emphasizes* the ongoing challenges faced by many developing country Parties in accessing climate finance and *encourages* further efforts, including by the operating entities of the Financial Mechanism, to simplify access to such finance;

40. *Takes note* of the report on the determination of the needs of developing country Parties related to implementing the Convention and the Paris Agreement and in this context *urges* developed country Parties to provide resources for the second replenishment of the Green Climate Fund while demonstrating progression over previous replenishments and in line with the programming capacity of the Fund;

X. Technology transfer and deployment

41. *Welcomes with appreciation* the first joint work programme of the Technology Executive Committee and the Climate Technology Centre and Network,[24] for 2023–2027, which will facilitate the transformational change needed to achieve the goals of the Convention and the Paris Agreement, *invites* Parties and stakeholders to cooperate and engage with the Technology Executive Committee and the Climate Technology Centre and Network to support the implementation of the joint work programme activities, including on technology needs assessments, action plans and road maps, *acknowledges* the findings in the final report on the first periodic assessment of the effectiveness and adequacy of the support provided to the Technology Mechanism in supporting the implementation of the Paris Agreement[25] and *decides* that the main challenges identified therein should be considered under the global stocktake;

[23] See document https://unfccc.int/documents/619173.
[24] See https://unfccc.int/ttclear/tec/documents.html.
[25] FCCC/SBI/2022/13.

42. *Highlights* the importance of cooperation on technology development and transfer and innovation in implementing the joint work programme activities;

43. *Welcomes* the forward-looking conclusions of the Subsidiary Body for Implementation to continue consideration of the Poznan strategic programme on technology transfer at its sixty-first session (November 2024)[26] with the aim of supporting the implementation of relevant activities, such as those identified and prioritized in developing countries' nationally determined contributions, national adaptation plans, technology needs assessments and technology action plans, and long-term strategies;

XI. Capacity-building

44. *Notes* that capacity gaps and needs still exist in developing countries and *calls on* developed country Parties to increase support for long-term country-driven capacity-building interventions to enhance the effectiveness, success and sustainability of those interventions;

XII. Taking stock

(i) *Notes* the importance of the periodic review of the long-term global goal under the Convention and *welcomes* the adoption of decision -/CP.27,[27] on the second periodic review of the long-term global goal under the Convention and of overall progress towards achieving it;

XIII. Ocean

45. *Welcomes* the outcomes of and key messages[28] from the ocean and climate change dialogue[29] in 2022 and *decides* that future dialogues will, from 2023, be facilitated by two co-facilitators, selected by Parties biennially, who will be responsible for deciding the topics for and conducting the dialogue, in consultation with Parties and observers, and preparing an informal summary report to be presented in conjunction with the subsequent session of the Conference of the Parties;

46. *Encourages* Parties to consider, as appropriate, ocean-based action in their national climate goals and in the implementation of these goals, including but not limited to nationally determined contributions, long-term strategies and adaptation communications;

XIV. Forest

47. *Recalls* that, in the context of the provision of adequate and predictable support to developing country Parties, Parties should collectively aim to slow, halt and reverse forest cover and carbon loss, in accordance with national circumstances, consistently with the ultimate objective of the Convention, as stated in its Article 2;[30]

48. *Encourages* Parties to consider, as appropriate, nature-based solutions or ecosystem-based approaches, taking into consideration United Nations Environment Assembly

[26] FCCC/SBI/2022/L.28.
[27] Draft decision entitled "Second periodic review of the long-term global goal under the Convention and of overall progress towards achieving it" proposed under agenda item 13 of the Conference of the Parties at its twenty-seventh session.
[28] Available at https://unfccc.int/documents/615101.
[29] Mandated in decision 1/CP.25, para. 31.
[30] Decisions 1/CP.16 and 9/CP.19.

resolution 5/5,[31] for their mitigation and adaptation action while ensuring relevant social and environmental safeguards;

XV. Agriculture

49. *Welcomes* the establishment of the four-year Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security as well as the establishment of the Sharm el-Sheikh online portal under the joint work by decision -/CP.27;[32]

XVI. Enhancing implementation: action by non-Party stakeholders

50. *Acknowledges* the engagement of non-Party stakeholders in climate action, which complements and broadens it, while recognizing the pivotal role of governments in action on climate change within the framework of the Convention, the Kyoto Protocol and the Paris Agreement;

51. *Recognizes* the important role of indigenous peoples, local communities, cities and civil society, including youth and children, in addressing and responding to climate change and *highlights* the urgent need for multilevel and cooperative action in this regard;

52. *Notes* the adoption of the action plan under the Glasgow work programme on Action for *Climate* Empowerment by decision -/CP.27;[33]

53. *Encourages* Parties to increase the full, meaningful and equal participation of women in climate action and to ensure gender-responsive implementation and means of implementation, including by fully implementing the Lima work programme on gender and its gender action plan, to raise climate ambition and achieve climate goals;

54. *Invites* Parties to provide support to developing countries for undertaking gender-related action and implementing the gender action plan;

55. *Recognizes* the role of children and youth as agents of change in addressing and responding to climate change and *encourages* Parties to include children and youth in their processes for designing and implementing climate policy and action, and, as appropriate, to consider including young representatives and negotiators into their national delegations, recognizing the importance of intergenerational equity and maintaining the stability of the climate system for future generations;

56. *Expresses its appreciation* to the Presidency of the twenty-seventh session of the Conference of the Parties for its leadership in promoting the full, meaningful and equal participation of children and youth, including by co-organizing the first youth-led climate forum (the Sharm el-Sheikh youth climate dialogue), hosting the first children and youth pavilion and appointing the first youth envoy of a Presidency of the Conference of the Parties and *encourages* future incoming Presidencies of the Conference of the Parties to consider doing the same;

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[31] See https://www.unep.org/environmentassembly/unea-5.2/proceedings-report-ministerial-declaration-resolutions-and-decisions-unea-5.2?%2Fproceedings-report-ministerial-declaration-resolutions-and-decisions-unea-5_2=.

[32] Draft decision entitled "Joint work on implementation of climate action on agriculture and food security" proposed under agenda item 3(a–b) of the Conference of the Parties at its twenty-seventh session.

[33] Draft decision entitled "Action plan under the Glasgow work programme on Action for Climate Empowerment" proposed under agenda item 3(b) of the Conference of the Parties at its twenty-seventh session.

57. *Expresses its appreciation* to the children and youth constituency for co-organizing the Sharm el-Sheikh youth climate dialogue with the Presidency of the twenty-seventh session of the Conference of the Parties and *notes* the outcomes of the seventeenth Conference of Youth, organized by the constituency and held in Sharm el-Sheikh, Egypt, in November 2022;

58. *Encourages* Parties and non-Party stakeholders to engage actively in the Marrakech Partnership for Global Climate Action;

59. *Welcomes* the leadership of the Presidency of the Conference of the Parties and the high-level champions, in particular in the context of the Sharm el-Sheikh Adaptation Agenda and the Breakthrough Agenda, and the collaboration between Parties and non-Party stakeholders, and *emphasizes* the need for continued acceleration and collaboration;

60. *Welcomes* the recommendations of the High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities, launched by the United Nations Secretary-General in March 2022, which are designed to enhance transparency and accountability related to, and progress in achieving, the climate pledges of businesses, investors, cities and regions;

61. *Invites* the secretariat to ensure greater accountability of voluntary initiatives through the Non-State Actor Zone for Climate Action platform;[34]

62. *Welcomes* the convening of five regional forums led by the President of the twenty-seventh session of the Conference of the Parties and the high-level champions, in collaboration with the United Nations Regional Economic Commissions, on initiatives for financing climate action and the Sustainable Development Goals.

[34] See https://climateaction.unfccc.int/.

Japan to weigh raising tax on EVs as it fears revenue decline - Nikkei Asia

POLITICS

Japan to weigh raising tax on EVs as it fears revenue decline

Policymakers look for flat-tax alternatives to ensure infrastructure funding

The all-electric Porsche Taycan is readied for a test drive near Tokyo. EVs in Japan are taxed at a flat rate. (Photo by Suzu Takahashi)

TOMOHIRO EBUCHI, Nikkei staff writer November 17, 2022 12:06 JST

TOKYO -- Japanese policymakers will consider changes to a flat local tax on electric vehicles to head off a potential drop in revenue as drivers shift away from more heavily taxed gasoline cars.

Local automobile taxes have a class component based on engine size that ranges up to 110,000 yen ($789) a year, but that is set at 25,000 yen for EVs and fuel cell vehicles. That makes EVs the least-taxed autos, apart from minicars.

One possible change would be to tax EVs based on motor power. Some European countries take this approach, said officials at Japan's Ministry of Internal Affairs and Communications, which oversees local taxes.

The ministry sees now as the right time to begin discussing a change, since EV ownership is still relatively low. EVs account for only 1% to 2% of new car sales in Japan, lower than in the U.S. or Europe.

The ministry will ask ruling party lawmakers to consider proposals for inclusion in the government's tax plan for fiscal 2023, to be decided in December.

Revenue from the class component of local auto taxes is expected to total 1.5 trillion yen in fiscal 2022, 14% lower than the peak in fiscal 2002.

This tax is a vital source of revenue for road upkeep and other projects at the local level. The ministry is concerned that a shift to EVs will reduce this revenue source, which is less prone to regional disparities. EVs generally weigh more than comparable gasoline vehicles and thus put a similar or greater burden on roads.

Any change in EV tax policy would likely take at least several years to go into effect.

In a related move, the Ministry of Finance, which has jurisdiction over national taxes, will consider a response to an expected drop in gasoline tax revenue as more drivers switch to EVs. Possible alternatives include a tax based on driving distance.

The Ministry of Economy, Trade and Industry and the automobile industry oppose tax increases that could put a damper on EV demand. At a session of the ruling Liberal Democratic Party's tax commission on Wednesday, some lawmakers expressed opposition to a distance-based tax.

In addition to the vehicle class tax that car owners pay every year, there is also an environmental tax that is paid at the time of purchase, based on fuel efficiency.

