

Energy Tidbits

Bad Week For US Net Zero: 1st Likely SMR Terminated, PLUG's Green Hydrogen Cost Warning, EVs 38% Less Mileage vs ICE

Produced by: Dan Tsubouchi

November 12, 2023

Dan Tsubouchi
Chief Market Strategist
dsubouchi@safgroup.ca

Ryan Dunfield
CEO
rdunfield@safgroup.ca

Aaron Bunting
COO, CFO
abunting@safgroup.ca

Ryan Haughn
Managing Director
rhaughn@safgroup.ca

Short-Term Energy Outlook

Overview

U.S. energy market indicators	2022	2023	2024
Brent crude oil spot price (dollars per barrel)	\$101	\$84	\$93
Retail gasoline price (dollars per gallon)	\$3.97	\$3.55	\$3.61
U.S. crude oil production (million barrels per day)	11.91	12.90	13.15
Natural gas price at Henry Hub (dollars per million British thermal units)	\$6.42	\$2.67	\$3.25
U.S. liquefied natural gas gross exports (billion cubic feet per day)	10.6	11.8	12.3
Shares of U.S. electricity generation			
Natural gas	39%	42%	41%
Coal	20%	16%	15%
Renewables	21%	22%	24%
Nuclear	19%	19%	19%
U.S. GDP (percentage change)	1.9%	2.4%	1.5%
U.S. CO₂ emissions (billion metric tons)	4.94	4.79	4.75

Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023

- Global oil supply.** We forecast global liquid fuels production will increase by 1.0 million barrels per day (b/d) in 2024. Ongoing OPEC+ production cuts will offset production growth from non-OPEC countries and help maintain a relatively balanced global oil market next year. Although the conflict between Israel and Hamas has not affected physical oil supply at this point, uncertainties surrounding the conflict and other global oil supply conditions could put upward pressure on crude oil prices in the coming months. We forecast the Brent crude oil price will increase from an average of \$90 per barrel (b) in the fourth quarter of 2023 to an average of \$93/b in 2024.
- U.S. gasoline consumption.** U.S. gasoline consumption declines by 1% in 2024 in our forecast, which would result in the lowest per capita gasoline consumption in two decades. An increase in remote work in the United States, improvements in the fuel efficiency of the U.S. vehicle fleet, high gasoline prices, and persistently high inflation have reduced per capita gasoline demand.
- Natural gas inventories.** We estimate that U.S. natural gas inventories totaled 3,835 billion cubic (Bcf) feet at the end of October, 6% more than the five-year (2018–2022) average. We forecast U.S. natural gas inventories will end the winter heating season (November–March) 21% above the five-year average with almost 2,000 Bcf in storage. Inventories are full because of high natural gas production and warmer-than-average winter weather, which reduces demand for space heating in the commercial and residential sectors. We forecast the Henry Hub spot price to average near \$3.20 per million British thermal units (MMBtu) in November, down from a price of almost \$5.50/MMBtu a year earlier.

- Coal markets.** U.S. coal exports have returned to pre-pandemic levels, driven by record-high global coal demand stemming primarily from Europe and Asia. We forecast that exports will rise to 97 million short tons (MMst) in 2023, because of increases in both steam and metallurgical coal exports. We expect steam coal exports to rise by 6 MMst compared with 2022 to 45 MMst in 2023 and metallurgical coal exports to increase by 6 MMst to reach 52 MMst over the same period. Despite this increase in coal exports, we expect U.S. production to fall by more than 100 MMst in 2024 due to reduced demand from the electric power sector. The decline in electricity generation from coal will be offset by an increase in electricity generation from renewable resources.
- OPEC production capacity.** Despite rising OPEC spare production capacity in 2023 and in 2024, we lowered our estimate of Iraq's spare capacity by about 0.4 million b/d compared with last month's STEO. We removed Iraq's total production capacity assets in northern Iraq that relied on the northern Iraq-to-Türkiye pipeline for access to global markets. The pipeline has been out of commission since March 2023.

Notable forecast changes		
Current forecast: November 7, 2023; previous forecast: October 11, 2023		
	2023	2024
OPEC surplus crude oil production capacity (million barrels per day)	3.7	4.3
Previous forecast	4.1	4.9
Percentage change	-10.0%	-12.0%
U.S. coal power demand (million short tons)	384	356
Previous forecast	373	342
Percentage change	3.1%	4.0%
U.S. coal production (million short tons)	585	480
Previous forecast	581	465
Percentage change	0.7%	3.2%

Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*

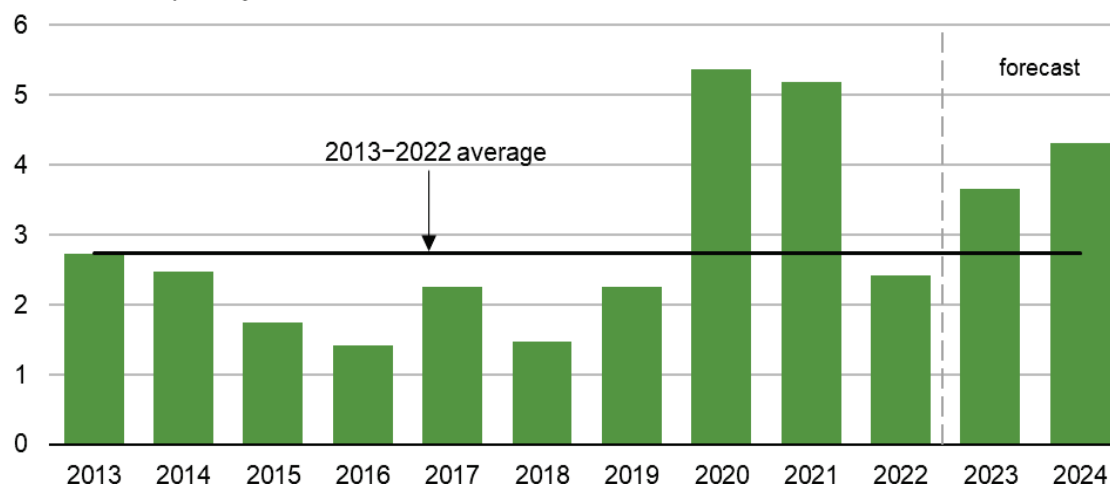
Global Oil Markets

Global oil supply

We forecast global liquid fuels production will increase by 1.0 million barrels per day (b/d) in 2024, down from growth of 1.6 million b/d this year. Although we forecast global oil production to grow next year, we expect ongoing cuts from OPEC+ will keep global production growth lower than global consumption growth and contribute to inventory draws and upward oil price pressure in the early part of 2024.

Growth in global crude oil supply has been limited in 2023 because of voluntary production cuts from Saudi Arabia and ongoing production cuts from other [OPEC+ countries](#), which raised OPEC's [spare crude oil production capacity](#) from 2.4 million b/d in 2022 to a forecast of 4.3 million b/d in 2024. Saudi Arabia and the United Arab Emirates hold most of this capacity. Despite rising OPEC spare capacity in 2023 and in 2024, we lowered our estimate of Iraq's spare capacity compared with last month's STEO. We removed production capacity assets in northern Iraq that relied on the northern Iraq-to-Türkiye pipeline for access to global markets. The [pipeline has been offline since March 2023](#) because of a dispute between Türkiye and Iraq over an international court ruling.

Organization of the Petroleum Exporting Countries (OPEC) surplus crude oil production capacity
million barrels per day



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023

Note: Black line represents 2013–2022 average (2.7 million barrels per day).



Although [Russia's total liquids production fell significantly](#) after its full-scale invasion of Ukraine in early 2022, its production has stabilized in mid-2023 around 10.6 million b/d. We assume Russia's oil production will remain relatively flat over the remainder of our forecast period at an average of 10.7 million b/d.

Although it has not directly affected physical oil markets so far, heightened uncertainty around [the recent attacks on Israel](#) and the potential for tensions spreading to a wider area in the Middle East poses risks to oil supply including available surplus production capacity. At this time, we have not materially

changed our oil production forecast for countries in the region, but the geopolitical situation could change rapidly.

The United States lifted [sanctions on Venezuela's crude oil exports](#) on October 18 for six months, contingent on electoral reforms. While the political situation remains in flux, we expect sanctions relief will only lead to limited increases in oil production. With sanctions relief, we forecast that Venezuela will increase crude oil production by less than 0.2 million b/d to an average of 0.9 million b/d by the end of 2024. Further increases in Venezuela's crude oil production will take longer and require significant investment after years of deferred maintenance and lack of access to capital.

Iran's crude oil production rose in recent years as it has increased exports to China using heavily discounted prices. Our assumption is that Iran will raise production by an additional 0.2 million in 2024. Sanctions on Iran's crude oil, insufficient upstream investment, and limited oil consumption growth in China cap Iran's oil production beyond this limited growth.

Global oil prices and inventory levels

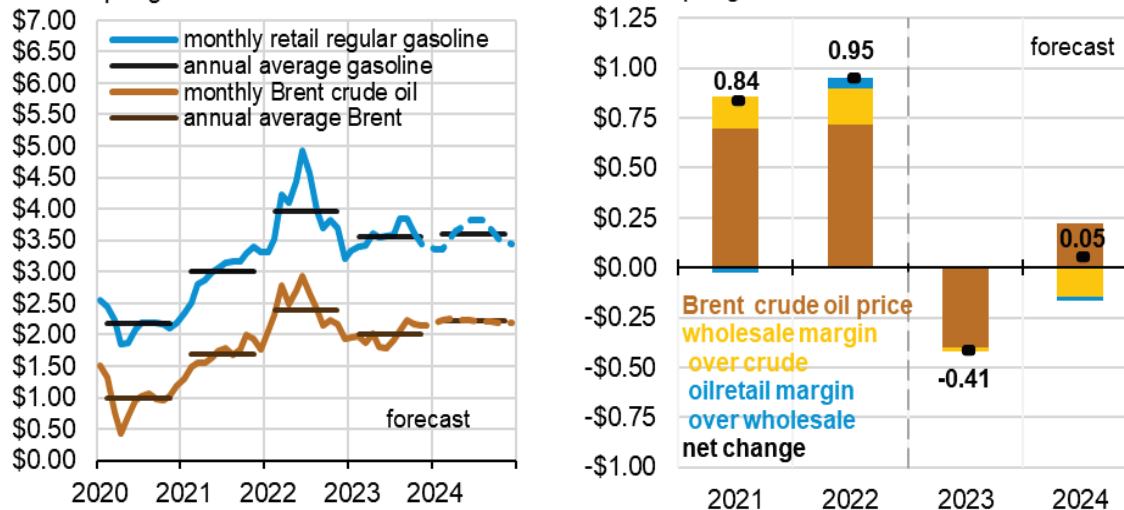
The Brent crude oil spot price averaged \$91 per barrel (b) in October, a decrease of \$3/b compared with September, accompanied by a significant increase in oil price volatility. We forecast the Brent crude oil price will increase from an average of \$90/b in the fourth quarter of 2023 to an average of \$94/b during the first half of 2024. Modest upward oil price pressures in the coming months reflect a slight decline in global oil inventories in the first half of 2024 as risks of supply disruptions remain high. Current OPEC+ production targets are set to expire at the end of 2024, and we assume that continuing voluntary cuts and other factors will keep actual OPEC+ crude oil production well below targets as the group tries to limit increases in global oil inventories. However, should OPEC+ produce closer to target levels than we currently assume, it could reduce prices in 2024.

Petroleum Products

Gasoline prices and margins

U.S. regular gasoline retail prices declined throughout October, falling from \$3.80 per gallon (gal) on October 2 to \$3.47/gal on October 30 because of a [sharp decline in wholesale gasoline margins](#) that began in late September. We forecast retail gasoline prices to remain near \$3.40/gal for the remainder of 2023, resulting in an average 2023 price of \$3.55/gal. We forecast a similar average near \$3.60/gal for 2024.

U.S. gasoline and crude oil prices and components of annual gasoline price changes



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023, and Refinitiv, an LSEG business



Our forecast that retail gasoline prices will rise in 2024 primarily reflects a higher Brent crude oil price. We expect crude oil prices to contribute an additional 22 cents/gal to the retail gasoline price in 2024 compared with 2023. However, we expect much of this increase to be offset by decreases in the wholesale gasoline margin over crude oil. We expect the wholesale gasoline margin with crude oil to average 52 cents/gal in 2024, a decrease of 14 cents/gal from the forecast 2023 average of 67 cents/gal, resulting primarily from [reduced demand for motor gasoline](#).

U.S. per capita gasoline consumption

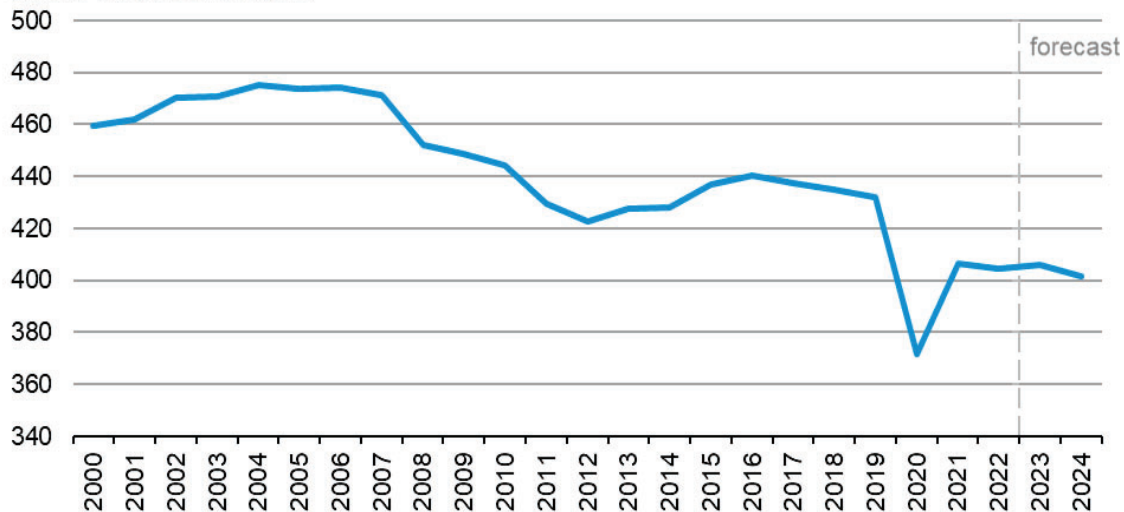
Although the U.S. population has grown in recent years, the nation's gasoline consumption has increased more slowly in comparison, meaning U.S. gasoline consumption has been decreasing on a per capita basis. There are two components to gasoline consumption—travel demand, measured by vehicle miles traveled (VMT), and vehicle fuel efficiency. Some of the major factors that may be contributing to the decline in per capita gasoline consumption include:

- The unclear effects of increased remote work on gasoline consumption since 2020. Although a higher percentage of the workforce engages in some remote work than before the pandemic, some studies suggest these workers drive more for nonwork purposes.
- Relatively high gasoline prices and persistently high inflation may be affecting consumer budgets and reducing discretionary driving.
- An aging population is reducing per person driving. Since 2001, the share of population over the age of 65 has increased, and this age cohort is less likely to be working. Partially offsetting this trend, however, is increasing employment as a share of the working age population, which has reached the highest levels since 2001.

- The replacement of older and less efficient internal combustion engine vehicles for newer internal combustion engine vehicles with higher fuel efficiency. Purchases of newer vehicles is partially offset by people keeping their vehicles longer, contributing to an increase in the average age of the vehicle fleet.
- Increased adoption of electric and hybrid vehicles, which reduces gasoline consumption.

Gradual improvements in fuel efficiency and the growing share of electric vehicles are reducing U.S. motor gasoline demand per capita. Our gasoline consumption forecast contains a variable for fuel economy that captures the combined effects that newer, more efficient internal combustion engine vehicles and electric vehicles have on gasoline consumption. [Researchers at Argonne National Laboratory estimated](#) electric vehicle adoption contributed to about 0.5% less U.S. gasoline consumption in 2021 than what would have otherwise occurred. The effects of electric vehicle adoption on gasoline consumption have likely increased since 2021; however, lags in data on vehicle scrappage rates and evolving telework trends, among other factors, complicate the analysis of attributing the degree to which electric vehicles have caused more recent declines in gasoline consumption per capita.

U.S. per capita gasoline consumption
gallons per person per year



Data source: U.S. Energy information Administration, *Short-Term Energy Outlook*, November 2023 and Oxford Economics



We forecast the average person in the United States will consume 402 gallons of gasoline in 2024, down from a peak of 475 gallons per person in 2004. Because of lower per capita gasoline consumption, we forecast overall U.S. gasoline consumption to decline in 2024 to 8.83 million barrels per day (b/d), from 8.88 million b/d in 2023 and down from the 2019 pre-pandemic average of 9.31 million b/d.

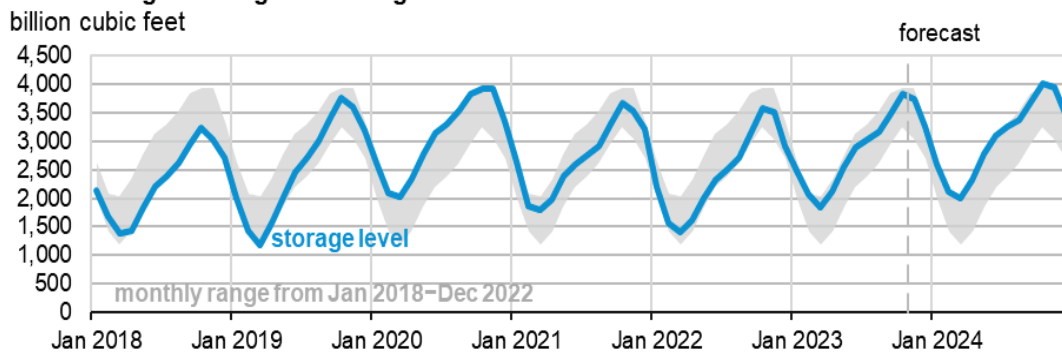
Natural Gas

Natural gas storage

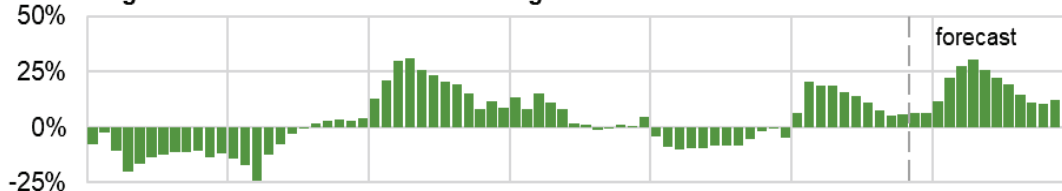
At the end of October, which marks the end of the U.S. natural gas storage injection season (March–October), we expect that U.S. working natural gas in underground storage reached 3,835 billion cubic feet (Bcf), 6% more than the five-year (2018–2022) average.

Driven by strong natural gas production and expected warmer-than-average winter weather, we forecast U.S. natural gas inventories will end the winter heating season in March with 21% more natural gas than the five-year average, with just under 2,000 Bcf in storage. We expect U.S. dry natural gas production to average almost 105 billion cubic feet per day (Bcf/d) during the second half of 2023, up nearly 2 Bcf/d from the first half of the year. We forecast U.S. dry natural gas production will continue to average around 105 Bcf/d during the winter heating season. Our expectation of warmer-than-average winter weather, with 4% fewer heating [degree days](#) (HDDs) this winter compared with the prior 10-year (2013–2022) average, reduces consumption for space heating in the commercial and residential sectors by 2% compared with the five-year average. Although we expect this winter on average to be warmer than normal, we expect January and February to be colder than last year’s warmer-than-average [January](#) and [February](#).

U.S. working natural gas in storage



Percentage deviation from 2018–2022 average



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023



Natural gas storage inventories in the East, Midwest, and South Central are all more than 87% full entering the winter according to our forecast. In the Mountain region, which has much less storage capacity than the other regions, we estimate storage is 98% full, the highest level on record at the end of October. Pacific region storage stocks were well below the five-year average all of last winter,

supporting [record-high natural gas prices in the region](#) in December 2022, but Pacific inventories have increased steadily this summer and are almost 80% full entering this winter heating season.

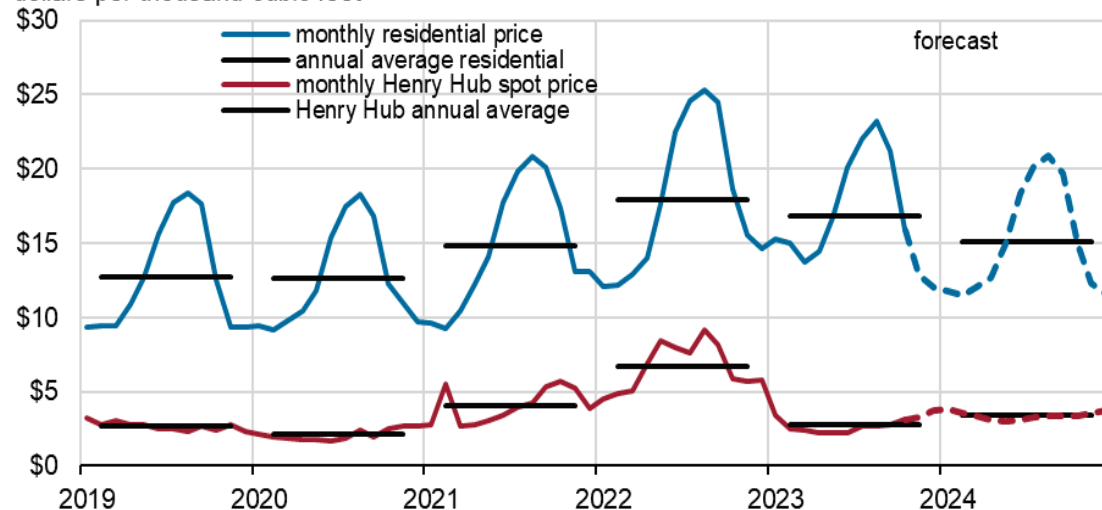
Natural gas prices

The U.S. benchmark Henry Hub spot price in our forecast averages around \$3.40 per million British thermal units (MMBtu) over the course of the winter, peaking in January at over \$3.60/MMBtu. Natural gas prices typically rise during the winter as demand for space heating increases and consumption of natural gas peaks for the year. We forecast prices this winter to be lower than last winter because of increased production and relatively full natural gas storage inventories entering the winter heating season. At the start of the winter last year, prices were over \$5.00/MMBtu, and storage inventories were 3% below the five-year average.

Lower wholesale natural gas prices contribute to lower prices for residential consumers this winter compared with last year. [Changes in residential natural gas prices lag changes in wholesale natural gas prices](#) because of the nature of some utility regulation. Fixed costs incurred by utility companies are spread over time, usually resulting in lower residential prices in the winter than in the summer on a per-unit basis when all charges are combined. We forecast the residential price of natural gas will average just over \$12 per thousand cubic feet this winter, down almost 20% from last year, [reducing winter heating expenditures for consumers that heat their homes with natural gas](#).

U.S. natural gas prices

dollars per thousand cubic feet



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023, and Refinitiv, an LSEG business



Electricity, Coal, and Renewables

Electricity consumption

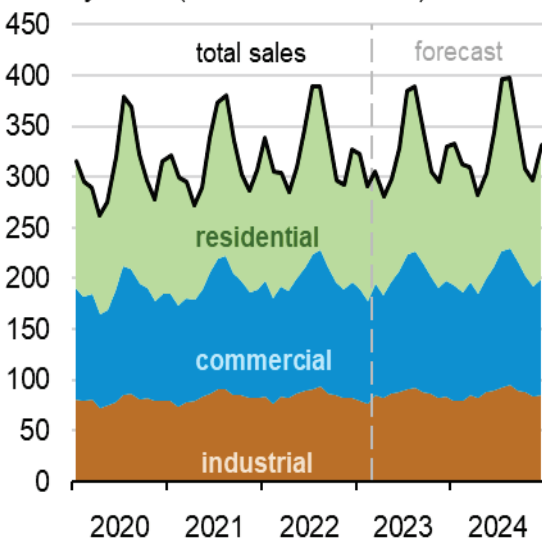
Forecast sales of electricity to U.S. customers increase by more than 2% in 2024 after falling by an estimated 1% in 2023. We expect electricity consumption will grow slightly in most sectors next year, but mainly in the residential sector. Residential electricity use is sensitive to weather conditions. We

expect winter temperatures in 2024, as measured by heating degree days (HDDs), will be 2% colder than in 2023. We expect summer temperatures, measured by cooling degree days in our forecast, to be 6% hotter than in 2023. Both a colder winter and a warmer summer increase electricity use by households.

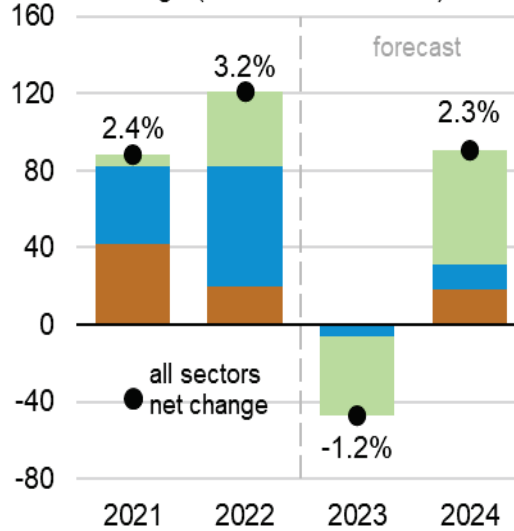
In addition to weather conditions, macroeconomic conditions affect electricity demand in the commercial and industrial sectors. Nationwide, we expect retail sales of electricity to these two sectors to grow slightly in 2024 after a slight decline in 2023. More than 40% of forecast growth in 2024 occurs in the West South Central Census Division where forecast GDP grows by 1.9% next year compared with overall U.S. GDP growth of 1.5%.


U.S. sales of electricity to ultimate customers, by sector

monthly sales (billion kilowatthours)



annual change (billion kilowatthours)

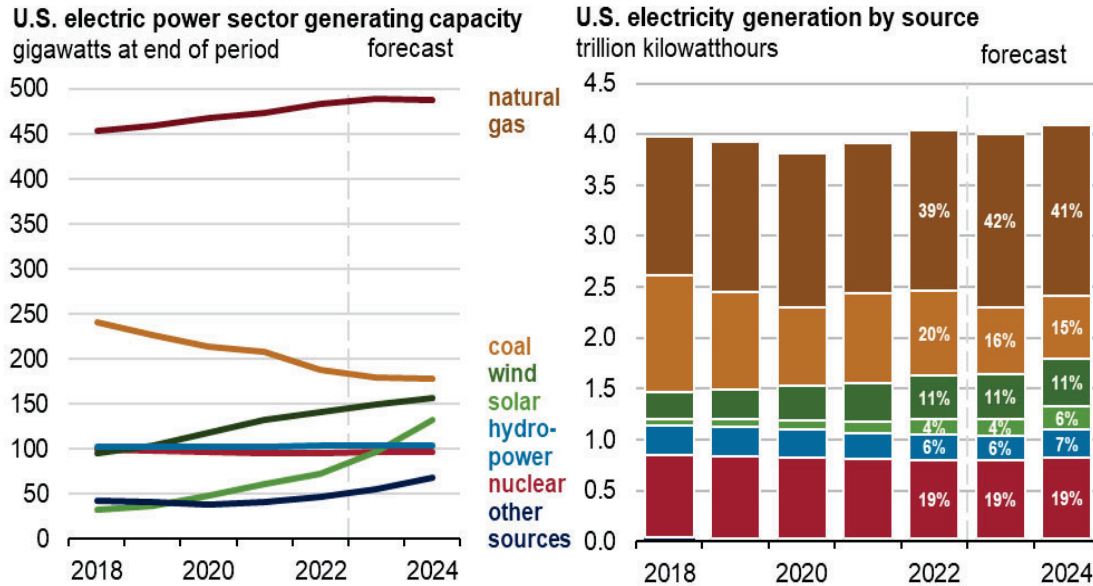


Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023 

Electricity generation

Generation from renewable energy sources is the main contributor to growth in U.S. electricity generation over the STEO forecast horizon. The share of total U.S. generation from renewables rises from 21% in 2022 to a forecast share of 22% in 2023 and to 24% in 2024. Much of this increase is the result of an expected 60 gigawatts of new solar generating capacity entering service during 2023 and 2024. We believe that the solar capacity increase, in addition to our forecast of increased hydropower generation and modest gains in new wind capacity, will reduce generation from fossil fuel-fired power plants. We forecast the U.S. natural gas generation share will fall from its record high of 42% in 2023 to 41% in 2024, while coal's generation share continues to fall from 16% to 15%.

About one-third of the forecast growth in solar capacity occurs in the Texas electricity market. Natural gas is the largest source of power in that market, and we expect the share of generation from natural gas in Texas will fall from 46% in 2023 to 41% in 2024, replaced by a significant increase in generation from solar. New solar and wind capacity also is being added in the Midwest electricity region, which we expect will lead to reduced generation from coal-fired power plants.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023

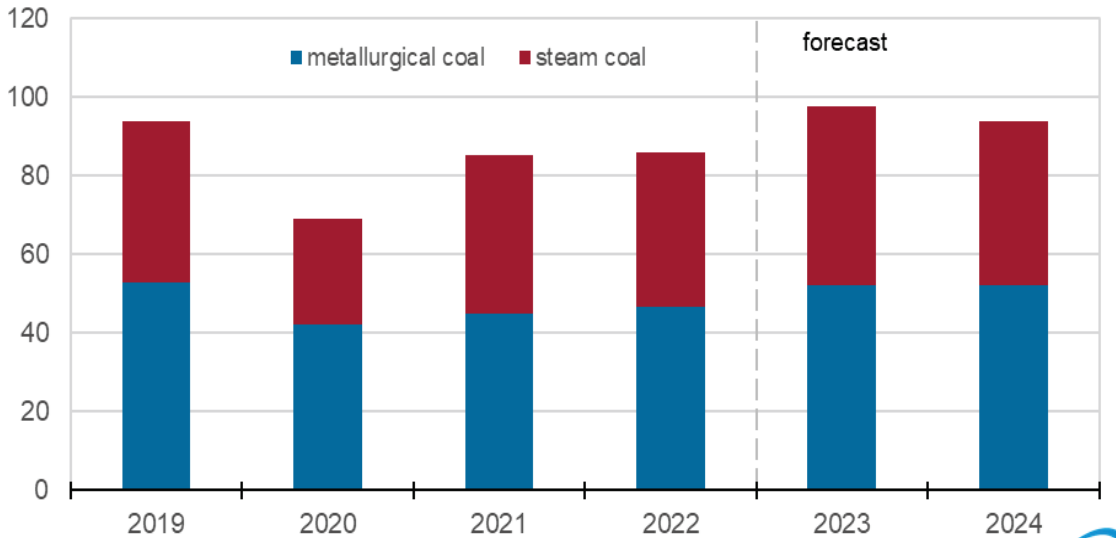


Coal markets

Coal production in our forecast totals 585 million short tons (MMst) in 2023 and falls by more than 100 MMst in 2024. The large decrease next year is due to falling demand from the U.S. electric power sector. Reduced coal production is also a consequence of relatively full coal inventories held by electric generating plants, in late 2023 there is 50% more coal held by plants than in mid-2022. Even though coal prices have fallen due to demand reductions, coal-fired power generation is still not cost competitive based on our expectations that natural gas prices for electric generation will average about \$3.50/MMBtu in 2024.

Declines in U.S. coal production from less domestic demand are partially offset by a return of demand from export markets to pre-pandemic levels. We forecast that exports will rise by 13% to reach 97 MMst in 2023, before again falling to 94 MMst in 2024. Exports fell to 69 MMst in 2020 though they returned to 86 MMst in 2022. The increase in coal exports to pre-pandemic levels is made up of both steam and metallurgical coal exports to customers in Europe and Asia. Exports to Europe have been bolstered by a ban on the import of coal from Russia due to the conflict in Ukraine.

Annual U.S. coal exports by type million short tons



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023



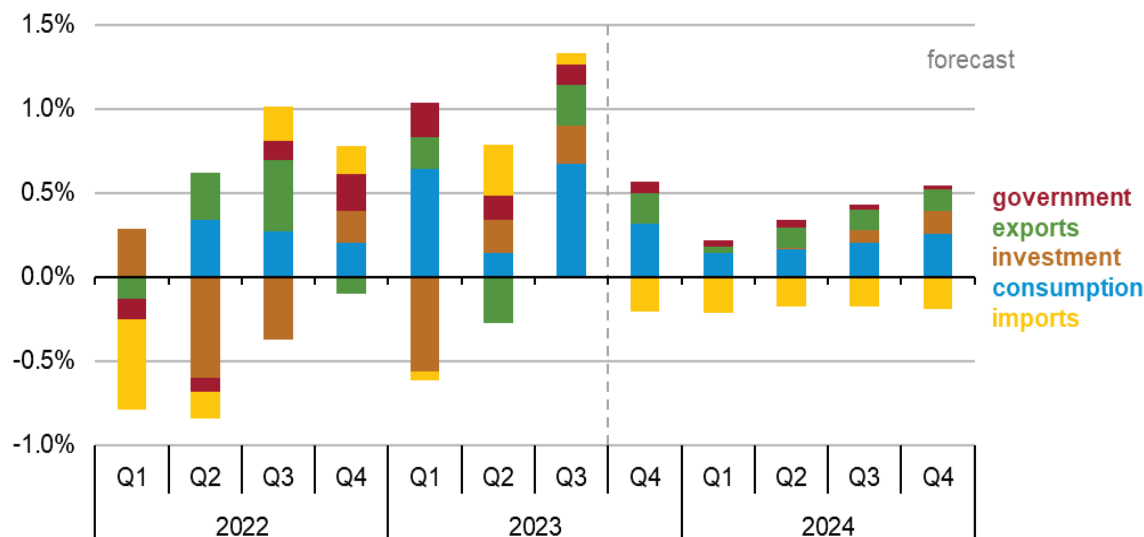
Economy, Weather, and CO₂

U.S. macroeconomics

Our forecast assumes real U.S. GDP will grow 2.4% in 2023 and 1.5% in 2024, similar to our assumptions in last month's STEO. Growth in GDP next year is mostly the result of rising consumer expenditures with a significant contribution from exports as well. Our forecast now assumes that GDP will grow at an annualized rate of 4.8% in the third quarter of 2023 (3Q23), close to the Bureau of Economic Analysis's (BEA) 3Q23 advanced estimate of 4.9%. We assume GDP growth will slow in the last quarter, with an annualized growth rate of 1.7% in 4Q23.

Contributions to GDP growth

weighted annualized percentage change



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023



Our U.S. macroeconomic forecasts are based on S&P Global's macroeconomic model. We incorporate STEO energy price forecasts into the model to obtain the final macroeconomic assumptions.

Non-farm payroll employment increased by 336,000 jobs in September, but monthly additions are trending down toward pre-pandemic levels. Additions to non-farm payroll averaged 260,000 jobs per month in 2023 through September, down from a monthly average of nearly 400,000 jobs in 2022. Our forecast assumes employment growth will slow further in 2023 and 2024, as the unemployment rate rises to 4.1% by the end of 2024. S&P Global forecasts that slowing GDP growth and a rising unemployment rate are necessary for year-over-year inflation to fall to the Federal Reserve's target of 2%.

Emissions

U.S. energy-related carbon dioxide (CO₂) emissions increase in our forecast during the last few months of 2023 relative to October and remain relatively high during the first few months of 2024 as we enter the winter. Most of these seasonal emissions increases come from increased consumption of coal, predominantly for electric power, and natural gas for both electricity generation and space heating. Seasonal emissions typically peak in January in the United States.

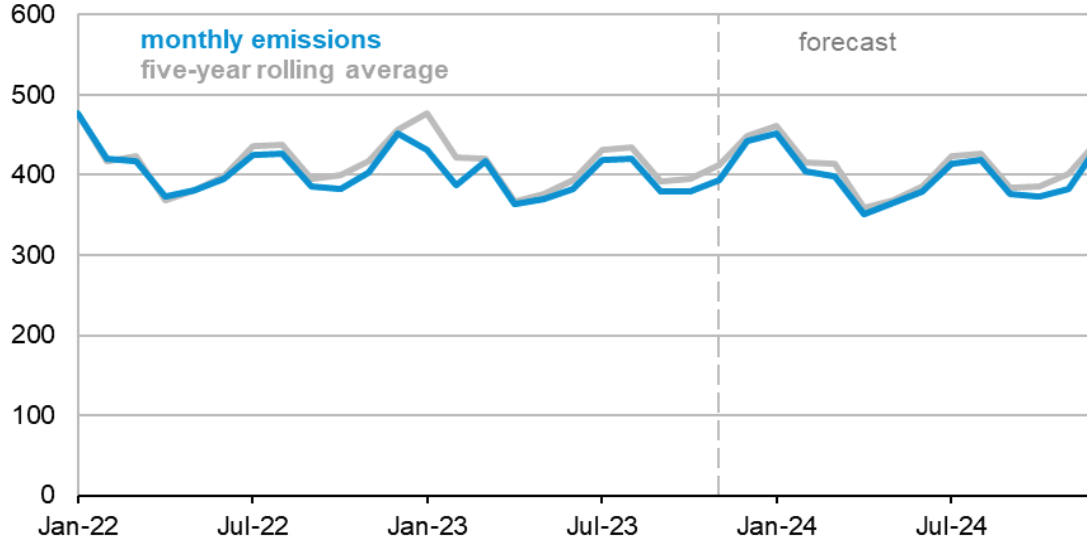
We expect slightly less emissions this winter than in recent winters. We forecast 3% less U.S. CO₂ emissions between November 2023 and March 2024 than the average over that period during the past five winters. Less-than-average winter emissions are the result of several factors, including higher-than-average temperatures, improvements in energy efficiency, and decreases in the carbon intensity of electricity and space heating.

We expect U.S. CO₂ emissions to decrease by 3% for all of 2023. The largest reduction in CO₂ emissions is from decreased use of coal, down 18% from 2022. Emissions from petroleum remain unchanged as

falling gasoline consumption is offset by rising consumption of jet fuel and diesel, and emissions from natural gas increase slightly. In our forecast, total energy-related U.S. CO₂ emissions fall by 1% in 2024.

U.S. energy-related carbon dioxide emissions

million metric tons



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2023



Weather

In our forecast, we assume a warmer November than last year, with a total of 488 HDDs, 5% fewer than in November 2022. We expect a colder 1Q24 with 4% more HDDs than in 1Q23. Overall, we expect an average of around 3,220 HDDs in the United States this winter, about the same as last winter and 4% fewer than the previous 10-winter average.

Table 3a. International Petroleum and Other Liquids Production, Consumption, and Inventories

U.S. Energy Information Administration | Short-Term Energy Outlook - November 2023

	2022				2023				2024				Year		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2022	2023	2024
Production (million barrels per day) (a)															
OECD	31.75	32.00	32.59	33.03	33.48	33.76	34.49	<i>35.03</i>	<i>34.88</i>	<i>34.51</i>	<i>34.69</i>	<i>35.34</i>	32.35	<i>34.19</i>	<i>34.86</i>
U.S. (50 States)	19.57	20.24	20.65	20.72	21.05	21.69	22.15	<i>22.24</i>	<i>22.04</i>	<i>22.15</i>	<i>22.24</i>	<i>22.45</i>	20.30	<i>21.79</i>	<i>22.22</i>
Canada	5.66	5.51	5.72	5.91	5.79	5.44	5.80	<i>6.00</i>	<i>5.99</i>	<i>5.65</i>	<i>5.84</i>	<i>6.05</i>	5.70	<i>5.76</i>	<i>5.88</i>
Mexico	1.91	1.89	1.90	1.90	2.07	2.16	2.11	<i>2.11</i>	<i>2.11</i>	<i>2.08</i>	<i>2.06</i>	<i>2.03</i>	1.90	<i>2.11</i>	<i>2.07</i>
Other OECD	4.61	4.35	4.32	4.49	4.56	4.47	4.43	<i>4.69</i>	<i>4.73</i>	<i>4.64</i>	<i>4.55</i>	<i>4.80</i>	4.44	<i>4.54</i>	<i>4.68</i>
Non-OECD	67.21	66.86	68.30	68.17	67.63	67.70	67.06	<i>67.01</i>	<i>66.97</i>	<i>67.74</i>	<i>68.29</i>	<i>67.78</i>	67.64	<i>67.35</i>	<i>67.70</i>
OPEC	33.75	33.76	34.71	34.43	33.95	33.69	32.85	<i>32.97</i>	<i>33.15</i>	<i>33.21</i>	<i>33.39</i>	<i>33.19</i>	34.17	<i>33.36</i>	<i>33.24</i>
Crude Oil Portion	28.19	28.33	29.23	28.92	28.46	28.38	27.50	<i>27.58</i>	<i>27.67</i>	<i>27.85</i>	<i>28.01</i>	<i>27.77</i>	28.67	<i>27.98</i>	<i>27.83</i>
Other Liquids (b)	5.56	5.43	5.48	5.52	5.49	5.31	5.35	<i>5.39</i>	<i>5.49</i>	<i>5.35</i>	<i>5.38</i>	<i>5.42</i>	5.50	<i>5.38</i>	<i>5.41</i>
Eurasia	14.39	13.39	13.59	14.01	14.11	13.67	13.45	<i>13.63</i>	<i>13.67</i>	<i>13.73</i>	<i>13.76</i>	<i>13.84</i>	13.84	<i>13.71</i>	<i>13.75</i>
China	5.18	5.18	5.05	5.09	5.32	5.32	5.19	<i>5.32</i>	<i>5.27</i>	<i>5.30</i>	<i>5.29</i>	<i>5.33</i>	5.12	<i>5.29</i>	<i>5.30</i>
Other Non-OECD	13.90	14.53	14.94	14.65	14.26	15.02	15.58	<i>15.10</i>	<i>14.88</i>	<i>15.51</i>	<i>15.85</i>	<i>15.42</i>	14.51	<i>14.99</i>	<i>15.41</i>
Total World Production	98.96	98.86	100.88	101.20	101.11	101.45	101.55	<i>102.05</i>	<i>101.85</i>	<i>102.25</i>	<i>102.98</i>	<i>103.12</i>	99.99	<i>101.54</i>	<i>102.55</i>
Non-OPEC Production	65.22	65.10	66.18	66.76	67.16	67.77	68.70	<i>69.08</i>	<i>68.70</i>	<i>69.04</i>	<i>69.59</i>	<i>69.93</i>	65.82	<i>68.18</i>	<i>69.32</i>
Consumption (million barrels per day) (c)															
OECD	45.63	45.11	46.22	45.63	45.20	45.33	46.20	<i>46.45</i>	<i>45.74</i>	<i>45.35</i>	<i>46.13</i>	<i>46.20</i>	45.65	<i>45.80</i>	<i>45.86</i>
U.S. (50 States)	20.09	20.00	20.11	19.85	19.66	20.38	20.24	<i>20.29</i>	<i>20.10</i>	<i>20.38</i>	<i>20.53</i>	<i>20.39</i>	20.01	<i>20.15</i>	<i>20.35</i>
U.S. Territories	0.11	0.12	0.13	0.12	0.12	0.12	0.12	<i>0.12</i>	<i>0.12</i>	<i>0.12</i>	<i>0.12</i>	<i>0.12</i>	0.12	<i>0.12</i>	<i>0.12</i>
Canada	2.24	2.21	2.38	2.30	2.24	2.23	2.32	<i>2.30</i>	<i>2.26</i>	<i>2.21</i>	<i>2.31</i>	<i>2.29</i>	2.28	<i>2.27</i>	<i>2.27</i>
Europe	13.19	13.43	14.04	13.35	13.06	13.32	13.98	<i>13.74</i>	<i>13.17</i>	<i>13.32</i>	<i>13.73</i>	<i>13.49</i>	13.50	<i>13.53</i>	<i>13.43</i>
Japan	3.70	3.03	3.19	3.56	3.72	3.03	3.15	<i>3.48</i>	<i>3.62</i>	<i>3.00</i>	<i>3.10</i>	<i>3.43</i>	3.37	<i>3.34</i>	<i>3.29</i>
Other OECD	6.30	6.33	6.37	6.45	6.39	6.26	6.38	<i>6.52</i>	<i>6.46</i>	<i>6.31</i>	<i>6.34</i>	<i>6.47</i>	6.36	<i>6.39</i>	<i>6.40</i>
Non-OECD	52.83	53.49	53.86	53.85	54.70	55.43	55.44	<i>55.39</i>	<i>56.24</i>	<i>56.74</i>	<i>56.68</i>	<i>56.65</i>	53.51	<i>55.24</i>	<i>56.58</i>
Eurasia	4.28	4.43	4.73	4.65	4.32	4.47	4.78	<i>4.69</i>	<i>4.39</i>	<i>4.54</i>	<i>4.86</i>	<i>4.76</i>	4.53	<i>4.57</i>	<i>4.64</i>
Europe	0.74	0.76	0.76	0.77	0.74	0.76	0.76	<i>0.77</i>	<i>0.75</i>	<i>0.77</i>	<i>0.77</i>	<i>0.77</i>	0.76	<i>0.76</i>	<i>0.77</i>
China	15.12	15.10	15.09	15.28	15.89	16.08	15.77	<i>15.98</i>	<i>16.27</i>	<i>16.47</i>	<i>16.14</i>	<i>16.36</i>	15.15	<i>15.93</i>	<i>16.31</i>
Other Asia	13.74	13.75	13.41	13.84	14.30	14.37	13.79	<i>14.09</i>	<i>14.90</i>	<i>14.88</i>	<i>14.27</i>	<i>14.58</i>	13.69	<i>14.14</i>	<i>14.66</i>
Other Non-OECD	18.95	19.45	19.86	19.32	19.45	19.74	20.34	<i>19.86</i>	<i>19.93</i>	<i>20.10</i>	<i>20.65</i>	<i>20.17</i>	19.39	<i>19.85</i>	<i>20.21</i>
Total World Consumption	98.46	98.60	100.08	99.48	99.90	100.76	101.64	<i>101.85</i>	<i>101.98</i>	<i>102.09</i>	<i>102.82</i>	<i>102.85</i>	99.16	<i>101.04</i>	<i>102.44</i>
Total Crude Oil and Other Liquids Inventory Net Withdrawals (million barrels per day)															
U.S. (50 States)	0.80	0.51	0.45	0.41	-0.08	-0.11	-0.14	<i>0.47</i>	<i>-0.06</i>	<i>-0.31</i>	<i>0.01</i>	<i>0.37</i>	0.54	<i>0.04</i>	<i>0.00</i>
Other OECD	-0.09	-0.29	-0.48	-0.26	0.32	-0.53	0.07	<i>-0.22</i>	<i>0.06</i>	<i>0.05</i>	<i>-0.05</i>	<i>-0.20</i>	-0.28	<i>-0.09</i>	<i>-0.04</i>
Other Stock Draws and Balance	-1.21	-0.49	-0.79	-1.85	-1.45	-0.06	0.16	<i>-0.45</i>	<i>0.13</i>	<i>0.10</i>	<i>-0.12</i>	<i>-0.44</i>	-1.09	<i>-0.45</i>	<i>-0.08</i>
Total Stock Draw	-0.51	-0.26	-0.81	-1.71	-1.21	-0.70	0.09	<i>-0.20</i>	<i>0.13</i>	<i>-0.16</i>	<i>-0.16</i>	<i>-0.27</i>	-0.83	<i>-0.50</i>	<i>-0.12</i>
End-of-period Commercial Crude Oil and Other Liquids Inventories (million barrels)															
U.S. Commercial Inventory	1,154	1,180	1,216	1,223	1,231	1,264	1,273	<i>1,230</i>	<i>1,235</i>	<i>1,264</i>	<i>1,262</i>	<i>1,229</i>	1,223	<i>1,230</i>	<i>1,229</i>
OECD Commercial Inventory	2,604	2,657	2,736	2,767	2,746	2,828	2,830	<i>2,807</i>	<i>2,807</i>	<i>2,831</i>	<i>2,834</i>	<i>2,819</i>	2,767	<i>2,807</i>	<i>2,819</i>

(a) Supply includes production of crude oil (including lease condensates), natural gas plant liquids, biofuels, other liquids, and refinery processing gains.

(b) Includes lease condensate, natural gas plant liquids, other liquids, and refinery processing gain. Includes other unaccounted-for liquids.

 (c) Consumption of petroleum by the OECD countries is synonymous with "petroleum product supplied," defined in the glossary of the EIA *Petroleum Supply Monthly*,

DOE/EIA-0109. Consumption of petroleum by the non-OECD countries is "apparent consumption," which includes internal consumption, refinery fuel and loss, and bunkering.

- = no data available

OECD = Organization for Economic Cooperation and Development: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Türkiye, United Kingdom, and United States.

OPEC = Organization of the Petroleum Exporting Countries: Algeria, Angola, Congo (Brazzaville), Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates, Venezuela.

Notes: EIA completed modeling and analysis for this report on November 2, 2023.

The approximate break between historical and forecast values is shown with historical data printed in bold; estimates and forecasts in italics.

Historical data: Latest data available from Energy Information Administration *International Energy Statistics* (<https://www.eia.gov/international/data/world>).

Minor discrepancies with published historical data are due to independent rounding.

Forecasts: EIA Short-Term Integrated Forecasting System.

Table 4a. U.S. Petroleum and Other Liquids Supply, Consumption, and Inventories
U.S. Energy Information Administration | Short-Term Energy Outlook - November 2023

	2022				2023				2024				Year		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2022	2023	2024
Supply (million barrels per day)															
Crude Oil Supply															
Domestic Production (a)	11.52	11.77	12.05	12.30	12.63	12.75	13.07	13.17	13.06	13.08	13.11	13.35	11.91	12.90	13.15
Alaska	0.45	0.44	0.42	0.44	0.44	0.43	0.40	0.43	0.43	0.41	0.39	0.41	0.44	0.43	0.41
Federal Gulf of Mexico (b)	1.66	1.70	1.77	1.79	1.87	1.77	1.93	1.94	1.92	1.91	1.86	1.92	1.73	1.88	1.90
Lower 48 States (excl GOM)	9.42	9.63	9.85	10.06	10.31	10.55	10.74	10.80	10.71	10.76	10.85	11.02	9.74	10.60	10.84
Transfers to Crude Oil Supply	0.41	0.37	0.42	0.48	0.39	0.51	0.65	0.46	0.36	0.36	0.37	0.34	0.42	0.50	0.36
Crude Oil Net Imports (c)	3.06	2.81	2.75	2.20	2.27	2.51	2.66	2.27	2.43	2.75	2.83	2.06	2.71	2.43	2.52
SPR Net Withdrawals	0.31	0.80	0.84	0.48	0.01	0.26	-0.04	0.00	0.00	0.00	0.00	0.00	0.61	0.06	0.00
Commercial Inventory Net Withdrawals	0.08	-0.04	-0.12	-0.01	-0.39	0.12	0.41	0.02	-0.33	0.11	0.19	-0.10	-0.02	0.04	-0.03
Crude Oil Adjustment (d)	0.20	0.45	0.38	0.41	0.34	0.00	-0.27	0.24	0.37	0.37	0.36	0.39	0.36	0.08	0.37
Total Crude Oil Input to Refineries	15.58	16.15	16.31	15.86	15.25	16.15	16.48	15.90	15.53	16.31	16.49	15.70	15.98	15.94	16.01
Other Supply															
Refinery Processing Gain	0.97	1.08	1.06	1.01	0.97	1.01	1.05	1.03	0.98	1.01	1.02	1.00	1.03	1.02	1.00
Natural Gas Plant Liquids Production	5.66	5.96	6.13	5.97	6.01	6.42	6.51	6.50	6.48	6.50	6.54	6.55	5.93	6.36	6.52
Renewables and Oxygenate Production (e)	1.20	1.20	1.18	1.23	1.24	1.29	1.29	1.32	1.32	1.34	1.35	1.33	1.20	1.29	1.33
Fuel Ethanol Production	1.02	1.01	0.97	1.01	1.00	1.00	1.00	1.02	1.00	0.99	1.00	0.98	1.00	1.01	0.99
Petroleum Products Adjustment (f)	0.22	0.23	0.22	0.22	0.20	0.22	0.22	0.22	0.21	0.22	0.22	0.22	0.22	0.22	0.22
Petroleum Products Transfers to Crude Oil Supply	-0.41	-0.37	-0.42	-0.48	-0.39	-0.51	-0.65	-0.46	-0.36	-0.36	-0.37	-0.34	-0.42	-0.50	-0.36
Product Net Imports (c)	-3.54	-4.02	-4.12	-3.90	-3.91	-3.71	-4.16	-4.67	-4.32	-4.22	-4.54	-4.54	-3.90	-4.12	-4.41
Hydrocarbon Gas Liquids	-2.07	-2.36	-2.25	-2.26	-2.47	-2.39	-2.43	-2.66	-2.69	-2.63	-2.60	-2.59	-2.24	-2.48	-2.63
Unfinished Oils	0.17	0.29	0.29	0.30	0.28	0.27	0.23	0.30	0.24	0.30	0.33	0.21	0.26	0.27	0.27
Other HC/Oxygenates	-0.07	-0.10	-0.06	-0.02	-0.05	-0.07	-0.05	-0.06	-0.06	-0.05	-0.04	-0.04	-0.06	-0.06	-0.05
Motor Gasoline Blend Comp.	0.38	0.60	0.48	0.40	0.45	0.67	0.58	0.41	0.43	0.65	0.50	0.40	0.46	0.53	0.50
Finished Motor Gasoline	-0.69	-0.75	-0.79	-0.84	-0.75	-0.58	-0.73	-0.95	-0.76	-0.67	-0.74	-0.78	-0.77	-0.75	-0.74
Jet Fuel	-0.03	-0.06	-0.10	-0.03	-0.05	0.01	-0.06	0.01	-0.02	0.00	0.01	0.00	-0.06	-0.02	0.00
Distillate Fuel Oil	-0.74	-1.08	-1.24	-1.00	-0.76	-0.97	-1.01	-1.01	-0.80	-1.08	-1.19	-0.98	-1.02	-0.94	-1.01
Residual Fuel Oil	0.09	0.08	0.10	0.09	0.01	-0.04	-0.03	0.01	0.00	0.00	-0.06	0.02	0.09	-0.01	-0.01
Other Oils (g)	-0.58	-0.64	-0.53	-0.54	-0.58	-0.61	-0.66	-0.73	-0.66	-0.74	-0.74	-0.78	-0.57	-0.64	-0.73
Product Inventory Net Withdrawals	0.42	-0.25	-0.26	-0.06	0.30	-0.49	-0.51	0.45	0.27	-0.42	-0.18	0.46	-0.04	-0.06	0.03
Total Supply	20.09	20.00	20.11	19.85	19.67	20.38	20.24	20.29	20.10	20.38	20.53	20.39	20.01	20.15	20.35
Consumption (million barrels per day)															
Hydrocarbon Gas Liquids	3.77	3.18	3.17	3.32	3.40	3.36	3.29	3.61	3.76	3.36	3.39	3.76	3.36	3.42	3.57
Other HC/Oxygenates	0.14	0.17	0.17	0.19	0.22	0.28	0.26	0.24	0.26	0.28	0.28	0.30	0.17	0.25	0.28
Unfinished Oils	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Gasoline	8.57	9.00	8.93	8.74	8.67	9.13	8.95	8.79	8.58	9.01	9.04	8.71	8.81	8.88	8.83
Fuel Ethanol blended into Motor Gasoline	0.88	0.93	0.92	0.93	0.90	0.94	0.93	0.93	0.89	0.93	0.94	0.91	0.91	0.93	0.92
Jet Fuel	1.45	1.61	1.60	1.58	1.55	1.67	1.73	1.71	1.65	1.77	1.83	1.75	1.56	1.67	1.75
Distillate Fuel Oil	4.22	3.97	3.91	4.00	4.01	3.93	3.91	4.00	4.08	3.97	3.89	4.01	4.03	3.96	3.98
Residual Fuel Oil	0.33	0.30	0.38	0.30	0.29	0.22	0.27	0.27	0.22	0.21	0.20	0.23	0.33	0.26	0.22
Other Oils (g)	1.61	1.78	1.94	1.70	1.53	1.79	1.84	1.67	1.55	1.77	1.90	1.63	1.76	1.71	1.71
Total Consumption	20.09	20.00	20.11	19.85	19.66	20.38	20.24	20.29	20.10	20.38	20.53	20.39	20.01	20.15	20.35
Total Petroleum and Other Liquids Net Imports	-0.48	-1.21	-1.37	-1.69	-1.64	-1.20	-1.50	-2.40	-1.90	-1.47	-1.71	-2.47	-1.19	-1.69	-1.89
End-of-period Inventories (million barrels)															
Commercial Inventory															
Crude Oil (excluding SPR)	414.2	417.8	429.0	430.1	465.4	454.7	417.0	415.5	445.3	435.2	417.9	426.9	430.1	415.5	426.9
Hydrocarbon Gas Liquids	142.1	186.7	243.7	211.1	174.3	225.4	274.8	229.5	189.8	236.6	275.6	230.1	211.1	229.5	230.1
Unfinished Oils	88.1	88.9	82.3	86.4	88.6	87.0	84.2	80.1	90.7	87.9	86.8	78.9	86.4	80.1	78.9
Other HC/Oxygenates	34.4	29.7	27.3	31.6	34.3	30.1	29.7	29.7	31.7	30.5	30.2	30.5	31.6	29.7	30.5
Total Motor Gasoline	238.5	221.0	209.5	224.4	225.3	223.2	226.6	237.0	234.3	231.1	219.0	230.3	224.4	237.0	230.3
Finished Motor Gasoline	17.3	17.1	17.6	17.2	14.7	17.6	17.4	18.3	15.8	16.6	18.2	19.3	17.2	18.3	19.3
Motor Gasoline Blend Comp.	221.2	203.9	191.9	207.2	210.6	205.6	209.2	218.7	218.6	214.5	200.8	211.0	207.2	218.7	211.0
Jet Fuel	35.6	39.4	36.5	35.0	37.7	42.7	42.7	38.1	38.9	37.7	38.3	35.2	35.0	38.1	35.2
Distillate Fuel Oil	114.7	111.3	110.5	118.9	112.3	112.6	118.3	120.4	114.5	116.9	118.1	119.7	118.9	120.4	119.7
Residual Fuel Oil	28.1	29.3	27.4	30.7	29.6	30.4	27.6	27.2	28.4	28.2	26.5	25.9	30.7	27.2	25.9
Other Oils (g)	58.6	56.3	49.3	54.3	63.3	58.3	52.5	52.5	61.6	59.3	49.9	51.3	54.3	52.5	51.3
Total Commercial Inventory	1154.2	1180.4	1215.6	1222.6	1230.8	1264.4	1273.3	1230.0	1235.3	1263.5	1262.4	1228.7	1222.6	1230.0	1228.7
Crude Oil in SPR	566.1	493.3	416.4	372.0	371.2	347.2	351.3	351.5	351.5	351.5	351.5	351.5	372.0	351.5	351.5

(a) Includes lease condensate.