White Paper

Electric Highways:

Accelerating and Optimizing Fast-Charging Deployment for Carbon-Free Transportation

November 2022

nationalgrid

CALSTART

RMI

Stable

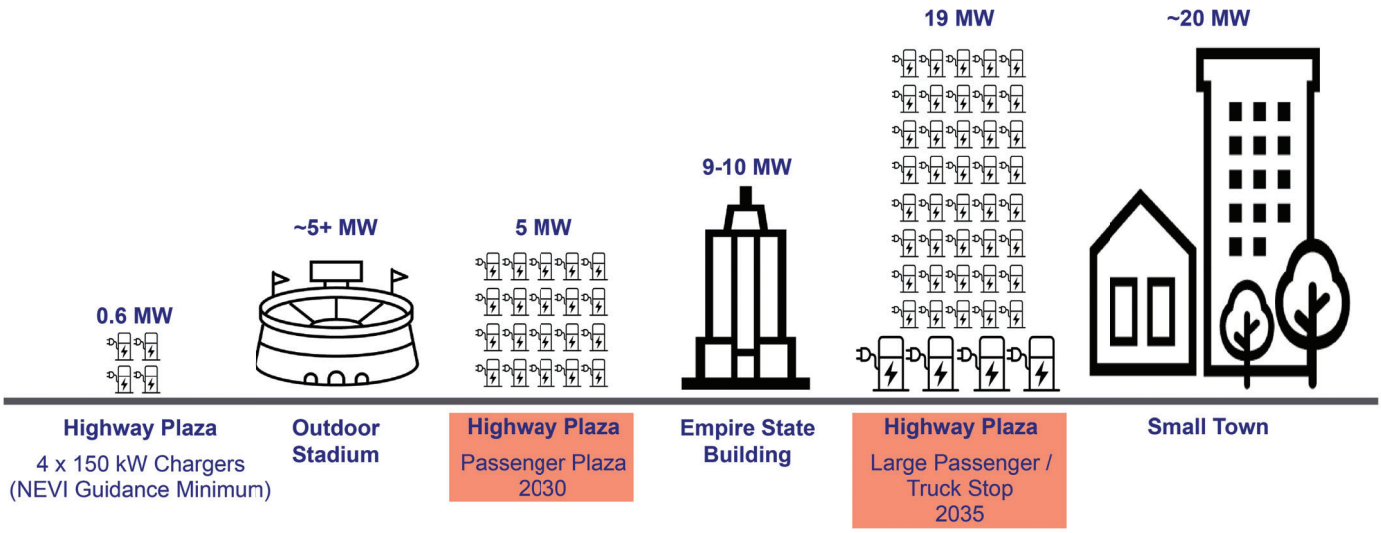
GEOTAB ITS

IV. Conclusion and Implications

A typical highway site will eventually need 20+ fast-chargers to serve expected traffic. As a result, these sites will see drastic increases in power demand compared to usage today. Highway charging sites will bring about significant electric loads. At many sites, these loads will begin to exceed distribution line capacity in the next 5-10 years.

For perspective, the Mixed Use Traffic Plaza and Passenger Plaza will each require about 5 MW of charging capacity by 2030—about the amount of power used by an outdoor professional sports stadium. By 2035, the nameplate charging capacity required at the Large Passenger/Truck Stop site will be roughly equivalent to the electric load of a small town (Figure 21). Note that the other large energy users' loads depicted in the figure below are approximate based on a range of loads.

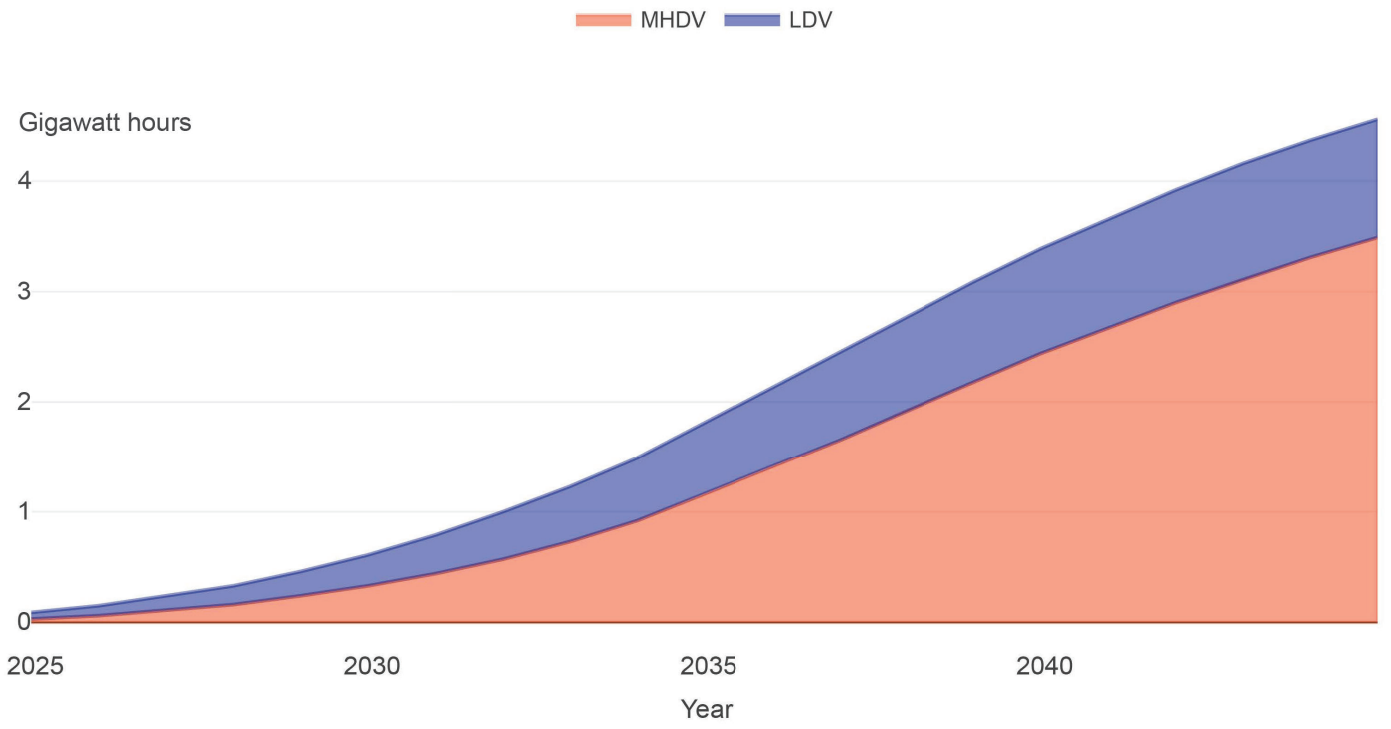
Figure 21. Comparative Peak Loads for Illustrative Sites and Other Major Users[35]



While LDVs will drive load increases in the near term, MHDV electrification will magnify charging needs over the mid to long term. As of June 2022, the United States had more than 2.7 million electric LDV registrations.[36] For comparison, as of June 2022, 1,895 electric trucks were registered in the country.[37] As a result, LDV charging demand will likely be a focus of site operators and policymakers in the near term, and LDVs will account for a large portion of total energy demand across highway sites.

However, it is important to plan for MHDV electrification today. Based on these results, MHDV electric demand will increase much quicker than may be expected. Some of the sites we analyzed required 5 MW of charging capacity for electric trucks *alone* by 2030. In fact, MHDV charging demands will exceed those of LDVs: by 2045, electric MHDVs will require over three-quarters of total energy demand at the 71 highway sites (Figure 22).

Figure 22. Average Daily Energy Demand Across All Sites



Through the NEVI program, the federal government is allocating funding to states to establish the beginnings of a national fast-charging network on major travel corridors. State policymakers should take the time today to plan charging infrastructure for both electric LDVs and MHDVs. Selecting sites that could host both LDVs and MHDVs will reduce the need for redundant interconnection infrastructure and create opportunities to future-proof infrastructure at high-demand sites. Considering MHDVs in highway fast-charging

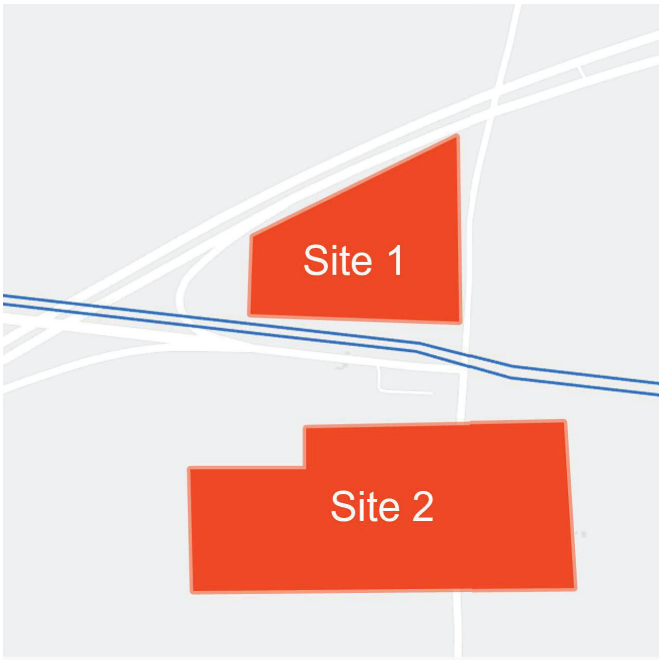
planning now will also allow policymakers to provide market certainty for MHDV manufacturers and businesses that are considering converting their fleets to EVs.

This study's results demonstrate the importance of involving electric utilities in state and federal planning for highway charging deployment. By doing so, utilities and site operators can implement electric infrastructure that serves not only the immediate load at a site but the ultimate charging needs, which could be more than 50 times the charging capacity (four 150-kW chargers) required under the NEVI formula funding guidance.

Anticipated levels of demand will require transmission interconnection at many highway fast-charging sites. As shown in Figure 20, over a quarter of the sites studied will cross the 5-MW charging capacity threshold as soon as 2030. Sites begin to resemble small towns or even industrial manufacturers in terms of their electric demand. At a certain threshold, highway fast-charging sites will require interconnection to the high-voltage transmission system.

Transmission interconnections are well-suited for highway charging applications, as they can provide sufficient electrical capacity to satisfy all charging needs for decades to come. The transmission system often overlaps with highways, providing an opportunity to efficiently facilitate this interconnection. The sites detailed in this report are all within about one-third of a mile from existing transmission lines. Figure 23 depicts an example of one location (not previously discussed) with two large charging sites adjacent to each other; two transmission lines run between them. It may not be feasible to extend the transmission network to every site, particularly in locations where there would be impacts to local residents and the environment, but there are opportunities for minimal extensions or taps of transmission lines to many highway charging locations.

Figure 23. Example Interconnection Location with Two Large Charging Sites



Additionally, connection to the transmission system offers resiliency benefits: transmission lines are the least likely to go out and the first to be restored after a power outage. Implementing these capacity-creating upgrades can allow utilities to address the needs of multiple nearby sites at once. For example, truck stops that are situated next to each other (on opposite sides of the highway), or highway service plazas and fleet depots located in the surrounding area, could share the benefits of newly created capacity.

Where feasible, we should bring chargers to the higher capacity wires that already overlap with the highway system. This analysis highlights that access to electric infrastructure is a critical factor—along with traffic, expected utilization, and access to suitable land—in the identification of high-priority fast-charging sites. Placing charging demand where the electric grid can easily accommodate it will provide significant cost savings to operators (and thus drivers) and minimize roadblocks to site development. Some existing service plazas and truck stops are very close to substations and transmission infrastructure; new plazas have an opportunity to guarantee proximity to high-capacity grid infrastructure.

Utilities have historically been in a reactive position, responding to customer requests wherever new demand may appear. Here, there is an opportunity to steer electric demand to the most intelligent locations for long-term growth. By strategically planning for highway charging, we can guide electric demand where it makes the most sense for commerce, communities, and our electric network.