(b) Crude oil production from U.S. Federal leases in the Gulf of Mexico (GOM).

(c) Net imports equal gross imports minus gross exports.

(d) Crude oil adjustment equals the sum of disposition items (e.g. refinery inputs) minus the sum of supply items (e.g. production).

(e) Renewables and oxygenate production includes pentanes plus, oxygenates (excluding fuel ethanol), and renewable fuels. Beginning in January 2021, renewable fuels includes biodiesel, renewable diesel, renewable jet fuel, renewable heating oil, renewable naphtha and gasoline, and other renewable fuels. For December 2020 and prior, renewable fuels includes only biodiesel.

(f) Petroleum products adjustment includes hydrogen/oxygenates/renewables/other hydrocarbons, motor gasoline blending components, and finished motor gasoline.

(g) "Other Oils" includes aviation gasoline blend components, finished aviation gasoline, kerosene, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt and road oil, still gas, and miscellaneous products.

- = no data available

SPR: Strategic Petroleum Reserve

HC: Hydrocarbons

Notes: EIA completed modeling and analysis for this report on November 2, 2023.

The approximate break between historical and forecast values is shown with historical data printed in bold; estimates and forecasts in italics.

Historical data: Latest data available from Energy Information Administration databases supporting the following reports: *Petroleum Supply Monthly*, DOE/EIA-0109;

Petroleum Supply Annual, DOE/EIA-0340/2; and *Weekly Petroleum Status Report*, DOE/EIA-0208.

Minor discrepancies with published historical data are due to independent rounding.

Forecasts: EIA Short-Term Integrated Forecasting System.

Table 5a. U.S. Natural Gas Supply, Consumption, and Inventories
U.S. Energy Information Administration | Short-Term Energy Outlook - November 2023

	2022				2023				2024				Year		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2022	2023	2024
Supply (billion cubic feet per day)															
Total Marketed Production	104.80	107.29	109.76	110.16	111.18	112.50	113.54	<i>114.53</i>	<i>114.59</i>	<i>114.25</i>	<i>114.16</i>	<i>115.40</i>	108.02	<i>112.95</i>	<i>114.60</i>
Alaska	1.06	1.00	0.96	1.07	1.08	1.01	0.90	<i>1.00</i>	<i>1.02</i>	<i>0.95</i>	<i>0.87</i>	<i>0.99</i>	1.02	<i>1.00</i>	<i>0.96</i>
Federal GOM (a)	2.06	2.10	2.16	2.12	2.13	1.89	2.01	<i>2.09</i>	<i>2.05</i>	<i>1.99</i>	<i>1.90</i>	<i>1.91</i>	2.11	<i>2.03</i>	<i>1.96</i>
Lower 48 States (excl GOM)	101.69	104.19	106.64	106.97	107.97	109.60	110.63	<i>111.44</i>	<i>111.52</i>	<i>111.31</i>	<i>111.39</i>	<i>112.49</i>	104.89	<i>109.92</i>	<i>111.68</i>
Total Dry Gas Production	96.63	98.92	101.20	101.57	102.28	103.19	104.14	<i>105.05</i>	<i>105.11</i>	<i>104.80</i>	<i>104.71</i>	<i>105.85</i>	99.60	<i>103.68</i>	<i>105.12</i>
LNG Gross Imports	0.15	0.01	0.07	0.05	0.09	0.02	0.03	<i>0.06</i>	<i>0.10</i>	<i>0.04</i>	<i>0.04</i>	<i>0.06</i>	0.07	<i>0.05</i>	<i>0.06</i>
LNG Gross Exports	11.50	10.80	9.74	10.35	11.45	11.76	11.42	<i>12.58</i>	<i>12.22</i>	<i>11.64</i>	<i>11.82</i>	<i>13.47</i>	10.59	<i>11.80</i>	<i>12.29</i>
Pipeline Gross Imports	8.89	7.73	7.84	8.41	8.45	7.32	7.87	<i>7.68</i>	<i>8.39</i>	<i>7.03</i>	<i>7.26</i>	<i>7.50</i>	8.22	<i>7.83</i>	<i>7.55</i>
Pipeline Gross Exports	8.46	8.52	8.13	8.19	8.91	8.73	9.12	<i>9.29</i>	<i>9.51</i>	<i>8.89</i>	<i>9.21</i>	<i>9.64</i>	8.32	<i>9.02</i>	<i>9.32</i>
Supplemental Gaseous Fuels	0.19	0.20	0.20	0.20	0.22	0.17	0.19	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>	0.20	<i>0.19</i>	<i>0.20</i>
Net Inventory Withdrawals	20.14	-10.25	-8.94	2.33	11.97	-11.69	-6.46	<i>2.53</i>	<i>13.92</i>	<i>-12.20</i>	<i>-6.51</i>	<i>2.76</i>	0.74	<i>-0.95</i>	<i>-0.51</i>
Total Supply	106.04	77.30	82.49	94.03	102.64	78.51	85.23	<i>93.66</i>	<i>105.98</i>	<i>79.33</i>	<i>84.67</i>	<i>93.27</i>	89.91	<i>89.97</i>	<i>90.80</i>
Balancing Item (b)	-1.52	-1.39	-1.59	-1.63	0.27	-0.52	-1.34	<i>-0.61</i>	<i>-2.00</i>	<i>-2.12</i>	<i>-2.07</i>	<i>-1.04</i>	-1.53	<i>-0.55</i>	<i>-1.81</i>
Total Primary Supply	104.53	75.92	80.90	92.40	102.91	77.99	83.89	<i>93.05</i>	<i>103.98</i>	<i>77.21</i>	<i>82.59</i>	<i>92.23</i>	88.38	<i>89.42</i>	<i>89.00</i>
Consumption (billion cubic feet per day)															
Residential	25.97	7.80	3.56	17.28	23.50	7.29	3.62	<i>16.15</i>	<i>24.60</i>	<i>7.49</i>	<i>3.85</i>	<i>16.20</i>	13.60	<i>12.60</i>	<i>13.02</i>
Commercial	15.55	6.65	4.74	11.61	14.51	6.43	4.83	<i>11.27</i>	<i>14.72</i>	<i>6.55</i>	<i>5.14</i>	<i>11.37</i>	9.61	<i>9.24</i>	<i>9.44</i>
Industrial	25.73	22.46	21.68	23.72	24.83	22.40	21.95	<i>24.22</i>	<i>24.80</i>	<i>21.63</i>	<i>21.28</i>	<i>23.55</i>	23.39	<i>23.35</i>	<i>22.81</i>
Electric Power (c)	28.11	30.88	42.50	30.88	30.71	33.39	44.75	<i>32.25</i>	<i>30.25</i>	<i>33.00</i>	<i>43.58</i>	<i>31.91</i>	33.13	<i>35.30</i>	<i>34.70</i>
Lease and Plant Fuel	5.00	5.12	5.24	5.26	5.31	5.37	5.42	<i>5.47</i>	<i>5.47</i>	<i>5.46</i>	<i>5.45</i>	<i>5.51</i>	5.16	<i>5.39</i>	<i>5.47</i>
Pipeline and Distribution Use	3.98	2.83	3.01	3.48	3.86	2.93	3.14	<i>3.51</i>	<i>3.94</i>	<i>2.88</i>	<i>3.10</i>	<i>3.48</i>	3.32	<i>3.36</i>	<i>3.35</i>
Vehicle Use	0.17	0.17	0.17	0.17	0.18	0.18	0.18	<i>0.18</i>	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>	0.17	<i>0.18</i>	<i>0.20</i>
Total Consumption	104.53	75.92	80.90	92.40	102.91	77.99	83.89	<i>93.05</i>	<i>103.98</i>	<i>77.21</i>	<i>82.59</i>	<i>92.23</i>	88.38	<i>89.42</i>	<i>89.00</i>
End-of-period Inventories (billion cubic feet)															
Working Gas Inventory	1,401	2,325	3,146	2,925	1,850	2,900	3,493	<i>3,260</i>	<i>1,994</i>	<i>3,104</i>	<i>3,703</i>	<i>3,449</i>	2,925	<i>3,260</i>	<i>3,449</i>
East Region (d)	242	482	759	698	334	646	851	<i>786</i>	<i>387</i>	<i>687</i>	<i>873</i>	<i>799</i>	698	<i>786</i>	<i>799</i>
Midwest Region (d)	296	557	917	831	417	701	995	<i>900</i>	<i>439</i>	<i>735</i>	<i>1,017</i>	<i>921</i>	831	<i>900</i>	<i>921</i>
South Central Region (d)	587	885	1,006	1,042	919	1,136	1,093	<i>1,109</i>	<i>840</i>	<i>1,203</i>	<i>1,237</i>	<i>1,211</i>	1,042	<i>1,109</i>	<i>1,211</i>
Mountain Region (d)	90	137	184	158	79	171	240	<i>203</i>	<i>125</i>	<i>166</i>	<i>227</i>	<i>197</i>	158	<i>203</i>	<i>197</i>
Pacific Region (d)	165	240	247	167	74	216	278	<i>231</i>	<i>177</i>	<i>285</i>	<i>316</i>	<i>291</i>	167	<i>231</i>	<i>291</i>
Alaska	21	25	32	30	27	30	36	<i>31</i>	<i>25</i>	<i>28</i>	<i>33</i>	<i>29</i>	30	<i>31</i>	<i>29</i>

(a) Marketed production from U.S. Federal leases in the Gulf of Mexico.

(b) The balancing item represents the difference between the sum of the components of natural gas supply and the sum of components of natural gas demand.

(c) Natural gas used for electricity generation and (a limited amount of) useful thermal output by electric utilities and independent power producers.

(d) For a list of States in each inventory region refer to *Weekly Natural Gas Storage Report, Notes and Definitions* (<http://ir.eia.gov/ngs/notes.html>).

- = no data available

LNG: liquefied natural gas.

Notes: EIA completed modeling and analysis for this report on November 2, 2023.

The approximate break between historical and forecast values is shown with historical data printed in bold; estimates and forecasts in italics.

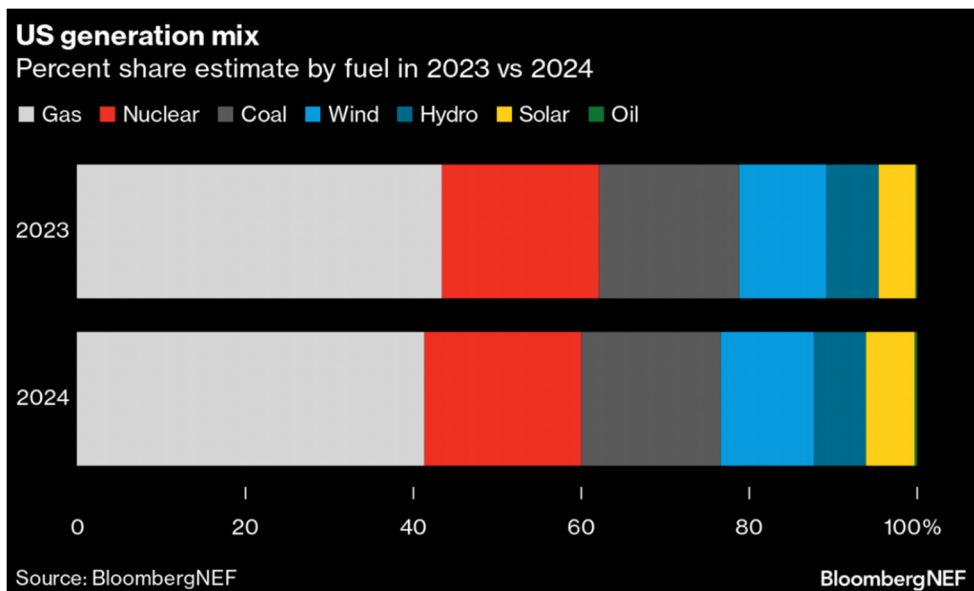
Historical data: Latest data available from Energy Information Administration databases supporting the following reports: *Natural Gas Monthly*, DOE/EIA-0130; and *Electric Power Monthly*, Minor discrepancies with published historical data are due to independent rounding.

Forecasts: EIA Short-Term Integrated Forecasting System.

By Enrique Gonzalez

(BloombergNEF) -- The winter has kicked off by delivering warmer weather than normal and adding looseness to the market. The resulting heating demand destruction manages to outweigh the overall strength observed across other gas demand sectors. In the longer term, the tide could be turned by a wave of new LNG terminals positioned to start consuming feedgas in the second half of 2024, especially as some of them move ahead of schedule.

By the Numbers		
1,843Bcf	4,076Bcf	1,948Bcf
Forecast end-of-winter 2023-24 US gas storage - looser than October	Expected end-of-summer 2024 storage - looser than October	Projected end-of-winter 2024-25 storage - tighter than October



* November is forecast to deliver 42 heating degree days or HDD (the total number of degrees the average daily temperature is lower than 65F) below normal. This results in a 1.8Bcf/d drop in expected heating demand for the month versus the last report.

* BNEF has revised its production forecast upward after recent production figures exceeded expectations and large US Energy Information Administration historical data revisions. After the adjustments, US gas production averages 101.1Bcf/d in 2023 and 102.4Bcf/d in 2024, a year-on-year increase of 3.4Bcf/d and 1.3Bcf/d respectively. The production increase is mostly offset by a rise in industrial demand.

* In its latest earnings call, Cheniere Energy announced that its Corpus Christi Stage 3 project will begin consuming feedgas

by the end of 2024 – earlier than expected. BNEF models the project consuming feedgas by December 2024, in line with the announcement.

* The share of gas in the generation market is set to drop from 43.5% to 41.4% in 2024 but the fuel will remain the dominant source in the power mix. Higher 2024 prices, new renewable capacity, and lower coal retirements eat into the share of gas demand.

* BNEF calculates 1,891Bcf of gas storage level variability attributable to weather between now and the end of winter 2023-24.

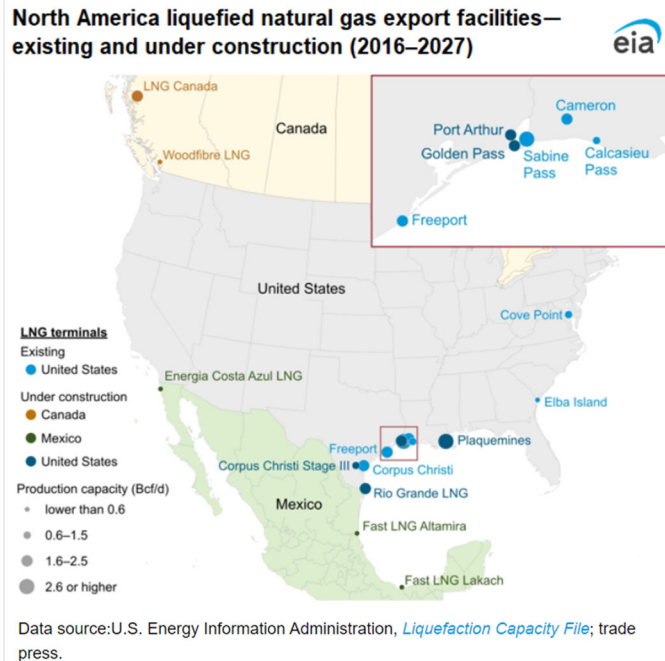
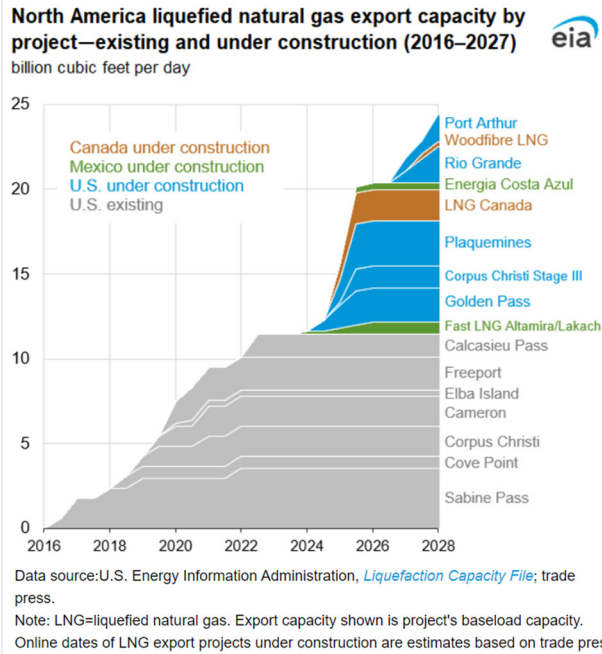
View the full report

To view this story in Bloomberg click here:

<https://blinks.bloomberg.com/news/stories/S3VE42T1UM0W>

Natural Gas Weekly Update

for week ending October 25, 2023 | Release date: October 26, 2023 | Next release: November 2, 2023 | [Previous weeks](#)



LNG exports from North America are set to expand with new projects

Over the next five years, we expect North America's liquefied natural gas (LNG) export capacity to expand by 12.9 billion cubic feet per day (Bcf/d) as Mexico and Canada place into service their first LNG export terminals and the United States adds to its 11.4 Bcf/d of existing LNG capacity. **By the end of 2027, we estimate LNG export capacity will grow by 1.1 Bcf/d in Mexico, 2.1 Bcf/d in Canada, and 9.7 Bcf/d in the United States from a total of ten new projects across the three countries.**

Mexico. Three projects with a combined LNG export capacity of 1.1 Bcf/d are currently under construction—Fast LNG Altamira offshore and onshore, Fast LNG Lakach on the east coast, and Energia Costa Azul on the west coast.

- Fast LNG Altamira consists of three units, each with a capacity to liquefy up to 0.18 Bcf/d. The first unit will be located offshore and the other two units will be installed onshore at the Altamira LNG regasification terminal. These units will be supplied by natural gas from the United States delivered via the [Sur de Texas-Tuxpan pipeline](#). The first LNG exports from the offshore unit are expected in December 2023, and LNG exports from the onshore units are expected in 2025.
- The Fast LNG Lakach unit (capacity 0.18 Bcf/d) will be installed offshore of Veracruz, Mexico, at the nearby Lakach natural gas field. First LNG exports are expected in 2026.
- The [Energia Costa Azul LNG export terminal](#) is located at the site of the existing LNG regasification terminal in Baja California, western Mexico. The LNG export capacity will be 0.4 Bcf/d for Phase 1 (under construction) and 1.6 Bcf/d for Phase 2 (proposed). The export terminal will be supplied with [natural gas from the Permian Basin](#) in the United States.

Developers have proposed other LNG export projects for Mexico's west coast, including Saguaro Energia LNG, Salina Cruz FLNG, and Vista Pacifico LNG, which have a combined capacity over 2.7 Bcf/d. These projects will use relatively low-cost natural gas imported from the United States for LNG exports to Asian markets. However, none of these proposed projects has reached a final investment decision yet.

Canada. Two LNG export projects with a combined capacity of 2.1 Bcf/d are under construction in British Columbia on Canada's west coast. [LNG Canada](#) (with an export capacity of 1.8 Bcf/d) is scheduled to begin service in 2025, and [Woodfibre LNG](#) (0.3 Bcf/d) is scheduled to begin service in 2027. Both export terminals will be supplied with natural gas from western Canada. In addition, [the Canada Energy Regulator \(CER\) has authorized an additional 18 LNG export projects](#) with a combined capacity of 29 Bcf/d.

United States. [Five LNG export projects are currently under construction](#) with a combined 9.7 Bcf/d of LNG export capacity—Golden Pass, Plaquemines, Corpus Christi Stage III, Rio Grande, and Port Arthur. LNG exports from Golden Pass LNG and Plaquemines LNG are [expected to start](#) in 2024.



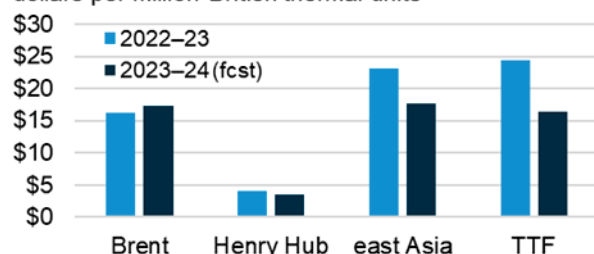
Global LNG supplies and natural gas stocks will likely meet demand this winter 2023–24, but risks remain

November 2023

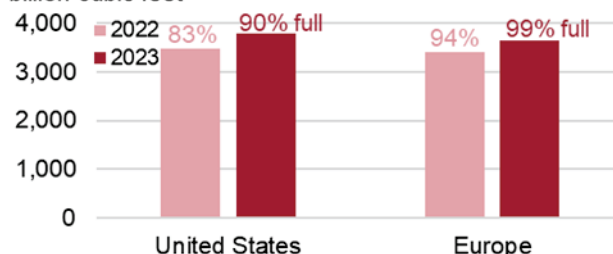
Relatively full natural gas inventories in the United States and Europe as well as expanded global export and import capacity for liquefied natural gas (LNG) have improved the likelihood that supply will be sufficient to meet demand in global natural gas markets as we enter the upcoming 2023–24 winter season (November–March). However, risks to this balance are associated with possible extreme weather and supply issues.

LNG supplies from [new LNG export projects that came online this year](#) or that will start service this winter, in addition to greater output at existing facilities especially in the United States, should help balance global natural gas markets. The addition of [new LNG import facilities](#)—both fixed terminal facilities and floating storage regasification units that convert LNG into pipeline-ready gaseous supplies—have increased regional LNG import capacity, especially in Europe. Europe’s natural gas storage inventories are full at the start of the 2023–24 winter season. If normal weather conditions prevail, we expect less natural gas demand for heating in Europe and limited growth in demand from Asia compared with prior years. Under these conditions, the market should remain balanced during the upcoming winter season.

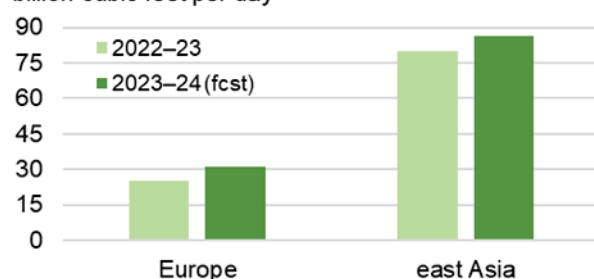
Natural gas and crude oil futures prices at select trading hubs during winter season (Nov–Mar)
dollars per million British thermal units



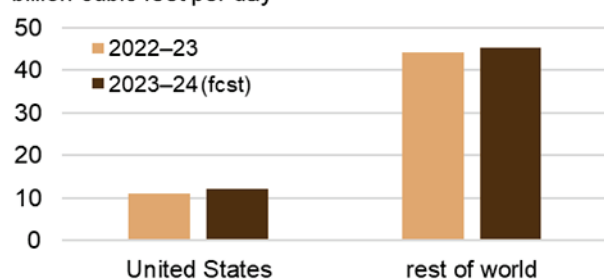
Natural gas in underground storage at the end of October (2022 and 2023)
billion cubic feet



Liquefied natural gas import capacity (Nov–Mar)
billion cubic feet per day



Average liquefied natural gas exports (Nov–Mar)
billion cubic feet per day



Data source: U.S. Energy Information Administration, U.S. Department of Energy, Bloomberg Finance, L.P., Gas Infrastructure Europe, Aggregated Gas Storage Inventory (AGSI+), International Group of Liquefied Natural Gas Importers (GIIGNL), and CEDIGAZ

Note: Fcst = forecast. The 2022–23 historical prices are average daily near-month futures prices. The 2023–24 prices are average monthly futures prices as of October 27, 2023. Brent crude oil price was converted using energy equivalence of 5.691 MMBtu/Bbl. Storage stocks in the United States and Europe (EU-27) are as of October 27, 2022, and October 27, 2023. Europe’s storage stocks include EU-27 countries and do not include storage stocks in the United Kingdom, Serbia, and Ukraine.

Even with increasing LNG supplies and larger natural gas inventories, key market uncertainties remain. Sustained colder-than-normal temperatures in one or more regions in the Northern Hemisphere could increase demand for LNG. Unplanned outages at LNG export facilities or key natural gas supply basins due to freeze-offs could decrease supply and potentially disrupt global natural gas balances by creating supply shortages that lead to price spikes. Some major natural gas utilities, especially in Europe, have limited access to long-term, contract-based LNG supply. The lack of long-term contracts increases supply risk during cold weather and price spikes and may also intensify competition for spot LNG between regions. Lack of underground storage capacity in Asia highlights the region's dependence on real-time LNG flows. If economic activity in China and other markets improves, that could boost regional natural gas demand. Electricity generation from sources other than natural gas (including nuclear, coal, hydropower, wind, and solar) based on fuel pricing could also affect natural gas balances in regional markets.

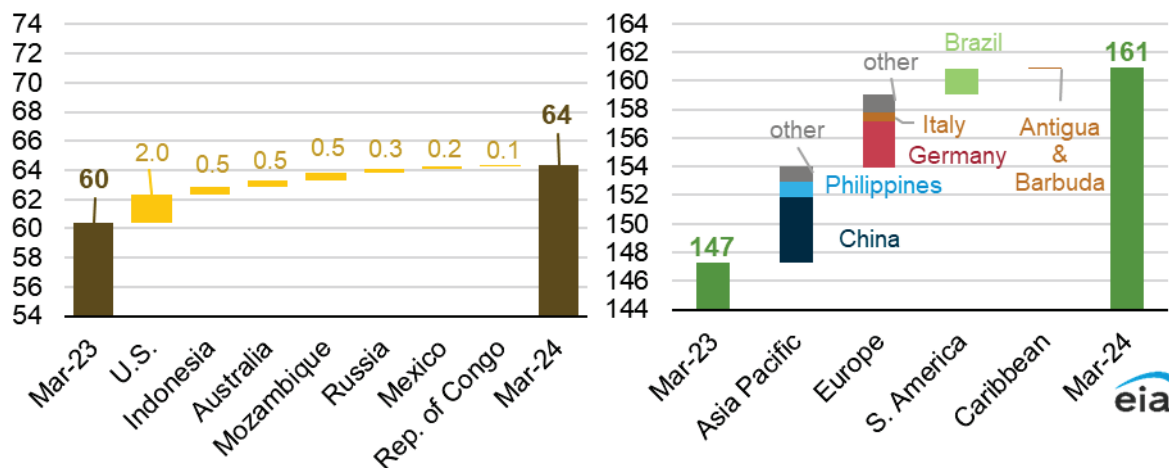
Last year, exceptionally mild winter weather in the Northern Hemisphere reduced heating demand in both Europe and Asia. In addition to mild weather, an [economic slowdown in China reduced LNG imports](#). High LNG prices reduced the use of LNG imports in other parts of Asia. Europe implemented [coordinated demand-reduction measures](#) to offset [decreased natural gas pipeline imports from Russia](#), decreasing the region's natural gas consumption by [more than 15%](#). Reduced demand in Asia offset increased LNG demand in Europe, leading to a relatively balanced global natural gas market during the past winter.

Overall, more natural gas is in storage than last winter. [Europe's natural gas storage inventories](#) are almost full near the start of 2023–24 withdrawal season. Europe has [enacted policies](#) requiring storage operators to maximize storage injections during the refill season to ensure availability of natural gas during the winter. Natural gas storage inventories in Europe (EU-27) as of October 31, 2023, were approximately 3,657 billion cubic feet (Bcf). We estimate this storage volume represents 65 days of natural gas consumption at peak five-year (2019–2023) winter rates and 84 days of natural gas consumption at rates like we saw last winter. The on-site storage capacity at regasification facilities in [Japan](#) and [South Korea](#) has been consistently full this year. In the United States—an important global LNG supplier—[storage inventories](#) exceeded last year's inventories by 8% as of October 27.

This year, LNG front-month futures prices have been consistently lower than last year, mainly in response to more natural gas held in storage inventories in Europe compared with previous years. Global natural gas prices in east Asia and at Title Transfer Facility (TTF) in Europe are down more than 50% compared with this time last year, averaging close to \$15.00/million British thermal units (MMBtu), according to data from Bloomberg, L.P. Natural gas prices reached daily record highs of nearly \$70.00/MMBtu in east Asia and nearly \$100.00/MMBtu at TTF in Europe in the summer 2022. Natural gas prices in both regions averaged over \$30.00/MMBtu last winter. Above-average natural gas storage inventories and modest demand in both Europe and Asia have reduced global natural gas prices so far this year. Entering winter, front-month natural gas futures prices remain high enough to encourage robust LNG exports to both Europe and east Asia. Prices could spike in the short term in the event of severely cold regional weather or major supply disruptions.

Expanded LNG export and import capacity will make more natural gas available this winter. Similar to last year, global LNG export (liquefaction) capacity [continued to expand this year](#), although more slowly than in recent years. The return to service of Freeport LNG in the United States has boosted global LNG production capacity and LNG exports by 2.0 billion cubic feet per day (Bcf/d) so far this year. We expect approximately 2.0 Bcf/d of additional new and returning-to-service LNG export capacity will be available during winter 2023–24, including projects in Indonesia, Mozambique, Mexico, offshore the Republic of Congo (Brazzaville), Russia, and Australia. We estimate that global LNG import (regasification) capacity has expanded by 13% (18 Bcf/d) so far this year in both [Europe](#) and [Asia](#) and that more import projects will be entering operation this winter in Germany and China.

Global liquefied natural gas export and import capacity and additions (Mar 2023–Mar 2024)
billion cubic feet per day



Data source: U.S. Energy Information Administration

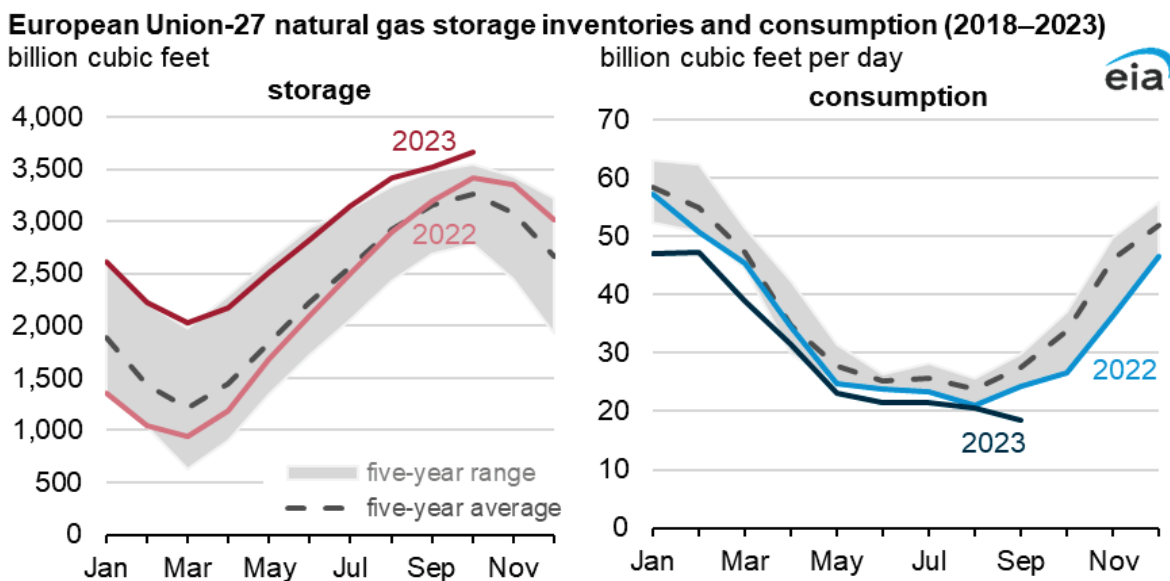
Exports from the United States will continue to help balance global natural gas markets this winter.

The United States, which [exported more LNG than any other country in the first half of 2023](#), will be the key swing supplier of spot LNG this winter. With the [return to service of Freeport LNG](#) and the startup of the [Calcasieu Pass](#) LNG facility last year, the United States remains an important provider of flexible LNG supplies in global spot markets. In 2022, the United States exported 34% of global spot and short-term volumes, the largest share of any country, followed by Australia at 15%, according to data from the International Group of Liquefied Natural Gas Importers (GIIGNL). This winter, we forecast U.S. LNG exports averaging 12.2 Bcf/d, a 10% increase from last winter. If global LNG demand has a sustained peak, U.S. LNG export facilities, which [we estimate have an overall peak capacity of 13.9 Bcf/d](#), could be utilized at higher rates.

Similar to last winter, countries in Europe will continue implementing natural gas conservation measures and importing flexible LNG supplies to replace natural gas pipeline imports from Russia. In 2022, following a reduction in pipeline imports from Russia, European governments [enacted](#)

[coordinated demand-reduction measures](#), which reduced natural gas consumption from August 2022 through March 2023 [by 18%](#) compared with the previous five-year average during the same months.

In the first six months of this year, Europe and the UK's LNG imports exceeded natural gas pipeline imports for the first time on record, according to data from Refinitiv Eikon. Europe and the UK's LNG imports averaged 15.9 Bcf/d, 0.1 Bcf/d more than the region's natural gas pipeline imports from all sources. In comparison, last year, the region imported 14.9 Bcf/d of natural gas as LNG, 28% less than it did through pipelines. LNG exports more than doubled from the United States [to Europe in 2022](#) compared with 2021 and [increased by even more in the first half of 2023](#).

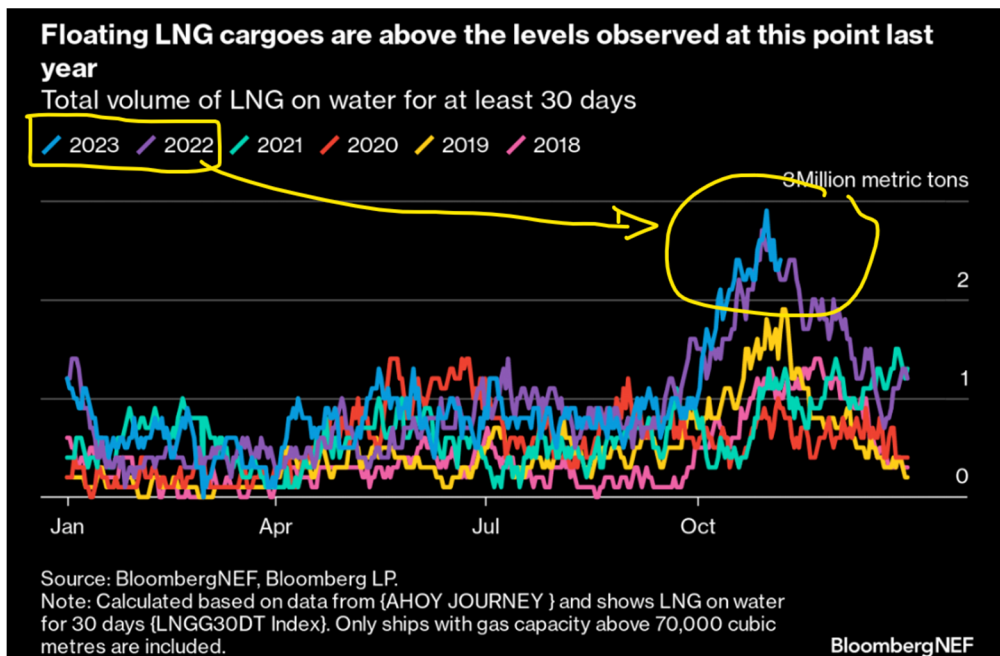


Data source: Aggregated Gas Storage Inventory (AGSI+), Eurostat

LNG consumption in east Asia this winter is a key uncertainty with potentially large implications for global markets. [Japan and South Korea](#) have relied in the past on steady LNG imports supplied under long-term contracts, while China has been a major LNG consumer in the global spot market during peak winter months to supplement its contracted LNG supply. Since last year, China increased pipeline imports from Russia and reduced its spot LNG purchases. China is also likely to have access to more stable natural gas pipeline imports from Central Asia (Uzbekistan and Kazakhstan) this winter. Imports from those countries in the past varied based on domestic demand, but [Uzbekistan started receiving imports of natural gas from Russia](#) in October 2023 under new supply contracts, making more natural gas available for export to China. However, the pace of China's natural gas demand recovery and the effects of winter weather on natural gas consumption this winter remain a key uncertainty for the global natural gas market.

Severe cold weather or unplanned supply outages could lead to significant price spikes and affect global natural gas balances. In the event of severe cold weather over several weeks or months in Europe or Asia, global LNG spot prices could increase rapidly. Buyers in Europe and Asia would have to compete for spot LNG cargoes, which in turn would raise prices at both European and Asian price hubs, especially if they can't switch to alternative fuels. Production freeze-offs in the United States, Norway, or other major natural gas suppliers could also greatly affect global balances, creating supply shortages and price spikes. Other supply disruptions could occur, such as a further reduction in pipeline exports from Russia transiting Ukraine, [worker strikes](#) at Australian LNG facilities, spread of the military conflict in the Middle East, or other potential unplanned outages affecting global supplies.

By Nnenna Amobi and Alireza Nahvi (BloombergNEF) -- For the second winter in a row, mild temperatures and significant demand destruction are piling up high volumes of floating liquefied natural gas storage. A record high 2.4 million metric tons of LNG is estimated to be floating as of Nov. 6, according to Bloomberg's mapping tool. This is LNG that was exported or re-exported at least 30 days ago and has not yet unloaded at a destination. It compares to 2.2Mt in the same period last year, and a 1.4Mt average over the previous five years.



Floating cargoes are focused around Europe and Asia

About 25% of volumes, equivalent to 8 cargoes, are located around Europe, while the rest – approximately 25 cargoes – are heading toward or already in Asia. Nearly a third of the total volume of floating cargoes currently on the water were loaded in the US, reflecting the high share of flexible volume originating from the region. US LNG exports have risen 10% year-on-year from January through October, amounting to more than 100 additional cargoes. Europe has received around 60% of the total LNG exported from the US during the period.

Traders will look to optimize flows, providing additional flexibility for buyers. However, several factors, including slot availability, will dictate where and when these cargoes will unload. European gas storage is sitting at a record high, almost 100% full. At the same time, LNG stock levels onland are on the rise as a secondary option for short-range storage. Europe has around 8 billion cubic meters gas equivalent of LNG stored on

land. More than half of this inventory is stocked in Spain and the UK.

To avoid delayed discharge, some cargoes dispatched from the US that appeared to be headed to Europe may have diverted course toward Asia, which still holds a premium against Europe. The likes of GASLOG GEORGETOWN left Lake Charles on Sept. 26 and diverted its initial course to Europe, instead advancing via the Cape of Good Hope (COGH) and eventually unloading in India on Nov. 4. Demand in Asia is relatively muted, with comfortable storage levels across major importing countries, but is expected to pick up as the heating season starts.

The route via COGH was likely utilized as a prolonged drought around the Panama Canal has restricted the passage of LNG tankers. As a result, we could yet see more cargoes taking this path over the coming weeks.

Delayed discharge beyond the 30-day mark despite shrinking profit margins

Compared to the past five years, floating storage levels are at a record high for November. But they have already come off from the peak level observed toward the end of October. Levels will likely decline more rapidly over the coming days as winter demand picks up and net storage withdrawals increase, replicating last year's trend.

Still, some cargoes that were located around Europe have floated for more than two months, such as NEW APEX, which reloaded in Spain and departed on Aug. 22. The KOOL ORCA and AMERJACK LNG had also surpassed the two-month mark before finally discharging in Italy and Lithuania, respectively. Current price markers indicate it remains out of the money to float (see BloombergNEF's floating storage calculator), suggesting muted demand may have delayed offtake. It also explains the greater build-up of cargoes even though profit margins have eroded.

Prices remain volatile, which could open some arbitrage opportunities heading toward December. However, even if prices strengthen to support a more favorable time-spread – the point when the floating cargo was loaded to the point of discharge – the profit margin could still be wiped out due to associated costs that may accumulate, such as chartering rates.

This is despite comparably lower charter rates versus the same period last year with more vessels available. Atlantic freight futures (Spark30s) for journeys of 160,000-cubic-meter tri-fuel diesel electric (TFDE) vessels from Sabine Pass, US, to Gate terminal, Netherlands are assessed at \$166,500 per day for November and rise to \$176,250 per day in December. In comparison, the average rate through November and December in 2022 was near \$200,000.

To contact BloombergNEF about this article click [here](#).

To contact the authors:

Nnenna Amobi in London at namobi3@bloomberg.net;

Alireza Nahvi in London at anahvi@bloomberg.net

To contact the editor responsible for this article:

Mark Williams at mwilliams108@bloomberg.net

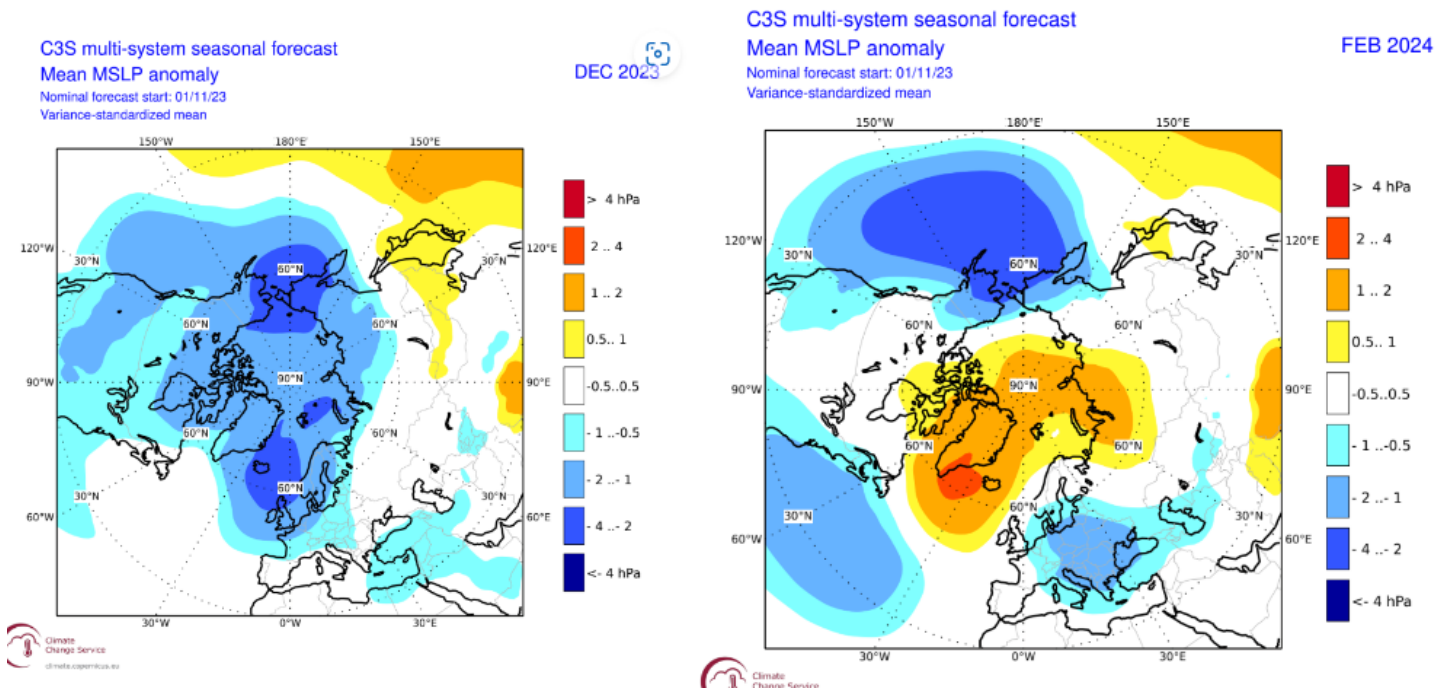
To view this story in Bloomberg click here:

<https://blinks.bloomberg.com/news/stories/S3T802DWLU68>

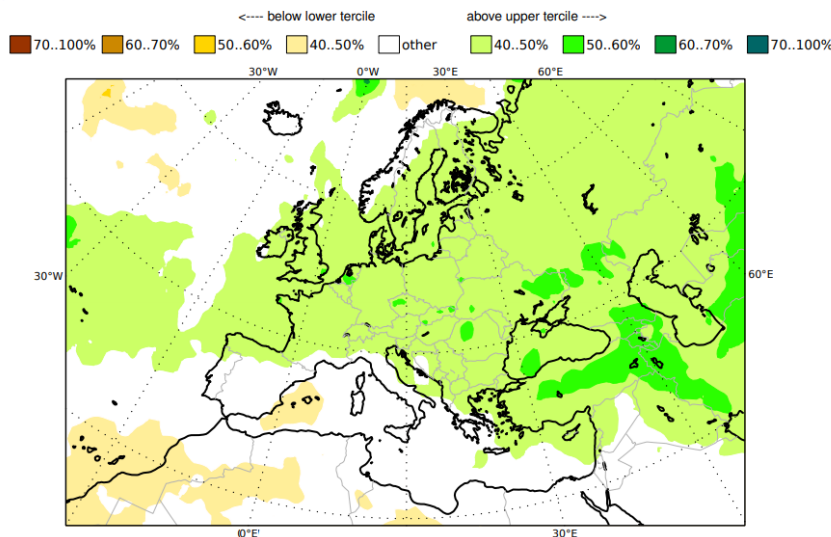
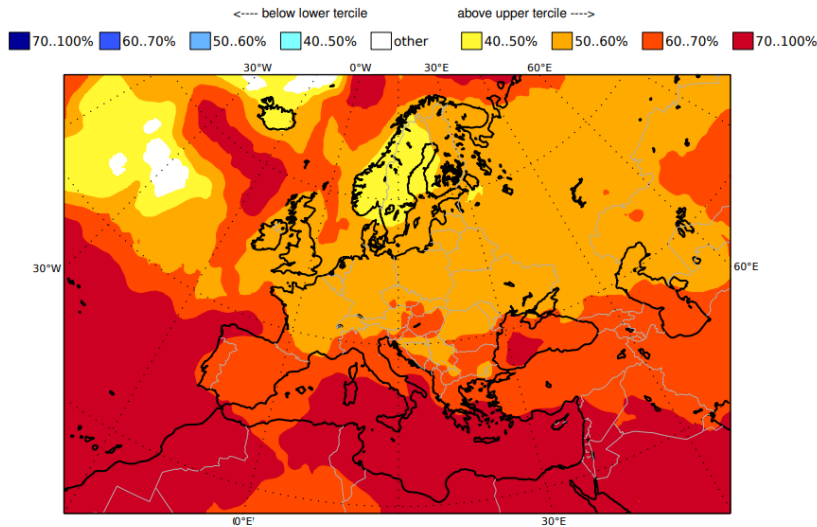
Highlights of the latest seasonal forecasts

10 NOVEMBER 2023

- For the equatorial Pacific, the forecast continues to favour further increase in the amplitude of the ongoing El Niño event, expected to peak around the end of the calendar year. As the season progresses, the largest anomalies in sea-surface temperature are seen further west in the basin. Impacts – especially on global average temperature – typically last beyond the peak of the event.
- The predicted atmospheric circulation patterns likely to influence the European winter show differences between the beginning and the end of the season: early winter is more likely to see increased cyclonic activity, with stronger westerly winds, for northern and central parts of the continent, while in late winter the enhancement to cyclonic conditions shifts towards the southeast, leaving northern and western parts under the influence of higher than average atmospheric pressure, with a reduction in the prevailing westerly winds.



- For the season as a whole, the prediction favours warmer-than-average conditions over all land areas, and wetter-than-average over most areas away from the southwest and far northeast of the continent.



About the seasonal forecasts

The seasonal forecasts include data as well as graphical products cover a time period of six months and are updated every month. All graphical products are updated on the **10th day at 12UTC**; data products are released either on the **6th or the 10th at 12 UTC** as described below.

The graphical products consist of maps or time series for a number of forecast variables (air and sea-surface temperature, atmospheric circulation and precipitation); the interface offers the facility to navigate the full set of graphics. Multi-system combinations, as well as predictions from the individual component systems, are available.

I know it's sort of early days, but when you look at these wells, do you tell yourself that you've already been able to see some improvement over the last year, just trying to get a sense, are these wells a little better than they were, say a year ago? And then on the cost side in the Utica, are you starting to see maybe the cost come down a little bit here, or maybe it's kind of early, I think you've had a target of sort of sub \$5 F&D, just not really sure kind of where you're at today.

A - Unidentified Speaker

Yeah, thanks Leo. No, we're really excited about the latest package that we brought on. That's our Timber Wolf package that we highlighted in Slide 11.

It's in a thousand foot space test. And a note there is we've talked about our new completions design down there in the Permian and the Wolf Camp, but we were able to go ahead and implement that on that. And as you can see from the initial results that we talked about, the 30 day IPs on that are 2,150 BOE per day, over that 30-day period. So really excited about, how that's turning out, from the spacing test.

We have an additional package we actually highlighted in our slide deck, the Xaviers. We're going to tighten the spacing on that to 800 foot and we should have results coming on, here fairly shortly. So we're very excited with the results and, with that application, a new completion design, it's going to be tough to tell if that's really what the big mover is, but we're extremely excited about the results that we're seeing so far. And then from a cost standpoint, we really haven't disclosed specific costs in the Utica.

We're still in the early stages as we've talked about and learning in this play. We've got a lot of room for operational efficiency gains. We've got some infrastructure, small infrastructure to develop that we can install like water gathering, reuse, and sand to drive down costs. And then as we said, with the well results we're seeing, we feel really confident in supporting that sub \$5 F&D cost.

Operator

The next question comes from Arun Jayarma of JP Morgan Securities. Please go ahead.

Q - Analyst

Yeah, good morning. Ezra, I wanted to get your thoughts maybe at a high level on 2024.

On the third quarter call of last year, you provided some soft guidance for the quarter. I was wondering if you could maybe give us some thoughts on overall how you see the year kind of playing out. If I look at consensus forecast, it's for about \$6.1 billion of CapEx with the \$500. So, I wanted to get your thoughts if you could give us some soft guidance around next year.

A - Unidentified Speaker

Yeah, Arun, this is Billy. Let me try to weigh in on that for you, and I apologize if I missed some of your question. You were breaking up a little bit there. As far as 2024, as I said

earlier, it's a As I said earlier, it's a little bit early to give specifics on the plan, but I would say just look at our activity levels we're seeing today, and I would expect to see similar levels of activity on our core foundational plays going into next year.

Give you some hint as to what activity levels we might have. I would expect a few additional wells next year in our emerging plays, such as the Utica and maybe Dorado. And then as far as service costs, let me just weigh in a little bit on that while we're talking about that. We certainly understand, service costs have moderated in the industry, as industry activity has dropped throughout the year.

The magnitude of those declines certainly varies between the services and in which basins we're operating in. We remain focused on just continuous improvement that we see in our efficiency gains throughout our operations. So we tend to use the latest technology and the highest performing crews, which includes superspec rigs and track fleets. That equipment continues to be in high demand with service pricing proving to be more resilient.

We have seen drops in tubular and casing costs for next year that will tend to reduce overall well cost. But again, the magnitude of that effect on overall well cost is yet to be quantified. So as we go into next year, certainly we expect to maintain our activity levels that we see in our core plays, a few extra wells, some softening on well cost. Overall, I think that's kind of where we're headed.

Q - Analyst

Okay. Fair enough. Maybe one for Jeff. Jeff, I wanted to give, if you give some more details, you've provided your Utica type curve on Slide 11.

Just wanted to get a sense, is that type curve for the entire play? Is it for the volatile oil window only? Would that be representative of both the north and the southern portions of the play?

A - Unidentified Speaker

Yeah, that would just be the general type curve and mix across the 140 miles from north to south there in the play. It's pretty consistent. You can see on the slide that we put our first handful of wells on there, and that's really what a lot of the type curve was going to be built off. You can see the Timberwolf package, the most recent one that we brought on, and the outperformance in that one.

Operator

The next question comes from Phillips Johnston of Capital One Securities. Please go ahead.

Q - Analyst

Hey, guys. Thanks.

Just a few quick follow-ups for Jeff on Utica. First on the 55% oil cut, what sort of API are we talking about on that crew, or is it more of a quasi-condensate type of mix there?

A - Unidentified Speaker

Hey, Phillips. Hey, say, this is Lance. What we're seeing is still early, but what we're seeing is APIs in the 40s to 50s.