Build the grid infrastructure once, and build it right. High-voltage infrastructure takes years to develop, which is why it is so important to take a long-term view when planning for expected charging demand. At high-traffic sites, a series of small, distribution-based upgrades will likely result in stranded costs, since that infrastructure would eventually need to be replaced with a transmission interconnection to meet driver needs. If we prioritize short-term needs over the long-term need, we risk a situation where site operators—and drivers—have to wait years for upgrades to grid infrastructure before new chargers can be installed, which could frustrate drivers and negatively impact confidence in EV charging.

At many sites, a transmission interconnection will likely be needed in the next 10 years to serve LDVs alone. By taking future charging growth from LDVs and MHDVs into account when implementing these solutions, we can future-proof sites to not only meet growing demand for charging but accelerate charging deployment at strategically selected no-regrets sites.

The electric highway future is happening now. As discussed, the timelines required for grid infrastructure upgrades, particularly transmission, are much longer than those required for EV supply equipment installation. If many sites will see transmission-level loads in the next 5-10 years, it is imperative to get ahead of the demand and begin planning for those upgrades now.

By deploying these no-regrets upgrades at no-regrets sites, we can ensure that the electric grid becomes an enabler—even an accelerator—to the EV transition.

https://www.fao.org/worldfoodsituation/foodpricesindex/en/

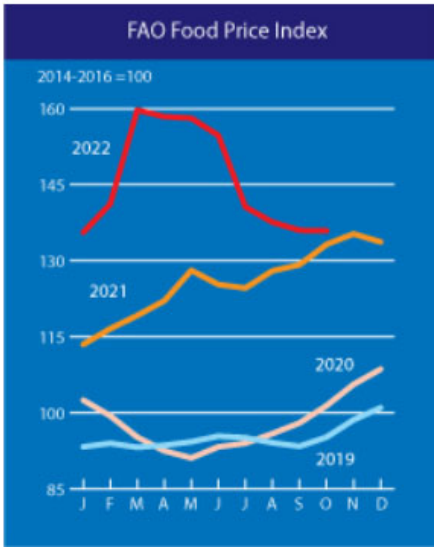
FAO Food Price Index

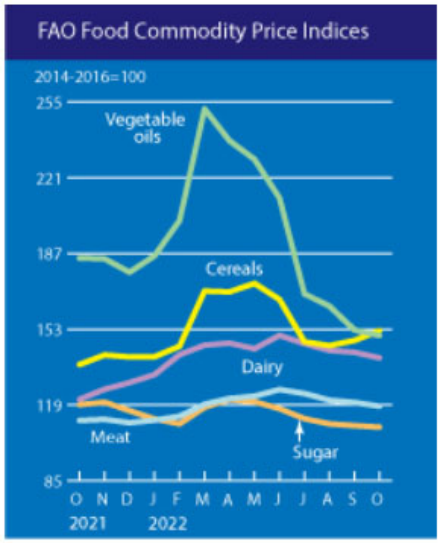
The FAO Food Price Index (FFPI) is a measure of the monthly change in international prices of a basket of food commodities. It consists of the average of five commodity group price indices weighted by the average export shares of each of the groups over 2014-2016. A feature article published in the June 2020 edition of the Food Outlook presents the revision of the base period for the calculation of the FFPI and the expansion of its price coverage, to be introduced from July 2020. A November 2013 article contains technical background on the previous construction of the FFPI.

Monthly release dates for 2022: 6 January, 3 February, 4 March, 8 April, 6 May, 3 June, 8 July, 5 August, 2 September, 7 October, 4 November, 2 December.

FAO Food Price Index virtually unchanged in October, with higher world cereal prices almost offsetting lower prices of other food commodities

Release date: 04/11/2022





» The **FAO Food Price Index*** (FFPI) averaged 135.9 points in October 2022, virtually unchanged from September, with the price indices of all the covered commodity groups, except cereals, down month-on-month. An upturn in the Cereal Price Index countered drops in the indices for vegetable oils, dairy, meat and sugar. With the latest updates, the FFPI has dropped 23.8 points (14.9 percent) from its peak in March this year, but remained 2.7 points (2.0 percent) above its value in the corresponding month last year.

» The **FAO Cereal Price Index** averaged 152.3 points in October, up 4.4 points (3.0 percent) from September and 15.2 points (11.1 percent) above its value a year ago. International reference prices of all the major cereals were up month-on-month. World wheat prices rose by 3.2 percent, mostly reflecting continued uncertainties related to the Black Sea Grain Initiative. Tighter supplies in the United States of America, following a downward production revision, also contributed to the firmer tone in markets. International prices of coarse grains increased by 3.5 percent month-on-month, led by a 4.3-percent rise in world maize prices. The maize price increase was underpinned by lower production prospects in the United States of America and the European Union, along with dry planting conditions in Argentina and uncertainty about the continuation of Ukraine's exports. International sorghum prices also increased by 3.0 percent in October, influenced by the strength in maize prices. Meanwhile, world barley prices increased only marginally (0.3 percent), with higher global supplies stemming from better production prospects in the European Union helping to cap price gains. International rice prices remained on an uptrend in October, as the bulk of new crop arrivals were still forthcoming in Asia, although low demand limited the monthly price increase to 1.0 percent.

» The **FAO Vegetable Oil Price Index** averaged 150.1 points in October, down 2.4 points (1.6 percent) month-on-month and standing nearly 20 percent below its year-earlier level. The continued decrease of the index was driven by world lower prices of palm, soy and rapeseed oils, which more than offset higher sunflowerseed oil quotations. In October, international palm oil prices declined slightly from the previous month, broadly weighed by lingering heavy stock levels in Southeast Asia, despite concerns over unfavourable weather prospects in pockets of major growing regions. Meanwhile, world soy and rapeseed oil quotations dropped on outlooks of ample supplies in the coming months. By contrast, international sunflower oil prices rebounded moderately after falling continuously over the past half a year due to uncertainty over the future of the export corridor in Ukraine amid rising geopolitical tensions.

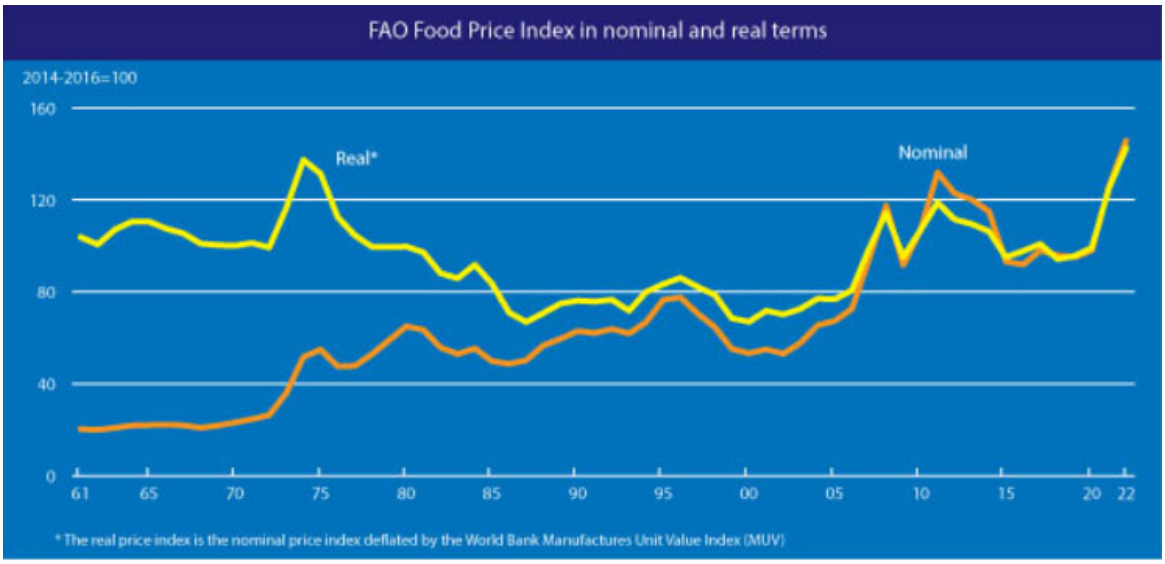
» The **FAO Dairy Price Index** averaged 140.1 points in October, down 2.5 points (1.7 percent) from September, marking the fourth consecutive monthly decline, nevertheless, it remained 18.7 points (15.4 percent) above its value a year ago. In October, international prices of all dairy products covered by the index fell. Lower-than-anticipated purchases by China and lacklustre demand for spot supplies as most importing countries were well covered for their immediate needs, together with the impact of the weaker Euro against the United States dollar, underpinned the drop in world dairy prices. Market uncertainty about the direction of demand for dairy products, due to soaring inflation and economic downturns, also pressured international dairy prices down. Nonetheless, demand for some dairy products in other countries in Asia increased, containing potential larger declines in dairy prices.

» The **FAO Meat Price Index*** averaged 118.4 points in October, down 1.6 points (1.4 percent) from September, marking the fourth consecutive monthly decline, with world prices of all meat types registering drops. However, the index remained 6.4 points (5.8 percent) above its value a year ago. International ovine meat prices registered the steepest drop, underpinned by the impacts of currency movements and seasonally increasing supplies from Oceania amid subdued import purchases. Likewise, world pig meat prices dropped substantially on weak global import purchases in tandem with softer internal demand in some leading producing countries. Meanwhile, world bovine prices fell slightly on high current supplies and rising availability of slaughter cattle, notably in Brazil. International poultry meat price downward trend continued for the fourth consecutive month, as export availabilities outpaced subdued global demand, notwithstanding setbacks to production stemming from avian influenza outbreaks and high feed costs.

» The **FAO Sugar Price Index** averaged 109 points in October, down 0.7 points (0.6 percent) from September and 10.1 points (8.5 percent) from its value in the corresponding month last year. The positive global supply outlook for the 2022/23 season, further bolstered by improved production prospects in India, weighed on world sugar prices in October. However, concerns over rains hampering harvest progress in Brazil and delaying the start of the season in India limited the month-on-month price decline. Additional support that prevented world sugar prices from dropping further was lent by a stronger import demand, particularly from Indonesia and China, along with higher ethanol price quotations in Brazil, prompting a greater use of sugarcane to produce ethanol.

** Unlike for other commodity groups, most prices utilized in the calculation of the FAO Meat Price Index are not available when the FAO Food Price Index is computed and published; therefore, the value of the Meat Price Index for the most recent months is derived from a mixture of projected and observed prices. This can, at times, require significant revisions in the final value of the FAO Meat Price Index which could in turn influence the value of the FAO Food Price Index.*

To access benchmark export quotations of various foodstuffs and national retail/wholesale prices of foods please visit FAO's Food Price Monitoring and Analysis (FPMA) Tool



FAO food price index

		Food Price Index [1]	Meat [2]	Dairy [3]	Cereals [4]	Vegetables Oils [5]	Sugar [6]
2004		**65.6**	**67.6**	**69.8**	**64.0**	**69.6**	44.3
2005		**67.4**	**71.8**	**77.2**	**60.8**	**64.4**	61.2
2006		**72.6**	**70.5**	**73.1**	**71.2**	**70.5**	91.4
2007		**94.3**	**76.9**	**122.4**	**100.9**	**107.3**	62.4
2008		**117.5**	**90.2**	**132.3**	**137.6**	**141.1**	79.2
2009		**91.7**	**81.2**	**91.4**	**97.2**	**94.4**	112.2
2010		**106.7**	**91.0**	**111.9**	**107.5**	**122.0**	131.7
2011		**131.9**	**105.3**	**129.9**	**142.2**	**156.5**	160.9
2012		**122.8**	**105.0**	**111.7**	**137.4**	**138.3**	133.3
2013		**120.1**	**106.2**	**140.9**	**129.1**	**119.5**	109.5
2014		**115.0**	**112.2**	**130.2**	**115.8**	**110.6**	105.2
2015		**93.0**	**96.7**	**87.1**	**95.9**	**89.9**	83.2
2016		**91.9**	**91.0**	**82.6**	**88.3**	**99.4**	111.6
2017		**98.0**	**97.7**	**108.0**	**91.0**	**101.9**	99.1
2018		**95.9**	**94.9**	**107.3**	**100.8**	**87.8**	77.4
2019		**95.1**	**100.0**	**102.8**	**96.6**	**83.2**	78.6
2020		**98.1**	**95.5**	**101.8**	**103.1**	**99.4**	79.5
2021		**125.7**	**107.7**	**119.1**	**131.2**	**164.9**	109.3
2021	October	**133.2**	112.0	121.5	137.1	184.8	119.1
	November	**135.3**	112.5	126.0	141.4	184.6	120.2
	December	**133.7**	111.0	129.0	140.5	178.5	116.4
2022	January	**135.6**	112.1	132.6	140.6	185.9	112.7
	February	**141.2**	113.9	141.5	145.3	201.7	110.5
	March	**159.7**	119.3	145.8	170.1	251.8	117.9
	April	**158.4**	121.9	146.7	169.7	237.5	121.5
	May	**158.1**	122.9	144.2	173.5	229.2	120.4
	June	**154.7**	125.9	150.2	166.3	211.8	117.3
	July	**140.6**	124.1	146.5	147.3	168.8	112.8
	August	**137.6**	121.1	143.4	145.6	163.3	110.5
	September	**136.0**	120.1	142.6	147.9	152.6	109.7
	October	**135.9**	118.4	140.1	152.3	150.1	109.0

1 Food Price Index: Consists of the average of 5 commodity group price indices mentioned above, weighted with the average export shares of each of the groups for 2014-2016: in total 95 price quotations considered by FAO commodity specialists as representing the international prices of the food commodities are included in the overall index. Each sub-index is a weighted average of the price relatives of the commodities included in the group, with the base period price consisting of the averages for the years 2014-2016.

2 Meat Price Index: Based on 35 average export unit values/market prices of four meat types (bovine, pig, poultry and ovine) from 10 representative markets. Within each meat type, export unit values/prices are weighted by the trade shares of their respective markets, while the meat types are weighted by their average global export trade shares for 2014-2016. Quotations for the two most recent months may consist of estimates and be subject to revision.

3 Dairy Price Index: Computed using 8 price quotations of four dairy products (butter, cheese, SMP and WMP) from two representative markets. Within each dairy product, prices are weighted by the trade shares of their respective markets, while the dairy products are weighted by their average export shares for 2014-2016.

4 Cereals Price Index: Compiled using the International Grains Council (IGC) wheat price index (an average of 10 different wheat price quotations), the IGC maize price index (an average of 4 different maize price quotations), the IGC barley price index (an average of 5 different barley price quotations), 1 sorghum export quotation and the FAO All Rice Price Index. The FAO All Rice Price Index is based on 21 rice export quotations, combined into four groups consisting of Indica, Aromatic, Japonica and Glutinous rice varieties. Within each varietal group, a simple average of the relative prices of appropriate quotations is calculated; then the average relative prices of each of the four rice varieties are combined by weighting them with their (fixed) trade shares for 2014-2016. The Cereal Price Index combines the relative prices of sorghum, the IGC wheat, maize and barley price indices (re-based to 2014-2016) and the FAO All Rice Price Index by weighing each commodity with its average export trade share for 2014-2016.

5 Vegetable Oil Price Index: Consists of an average of 10 different oils weighted with average export trade shares of each oil product for 2014-2016.

6 Sugar Price Index: Index form of the International Sugar Agreement prices with 2014-2016 as base.

https://livingwagealberta.ca/2022/11/14/2022-living-wage-numbers-released-by-alberta-living-wage-network/

2022 Living Wage Numbers released by Alberta Living Wage Network

Nov 14, 2022 | News

A network of municipalities and community organizations are shedding light on the affordability and livability of Albertan communities.

Marking a year since its launch, the Alberta Living Wage Network (ALWN or "the Network") has released updated living wage numbers for 2022.

The 2022 living wages are as follows:

- Calgary: $22.40
- Canmore: $32.75
- Cochrane: $22.35
- Drayton Valley: $19.65
- Drumheller: $21.20
- Edmonton: $21.40
- Fort McMurray: $22.50
- Grand Prairie: $19.65
- Lethbridge: $20.30
- Medicine Hat: $17.50
- Red Deer: $19.65
- Rocky Mountain House: $21.85
- Spruce Grove: $20.70
- St. Albert: $22.40
- Stony Plain: $20.40

With record high inflation in a post-pandemic world, the intention of releasing the living wage numbers is not to add further stress to business, but rather to shed light on the reality of the cost of living in cities and towns across Alberta.

The living wage is defined as the hourly wage a worker needs to earn to cover their basic expenses and participate in the community. Over the last year, the Network has adjusted its calculations to better reflect the lived reality of Albertans. The 2022 are based on the income needs of three household types: 1) a two-parent family with 2 young children, 2) a lone-parent family with one child and 3) a single individual living alone. The calculation considers the hourly rate of pay needed for a household to maintain a modest standard of living, once government transfers have been added and taxes have been subtracted. It assumes that each adult is working full-time hours and includes more than the basics of food, clothing and shelter – it also takes into account unexpected costs, small investments in education, child care, and participating in the community.

Quotes:

“Living wages are an important tool in figuring out what it costs to live in a city and with the current affordability crisis, it’s clear that more needs to be done to help people make ends meet. Alberta is the only province that didn’t review and raise its minimum wage in 2022 and one of the only provinces that doesn’t tie its minimum wage to the cost of living. It’s time for the government to step up and give Albertans the help they need.”

– Meaghon Reid, Executive Director, Vibrant Communities Calgary

“The collective effort of Network council members, staff, certified employers and the financial support of The Calgary Foundation and The Greater Edmonton Foundation has resulted in a very successful first year of the Network. This progress would not be possible without the engagement of the 16 community members of the Network and the 75 living wage employers certified this year.”

– Franco Savoia, Chair, Alberta Living Wage Network

“The certification aligns with our commitment as a B Corp, and also a standard we’ve been meeting internally for many years. Our people are at the heart of our company, and this will further help us attract and retain the best talent in the construction industry.”

– Tim Coldwell, President, Chandos Construction

“The Living Wage provides context to the affordability concerns that are the lived reality of so many people in Alberta. It is a tool and calculation that helps us to understand what expenses impact the cost of living within our communities, as well as helping us to identify what programs increase affordability for our residents. The Town of Canmore is a founding member of the Living Wage Network and continues to support the network by working to understand Alberta’s diverse economic landscape.”

– Lisa Brown, Manager of Community Social Development, Town of Canmore

About the Alberta Living Wage Network

The Alberta Living Wage Network is a network of community organizations and municipalities with the goal of advancing a coordinated living wage movement in Alberta. The network assists communities in their annual living wage calculation and provides certification to qualifying living wage employers. For more information visit https://livingwagealberta.ca/ and follow @livingwageab on Twitter or Instagram.

Resources

- The Alberta Living Wage Network publishes common questions and answers about living wages.
- Alberta Living Wage Methodology explains how living wages are calculated in the province.
- Certified employers have been featured on the Alberta Living Wage Network blog – TELUS Calgary Convention Centre, Lethbridge and Alberta Capital Region United Ways, Knifewear, Delnor Construction and Naiad Irrigation.

For more information

Email coordinator@livingwagealberta.ca

Dan Tsubouchi @Energy_Tidbits · 1h

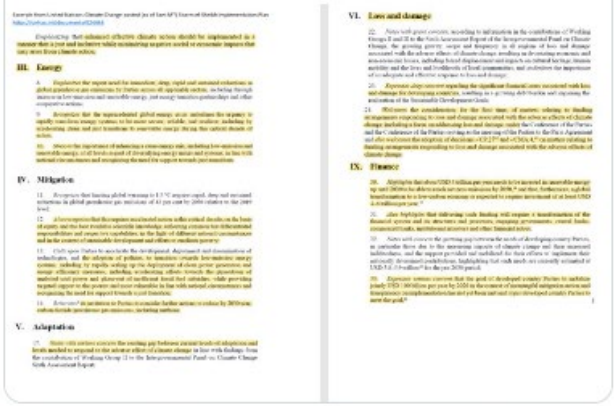
WOW! Must read 👇 #30, did @UNFCCC #COP27 sneak in an admission there has to be an Energy TRANSITION?

Step 1: transform to a "LOW-CARBON" economy

Sept 2: try to reach #NetZero in 2050

#Oil #NatGas will be needed for way longer than #EnergyTransition aspirations.

#OOTT

> **Dan Tsubouchi** @Energy_Tidbits · 3h
>
> Hmmm!
>
> #cop27egypt @UNFCCC implementation plan.
>
> need $4T/yr in renewable energy "and that, furthermore, a global transformation to a LOW-CARBON economy is expected to require an investment of at least $4-6T per year"
>
> Sounds like #NatGas #Oil will be needed for 2020s.
>
> #OOTT
>
> 
> III. Energy
> IV. Mitigation
> V. Adaptation
> VI. Loss and damage
> IX. Finance

2 3

Dan Tsubouchi @Energy_Tidbits · 3h

Dan Tsubouchi @Energy_Tidbits · 3h

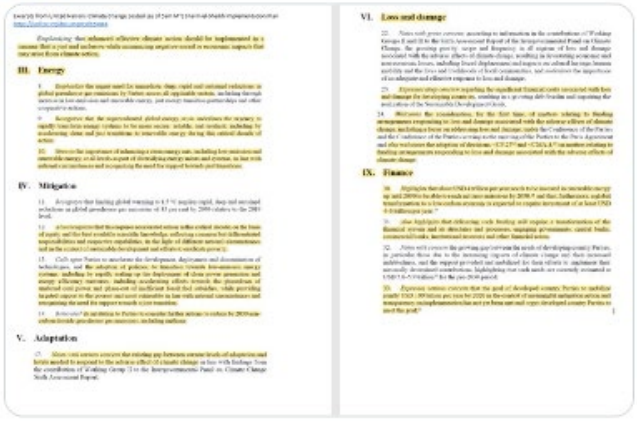
Hmmm!