Q - Analyst

Okay. Sounds good. Then the wells so far have pretty much all been along the eastern edge of the acreage. I'm pretty sure you guys have previously studied the black oil window.

It's sort of in the exploratory phase still, but how did the geology change as you go west, and when would you expect to test other parts of your acreage?

A - Unidentified Speaker

Yeah. Good question. To kind of start off, why did we start it off on the east? Really, the big reason with that is just we had good quality seismic data over on the east side of it when we were first starting out. Obviously, that's really important, so you can get a really good look at the detailed subsurface, any kind of drilling hazards to make sure you perform really, really clean tests.

So where we started, where that seismic's at, obviously, we started the delineation. welcome I think we highlighted on the call that we've added an additional 25,000 acres, bringing our total up to 425,000 acres at very low cost. And we also, let me just, highlight again that we actually own the minerals across 130,000 acres, down, mineral acres down in the Southern portion of the play. So when we look at it right now, as Jeff said, we're doing some, initial spacing packages, some delineation tests where we currently have seismic.

We're also, this year, acquiring seismic in a couple of different parts of the place. We can continue to step out and gather results on that and provide a bigger, a better estimate of what we've captured here for you guys. As far as being limited on incremental activity, I want to think of it that way. Like I said, we've put together a very large contiguous acreage position.

And really, our activity right now, as far as investment and pace, as Billy said, is going to be determined on our to collect data and integrate the production data that we're seeing back into the front end of our geologic models. The activity is really always considered to be at a pace where we can continue to learn and incorporate those learnings on the next set of wells.

Q - Neal Dingman {BIO 6416564 <GO>}

Great details, Ezra. And then, just to follow-up, I want to make sure I'll stick with the Utica, just sounds like you have more than ample takeaway, if I hear right, on the Southern Utica,

overall that is at, of funding and development cost lower than our current DVN rate and as I said in the opening remarks that contemplates maintenance level that current levels of production roughly 30 years, production so we're very confident in the high return inventory that we put together and believe that it's going to continue to deliver great shareholder value in the future.

Operator

The next question comes from Charles Meade of Johnson Rice. Please go ahead.

Q - Charles Meade {BIO 17614470 <GO>}

Good morning to you and the whole EOG team there. Billy I'm going to make one more run at the '24 outlook.

I think you've -- you've laid out that the activity levels are going to be pretty similar to '23 if I look at, or if I try to think about the big moving pieces, you're going to have some efficiency gains, some capital efficiency gains, especially as costs come down. On the other side, you have a slightly higher base production. So is it a reasonable stake in the ground to think that you guys are going to have similar results at '23 in the sense of low single-digit oil growth and kind of low teens NGL and natural gas growth?

A - Billy Helms {BIO 18366099 <GO>}

Hey, thanks, Charles. Yeah, this is Billy.

For '24, we've kind of said it's a little early to get specifics about things, but I would point you to the fact that, we're running a pretty decent level of activity now. We're going to maintain that same level of activity going into next year. Now, just a reminder, we're spending about \$6 billion on our CapEx program this year, and it's proved to be fairly rateable through each quarter of the year. Similar levels of activity.

There will be some upwards movement maybe on efficiency gains. Like you said, we'll have a little bit more efficiency gains to factor in. Maybe some cost reductions due to casing costs, those kind of things. We'll still have some infrastructure spend.

We may drill a few more wells in the Utica and Dorado place. And we're trying to quantify that as we go towards the end of the year. But directionally, that kind of hopefully points you towards what next year might look like. We're not going to see a big ramp up in activity in any play as we see today.

Small changes in capital efficiency and well cost as we go into next year with some infrastructure spend.

Q - Charles Meade {BIO 17614470 <GO>}

Got it. Thank you, Billy. And then I'm not sure who this would be best for, but I'm curious about your three mile laterals in the Utica.

It seems to me like you're pleased with the results because you mentioned that you're even considering longer laterals in the Utica, but I'm curious if you could address that point and then also whether we can expect to see three-mile laterals in other key plays for you guys, and if yes, where, or if no, what's special about the Utica that it works there and not in other places?

A - Billy Helms {BIO 18366099 <GO>}

Yeah, Charles. This is Billy again. Let me give you kind of an overview and then Jeff may add some more color. The three-mile laterals on the Utica, yeah, we're very excited about that play and its ability to do these longer laterals very efficiently on the operational side.

We're doing these things in record times and making progress with each pattern of wells we drill, and we feel we have line of sight on being able to continue to reduce cost over the longer-term period as we apply learnings from other plays into this area. So that's going to continue. Now, we're also drilling longer laterals in some other plays. We've drilled some three-mile laterals in the Eagle Ford, and we're drilling three-mile laterals in the Delaware Basin.

So we expect that trend to continue in each of our plays. Now, Jeff might want to add some colors on what we're seeing on performance there, too.

A - Jeff Leitzell {BIO 20453166 <GO>}

Yeah, just a little bit to add in. You know, in the Delaware, in the Eagle Ford, and in Utica, we've had great operational efficiency with our three-mile laterals.

And that's one of the things as you start, stretching out the length of these laterals, you want to make sure that operationally you don't have any issues on the drilling side and you're able to optimally complete that. And we've seen really, really good results with that. The other thing we're also seeing is by drilling these longer laterals, we're able to supplement, one vertical, with a three-mile lateral versus two verticals and a two-mile-and-a-half lateral. So we're able to see substantial cost savings there anywhere from kind of 15 to 25%.

So, we're definitely excited about where we're seeing it. Obviously, it ties in with our leasehold, and we have to see where we can actually drill three-mile laterals, but we are looking to expand that across our plays moving into next year and beyond.

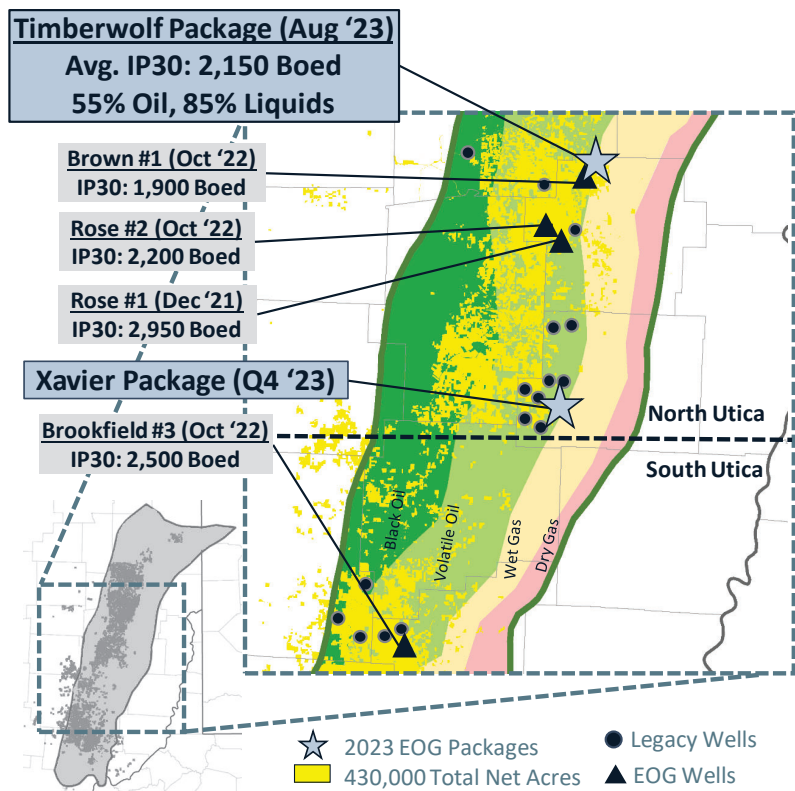
Operator

The next question comes from Scott Gruber of Citigroup. Please go ahead.

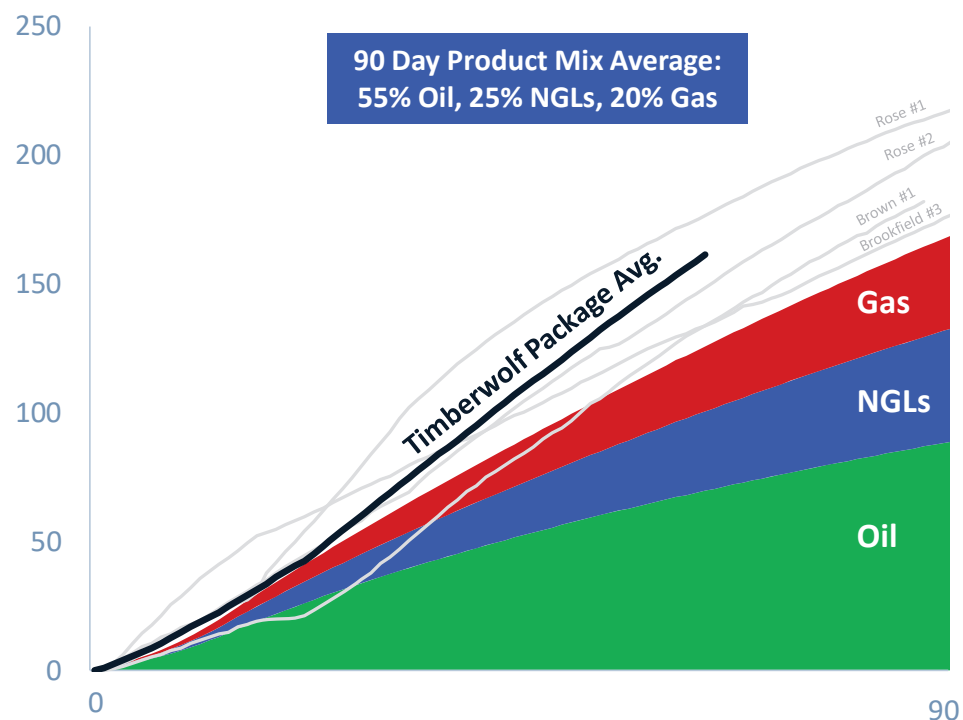
Q - Analyst

Yes, good morning. The enhanced completion technique in the Delaware appears to be a success. If I heard correctly, 20% uplift in productivity. But there has been a question regarding, applicability as you've talked about in the past.

Utica Combo Package Results Outperform Type Curve

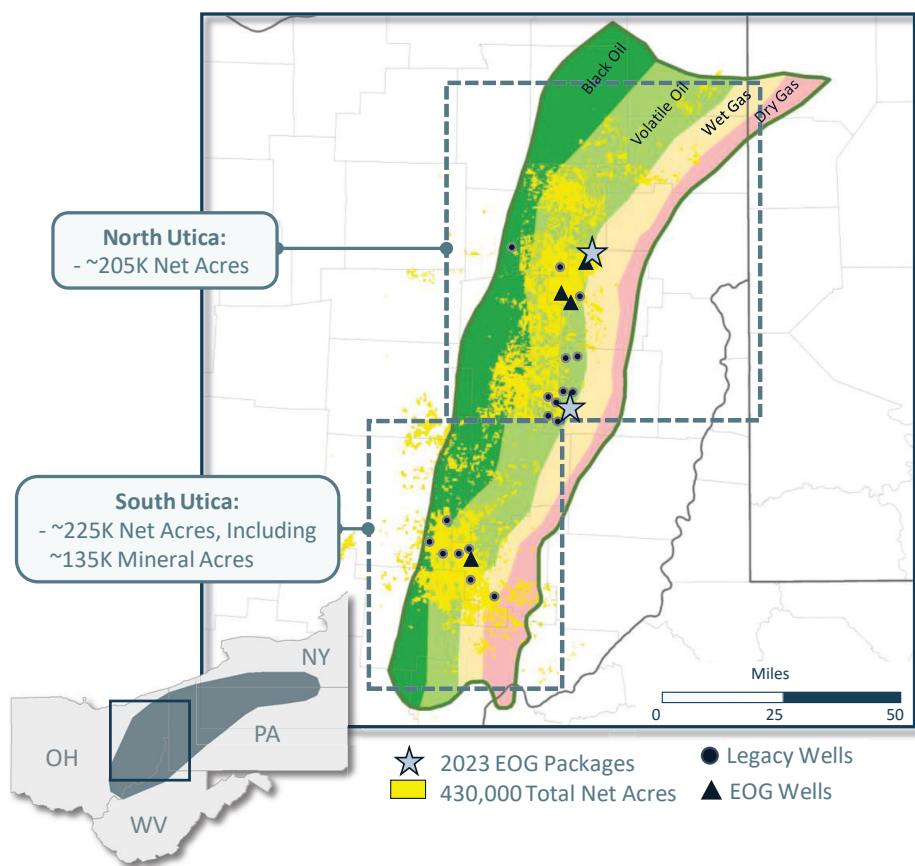


Utica Type Curve: 90 Day Cumulative Production (MBoe)



Note: IP and Cumulative Production Data Normalized to 15,000 ft.

Utica Shale Play Positioned to Deliver Premium Returns



Utica Development

- 90%+ of Acreage Held by Production with Minimal Drilling Commitments
- Infrastructure Capital Investment Limited to Infield Gathering to Support Operations and Marketing Efforts
- Targeting 3-Mile Laterals for Capital Efficient Development

~430K Net Acres in High Potential Play

- Further Expanded Acreage Position by ~25K Net Acres in 2023
- <\$600/Net Acre Average Cost of Entry
- EUR Product Mix Averages ~60-70% Liquids Across Acreage

100% Minerals Ownership Across ~135K Acres in South Utica

- Acquired Mineral Interest at Low Cost of ~\$1,800/Acre¹
- ~25% Uplift in Production and Reserves from Minerals Ownership Enhances Returns²
- Control Over Development Pace Provides Significant Upside to Value of Investment in Mineral Interest

(1) Cost of mineral interest acquisition separate from any leased acreage transactions and is based on EOG's internal transaction cost valuation.
 (2) Production and reserves uplift is based on a 20% royalty interest burden that would have been otherwise incurred if mineral interest was not acquired.

Venezuela could displace Canadian crude re-exports

Published date: 09 November 2023

Two key buyers of Canadian heavy crude exports from the US Gulf coast are poised to increase receipts of Venezuelan crude following a temporary lifting of sanctions, which could displace Canadian supplies.

PetroChina's 400,000 b/d Jieyang refinery in south China's Guangdong province accounted for 23.1pc of Cold Lake, Access Western Blend, and Christina Dilbit exports from the US Gulf coast in January-August this year, according to analytics firm Vortexa. Repsol's 220,000 b/d Cartagena refinery in Spain accounted for 17.5pc.

Both refineries have been in discussions to increase loadings of similar-quality heavy Venezuelan crude after the US temporarily [lifted some sanctions](#) targeting the oil and gas industry for six months ending on 18 April.

PetroChina is likely to [buy around 260,000-300,000 b/d of crude](#) from Venezuela's state-owned PdV, according to traders, which could displace nearly all of the 319,000 b/d of Canadian heavy crude purchases that the Jieyang refinery averaged in the first eight months of this year.

In the past, Petrochina preferred to run Venezuelan Merey at Jieyang, but turned to Canadian heavies following US sanctions on Venezuela starting in 2019.

In Spain, Repsol is also working with PdV to [increase oil and gas output](#) at its joint ventures in Venezuela.

The easing of US sanctions is expected to "increase the availability of heavy crude for our refineries," Repsol's chief executive Josu Jon Imaz said on 26 October, though it remains unclear how much such supplies could increase. The Cartagena refinery averaged 241,000 b/d in heavy Canadian crude imports between January and August.

Repsol resumed heavy Venezuelan imports last year under an oil-for-debt deal between Repsol and state-owned PdV. This year, most of Repsol's 22,000 b/d of Venezuelan imports to Spain have gone to the Cartagena refinery.

Cold Lake Houston is averaging an \$8.30/bl discount to the Nymex benchmark for December trade since the 26 October start of trading, compared with an average discount of about \$5.80/bl in November trade.

Sanctions relief could be short lived

Sanctions were lifted for a period of six months starting on 18 October, but they could be reimposed if Venezuela does not move toward commitments to free elections and release more political prisoners [by the end of the month](#), a US official said earlier this week.

"We have taken a pretty big step to signal our commitment, but after 30 November, if those expectations are not fulfilled, we will have to take steps to dismantle that sanctions' relief," White House senior western hemisphere adviser Juan Gonzales said on 7 November. This could include completely reinstating sanctions or other options under discussion.

By Scott Phillips

Canadian heavy crude importers Jan-Aug (via US Gulf)		
Refinery	Volume (b/d)	% of total
PetroChina Jieyang	318,526	23.1
Sinopec Zhenhai	244,851	17.8
Repsol Cartagena	241,377	17.5
Jamnagar Reliance	181,441	13.2
Sinopec Dongxing	91,372	6.6
Vortexa		

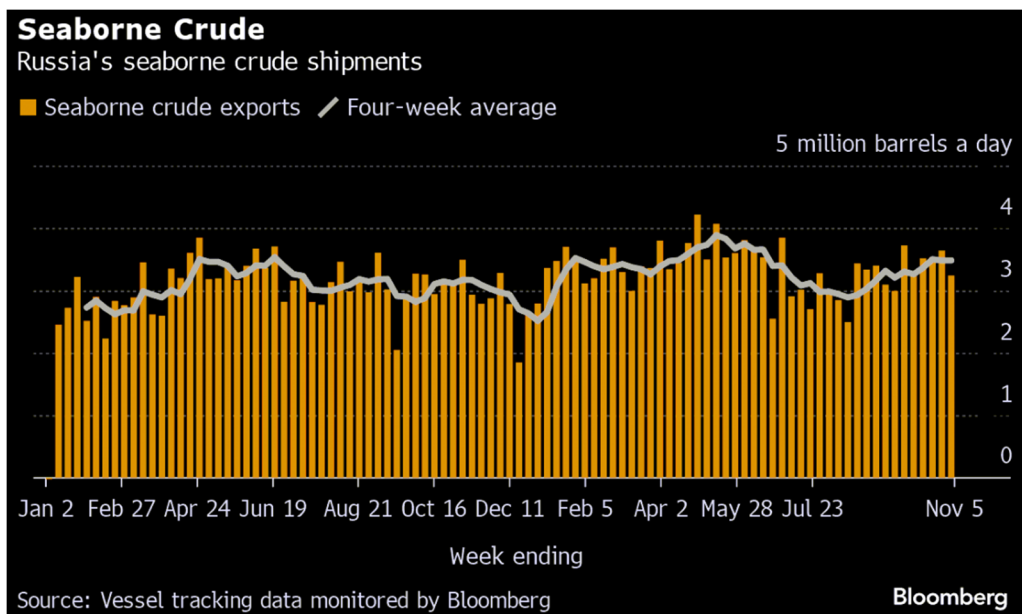
By Julian Lee

(Bloomberg) -- Russia is shipping crude through its ports at a rate close to the highest seen in more than four months. About 3.48 million barrels a day of crude was shipped from Russian ports in the four weeks to Nov. 5, tracking data monitored by Bloomberg show, edging up from the period to Oct.

29. That's despite a dip in the more volatile weekly figures. Moscow said in early August that it would prolong export restrictions at 300,000 barrels a day below their May-June average level until the end of the year, a policy confirmed at the weekend. This reduction, though, includes both crude and refined products, Deputy Prime Minister Alexander Novak told Interfax last month.

Crude flows have been cut by just one-third of that amount, leaving the rest to be achieved by lower exports of refined products.

Shipments remain elevated just weeks before the OPEC+ group of oil producers, jointly led by Russia and Saudi Arabia, meet in Vienna on Nov. 26 to set output targets for the first half of next year.



The more volatile weekly flow fell to 3.24 million barrels a day, down by about 400,000 barrels a day from the period to Oct. 29. The weekly decline reflected lower shipments from Russia's western ports on the Black Sea and the Baltic, which were partly offset by an increase in the amount leaving export terminals on the Pacific coast.

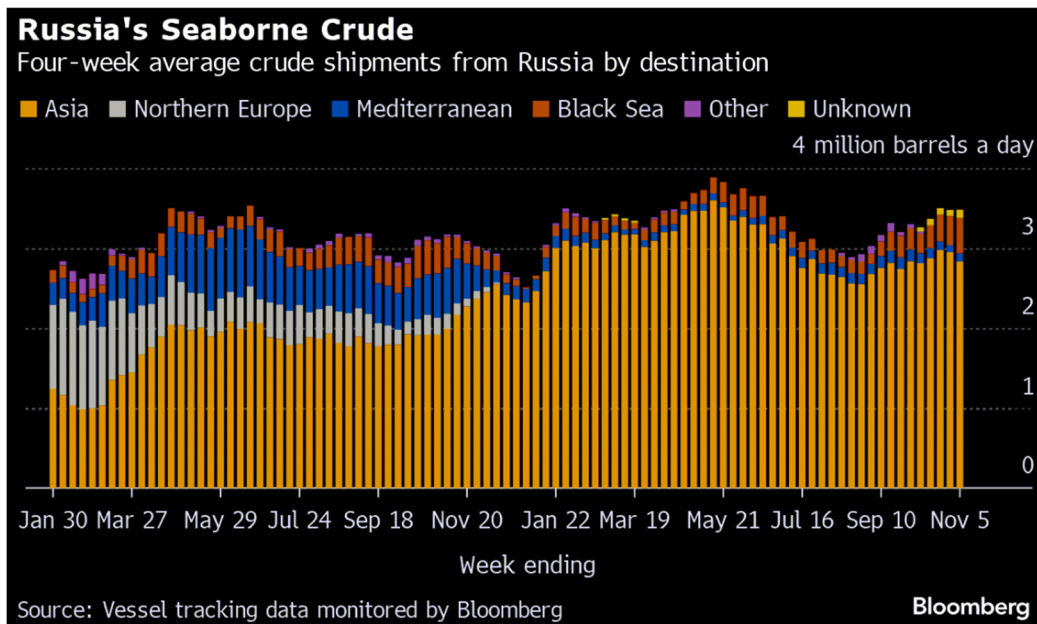
With most of last week's shipments attracting the higher export duty rate for November, the drop in the Kremlin's weekly revenues from oil export duties was muted. Meanwhile, the four-week average rose for a 14th straight week, setting a new high

for the period since the start of January.

Moscow's overall oil and gas revenue soared in October to the highest since April 2022 due to high oil prices and a pause in government subsidies to refiners. Levies on crude and petroleum products — which accounted for almost 91% of total hydrocarbon revenues last month — more than doubled. Oil revenue includes mineral extraction tax on gas condensate and export duty on petroleum products, as well as subsidies payments for refiners for domestic supplies of fuel, tax reimbursements and payments for refinery modernization.

Flows by Destination

Russia's seaborne crude flows were little changed in the four weeks to Nov. 5 at 3.48 million barrels a day. That was down from 3.5 million barrels a day in the period to Oct. 22. Shipments remain about 105,000 barrels a day below the average seen during the surge in volumes between April and June.



All figures exclude cargoes identified as Kazakhstan's KEBCO grade. Those are shipments made by KazTransoil JSC that transit Russia for export through Novorossiysk and the Baltic port of Ust-Luga and are not subject to European Union sanctions or a price cap.

The Kazakh barrels are blended with crude of Russian origin to create a uniform export grade. Since Russia's invasion of Ukraine, Kazakhstan has rebranded its cargoes to distinguish them from those shipped by Russian companies.

* Asia

Observed shipments to Russia's Asian customers, including those showing no final destination, fell to 2.93 million barrels a day in the four weeks to Nov. 5, down from 3.03 million barrels a day in the period to Oct. 29. That's well below a peak

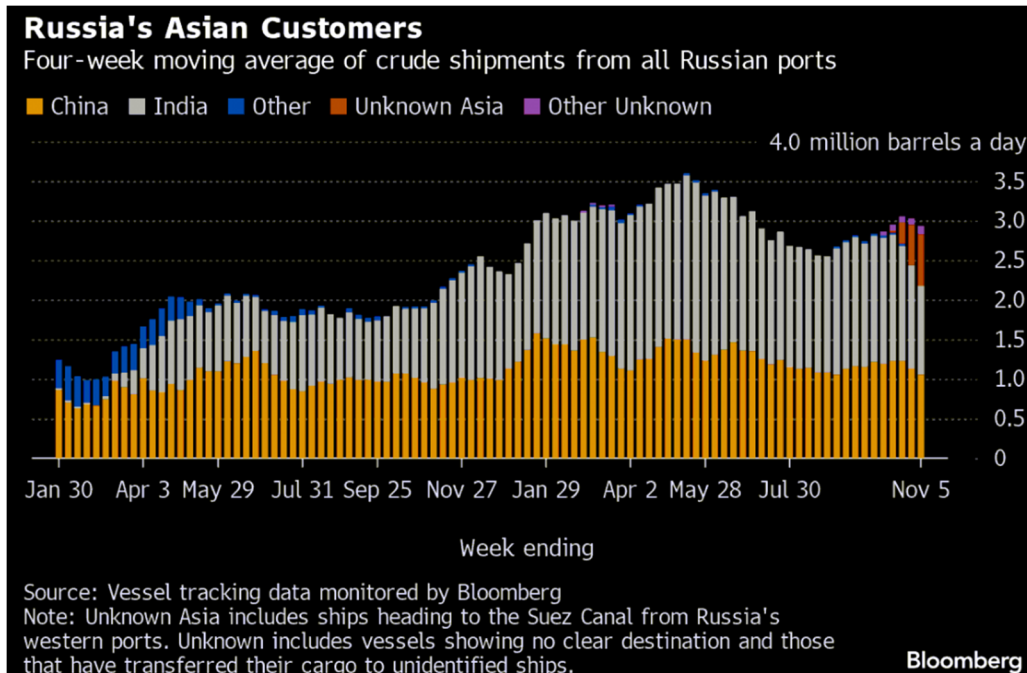
of about 3.6 million barrels a day seen in May.

About 1.1 million barrels a day of crude was shipped to China in the four weeks to Nov. 5, but that figure may rise once the destinations become apparent for more than 21 million barrels of crude on tankers that have yet to signal their final port of call. Shipments to China are similar to the volume on ships heading to India, but China's seaborne imports are supplemented by about 800,000 barrels a day of crude delivered directly from Russia by pipeline.

Flows to India are rising, but remain well below peak levels seen earlier this year. The volume on vessels showing Indian ports as their destination averaged 1.12 million barrels a day in the four weeks to Nov. 5.

However, the equivalent of about 655,000 barrels a day was on vessels signaling Port Said or Suez in Egypt, or are expected to be transferred from one ship to another off the South Korean port of Yeosu. Those voyages typically end at ports in India or China and show up in the chart below as "Unknown Asia" until a final destination becomes apparent.

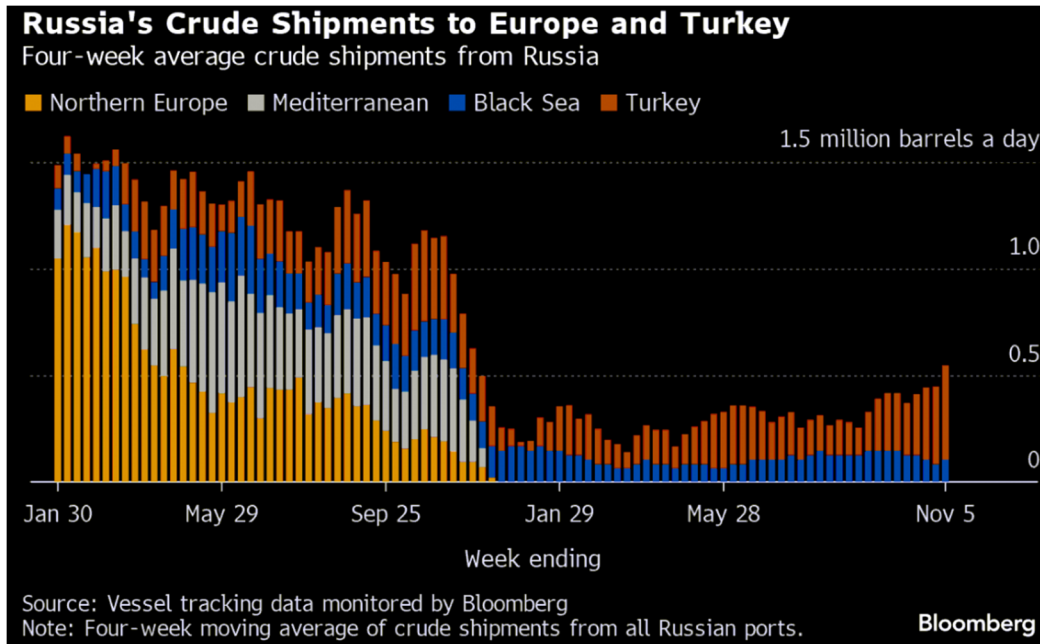
The "Other Unknown" volumes, running at about 103,000 barrels a day in the four weeks to Nov. 5, are those on tankers showing no clear destination. Most of those cargoes originate from Russia's western ports and go on to transit the Suez Canal, but some could end up in Turkey. Others could be moved from one vessel to another, with most such transfers now taking place in the Mediterranean, off the coast of Greece.