#cop27egypt @UNFCCC implementation plan.

need $4T/yr in renewable energy "and that, furthermore, a global transformation to a LOW-CARBON economy is expected to require an investment of at least $4-6T per year"

Sounds like #NatGas #Oil will be needed for 2020s.

#OOTT



III. Energy

V. Adaptation

VI. Loss and damage

IX. Finance

7 7

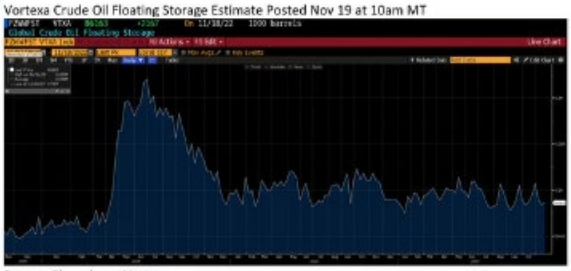
Dan Tsubouchi Retweeted

Dan Tsubouchi @Energy_Tidbits · 23h

Dan Tsubouchi @Energy_Tidbits · 23h

#Vortexa crude #Oil floating storage at 11/18 est 86.16 mmb, +2.16 mmb WoW vs upwardly revised 11/11 of 84.00 mmb. But big +10.97 mmb upward revision to 11/11, originally est at 73.03 mmb. Thx @Vortexa @business. #OOTT

Vortexa Crude Oil Floating Storage Estimate Posted Nov 19 at 10am MT



Source: Bloomberg, Vortexa

Posted Nov 19, 10am MT

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Fr 10/21/2022	94673
Fr 10/14/2022	87563
Fr 10/07/2022	83714
Fr 09/30/2022	88639
Fr 09/23/2022	105.268k
Fr 09/16/2022	89773
Fr 09/09/2022	82131

Nov 12, 11am MT

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Nov 5, 11am MT

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Fr 09/23/2022	107.74k
Fr 09/16/2022	92314
Fr 09/09/2022	85715
Fr 09/02/2022	80070
Fr 08/26/2022	87045

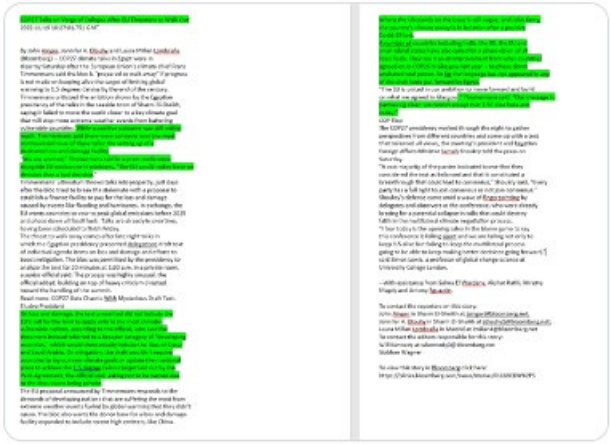
Source: Bloomberg, Vortexa

3 4

Dan Tsubouchi Retweeted

Dan Tsubouchi @Energy_Tidbits · Nov 19

Will EU''s Humpty Dumpty threat work? @TimmermansEU "EU would rather have no decision than a bad decision" at #COP27. It should, BUT, gotta believe best case is a carefully crafted text that keeps the aspiration alive but has lots of outs for countries? Thx @business. #OOTT

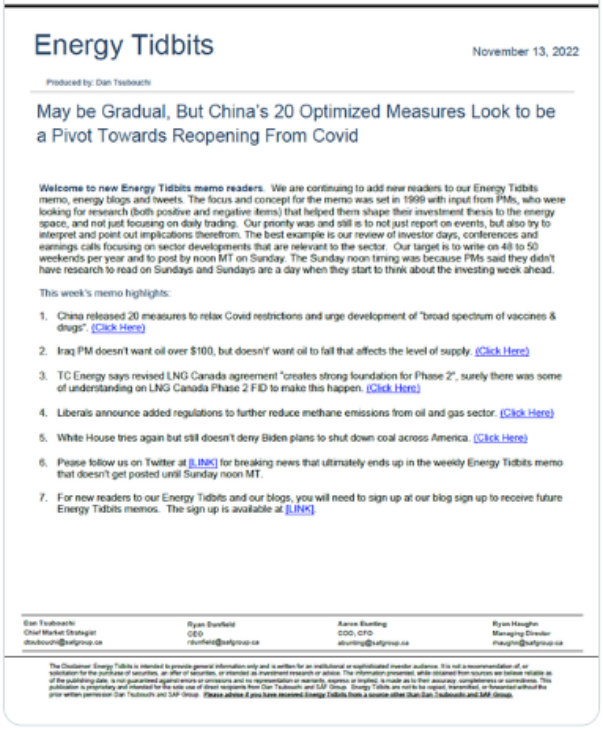


2 1

Dan Tsubouchi @Energy_Tidbits · Nov 18

JIC! I hope Twitter isn't interrupted, but every Sunday, i post an Energy Tidbits memo weekly recap of key data and look at key energy issues. Can access at news/insights section of SAF website safgroup.ca/news-insights/. Below is the link to the 58-pg Nov 13 memo. #OOTT

> **Dan Tsubouchi** @Energy_Tidbits · Nov 13
>
> Our weekly SAF Nov 13, 2022 Energy Tidbits memo is posted on SAF Group website. this 58-pg energy research memo expands upon & covers more items than tweeted this week. See news/insights section of SAF website #Oil #OOTT #LNG #NatGas #EnergyTransition safgroup.ca/news-insights/



SAF GROUP

Energy Tidbits

November 13, 2022

Produced by: Dan Tsubouchi

May be Gradual, But China's 20 Optimized Measures Look to be a Pivot Towards Reopening From Covid

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. Our target is to write on 48 to 50 weekends per year and to post by noon MT on Sunday. The Sunday noon timing was because PMs said they didn't have research to read on Sundays and Sundays are a day when they start to think about the investing week ahead.

This week's memo highlights:

1. China released 20 measures to relax Covid restrictions and urge development of "broad spectrum of vaccines & drugs". (Click Here)
2. Iraq PM doesn't want oil over $100, but doesn't want oil to fall that affects the level of supply. (Click Here)
3. TC Energy says revised LNG Canada agreement "creates strong foundation for Phase 2", surely there was some of understanding on LNG Canada Phase 2 FID to make this happen. (Click Here)
4. Liberals announce added regulations to further reduce methane emissions from oil and gas sector. (Click Here)
5. White House tries again but still doesn't deny Biden plans to shut down coal across America. (Click Here)
6. Pease follow us on Twitter at [LINK] for breaking news that ultimately ends up in the weekly Energy Tidbits memo that doesn't get posted until Sunday noon MT.
7. For new readers to our Energy Tidbits and our blogs, you will need to sign up at our blog sign up to receive future Energy Tidbits memos. The sign up is available at [LINK]

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4

Dan Tsubouchi @Energy_Tidbits · Nov 18

Key #FreeportLNG timing to watch - when do they actually start up production. Today's update suggests 4-6 weeks from restart to ~2 bcf/d ie. now target mid-Dec initial production at facility to hit ~2 bcf/d "in" Jan. Continued negative to HH #NatGas, positive to #LNG prices #OOTT

...newsrouter.com/news_release.asp?mtRelease_ID=9753&mtAcc_ID=77

...OVIDES UPDATE ON INITIAL RESTART OF ITS LIQUEFACTION FACILITY

...mber 18, 2022 – Freeport LNG Development, L.P. (Freeport LNG) today provided an update on the ongoing reconstruction and resumption of operations at ... ...NG export facility. As of November 14th, the reconstruction work necessary to commence initial operations, including utilization of all three liquefaction trains ... ...one dock, was approximately 90% complete, with all reconstruction work anticipated to be completed by the end of November. Proposed remedial work act... ...ial operations have been submitted to the relevant regulatory agencies for review and approval. Subject to Freeport LNG meeting its regulatory requirement... ...at the facility in mid-December.

...ng's three liquefaction trains will be restarted and ramped up safely, in a slow and deliberate manner, with each train starting separately before restarting a... ...d that approximately 2 BCF per day of production will be achieved in January 2023. Full production utilizing both docks remains anticipated to commence in ...

...worked diligently over the last several months alongside regulators to ensure the safe restart of our facility. I am immensely grateful for their efforts," said M... ...n and CEO. "We are committed to moving forward with an uncompromising safety focus and enhanced operational processes that will enable us to chart a s... ...erve our customers and the broader LNG market as a whole."

...LNG

...s LNG export company headquartered in Houston, Texas. The company's three train, 15 MTPA liquefaction facility is the seventh largest in the world and seco... ...LNG's liquefaction facility is the largest all-electric drive motor plant of its kind in the world, making it the most environmentally sustainable site of its kind. Th... ...ors reduce carbon emissions by over 90% relative to gas turbine-driven liquefaction facilities. Freeport plans to expand by adding a fourth liquefaction train, ...story approvals for construction. Freeport was formed in 2003 to develop, own and operate an LNG terminal on Quintana Island, near Freeport, Texas. The ba... ...tions in June 2008 and began LNG export operations in 2019. Further information can be found on Freeport's website at www.freeportlng.com.

> **Dan Tsubouchi** @Energy_Tidbits · Nov 14
>
> 
>
> Near term negative to HH #NatGas price. See 👇, sounds like #FreeportLNG cargos won't resume until after Dec, not target mid Nov. Makes sense, haven't seen any indications they have even started the process to resume operations. Thx @SStapczynski ...

1 2

Dan Tsubouchi @Energy_Tidbits · Nov 18

Seems others will follow UK having EVs pay more for roads. Japan looking

Dan Tsubouchi @Energy_Tidbits · Nov 18

Seems others will follow UK having EVs pay more for roads. Japan looking at increasing tax on #EVs. Do govts realize can't do all they want to do, but only what they can do or their economies blow up? ie. need affordable energy #Oil for longer? #OOTT

msn.com/en-us/money/ne...

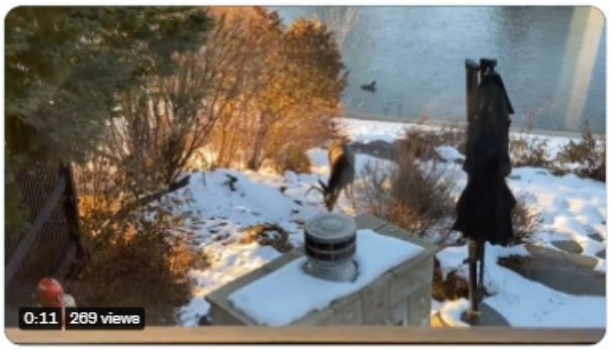
> **Dan Tsubouchi** @Energy_Tidbits · Nov 17
>
> Who has to pay to maintain roads? UK @Jeremy_Hunt since EVs est to be 50% of sales by 2025, "to make our motoring system fairer, I have decided that from Apr 2025, #EVs will no longer be exempt from Vehicle Excise Duty". This battle will come to US/Can eventually. #OOTT

2 3

Dan Tsubouchi @Energy_Tidbits · Nov 18

Dan Tsubouchi @Energy_Tidbits · Nov 18

couldn't help notice the big guy coming up to feast on our patio. who doesn't wildlife. back to work!



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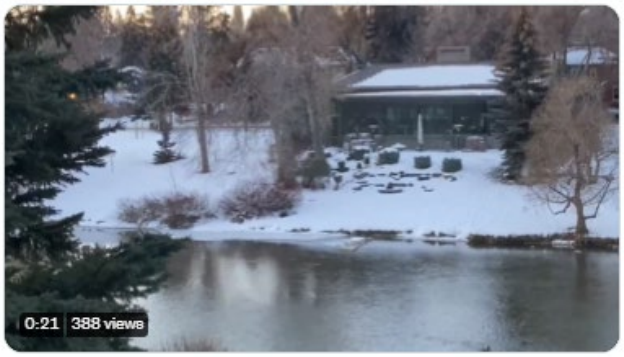
Dan Tsubouchi @Energy_Tidbits · Nov 18

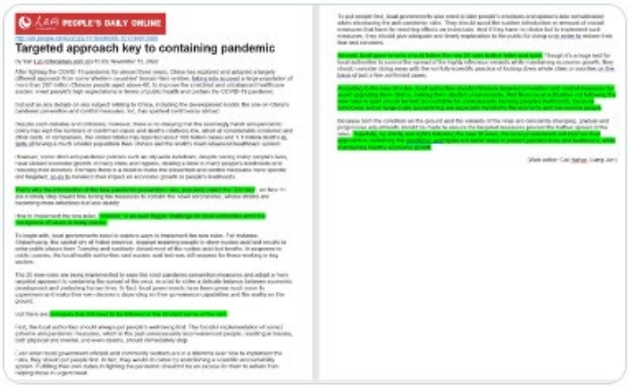
always great to look from your screen and see some local #Calgary deer having breakfast and also the ducks in the Elbow River. hope the ducks stay longer as they normally don't fly away until they sense it will get really cold.



1 1 8

Dan Tsubouchi @Energy_Tidbits · Nov 18

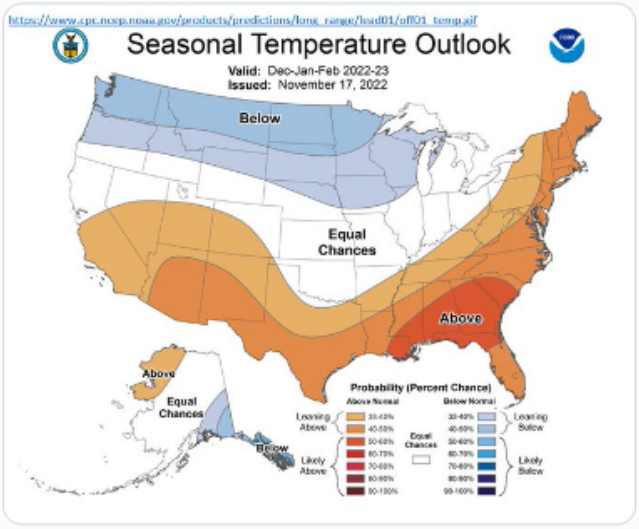
Negative to #Oil. Seems China leadership hope to ease Covid restrictions "while maintaining healthy economic growth" isn't being followed by local govt. Communist party now says "20 rules" not optimized measures ie. time to follow the rules. Adds risk to speed of reopen.
#OOTT



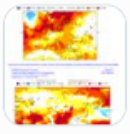
1 6 12

Dan Tsubouchi @Energy_Tidbits · Nov 17

If it wasn't for the scramble to replace Russian #NatGas, #LNG & Global #NatGas prices would be a lot lower with @CopernicusECMWF 👇 forecast for very warm DJF for EU & warmer than normal Asia, & now @NOAA forecasts a warmer than normal DJF for US. #OOTT



Dan Tsubouchi @Energy_Tidbits · Nov 13



Good start to EU avoiding winter #NatGas shortage - it's been a warm Oct/early Nov. And now @CopernicusECMWF expects much warmer than normal DJF in Europe & also in Asia. So no weather pressure on price, but, even still, TTF Dec/Jan ...

1 3

Dan Tsubouchi @Energy_Tidbits · Nov 17

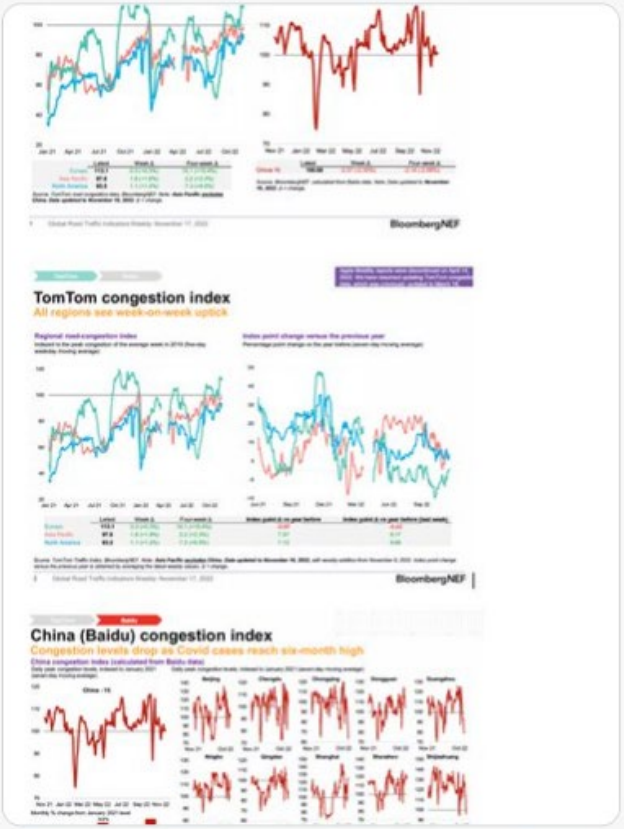
#Oil. Covid still the China story.

#BNEF "congestion levels pick up everywhere except China"

Nov 13, China 20 optimized measures easing Covid.

Increased Covid cases = no pickup in China congestion levels for week ended Nov 16.

Thx @BloombergNEF C Lubis, W Tan, P Geurts
#OOTT



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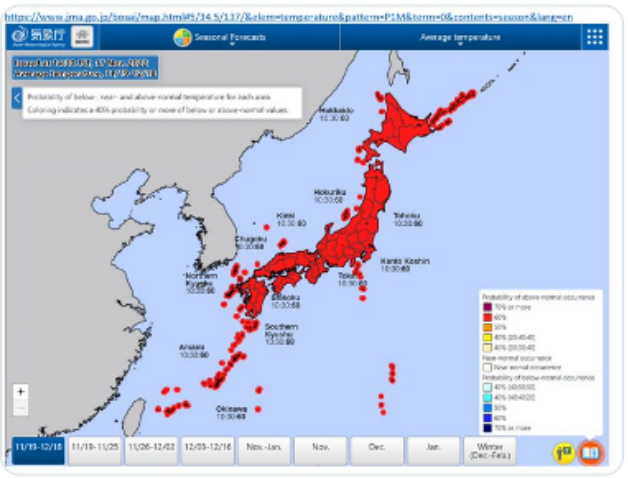
Dan Tsubouchi @Energy_Tidbits · Nov 17

Who has to pay to maintain roads? UK @Jeremy_Hunt since EVs est to be 50% of sales by 2025, "to make our motoring system fairer, I have decided that from Apr 2025, #EVs will no longer be exempt from Vehicle Excise Duty". This battle will come to US/Can eventually. #OOTT

3 10

Dan Tsubouchi @Energy_Tidbits · Nov 17

In case you were wondering why JKM #LNG Jan/Feb futures at $26/mmbtu (vs HH $6.35/mmbtu), it's been much warmer than normal in 1st half of Nov and Japan Meteorological Agency's updated 30-day forecast is for much warmer than normal temperatures. #OOTT #NatGas



1 3

Dan Tsubouchi Retweeted

Dan Tsubouchi @Energy_Tidbits · Nov 16

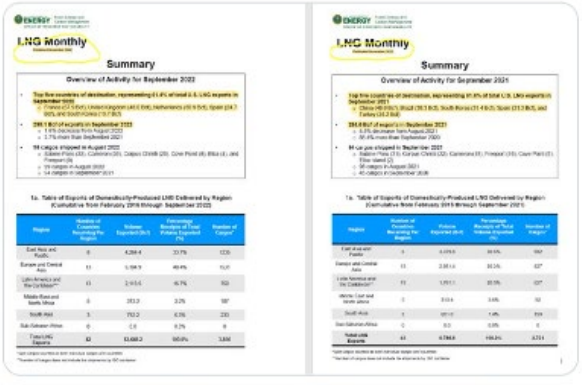
US #LNG exports Sept/22 were 9.5 bcf/d, flat YoY.

Continued impact of #FreeportLNG 2.2 bcf/d June 8 shut.

Sept/22 top 5 export countries: France, UK, Dutch, Spain, Korea

Sept/21 top 5 export countries: China, Brazil, Korea, Spain, Turkey.

#OOTT



2 5

Dan Tsubouchi Retweeted

Dan Tsubouchi @Energy_Tidbits · Nov 16

see 👇Breaking: @mariatad says Poland President Duda says no early indications that this was directly aimed at poland from russia. do not see the intention to hit from russia to hit poland. this was confirmed by NATO. #OOTT

1 1

Dan Tsubouchi @Energy_Tidbits · Nov 16

Breaking: See 👇@AP reports Oil tanker struck by a drone off the coast of Oman, owner says "some minor damage to the vessel's hull, but no spillage of cargo or water ingress", no injuries. thx @jongambrellAP. #OOTT

apnews.com

Official says oil tanker hit by bomb-carrying drone off Oman

DUBAI, United Arab Emirates (AP) — An oil tanker associated with an Israeli billionaire has been struck by a bomb-carrying drone off the ...

2 4

Dan Tsubouchi @Energy_Tidbits · Nov 15

"unlikely in the minds of the trajectory that it was fired from russia" says #Biden just now. #OOTT

1 1 6

Dan Tsubouchi @Energy_Tidbits · Nov 15

See 👇 for #NATO #Article5. It's still very early in this news. It's being blamed on Russia, but, at least at this early point, it doesn't sound like US or Poland is prepared to say it was deliberate Russian rockets attack vs Poland. #OOTT

https://www.nato.int/cps/en/natohq/topics_110496.htm#:~:text=Collective%20defence%20means%20that%20an%20attack%20against%20one,the%209%2F11%20terrorist%20attacks%20against%20the%20United%20States.