*** Europe and Turkey**

Russia's seaborne crude exports to European countries have collapsed since Moscow's troops invaded Ukraine in February 2022. A market that consumed about 1.5 million barrels a day of short-haul seaborne crude, coming from export terminals in the

Baltic, Black Sea and Arctic has been lost almost completely, to be replaced by long-haul destinations in Asia that are much more costly and time-consuming to serve. These figures do not include shipments to Turkey.



No Russian crude was shipped to northern European countries, or those in the Mediterranean in the four weeks to Nov. 5.

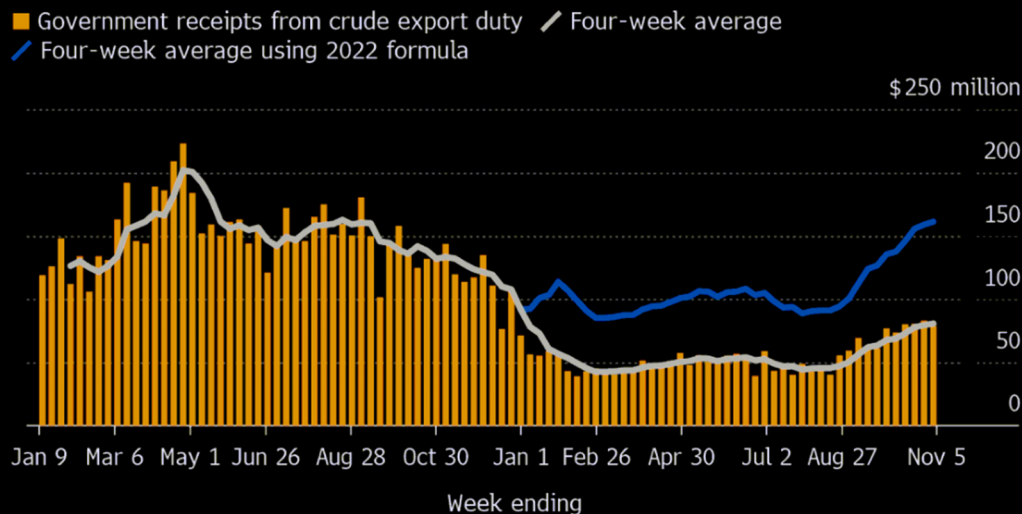
Flows to Bulgaria, now Russia's only European market for crude, recovered the previous week's loss to average about 104,000 barrels a day in the most recent four-week period. Exports to Turkey jumped to about 443,000 barrels a day in the four weeks to Nov. 5. Flows exceeded the 425,000 barrels a day seen in October 2022. The recent increase comes after Lukoil resumed deliveries to the Azerbaijani-owned Star refinery at Aliaga. Supplies to the plant are expected at about 100,000 barrels a day, equivalent to half of the refinery's capacity. Vessel-tracking data are cross-checked against port agent reports as well as flows and ship movements reported by other information providers including Kpler and Vortexa Ltd.

Export Revenue

Inflows to the Kremlin's war chest from its crude-export duty slipped to \$79 million in the seven days to Nov. 5, while four-week average income edged higher to \$80.6 million. The four-week average set a new high for the period since the start of January. The higher November duty rate helped to limit the drop in the Kremlin's oil revenue in the week to Nov. 5.

Export Receipts

The Kremlin's revenue from export duty on Russia's crude shipments



Source: Bloomberg calculation using data from the Russian Finance Ministry and vessel tracking data

Note: A new formula was introduced on Jan. 1, 2023, which halved export duty rates

Bloomberg

The duty rate for November has been set at \$3.57 a barrel, based on an average Urals price of \$83.35 during the calculation period between Sept. 15 and Oct. 14. That was about \$7.70 a barrel below Brent over the same period. November's duty rate sets another new high for the year.

Origin-to-Location Flows

The following table shows the number of ships leaving each export terminal.

A total of 31 tankers loaded 22.7 million barrels of Russian crude in the week to Nov. 5, vessel-tracking data and port agent reports show. That's down by about 2.8 million barrels from the previous week.

The number of shipments fell from all three of Russia's western ports, while flows from the Pacific were up by one cargo from the previous week.

Destinations are based on where vessels signal they are heading at the time of writing, and some will almost certainly change as voyages progress. All figures exclude cargoes identified as Kazakhstan's KEBCO grade.

In addition, two cargoes of KEBCO were loaded at Novorossiysk and one from Ust-Luga during the week.

NOTES
Note: This story forms part of a weekly series tracking shipments of crude from Russian export terminals and the export duty revenues earned from them by the Russian government. Weeks run from Monday to Sunday. The next update will be on Tuesday, Nov. 14.

Tankers Loading Crude at Russian Terminals

31 tankers loaded Russian crude in the week to November 5

Week ending	Nov. 5	Oct. 29	Oct. 22
Primorsk (Baltic)	8	9	11
Ust-Luga (Baltic)	5	7	6
Novorossiysk (Black Sea)	4	5	2
Murmansk (Arctic)	2	2	2
Kozmino (Pacific)	9	9	9
De Kastri (Pacific)	2	2	2
Prigorodnoye (Pacific)	1	0	1
Total	31	34	33

Source: Vessel tracking data monitored by Bloomberg

Note: Based on date of completion of cargo loading. Excludes ships loading cargoes identified as Kazakhstan's KEBCO grade.

Bloomberg

Note: All figures exclude cargoes owned by Kazakhstan's KazTransOil JSC, which transit Russia and are shipped from Novorossiysk and Ust-Luga as KEBCO grade crude.

If you are reading this story on the Bloomberg terminal, click here for a link to a PDF file of four-week average flows from Russia to key destinations.

--With assistance from Sherry Su.

To contact the author of this story:

Julian Lee in London at jlee1627@bloomberg.net

To contact the editor responsible for this story:

John Deane at jdeane3@bloomberg.net

To view this story in Bloomberg click here:

<https://blinks.bloomberg.com/news/stories/S3R7F8DWX2PS>

The Bab el-Mandeb Strait is a strategic route for oil and natural gas shipments



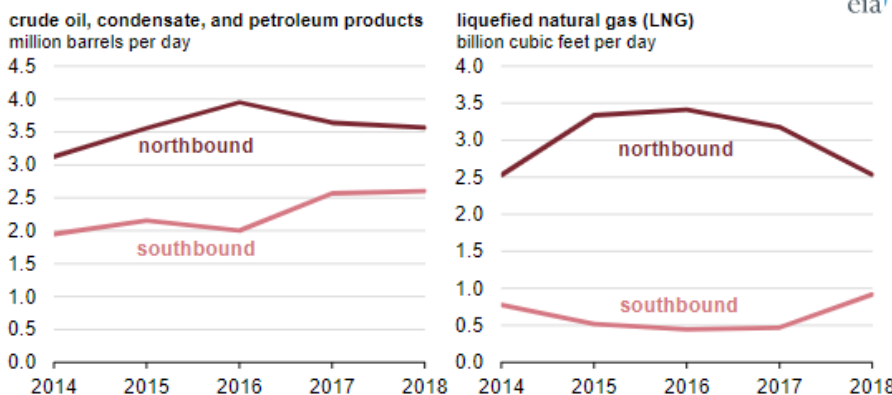
Source: U.S. Energy Information Administration

The Bab el-Mandeb Strait is a sea route chokepoint between the Horn of Africa and the Middle East, connecting the Red Sea to the Gulf of Aden and Arabian Sea. Most exports of petroleum and natural gas from the Persian Gulf that transit the [Suez Canal or the SUMED Pipeline](#) pass through both the Bab el-Mandeb and the [Strait of Hormuz](#).

[Chokepoints](#) are narrow channels along widely used global sea routes that are critical to global energy security. The Bab el-Mandeb Strait is 18 miles wide at its narrowest point, limiting tanker traffic to two 2-mile-wide channels for inbound and outbound shipments. Closure of the Bab el-Mandeb Strait could keep tankers originating in the Persian Gulf from transiting the Suez Canal or reaching the SUMED Pipeline, forcing them to divert around the southern tip of Africa, which would increase transit time and shipping costs.

In 2018, an estimated 6.2 million barrels per day (b/d) of crude oil, condensate, and refined petroleum products flowed through the Bab el-Mandeb Strait toward Europe, the United States, and Asia, an increase from 5.1 million b/d in 2014. Total petroleum flows through the Bab el-Mandeb Strait accounted for about 9% of total seaborne-traded petroleum (crude oil and refined petroleum products) in 2017. About 3.6 million b/d moved north toward Europe; another 2.6 million b/d flowed in the opposite direction mainly to Asian markets such as Singapore, China, and India.

Total petroleum and LNG flows through the Bab el-Mandeb Strait (2014-2018)



Source: U.S. Energy Information Administration, based on ClipperData, Inc; Suez Canal Authority; and International Group of LNG Importers (GIIGNL) using EIA conversion factors.
Note: CSV data

Before 2015, volumes of liquefied natural gas (LNG) passing through the Bab el-Mandeb Strait matched those passing through the Suez Canal because the Red Sea did not have any LNG infrastructure. In 2015, both Jordan and Egypt began importing small volumes of LNG into Red Sea ports, and these countries' imports of LNG peaked in 2016 at 1.4 billion cubic feet per day, 80% of which was delivered through the Bab el-Mandeb Strait.

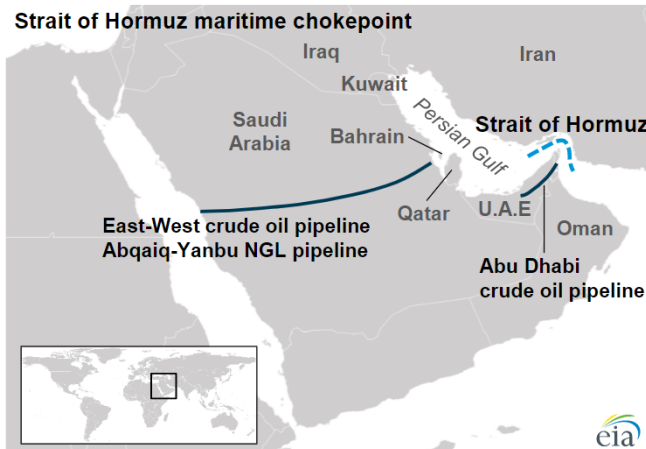
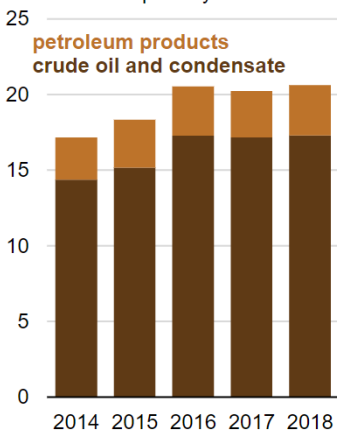
More recently, as new natural gas fields in Egypt have come online, the need for Egypt to import LNG has decreased. Like flows to Egypt, total northbound flows of LNG via the Bab el-Mandeb have also decreased since 2016 as northbound flows to other destinations have remained fairly constant.

JUNE 20, 2019

The Strait of Hormuz is the world's most important oil transit chokepoint

Crude oil, condensate, and petroleum products transported through the Strait of Hormuz

million barrels per day



Source: U.S. Energy Information Administration and ClipperData, Inc.

Source: U.S. Energy Information Administration and ClipperData, Inc.

The Strait of Hormuz, located between Oman and Iran, connects the Persian Gulf with the Gulf of Oman and the Arabian Sea. The Strait of Hormuz is the world's most important oil chokepoint because of the large volumes of oil that flow through the strait. In 2018, its daily oil flow averaged 21 million barrels per day (b/d), or the equivalent of about 21% of global petroleum liquids consumption. Chokepoints are narrow channels along widely used global sea routes that are critical to global energy security. The inability of oil to transit a major chokepoint, even temporarily, can lead to substantial supply delays and higher shipping costs, resulting in higher world energy prices. Although most chokepoints can be circumvented by using other routes that add significantly to transit time, some chokepoints have no practical alternatives.

Volumes of crude oil, condensate, and petroleum products transiting the Strait of Hormuz have been fairly stable since 2016, when international sanctions on Iran were lifted and Iran's oil production and exports returned to pre-sanctions levels. Flows through the Strait of Hormuz in 2018 made up about one-third of total global seaborne traded oil. More than one-quarter of global liquefied natural gas trade also transited the Strait of Hormuz in 2018.

Crude oil, condensate, and petroleum products transported through the Strait of Hormuz

million barrels per day

	2014	2015	2016	2017	2018
Total oil flows through Strait of Hormuz	17.2	18.4	20.6	20.3	20.7
Crude and condensate	14.4	15.2	17.3	17.2	17.3
Petroleum products	2.8	3.2	3.3	3.1	3.3
World maritime oil trade	56.4	58.9	61.2	62.5	N/A
World total petroleum and other liquids consumption	93.9	95.9	96.9	98.5	99.9
LNG flows through Strait of Hormuz (Tcf per year)	4.0	4.2	4.2	4.1	4.1

Source: U.S. Energy Information Administration, based on *Short-Term Energy Outlook* (June 2019), ClipperData, Saudi Aramco bond prospectus, Saudi Aramco annual reports, Saudi Ports Authority, International Group of Liquefied Natural Gas Importers, and U.N. Conference on Trade and Development

Note: LNG is liquefied natural gas; Tcf is trillion cubic feet

There are limited options to bypass the Strait of Hormuz. Only Saudi Arabia and the United Arab Emirates have pipelines that can ship crude oil outside the Persian Gulf and have the additional pipeline capacity to circumvent the Strait of Hormuz. At the end of 2018, the

total available crude oil pipeline capacity from the two countries combined was estimated at 6.5 million b/d. In that year, 2.7 million b/d of crude oil moved through the pipelines, leaving about 3.8 million b/d of unused capacity that could have bypassed the strait.

Operating pipelines that bypass the Strait of Hormuz, 2018

million barrels per day

Pipeline name	Country	Capacity	Throughput	Unused capacity
Petroline (East-West Pipeline)	Saudi Arabia	5.0	2.1	2.9
Abu Dhabi Crude Oil Pipeline	United Arab Emirates	1.5	0.6	0.9
Abqaiq-Yanbu Natural Gas Liquids Pipeline	Saudi Arabia	0.3	0.3	0.0
TOTAL		6.8	3.0	3.8

Source: U.S. Energy Information Administration, based on ClipperData, Saudi Aramco bond prospectus (April 2019)

Note: Unused capacity is defined as pipeline capacity that is not currently used but can be readily available.

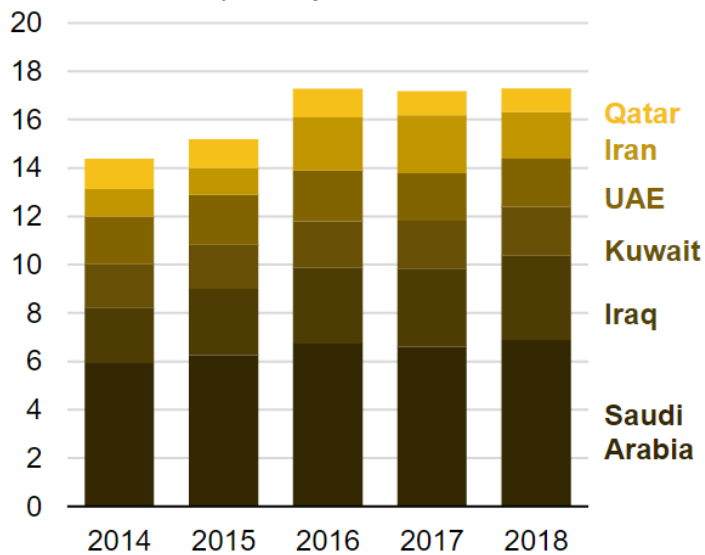
Based on tanker tracking data published by [ClipperData](#), Saudi Arabia moves the most crude oil and condensate through the Strait of Hormuz, most of which is exported to other countries (less than 0.5 million b/d transited the strait in 2018 from Saudi ports in the Persian Gulf to Saudi ports in the Red Sea).

EIA estimates that 76% of the crude oil and condensate that moved through the Strait of Hormuz went to Asian markets in 2018. China, India, Japan, South Korea, and Singapore were the largest destinations for crude oil moving through the Strait of Hormuz to Asia, accounting for 65% of all Hormuz crude oil and condensate flows in 2018.

Volume of crude oil and condensate transported through the Strait of Hormuz

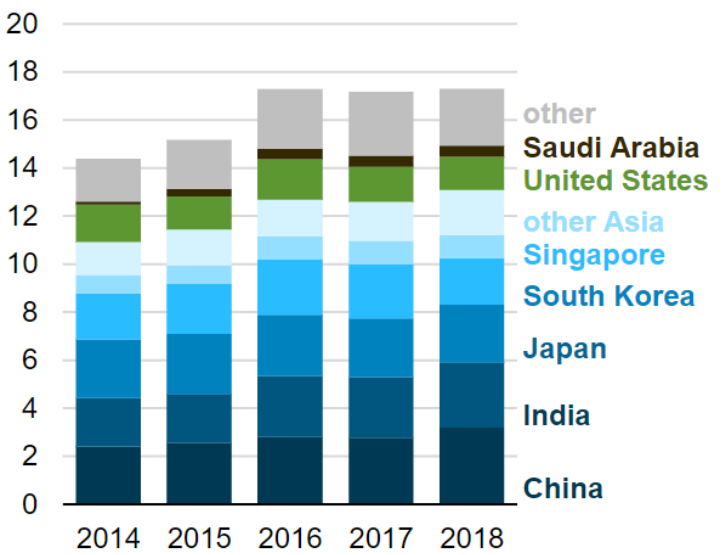
by origin

million barrels per day



by destination

million barrels per day



Source: U.S. Energy Information Administration, based on tanker tracking data published by ClipperData, Inc.

In 2018, the United States imported about 1.4 million b/d of crude oil and condensate from Persian Gulf countries through the Strait of Hormuz, accounting for about 18% of total U.S. crude oil and condensate imports and 7% of total U.S. petroleum liquids consumption.

Principal contributor: Justine Barden

Tags: [liquid fuels](#), [crude oil](#), [oil/petroleum](#), [map](#)

<https://ina.iq/eng/29719-abdul-ghani-confirms-resuming-production-and-export-from-kurdistans-fields.html>

Abdul Ghani confirms resuming production and export from Kurdistan's fields



- Today, 10:28

[+A](#) [-A](#)

INA- Baghdad

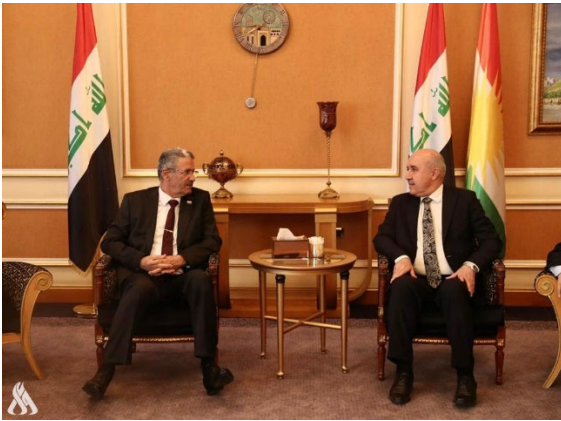
Oil Minister Hayyan Abdul Ghani said on Sunday keenness to resume production and export from Kurdistan's fields.

A statement by the Ministry of Oil received by the Iraqi News Agency (INA) said that "Deputy Prime Minister for Energy Affairs and Oil Minister Hayyan Abdul Ghani, arrived in the Kurdistan region, and was received by the Minister of Natural Resources in the region Kamal Mohammed Saleh and a number of officials."

Abdul Ghani said that "the visit comes as a continuation of the talks that took place in Baghdad to **discuss** the resumption of production operations and export of oil from the region's fields because of the importance of this in providing the federal budget with financial revenues."

Abdul Ghani pointed to "**the government's keenness to find appropriate mechanisms to resume production and export of oil from the region's fields, stressing that he will meet with a number of officials in the region.**"

Oil Minister from Erbil: We are keen to resume production and export from the region's fields



Today, 09:49

Baghdad - Oil Minister Hayyan Abdul Ghani stressed on Sunday the keenness to resume production and export from the region's fields.

According to a statement by the Ministry of Oil received by the Iraqi News Agency (INA), "Deputy Prime Minister for Energy Affairs and Oil Minister Hayyan Abdul Ghani, arrived in the Kurdistan region, and was received by the Minister of Natural Resources in the region Kamal Muhammad Saleh and a number of officials."

Abdul Ghani said: "The visit comes as a continuation of the talks that took place in Baghdad to **discuss** the resumption of production operations and the export of oil from the region's fields because of the importance of this in providing the federal budget with financial revenues."

Abdul Ghani pointed to "the government's keenness to find appropriate mechanisms to resume production and export of oil from the region's fields, stressing that he will meet with a number of officials in the region."

Iraqi oil minister to visit Erbil Sunday for talks on resuming exports

15 hours ago [Rudaw](#)



ECONOMY

Also in **ECONOMY** oil minister. Photo: Abdul Ghani's office

[Iraqi, KRG ministers discuss resuming Kurdish oil exports in Erbil](#)

ERBIL, Kurdistan Region - Iraqi Oil Minister Hayyan Abdul Ghani will visit Erbil on Sunday to meet with the Kurdistan Region's natural resources minister for **discussions about resuming exports of Kurdish oil.**

Kurdistan Regional Government (KRG) spokesperson Peshawa Hawramani said that Abdul Ghani's visit comes following an agreement between Kurdistan Region Prime Minister Masrour Barzani and Iraqi Prime Minister Mohammed Shia' al-Sudani for a federal government delegation to visit Erbil and discuss resolving the outstanding oil issues.

"The main topic of the meetings will be the issue of the cost of oil production, and the procedures for resuming the Region's oil exports," wrote Hawramani on X (formerly Twitter).

The federal government delegation will spend two or three days in the Kurdistan Region capital, he added.

Exports of Kurdistan Region's oil through the Iraq-Turkey pipeline have been **halted since March 23** when a Paris-based arbitration court ruled in favor of Baghdad against Ankara, saying Turkey had breached a 1973 agreement by allowing Erbil to begin independent oil exports in 2014.

Erbil and Baghdad have had multiple rounds of talks about restarting the exports. **Kurdistan Region President Nechirvan Barzani last week said the problem now is technical rather than political.**

Areas where they still need to reach an agreement include existing contracts between the KRG and oil companies, according to Barzani.

Representatives of the Iraqi government and oil companies operating in the Kurdistan Region on Wednesday held their first meeting in Dubai, stressing the need to resume full oil production and exports "under mutually acceptable commercial terms," the oil producers association stated.

Control over oil exports and revenues has long been a source of friction between Erbil and Baghdad.

“China will either need to continue running its refineries and building stock at low margins or that there will be a drop in runs and that will manifest itself into lower appetite for crude. And that’s highly visible since China is such a significant global importer of crude oil. I think those are the signs of softness that the market’s been detecting.” Mike Muller, Head Vitol Asia.



SAF Group created transcript of comments by Mike Muller (Head, Vitol Asia) to Sean Evers (Founder & Managing Partner of Gulf Intelligence) on Gulf Intelligence’s Daily Energy Markets podcast on Nov 5, 2023.

https://twitter.com/gulf_intel/status/1721052973919506582

Items in “italics” are SAF Group created transcript.,

At 11:45 min mark, Evers “... *what’s your outlook now as China moves in to the winter peak demand window and the China new year coming up in January?*” Muller “... *we have to remind ourself this is the time of year when demand in Asia peaks but demand in the western hemisphere tends to ebb to a low because of less driving activity, winter conditions, etc. But what we see going on in China is quite interesting because the fuel sale data on a weekly basis does not really show evident signs of economic weakness. Diesel sales are in line with expectations. Jet demand is indeed robust, exceeding expectations. Singapore Airlines just laid on five extra flights a week from Singapore to China, they don’t tend to do that unless they’re confident that there will be passengers in their seats. And it’s only really gasoline that has shown a steeper than expected dip in October but there is a reason for that – there was a public holiday Golden Week. But the one thing that has happened to China that is quite notable is that refining margins have dropped to the lowest levels we have seen in a very long time and certainly the lowest level this year. In some cases, bordering on the negative. So why are Chinese margins negative. I think the explanation is that runs in the third quarter, which were a million barrels a day more perhaps than same time last year when we still had Covid, so always difficult to compare. But they were likely a response to high demand expectations that were possibly unreasonably high and, at the same time, there was a bit of destocking going on. And as a consequence now, we’ve seen all this translate into higher than expected stocks. And if the stocks are unseasonably high, the only consequence is that you push domestic prices down, you push refining margins down and you force run cuts. So it goes without saying that China will either need to continue running its refineries and building stock at low margins or that there will be a drop in runs and that will manifest itself into lower appetite for crude. And that’s highly visible since China is such a significant global importer of crude oil. I think those are the signs of softness that the market’s been detecting.*

Prepared by SAF Group <https://safgroup.ca/news-insights/>

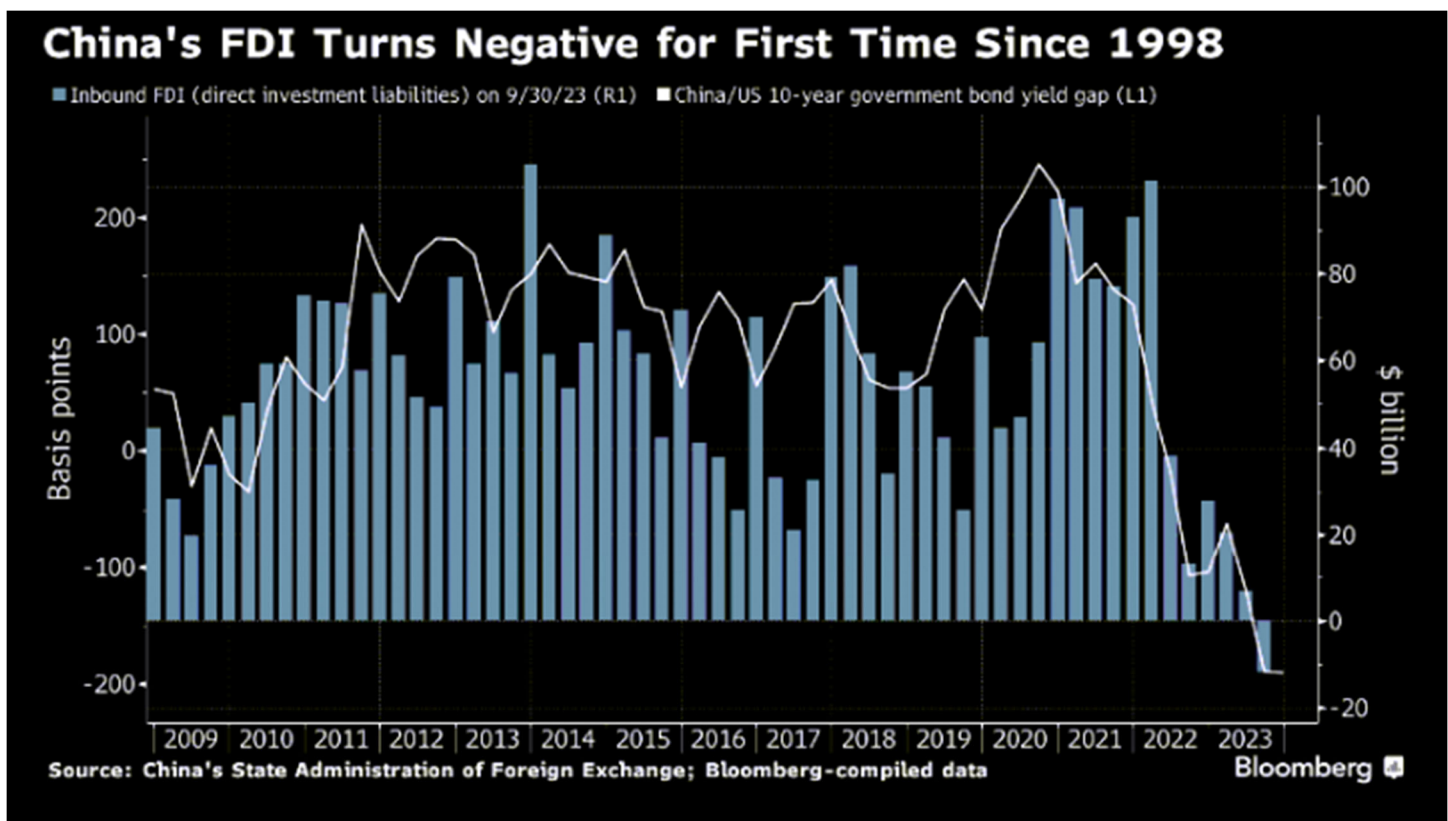
By Bloomberg News

(Bloomberg) -- China is struggling in its attempt to lure foreigners back as data shows more direct investment flowing out of the country than coming in, suggesting companies may be diversifying their supply chains to reduce risks.