NATO OTAN NORTH ATLANTIC TREATY ORGANIZATION

Collective defence and Article 5

- Last updated: 20 Sep. 2022 13:23

The principle of collective defence is at the very heart of NATO's founding treaty. It remains a unique and enduring principle that binds its members together, committing them to protect each other and setting a spirit of solidarity within the Alliance.

- Collective defence means that an attack against one Ally is considered as an attack against all Allies.
- The principle of collective defence is enshrined in Article 5 of the Washington Treaty.
- NATO invoked Article 5 for the first time in its history after the 9/11 terrorist attacks against the United States.
- NATO has taken collective defence measures on several occasions, including in response to the situation in Syria and the Russian invasion of Ukraine.
- NATO has standing forces on active duty that contribute to the Alliance's collective defence efforts on a permanent basis.

Dan Tsubouchi @Energy_Tidbits · Nov 15

Brent #Oil spiked $3 with the reports that Russian missiles crossed into NATO member Poland.

#OOTT twitter.com/AP/status/1592...

3 1 3

Dan Tsubouchi @Energy_Tidbits · Nov 15

Dan Tsubouchi @Energy_Tidbits · Nov 15

Brent #Oil spiked $3 with the reports that Russian missiles crossed into NATO member Poland.

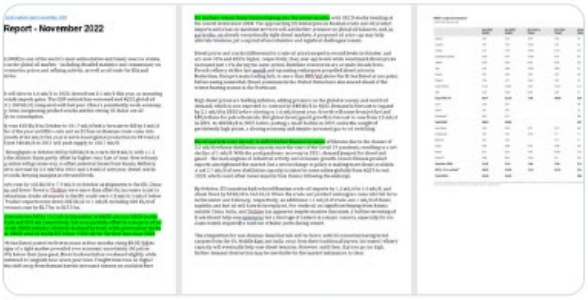
#OOTT

> **The Associated Press** @AP · Nov 15
>
> BREAKING: A senior U.S. intelligence official says Russian missiles crossed into NATO member Poland, killing two people.
>
> A Polish government spokesman did not immediately confirm the information, but said leaders were meeting on "crisis situation." ...
>
> Show this thread

3 2

Dan Tsubouchi @Energy_Tidbits · Nov 15

Wonder what #Oil does if China demand surprises or Putin shuts in oil? @IEA OMR "Oil markets remain finely balanced going into the winter months" "OECD total oil stocks fell below 4,000 mb for the 1st time since 2004". #OOTT



3 9 37

Dan Tsubouchi Retweeted

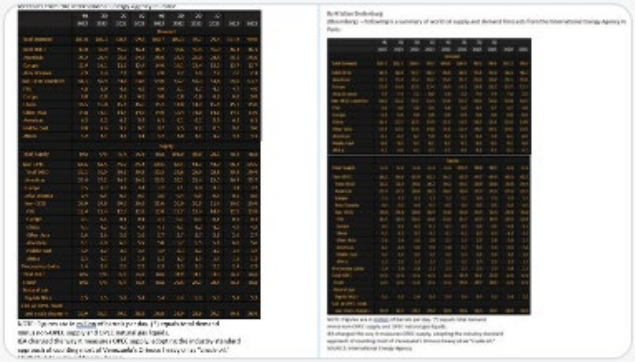
Dan Tsubouchi @Energy_Tidbits · Nov 15

Maybe only up 0.1 mmb/d but @IEA Nov OMR increases 2023 #OilDemand vs Oct OMR.

2022: Nov +2.1 mmbd YoY to 99.8 mmbd. Oct +1.9 mmbd to 99.6 mmbd.

2023: Nov +1.6 mmbd YoY to 101.4 mmbd. Oct +1.7 mmbd to 101.3 mmbd.

Thx @business Kristian Siedenburg! #OOTT



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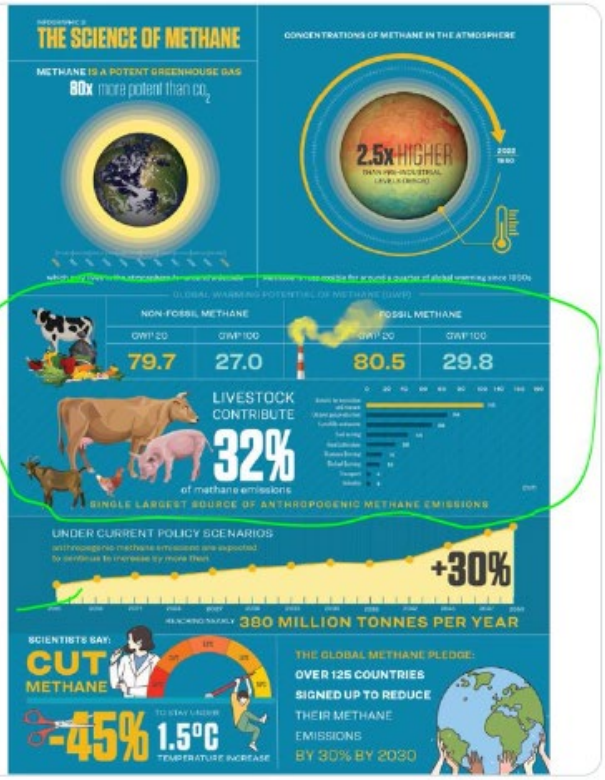
Dan Tsubouchi @Energy_Tidbits · Nov 14

#Methane emissions are much more than #Oil #NatGas. @IATP report "How emissions from big meat and dairy are heating up the planet", livestock contribute 32% of #Methane emissions, single largest source of anthropogenic methane emissions. #OOTT

iatp.org/emissions-impo...



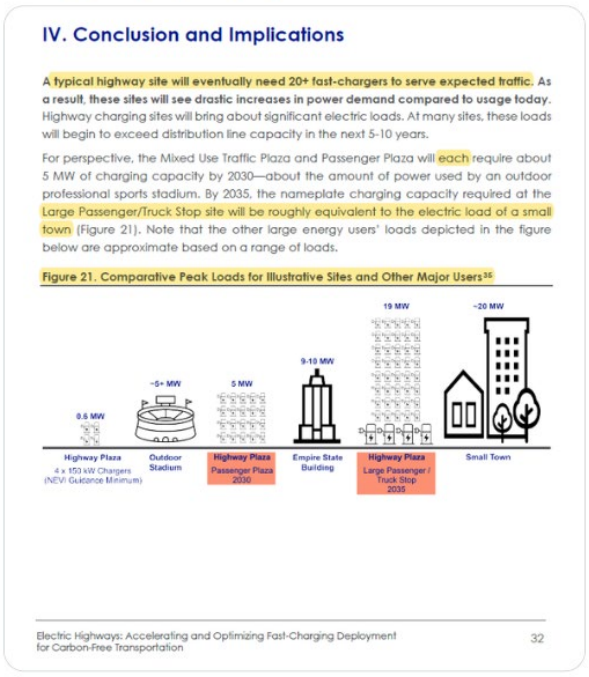
> **Dan Tsubouchi** @Energy_Tidbits · May 7, 2021
>
> 
>
> Interesting data from @UNEP global #Methane emissions report. worst are Freshwaters 159 mt/yr, Wetlands 145, Ruminants (cattle etc) 115, #Oil & #NatGas 84. Termites 9 are ~= to all offshore oil & gas. Fortunately, oil & gas will keep doing more. ...

2 2

Dan Tsubouchi @Energy_Tidbits · Nov 14

WOW! Bet most don't appreciate that a SINGLE large passenger/truck highway charging plaza will be ~equivalent to the electric load of a small town. SINGLE 20-fast charger #EV highway play = load of an outdoor stadium. Thx @nationalgrid. #NatGas #OOTT

nationalgrid.com/us/EVhighway?u...



IV. Conclusion and Implications

A typical highway site will eventually need 20+ fast-chargers to serve expected traffic. As a result, these sites will see drastic increases in power demand compared to usage today. Highway charging sites will bring about significant electric loads. At many sites, these loads will begin to exceed distribution line capacity in the next 5-10 years.

For perspective, the Mixed Use Traffic Plaza and Passenger Plaza will each require about 5 MW of charging capacity by 2030—about the amount of power used by an outdoor professional sports stadium. By 2035, the nameplate charging capacity required at the Large Passenger/Truck Stop site will be roughly equivalent to the electric load of a small town (Figure 21). Note that the other large energy users' loads depicted in the figure below are approximate based on a range of loads.

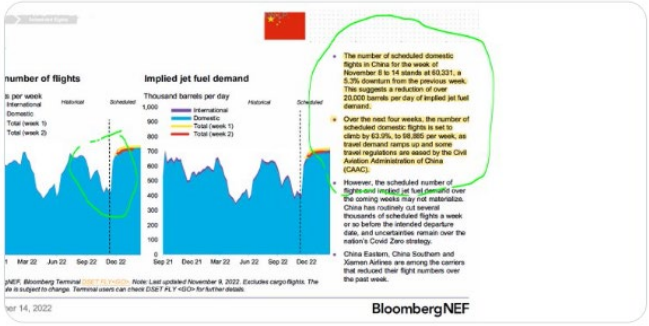
Figure 21. Comparative Peak Loads for Illustrative Sites and Other Major Users[35]

Electric Highways: Accelerating and Optimizing Fast-Charging Deployment for Carbon-Free Transportation 32

4 19 34

Dan Tsubouchi @Energy_Tidbits · Nov 14

Key China reopening test is coming. Will next 2-3 weeks show a sustained pickup in China domestic air flights in response to 20 optimized (relaxed) Covid measures? For now, domestic air flights still stuck, -5.3% WoW to 60,333 for Nov 8-14. Thx @BloombergNEF Claudio Lubis. #OOTT



5

Dan Tsubouchi @Energy_Tidbits · Nov 14

Near term negative to HH #NatGas price. See 👇, sounds like #FreeportLNG cargos won't resume until after Dec, not target mid Nov. Makes sense, haven't seen any indications they have even started the process to resume operations. Thx @SStapczynski @a_shiryaevskaya. #LNG #OOTT

Freeport LNG told buyers it will likely cancel shipments scheduled for November and December as work continues on repairs and regulatory approvals before a restart, according to people with knowledge of the matter.

The company's LNG export facility in Freeport, Texas, which previously accounted for about 15% of US shipments of the fuel, was knocked offline following an explosion and fire. The fate of the plant has fixated gas traders ever since. US gas prices slumped Friday after speculation that repairs could take longer than expected. The closely held company later said that a tweet about cracks in pipes at its terminal contained false information.

While global LNG prices are currently sliding amid a temporary glut ahead of the northern hemisphere winter, an extended outage could tighten the market once again and complicate Europe's effort to replace Russian pipeline gas. And the longer the export plant remains offline, the more gas will be accumulated at home, weighing on domestic prices.

US gas futures partially erased earlier gains on the news. Gas for December delivery were 1.9% higher at $5.99 per million British thermal units as of 1:40 p.m. in New York, after surging as much as 9.1%.