Direct investment liabilities in the country's balance of payments have been slowing in the last two years. After hitting a near-peak value of more than \$101 billion in the first quarter of 2022, the gauge has weakened nearly every quarter since. It fell \$11.8 billion in the July-to-September period, marking the first contraction since records started in 1998.

"It's concerning to see net outflows where China's doing its best at the moment to try and open — certainly the manufacturing sector — to new inflows," said Robert Carnell, regional head of research for Asia-Pacific at ING Groep NV.

"Maybe this is the beginning of a sign that people are just increasingly looking at alternatives to China for investment."



The Chinese government has embarked on a big push in recent months to lure foreign investment back to the country. On Wednesday, the Ministry of Commerce asked local governments to clear discriminatory policies facing foreign companies in a bid to stabilize investment confidence.

It cited the need to ensure subsidies for new energy vehicles are not limited to domestic brands as one example. In

some industries, foreign firms wait longer and are subject to more rigorous reviewing process when applying for licenses. In August, the internet regulator met with executives from dozens of international firms to ease concerns about new data rules. The government has also pledged to offer overseas companies better tax treatment and make it easier for them to obtain visas.

But Beijing's pledges have rung hollow for some firms, with foreign business groups decrying "promise fatigue" amid skepticism about whether meaningful policy support is forthcoming. They also have incentive to repatriate earnings overseas because of the wide gap in interest rates between China and the US, which may be pushing them to seek higher returns elsewhere.

The FDI outflows are adding pressure on the onshore yuan, which has hit the weakest level since 2007 earlier this year. China's benchmark 10-year government bond yield is trading at 191 basis points below that of comparable US Treasuries, versus an average premium of about 100 basis points over the past decade.

"Decoupling" or "derisking" from China is an important reason for the declining FDI data reported by the State Administration of Foreign Exchange, according to Louis Kuijs, chief economist for Asia Pacific at S&P Global Ratings. Concerns about geopolitics and US-China relations were cited as major reasons for foreign corporate pessimism in a survey published in September by the American Chamber of Commerce in Shanghai. Companies have cited various countries in the region as destinations for their supply chain shifts. Japan, India and Vietnam were floated as "top destinations gaining more attraction" in a spring survey of companies by UBS Group AG. A March AmCham report pointed to developing Asia and the US as places where members were considering moving capacity to from China.

Widespread Consequences

The lack of investment among global firms in China may have far reaching effects on the world's second-largest economy, especially as it tries counter US curbs on access to advanced technology.

Aside from geopolitical risks, companies had also been pulling back on investment in China last year as the country rolled out pandemic restrictions. While those curbs have been removed, firms are still contending with other challenges from rising manufacturing costs in China and regulatory hurdles as Beijing scrutinizes activity at foreign corporations due to national security concerns.

"Some of the most damaging things have been the abrupt regulatory changes that have taken place," said Carnell, pointing to this year's anti-espionage campaign, which resulted in some firms having their offices raided by local authorities.

"Once you damage the sort of perception of the business

environment, it's quite difficult to restore trust. I think it will take some time."

*T

=====
Read More About Foreign Firms in China:
=====

Why Global Investors Are Unloading China Stocks:

QuickTakeWestern Firms in China Are Historically Glum About Outlook
US Due Diligence Firm Mintz Staff Detained in China, NYT Reports
Majority of US Firms Don't See China as Priority for Investment
US Companies in China Grow More Pessimistic About Bilateral Ties

*T

Foreign companies make up less than 3% of the total number of corporations in China, but contribute to 40% of its trade, more than 16% of tax revenue and almost 10% of urban employment, state media has reported. They've also been key to China's technological development, with foreign investment in the country's high-tech industry growing at double-digit rates on average since 2012, according to the official Xinhua News Agency.

"A decline in trade and investment links with advanced economies will be a particularly significant headwind for a catching up economy such as China, weighing on productivity growth and technological progress," Kuijs said.

Limited Optimism

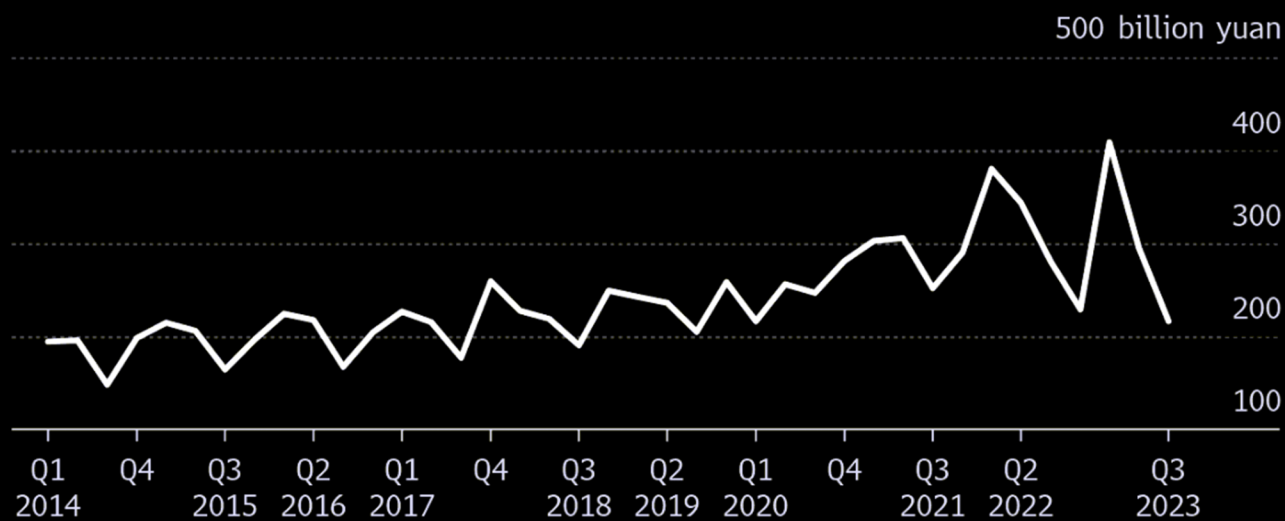
There are some reasons for optimism in the coming weeks and months. President Joe Biden is set to meet with his Chinese counterpart Xi Jinping on the sidelines of the Asia-Pacific Economic Cooperation summit in San Francisco later this month, which may help stabilize strained bilateral ties.

It would be helpful if increased communication yielded some "more stability and clarity on the geopolitical front," Kuijs said, though he added it is unlikely the US will meaningfully change its policy stance.

Another Measure of FDI in China Holds Up Better Than SAFE's

Still, investment actually utilized in third quarter was less than year ago

Quarterly actually-utilized FDI



Source: Bloomberg calculations based on data from China's Ministry of Commerce.

Bloomberg

Some economists also argue that FDI will stabilize once the China-US yield differential narrows. They also point to data on actually utilized FDI published by the Ministry of Commerce, which holds up better the SAFE data: Those figures show FDI fell 8.4% in the first nine months of this year from the same time period in 2022, to 920 billion yuan.

"I think things are not as bad as they seem from the SAFE data, otherwise policy tightening for China's capital account management would be witnessed," said Bruce Pang, chief economist for Greater China at Jones Lang LaSalle Inc.

In any case, China still needs to convince investors that they are welcome in the country.

"The more that it can offer a stable, conducive policy environment, the better it would be for FDI," Kuijs said. "That includes minimizing the impact of national security-related measures on the economy and sentiment."

--With assistance from Wenjin Lv and Evelyn Yu.

To contact Bloomberg News staff for this story:

John Liu in Beijing at jliu42@bloomberg.net;

Fran Wang in Beijing at fwang315@bloomberg.net

To contact the editors responsible for this story:

Jenni Marsh at jmarsh74@bloomberg.net

Jill Disis, Jasmine Ng

To view this story in Bloomberg click here:

<https://blinks.bloomberg.com/news/stories/S3SYJMT0AFB4>



Air Passenger Market Analysis

September 2023

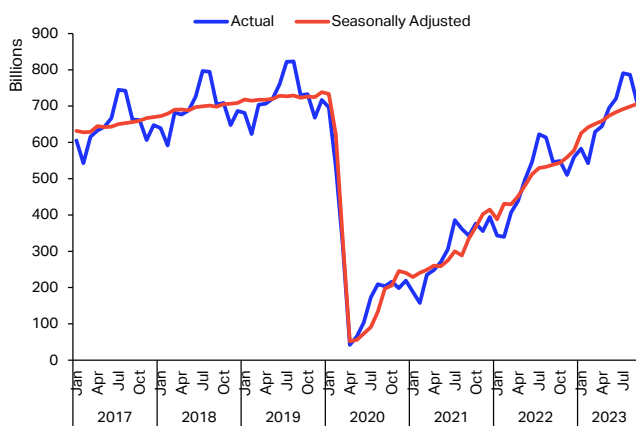
Robust third quarter concludes with strong passenger growth

- In September, the industry showed continued strength in the air travel recovery, with revenue passenger-kilometers (RPKs) growing 30.1% year-on-year (YoY), reaching 97.3% of 2019 levels.
- Available seat-kilometers (ASKs) rebounded by 28.8% YoY, recovering to 96.5% of pre-pandemic capacity. Industry-wide passenger load factors rose to 82.6%.
- Domestic passenger traffic achieved 28.3% annual growth in September, and surpassed 2019 RPKs by 5.0%. International passenger traffic resumed recovery, with international RPKs increasing by 31.2% compared to the same month a year ago, reaching 93.1% of pre-pandemic levels.
- Despite these positive trends, slowing domestic demand and ticket sales highlight potential challenges in the industry's recovery.

September showed continued strength in demand...

Across the industry, revenue passenger-kilometers (RPKs) grew 30.1% year-on-year (YoY) in September, bringing them closer to 2019 traffic levels. Seasonally-adjusted data indicate a steady expansion in RPKs, showing a 1.0% month-on-month (MoM) increase over August's numbers (**Chart 1**). Global RPKs are now within 2.7% of 2019 levels, marking substantial progress towards full recovery. Airlines in North America, Latin America and the Middle East have not only achieved full recovery in traffic volumes but have also experienced further growth in passenger traffic.

Chart 1 – Global air passengers, revenue-passenger kilometers (RPKs), billions per month

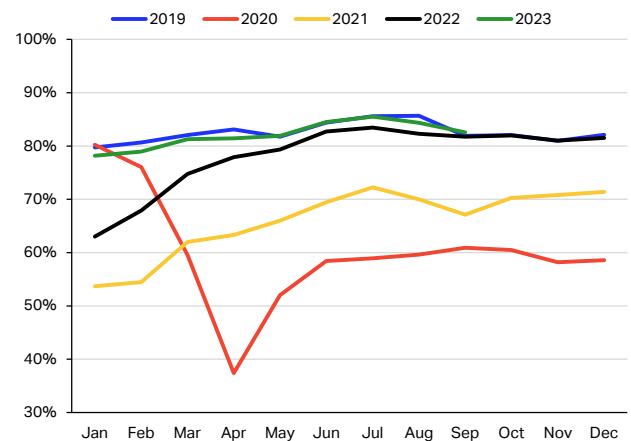


Sources: IATA Sustainability and Economics, IATA Monthly Statistics

Industry-wide capacity, which is measured in available seat-kilometers (ASKs), grew 28.8% YoY in September

and recovered to 96.5% of the levels seen in 2019. The passenger load factor (PLF) for the entire industry continued to trend near pre-Covid levels and is currently 0.7 percentage points (ppts) higher than it was a year ago (**Chart 2**). While there have been variations in results among different regions, the latest data show that airlines across the industry have fully recovered load factors.

Chart 2 – Industry-wide passenger load factors, % share of available seat-kilometers (ASKs)



Sources: IATA Sustainability and Economics, IATA Monthly Statistics

...helped by domestic and international traffic growth

In September, the industry continued its ascent to new heights in domestic passenger traffic, with RPKs growing 28.3% YoY and surpassing September 2019 levels by 5.0%. However, this performance was not as

Air passenger market in detail - September 2023

	World share ¹	September 2023 (% year-on-year)				September 2023 (% ch vs the same month in 2019)			
		RPK	ASK	PLF (%-pt) ²	PLF (level) ³	RPK	ASK	PLF (%-pt) ²	PLF (level) ³
TOTAL MARKET	100.0%	30.1%	28.8%	0.8%	82.6%	-2.7%	-3.5%	0.7%	82.6%
International	58.1%	31.2%	29.2%	1.3%	83.8%	-6.9%	-9.2%	2.1%	83.8%
Domestic	41.9%	28.3%	28.2%	0.1%	80.7%	5.0%	7.1%	-1.6%	80.7%

¹% of industry RPKs in 2022

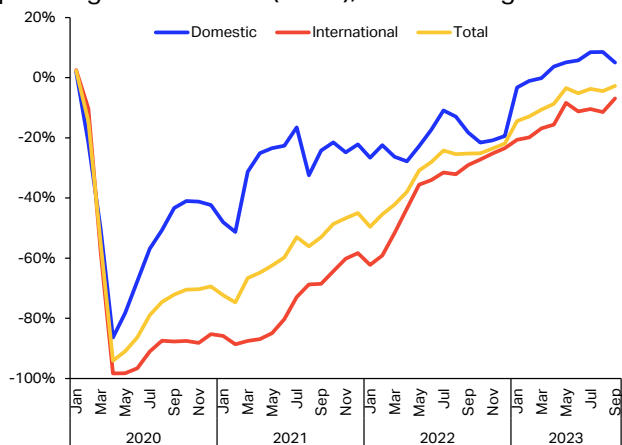
²Change in load factor

³Load factor level

strong as the growth witnessed in recent months when compared to 2019 numbers (**Chart 3**).

International traffic resumed recovery in September, after several months of stagnation. Growing 29.2% over September 2022 numbers, international RPKs reached 93.1% of pre-pandemic levels.

Chart 3 – Global domestic and international revenue passenger-kilometers (RPKs), YoY% change vs. 2019



Sources: IATA Sustainability and Economics, IATA Monthly Statistics

Domestic air travel recovery eased in PR China...

China's domestic RPKs more than doubled with 168.7% YoY growth in September, exceeding 2019 levels by 8.1%. The strong annual growth, however, is partly due to a low base in September 2022 when travel restrictions were reintroduced in some Chinese provinces, leading to significant traffic contractions (**Chart 4**).

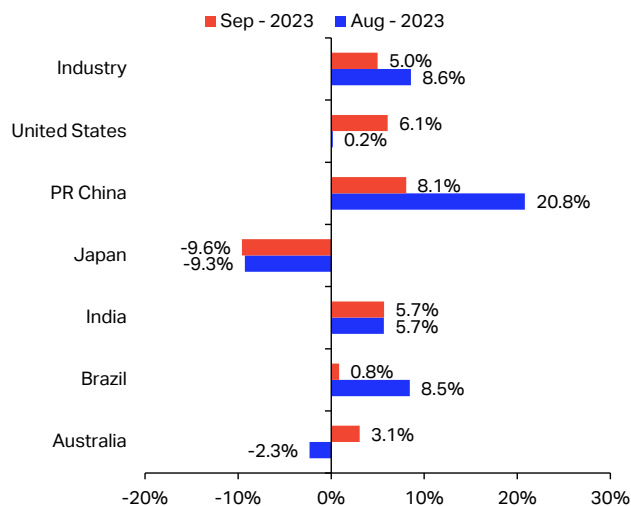
Seasonally adjusted data through September 2023 show that the growth momentum in China's domestic traffic is now tapering off, contributing to the industry-wide slowdown in the recovery of domestic traffic. ASKs remained 17.6% higher than in 2019, resulting in a market load factor lower than the 2019 level.

... while other major domestic markets stabilized

With the exception of Japan, all monitored domestic markets experienced growth in September, compared to their traffic levels in 2019 (**Chart 4**). In August, Japan's air system faced challenges due to typhoons and saw a year-on-year contraction in ASKs. However, RPKs and ASKs rebounded in September by 19.9% and 4.3% YoY, respectively. Domestic traffic in Japan is now at 90.4% of its September 2019 levels, approaching full recovery.

In India, domestic traffic sustained rapid growth in September, with a 17.2% annual increase in RPKs and a 5.7% rise over 2019 levels. Australia's traffic remained close to pre-pandemic numbers, growing by 3.1% over September 2019 levels, driven by strong traffic growth compared to the past seasonal patterns of September (**Chart 4**).

Chart 4 – Domestic RPK growth by market, YoY% change vs. 2019



Sources: IATA Sustainability and Economics, IATA Monthly Statistics

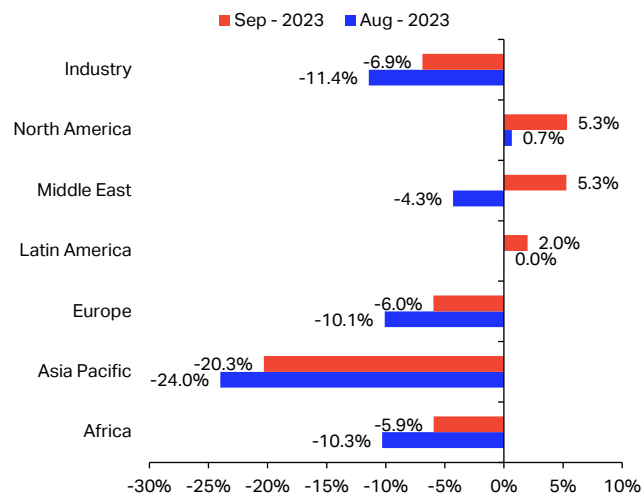
In the US, domestic RPKs grew by 5.5% YoY and by 6.1% over pre-Covid levels in September, as a positive trend in seasonally adjusted terms persisted. Brazil saw 5.0% annual growth in passenger traffic, surpassing 2019 levels by 0.8% (**Chart 4**).

International traffic growth picked up pace...

In September, total international RPKs increased 1.0% MoM, marking a faster pace of growth compared to the previous months of the peak season. While airlines in North America, Latin America and the Middle East reached their pre-pandemic traffic levels this month, Asia Pacific carriers nearly doubled their international RPKs compared to the previous year.

Airlines in the Asia Pacific region maintained their fast recovery, with international RPKs growing by 92.6% YoY in September. This brought traffic for the region's carriers within 20.3% of their 2019 levels (**Chart 5**). The significant RPK growth outpaced the annual increase in ASKs, resulting in the region's PLF reaching 82.5%, 4.5 ppts above the previous year's levels and 4.0 ppts higher than 2019 levels.

Chart 5 – International RPK growth by airline region of registration, YoY% change versus 2019



Sources: IATA Sustainability and Economics, IATA Monthly Statistics

African and Middle Eastern carriers both experienced robust growth in their international passenger traffic, with their RPKs increasing 28.1% and 26.6% above September 2022 levels, respectively (Chart 5). Both regions outperformed their pre-pandemic PLFs. Middle East carriers, alongside Latin American and North American airlines, also surpassed their 2019 international RPK levels.

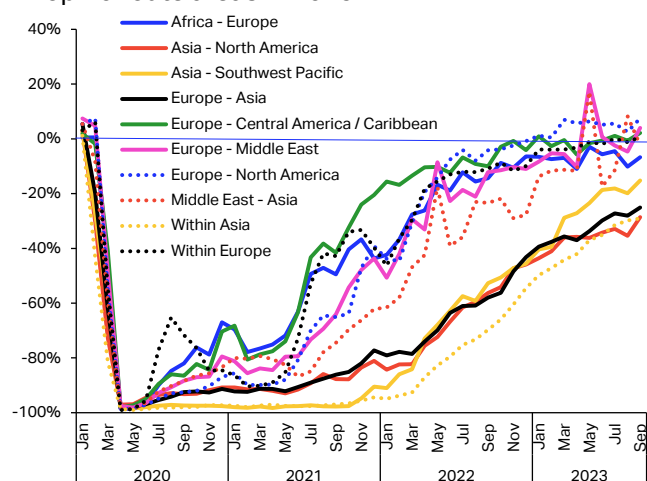
Latin American carriers expanded their recovery beyond pre-Covid levels in September, with a remarkable 26.8% annual growth in international RPKs. Airlines in North America continued to advance their recovery, achieving an 18.9% growth in international RPKs compared to the previous year and exceeding September 2019 levels for the sixth month in row, now with a substantial margin of 5.3% (Chart 5).

Apart from airlines registered in Africa, international RPKs outpaced ASKs, leading to an increase in the international PLF across the board by 1.3 ppts compared to the September 2022 level, and a 2.1 ppt improvement over the September 2019 PLF.

... with the recovery in international traffic broadly reflected across major route areas

Traffic performance for major route areas showed an increase in traffic across most monitored routes in September, reversing the trend observed in August when international RPKs saw a slight contraction in their recovery to 2019 levels. Apart from the Middle East-Asia route area, routes that had fully recovered to pre-pandemic levels expanded their recovery in September (Chart 6).

Chart 6 – International RPKs, YoY% change vs. 2019 – Top 10 route areas in 2019



Sources: IATA Sustainability and Economics, IATA Monthly Statistics

The Europe-North America route area's RPKs exceeded 2019 levels by 7.5%. Europe-related routes generally performed well, with Europe-Central America/Caribbean, Europe-Middle East, and Within Europe reaching 2019 levels in September (Chart 6). Route areas that remained below 2019 levels also

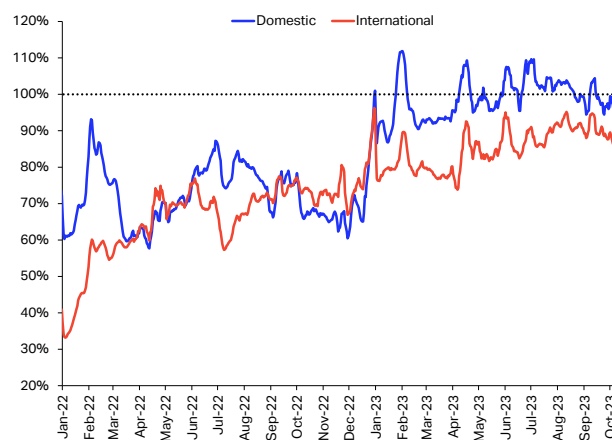
advanced their RPK recovery, with Asia-North America experiencing the largest improvement of 6.8 ppts, bringing the route area's traffic to be within 28.6% of full recovery.

Ticket sales continued to signal weakening global demand for air travel

In September, industry-wide traffic recovered to 97.3% of 2019 levels, despite a slowdown in domestic markets. However, recent developments in ticket sales data continue to signal declining demand for domestic travel. Over the past weeks, the decrease in passenger demand in China has been the main contributor to the global trend in domestic demand. The latest data suggest that total domestic passenger traffic growth could remain flat or decline as pent-up tourism in China cools down, impacting industry-wide and regional numbers (Chart 7).

International ticket sales steadily increased over the third quarter but now follow a similar downward trend as domestic sales. Despite the elevated risks posed by high consumer prices and a slowdown in China, air travel demand could remain resilient to these headwinds in the coming months.

Chart 7 – Ticket sales by purchase date, 7-day moving average - % share of 2019 levels



Sources: IATA Sustainability and Economics, DDS

Air passenger market in detail - September 2023

	World share ¹	September 2023 (% year-on-year)				September 2023 (% ch vs the same month in 2019)			
		RPK	ASK	PLF (%-pt) ²	PLF (level) ³	RPK	ASK	PLF (%-pt) ²	PLF (level) ³
TOTAL MARKET	100.0%	30.1%	28.8%	0.8%	82.6%	-2.7%	-3.5%	0.7%	82.6%
Africa	2.1%	24.6%	27.2%	-1.5%	73.1%	-4.6%	-5.4%	0.6%	73.1%
Asia Pacific	22.1%	87.9%	75.5%	5.3%	80.0%	-10.1%	-9.9%	-0.2%	80.0%
Europe	30.8%	13.8%	12.8%	0.8%	86.0%	-3.6%	-3.0%	-0.6%	86.0%
Latin America	6.4%	15.7%	14.3%	1.1%	83.9%	4.7%	2.3%	1.9%	83.9%
Middle East	9.8%	26.1%	22.8%	2.2%	81.6%	5.2%	-3.3%	6.6%	81.6%
North America	28.8%	9.7%	12.5%	-2.1%	83.0%	5.4%	5.0%	0.3%	83.0%
International	58.1%	31.2%	29.2%	1.3%	83.8%	-6.9%	-9.2%	2.1%	83.8%
Africa	1.8%	28.1%	29.9%	-1.0%	72.6%	-5.9%	-6.6%	0.5%	72.6%
Asia Pacific	8.9%	92.6%	82.1%	4.5%	82.5%	-20.3%	-24.2%	4.0%	82.5%
Europe	26.5%	15.7%	14.9%	0.6%	85.5%	-6.0%	-4.5%	-1.4%	85.5%
Latin America	2.8%	26.8%	24.7%	1.4%	85.8%	2.0%	-1.8%	3.2%	85.8%
Middle East	9.4%	26.6%	23.7%	1.9%	81.8%	5.3%	-3.2%	6.6%	81.8%
North America	8.7%	18.9%	18.0%	0.6%	85.6%	5.3%	2.4%	2.4%	85.6%
Domestic	41.9%	28.3%	28.2%	0.1%	80.7%	5.0%	7.1%	-1.6%	80.7%
Dom. Australia ⁴	1.0%	7.2%	11.7%	-3.6%	84.7%	3.1%	0.3%	2.3%	84.7%
Domestic Brazil ⁴	1.5%	5.0%	3.9%	0.8%	81.4%	0.8%	1.3%	-0.4%	81.4%
Dom. China P.R. ⁴	6.4%	168.7%	135.2%	9.6%	76.7%	8.1%	17.6%	-6.8%	76.7%
Domestic India ⁴	2.0%	17.2%	13.0%	3.1%	84.7%	5.7%	7.0%	-1.0%	84.7%
Domestic Japan ⁴	1.2%	19.9%	4.3%	9.7%	74.9%	-9.6%	-6.2%	-2.8%	74.9%
Domestic US ⁴	19.2%	5.5%	10.4%	-3.8%	81.3%	6.1%	7.7%	-1.3%	81.3%

¹% of industry RPKs in 2022

²Change in load factor

³Load factor level

⁴Note: the six domestic passenger markets for which broken-down data are available account for approximately 31.3% of global total RPKs and 74.6% of total domestic RPKs

Note: The total industry and regional growth rates are based on a constant sample of airlines combining reported data and estimates for missing observations. Airline traffic is allocated according to the region in which the carrier is registered; it should not be considered as regional traffic.