As recently as last week, Freeport said it was targeting a resumption of operations this month. But Freeport recently told customers that timeline has become challenging, according to the people, who asked not to be identified as they weren't authorized to discuss the matter. Freeport LNG hasn't been clear to clients about when exactly its facility will restart, they said.

The company said it doesn't comment on its customers' communications.

"Our work of progressing towards the restart of our liquefaction facility continues. That work includes obtaining the necessary regulatory approvals required for the restart of our facility," Heather Browne, a Freeport LNG spokesperson, said by email Monday, without providing a timeline.

Freeport still needs to submit its restart plan with the Pipeline and Hazardous Materials Safety Administration, a US regulator, before it can resume operations. The process may take at least one or two weeks to get authorization, according to energy analysis firm Wood Mackenzie Ltd., which estimates the plant won't start until December.

--With assistance from Gerson Freitas Jr..

To contact the reporters on this story:
Stephen Stapczynski in Singapore at sstapczynski1@bloomberg.net;
Anna Shiryaevskaya in London at ashiryaevska@bloomberg.net

3 6

Dan Tsubouchi @Energy_Tidbits · Nov 14

Brent #Oil been flat since #OPEC MOMR released at 5:10am MT. One modest negative is narrowing of deficit in 09/30 vs 08/31 global stocks vs 2015-2019 average. Crude oil 09/30 now -100 mmb (was -133 mmb). Products 09/30 now -118 mmb (was -140 mmb). #OOTT

OPEC MOMR Nov

Commercial Stock Movements

Preliminary September data shows total OECD commercial oil stocks up 13.4 mb m-o-m. At 2,749 mb, inventories were 21 mb less than the same month a year ago, 198 mb lower than the latest five-year average and 218 mb below the 2015–2019 average. Within components, crude and product stocks rose 6.5 mb and 6.8 mb, respectively, compared with the previous month. At 1,335 mb, OECD crude stocks were 36 mb higher than the same month last year, 70 mb below the latest five-year average and 100 mb lower than the 2015–2019 average. OECD product stocks stood at 1,414 mb, representing a m-o-m deficit of 56 mb. This was 128 mb lower than the latest five-year average and 118 mb below the 2015–2019 average. In terms of days of forward cover, OECD commercial stocks remained unchanged m-o-m in September to stand at 58.4 days. This is 0.8 days below September 2021 levels, 5.0 days less than the latest five-year average and 4.1 days lower than the 2015–2019 average.

OPEC MOMR Oct

Commercial Stock Movements

Preliminary August data shows total OECD commercial oil stocks up 7.8 mb, m-o-m. At 2,712 mb, inventories were 111 mb less than the same month a year ago, 267 mb lower than the latest five-year average, and 273 mb below the 2015–2019 average. Within components, crude and product stocks rose 6.8 mb and 1.0 mb, respectively, compared with the previous month. At 1,315 mb, OECD crude stocks were 0.7 mb lower than the same month last year, 105 mb below the latest five-year average and 133 mb lower than the 2015–2019 average. OECD product stocks stood at 1,398 mb, representing a m-o-m deficit of 110 mb, 162 mb lower than the latest five-year average and 140 mb below the 2015–2019 average. In terms of days of forward cover, OECD commercial stocks rose by 0.2 days m-o-m in August to stand at 59.3 days. This is 1.3 days below August 2021 levels, 5.0 days less than the latest five-year average and 3.8 days lower than the 2015–2019 average.

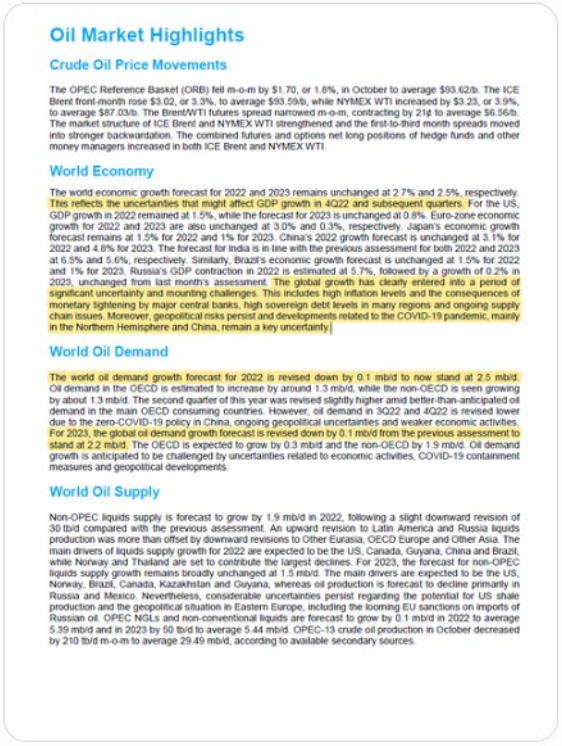
1 1 2

Dan Tsubouchi @Energy_Tidbits · Nov 14

#OPEC MOMR just released. No surprise. #OPEC lowers #Oil demand

Dan Tsubouchi @Energy_Tidbits · Nov 14

#OPEC MOMR just released. No surprise, #OPEC lowers #Oil dema
growth forecast by 0.1 mmb/d for 2022 and also by 0.1 mmb/d for 2
Fits their concern on uncertainties facing the global economy. #OO



Oil Market Highlights

Crude Oil Price Movements

The OPEC Reference Basket (ORB) fell m-o-m by $1.70, or 1.8%, in October to average $93.62/b. The ICE Brent front-month rose $3.02, or 3.3%, to average $93.59/b, while NYMEX WTI increased by $3.23, or 3.9%, to average $87.03/b. The Brent/WTI futures spread narrowed m-o-m, contracting by 21¢ to average $6.56/b. The market structure of ICE Brent and NYMEX WTI strengthened and the first-to-third month spreads moved into stronger backwardation. The combined futures and options net long positions of hedge funds and other money managers increased in both ICE Brent and NYMEX WTI.

World Economy

The world economic growth forecast for 2022 and 2023 remains unchanged at 2.7% and 2.5%, respectively. This reflects the uncertainties that might affect GDP growth in 4Q22 and subsequent quarters. For the US, GDP growth in 2022 remained at 1.5%, while the forecast for 2023 is unchanged at 0.8%. Euro-zone economic growth for 2022 and 2023 are also unchanged at 3.0% and 0.3%, respectively. Japan's economic growth forecast remains at 1.5% for 2022 and 1% for 2023. China's 2022 growth forecast is unchanged at 3.1% for 2022 and 4.8% for 2023. The forecast for India is in line with the previous assessment for both 2022 and 2023 at 6.5% and 5.6%, respectively. Similarly, Brazil's economic growth forecast is unchanged at 1.5% for 2022 and 1% for 2023. Russia's GDP contraction in 2022 is estimated at 5.7%, followed by a growth of 0.2% in 2023, unchanged from last month's assessment. The global growth has clearly entered into a period of significant uncertainty and mounting challenges. This includes high inflation levels and the consequences of monetary tightening by major central banks, high sovereign debt levels in many regions and ongoing supply chain issues. Moreover, geopolitical risks persist and developments related to the COVID-19 pandemic, mainly in the Northern Hemisphere and China, remain a key uncertainty.

World Oil Demand

The world oil demand growth forecast for 2022 is revised down by 0.1 mb/d to now stand at 2.5 mb/d. Oil demand in the OECD is estimated to increase by around 1.3 mb/d, while the non-OECD is seen growing by about 1.3 mb/d. The second quarter of this year was revised slightly higher amid better-than-anticipated oil demand in the main OECD consuming countries. However, oil demand in 3Q22 and 4Q22 is revised lower due to the zero-COVID-19 policy in China, ongoing geopolitical uncertainties and weaker economic activities. For 2023, the global oil demand growth forecast is revised down by 0.1 mb/d from the previous assessment to stand at 2.2 mb/d. The OECD is expected to grow by 0.3 mb/d and the non-OECD by 1.9 mb/d. Oil demand growth is anticipated to be challenged by uncertainties related to economic activities, COVID-19 containment measures and geopolitical developments.

World Oil Supply

Non-OPEC liquids supply is forecast to grow by 1.9 mb/d in 2022, following a slight downward revision of 30 tb/d compared with the previous assessment. An upward revision to Latin America and Russia liquids production was more than offset by downward revisions to Other Eurasia, OECD Europe and Other Asia. The main drivers of liquids supply growth for 2022 are expected to be the US, Canada, Guyana, China and Brazil, while Norway and Thailand are set to contribute the largest declines. For 2023, the forecast for non-OPEC liquids supply growth remains broadly unchanged at 1.5 mb/d. The main drivers are expected to be the US, Norway, Brazil, Canada, Kazakhstan and Guyana, whereas oil production is forecast to decline primarily in Russia and Mexico. Nevertheless, considerable uncertainties persist regarding the potential for US shale production and the geopolitical situation in Eastern Europe, including the looming EU sanctions on imports of Russian oil. OPEC NGLs and non-conventional liquids are forecast to grow by 0.1 mb/d in 2022 to average 5.39 mb/d and in 2023 by 50 tb/d to average 5.44 mb/d. OPEC-13 crude oil production in October decreased by 210 tb/d m-o-m to average 29.49 mb/d, according to available secondary sources.

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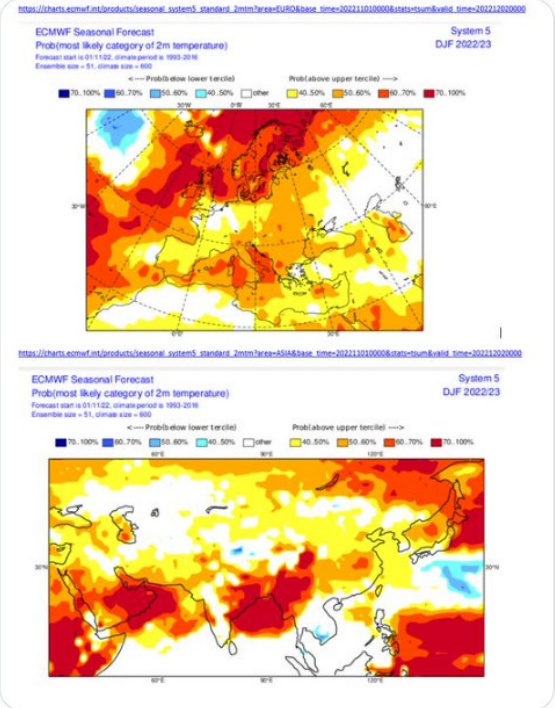
Dan Tsubouchi @Energy_Tidbits · Nov 13

Good start to EU avoiding winter #NatGas shortage - it's been a warm Oct/early Nov. And now @CopernicusECMWF expects much warmer tha normal DJF in Europe & also in Asia. So no weather pressure on price, bu even still, TTF Dec/Jan contracts are still ~$35/mmbtu. #LNG #OOTT



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