IATA Sustainability & Economics

economics@iata.org

9 November 2023

Get the data

Access data related to this briefing through IATA's Monthly Statistics publication:

www.iata.org/monthly-traffic-statistics

IATA Economics Consulting

To find out more about our tailored economics consulting solutions, visit:

www.iata.org/consulting

Terms and Conditions for the use of this IATA Economics Report and its contents can be found here: www.iata.org/economics-terms

By using this IATA Economics Report and its contents in any manner, you agree that the IATA Economics Report Terms and Conditions apply to you and agree to abide by them. If you do not accept these Terms and Conditions, do not use this report.



Air Cargo Market Analysis

September 2023

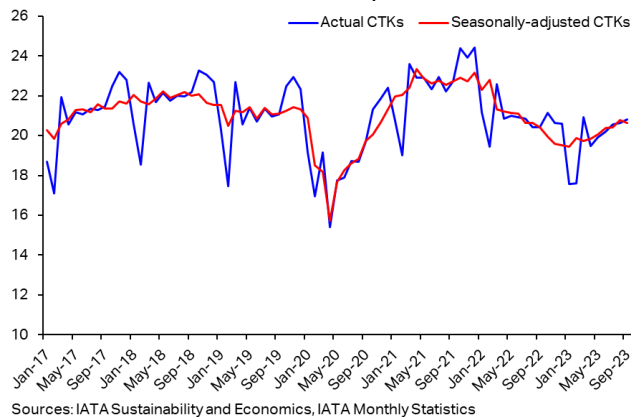
Modest uptrend in cargo volumes amid soft demand drivers

- Industry cargo tonne-kilometers (CTKs) were up 1.9% year-on-year (YoY) in September. Compared to the pre-Covid level, global CTKs remained 1.3% lower.
- Air cargo capacity, measured in available cargo tonne-kilometers (ACTKs), increased by 12.1% YoY, driven by the strong growth of international belly cargo capacity from airlines in the Asia Pacific, Latin America, and the Middle East regions.
- Global trade experienced the fifth annual decline in a row, falling 3.8% in August. This slump in trade was also reflected in the slowdown in global new export orders PMIs and among all the major economies.
- Inflation in the US remained flat in September, while the trend in the producer prices was mixed. The recent surge in global jet fuel prices led to an increase in air cargo yields for the first time since November 2022.
- Airlines in the Asia Pacific, Latin America, Middle East, and North America regions all registered annual growth in their international CTKs in September, with Asia Pacific airlines seeing the strongest growth.

Cargo maintained moderate growth in September

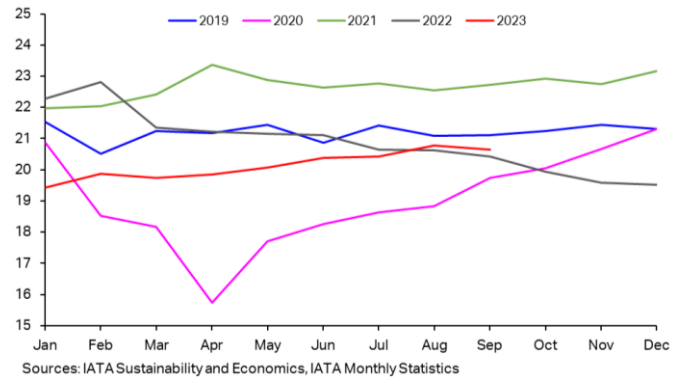
Global air cargo demand continued its year-on-year (YoY) growth in September. Cargo tonne-kilometers (CTKs) recorded 20.8 billion this month, increasing by 1.9% compared to September 2022 levels. This YoY growth is 0.7 percentage points (ppts) higher than in August. Seasonally adjusted (SA) CTKs stood at 20.6 billion, also 1.1% above the 2022 level. However, industry CTKs remained 1.3% lower compared to the pre-pandemic level (**Chart 1**). The expanded positive annual growth is also a result of a lower baseline in 2022.

Chart 1 – Global CTKs (billions per month)



Despite the annual growth in SA CTKs in September, cargo traffic was 0.6% lower compared to levels in the previous month (**Chart 2**). This is the first time since March that SA CTKs saw a month-on-month decline.

Chart 2 – Seasonally adjusted monthly CTKs (billions)



Sources: IATA Sustainability and Economics, IATA Monthly Statistics

Capacity continued to expand at fast rate

Industry capacity, measured by available cargo tonne-kilometers (ACTKs), grew by 12.1% YoY in September (**Chart 3**). This is the third month in a row that industry ACTKs recorded double-digit annual growth, driven by the sustained strong growth of international belly cargo capacity (31.5%), especially from airlines in the Asia Pacific (18.2%), Latin America (18.8%), and the Middle East (16.3%) this month. In comparison, international capacity growth for dedicated freighters saw an annual contraction of 0.3% YoY this month. SA ACTKs registered 47.6 billion, with the same annual growth rate as the ACTKs.

Air cargo market overview - September 2023

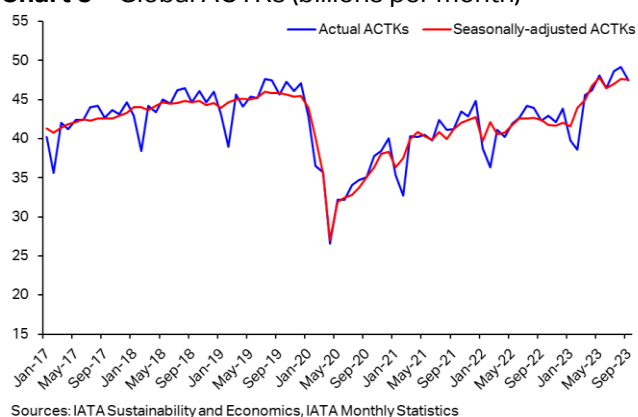
	World share ¹	September 2023 (% year-on-year)				September 2023 (% ch vs the same month in 2019)			
		CTK	ACTK	CLF (%-pt) ²	CLF (level) ³	CTK	ACTK	CLF (%-pt) ²	CLF (level) ³
TOTAL MARKET	100.0%	1.9%	12.1%	-4.4%	43.8%	-1.3%	3.9%	-2.2%	42.0%
International	86.9%	1.6%	11.0%	-4.5%	49.0%	-1.7%	1.8%	-1.6%	47.2%

¹% of industry CTKs in 2022

²Change in load factor

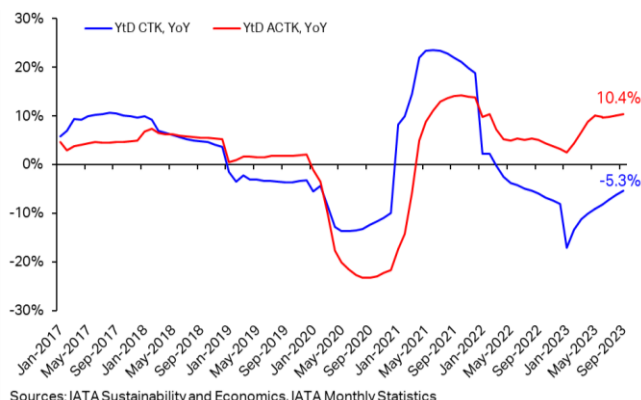
³Load factor level

Chart 3 – Global ACTKs (billions per month)



With the continued annual growth of air cargo demand, year-to-date (YTD) industry CTKs registered 177.8 billion in September and further narrowed the gap with 2022 CTK levels to 5.3% (**Chart 4**). The annual contractions of YTD CTKs have been shrinking by about 1.0% each month since March 2023, making significant improvement from the double-digit declines seen in January and February. Additionally, YTD industry ACTKs recorded 410.0 billion in September, which is 10.4% above 2022 levels (**Chart 4**).

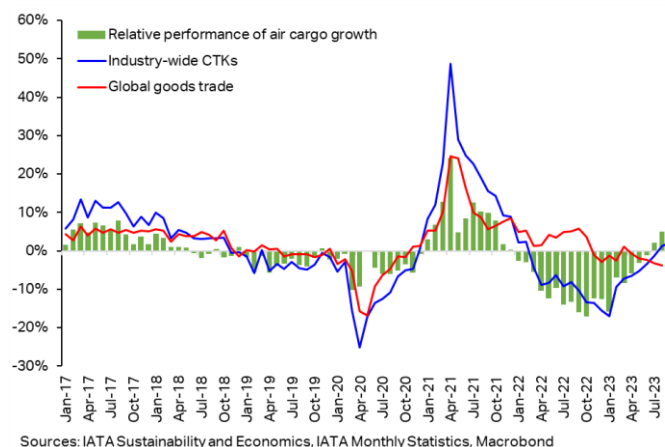
Chart 4 – Year-to-date CTKs and ACTKs, year-on-year % change



Positive relative performance of air cargo continued amid softening trade growth

Global cross-border trade experienced the fifth consecutive annual decline in August, falling 3.8%. This reflects the challenging global economic climate and the cooling cargo demand environment. Under the softening trade growth, the air cargo industry still showed resilience and outperformed global goods trade again in August by 5.1 ppts (**Chart 5**). However, while the annual decline of global goods trade is in comparison to a strong performance in 2022, the annual growth of air cargo is from a low base in the previous year. These base year effects are important considerations when comparing the relative performance of air cargo and global trade.

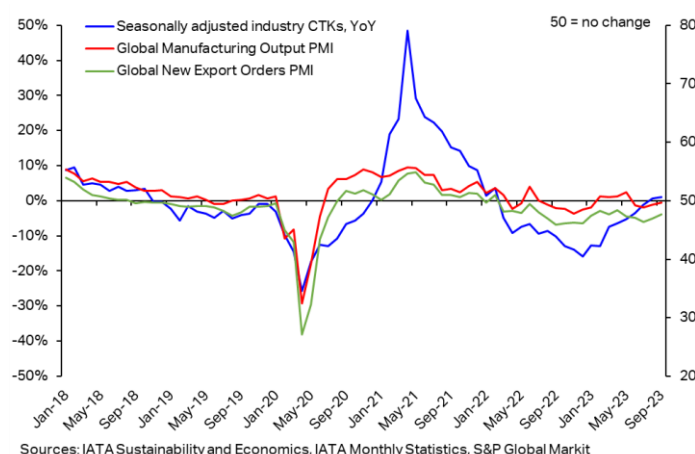
Chart 5 – Growth of global goods trade and CTKs (YoY)



Manufacturing PMIs maintained upward trends in Sep

The manufacturing output and new export order Purchasing Managers Indexes (PMIs) have historically served as leading indicators of global air cargo demand. Therefore, we closely monitor developments in these PMIs at a global level (**Chart 6**) and for major economies (**Chart 7**).

Chart 6 – CTK (SA) growth, global manufacturing output and global new export orders PMIs (50 = no change)

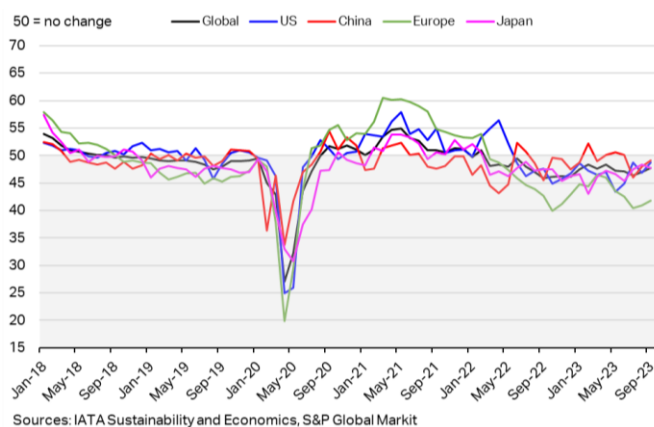


Although both manufacturing output PMI (49.7) and new export orders PMI (47.7) in September remained below the critical threshold represented by the 50-mark, they continued trending towards the growth territory. This indicates a slowing decline in global manufacturing production and exports (**Chart 6**). The upward trends of the PMIs also partially explain the 1.1% annual growth of SA CTKs this month.

The decline in global new export orders PMI reflects the widespread softening demand for global goods trade. Across all major economies, the new export orders PMIs were in the deterioration zone, despite the slight improvements compared to August (**Chart 7**). In September, China registered a new export orders PMI of 49.1, up from 47.9 in August. The US saw PMIs of 48.8, a 2.0 ppt increase compared with the previous month. PMIs in Europe remained the lowest across the major economies at 41.8, although this was an

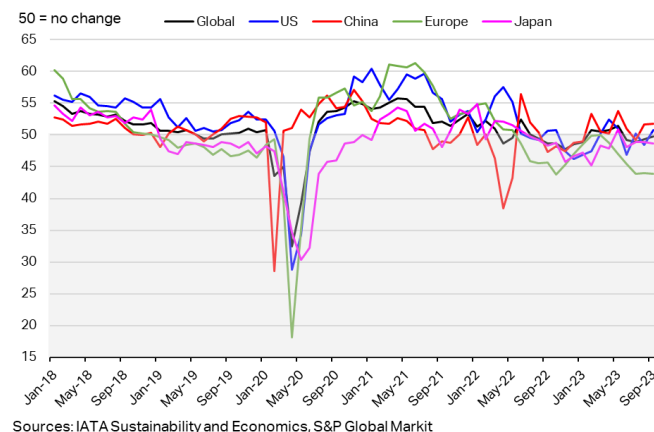
improvement from 40.9 in August. Japan was the only major economy that recorded a lower new export orders PMI at 47.7 in September, declining from 48.4 in August.

Chart 7 – New export orders PMI in major economies (50 = no change)



Compared to the new export orders PMIs, the manufacturing output PMIs of major economies performed slightly better in September (**Chart 8**). Both the US and China registered an expansion with manufacturing output PMIs of 50.8 and 51.8, respectively. For the US, this was a strong rebound from the PMI of 48.5 in August. For China, this was the second consecutive expansion. On the other hand, Europe's manufacturing PMI was the lowest among the major economies at 43.9, while the PMI of Japan was 48.7, similar to the previous month.

Chart 8 – Manufacturing output PMI in major economies (50 = no change)

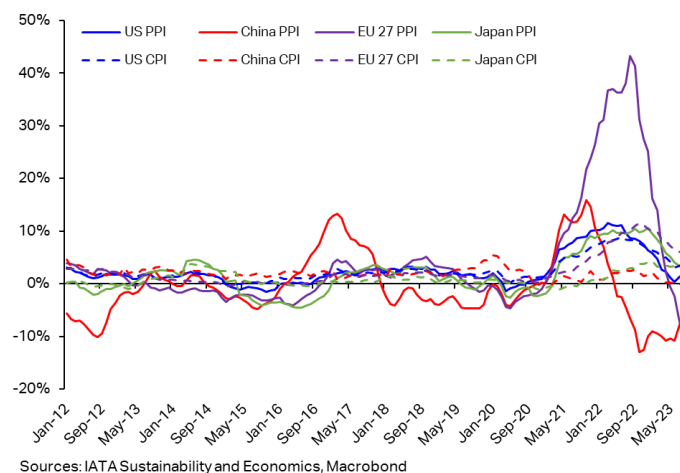


Inflation in the US remained flat in September

The annual growth of the US headline Consumer Price Index (CPI) stabilized at 3.7% in September, maintaining about the same rate as in August. In comparison, the YoY growth of CPI in the EU 27 countries continued to slow to 4.9% in September, 1.0 ppts lower than the previous month. China recorded a 0.1% annual increase in the CPI this month, and

Japan's CPI annual growth was 3.0%, 0.2 ppts lower than the level in August (**Chart 9**).

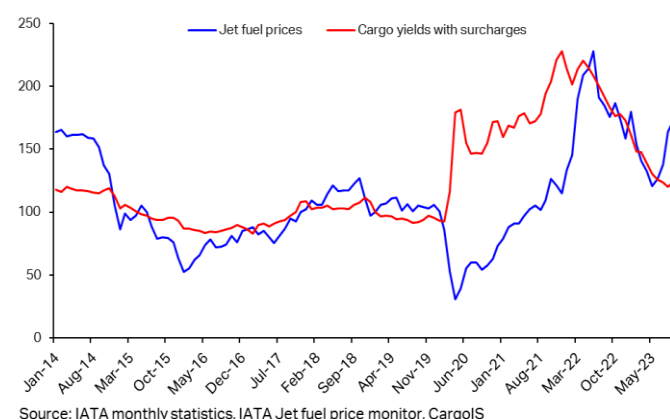
Chart 9 – Headline CPI and PPI inflation (YoY) in major economies



Changes in producer prices, as measured by the Producer Price Index (PPI), showed a more mixed profile in September. The US recorded the third consecutive expansion of the annual growth in PPI from 1.9% in August to 2.2% this month. Both China and EU 27 countries saw annual contractions in their PPis. China's PPI declined by 3.4%, which is the 17th consecutive month of the PPI decline from May 2022. September PPI data for the EU 27 countries has not been released yet, but it had declined by 10.5% YoY in August, from -6.6% in July. The PPI in Japan recorded a 1.9% YoY growth in September (**Chart 9**).

One of the primary factors influencing consumer prices is the global oil price. The IATA jet fuel monitor tracks the latest developments in global jet fuel prices, which directly impact airline operating costs. In September, jet fuel prices stood at USD 131.0 per barrel, marking a significant 43.1% increase from their lowest point in May this year. Reflecting in part this recent surge in jet fuel prices, air cargo yields saw an increase in September for the first time since November 2022 (**Chart 10**).

Chart 10: Jet fuel price versus air cargo yields including surcharges (indexed, Jan 2019 = 100)

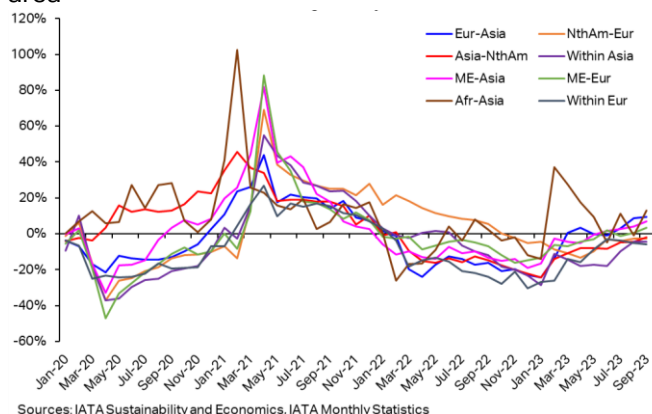


Asia-related trade lanes saw strong growth in September

In September, most of the Asia-related trade lanes recorded strong annual growth in their international CTGs, led by **Africa – Asia** (12.8%) and **Europe – Asia** (9.6%) (**Chart 11**). The Europe – Asia market expanded its growth from 8.8% last month, while the Africa – Asia market had a strong rebound from the annual decline of 0.8% in August to the double-digit growth this month. Additionally, the **Middle East – Asia** trade lane also experienced a 7.0% increase compared to the September 2022 level, making it the fourth consecutive growth in this market. **Within Asia**, international CTGs declined by 4.4% YoY, about the same as the previous month but still 5.4 pts better than July.

The **North America – Asia** trade lane narrowed its annual contractions from 4.3% in August to 1.8% this month, while the **North America – Europe** market maintained the same annual growth rate as in August (-2.5%). The **Middle East – Europe** trade lane expanded its annual growth from 0.5% in the previous month to 3.3% in September. This increase offset some losses that the European airlines had in the **Within Europe** market, which saw a further contraction by 5.7% this month from 5.2% in August.

Chart 11 – International CTG growth (YoY) by route area



Airlines from Asia Pacific led the growth in international CTGs

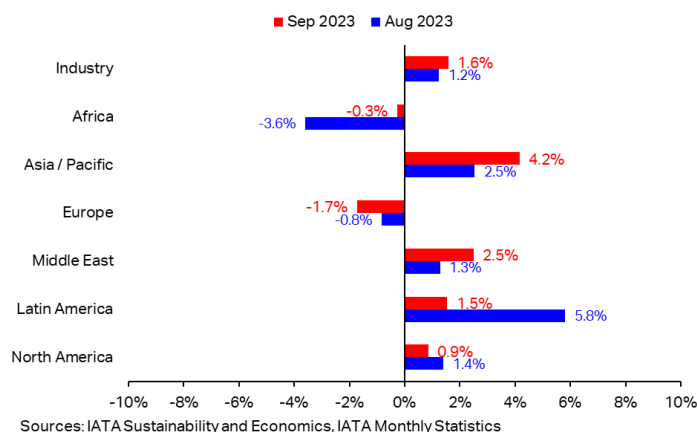
Industry-wide international CTGs increased by 1.6% YoY in September. **Asia Pacific** airlines recorded the strongest growth among all regions by 4.2%, followed by airlines from the **Middle East** (2.5%) and **Latin America** (1.5%). **North America** airlines also saw a modest growth in their international CTGs of 0.9%. The only two regions where airlines registered YoY declines are **Africa** (-0.3%) and **Europe** (-1.7%) (**Chart 12**).

The strong performance of Asia Pacific airlines (4.2% growth in international CTGs and 7.7% in regional overall CTGs) was largely attributed to the improved

performances on the **Europe – Asia**, **Middle East – Asia**, and **Africa-Asia** trade lanes, but also the stabilized within Asia market demand (**Chart 11**). Airlines in the **Middle East** expanded their international CTGs by 2.5% mainly driven by the growth in demand in the **Middle East – Europe** and **Middle East – Asia** markets. Airlines in **North America** had weaker YoY growth of 0.9% in international CTGs compared with the previous month (1.4%). However, this growth was overshadowed by the annual declines in the domestic North American market, making the regional overall CTGs (international and domestic combined) 2.2% lower than the 2022 levels.

On the other hand, **European** airlines saw a further decline in their international CTGs in September by 1.7%, compared to the 0.8% contraction in August. However, domestic CTGs by European airlines improved slightly, narrowing the overall decline in CTGs by airlines in this region to -1.5%. International CTGs of **African** carriers declined by 0.3% from the 3.6% annual contraction last month, despite the strong growth of international CTGs seen in the **Africa – Asia** trade lane.

Chart 12 – Growth in international CTGs by airline region of registration (YoY)



Air cargo market in detail - September 2023

	<i>World share¹</i>	September 2023 (% year-on-year)				September 2023 (% ch vs the same month in 2019)			
		CTK	ACTK	CLF (%-pt) ²	CLF (level) ³	CTK	ACTK	CLF (%-pt) ²	CLF (level) ³
TOTAL MARKET	100.0%	1.9%	12.1%	-4.4%	43.8%	-1.3%	4.1%	-2.4%	43.8%
Africa	2.0%	-0.1%	2.7%	-1.2%	43.6%	15.7%	-10.6%	9.9%	43.6%
Asia Pacific	32.4%	7.7%	30.5%	-9.9%	46.6%	-4.2%	10.6%	-7.2%	46.6%
Europe	21.8%	-1.5%	4.7%	-3.1%	50.0%	-12.8%	-12.8%	0.0%	50.0%
Latin America	2.7%	2.3%	14.4%	-3.8%	31.9%	-4.9%	11.5%	-5.5%	31.9%
Middle East	13.0%	2.5%	16.1%	-5.6%	42.4%	2.6%	9.8%	-3.0%	42.4%
North America	28.1%	-2.2%	0.2%	-1.0%	39.2%	11.4%	7.7%	1.3%	39.2%
International	86.9%	1.6%	11.0%	-4.5%	49.0%	-1.8%	2.0%	-1.9%	49.0%
Africa	2.0%	-0.3%	2.5%	-1.2%	44.5%	17.1%	-9.7%	10.2%	44.5%
Asia Pacific	29.7%	4.2%	18.2%	-7.3%	54.3%	-3.2%	6.4%	-5.4%	54.3%
Europe	21.5%	-1.7%	5.2%	-3.7%	52.0%	-13.5%	-13.8%	0.2%	52.0%
Latin America	2.3%	1.5%	18.8%	-6.1%	36.0%	-3.0%	26.3%	-10.9%	36.0%
Middle East	13.0%	2.5%	16.3%	-5.7%	42.7%	2.6%	10.0%	-3.1%	42.7%
North America	18.4%	0.9%	4.0%	-1.4%	46.1%	12.4%	7.8%	1.9%	46.1%

¹% of industry CTks in 2022

²Year-on-year change in load factor

³Load factor level

Note: the total industry and regional growth rates are based on a constant sample of airlines combining reported data and estimates for missing observations. Airline traffic is allocated according to the region in which the carrier is registered; it should not be considered as regional traffic. Historical statistics are subject to revision.

IATA Sustainability & Economics

economics@iata.org

8 November 2023

Get the data

Access data related to this briefing through IATA's Monthly Statistics publication:

www.iata.org/monthly-traffic-statistics

IATA Economics Consulting

To find out more about our tailored economics consulting solutions, visit:

www.iata.org/consulting

Terms and Conditions for the use of this IATA Economics Report and its contents can be found here: www.iata.org/economics-terms

By using this IATA Economics Report and its contents in any manner, you agree that the IATA Economics Report Terms and Conditions apply to you and agree to abide by them. If you do not accept these Terms and Conditions, do not use this report.



No. 05/23

7 November 2023

STRONG DEMAND OVER SUMMER PEAK SEASON DRIVES RECORD HALF-YEAR RESULTS FOR THE SIA GROUP

- Record load factors support highest-ever half-year operating and net profits
- Growing competition, macroeconomic uncertainties, and inflationary cost pressures pose challenges to the airline industry going forward
- Interim dividend of 10 cents per share to be paid on 22 December 2023

SIA GROUP FINANCIAL PERFORMANCE

First Half FY2023/24 – Profit and Loss

The Singapore Airlines (SIA) Group financial performance for the first half FY2023/24 is summarised as follows:

Group Financial Results	1 st Half FY2023/24 (\$ million)	1 st Half FY2022/23 (\$ million)	Better/ (Worse) (%)	2 nd Quarter FY2023/24 (\$ million)	2 nd Quarter FY2022/23 (\$ million)	Better/ (Worse) (%)
Total Revenue	9,162	8,417	8.9	4,683	4,488	4.3
Total Expenditure	7,609	7,182	(5.9)	3,884	3,810	(1.9)
Net Fuel Cost	2,283	2,696	15.3	1,230	1,423	13.6
<i>Fuel Cost (before hedging)</i>	<i>2,527</i>	<i>3,113</i>	<i>18.8</i>	<i>1,373</i>	<i>1,638</i>	<i>16.2</i>
<i>Fuel Hedging Gain</i>	<i>(244)</i>	<i>(417)</i>	<i>(41.5)</i>	<i>(143)</i>	<i>(215)</i>	<i>(33.5)</i>
Non-fuel Expenditure	5,326	4,486	(18.7)	2,654	2,387	(11.2)
Operating Profit	1,554	1,234	25.9	799	678	17.8
Net Profit	1,441	927	55.4	707	557	26.9

The SIA Group's unaudited financial results for the half year ended 30 September 2023 were announced on 7 November 2023. A summary of the financial and operating statistics is shown in Annex A. All monetary figures are in Singapore Dollars. The Company refers to Singapore Airlines, the Parent Airline Company. The Group comprises the Company and its subsidiary, joint venture, and associated companies.

The figures in the table may not sum up to the stated totals because of rounding.

The robust demand for air travel continued into the Northern Summer travel season, led by the rebound in passenger traffic to North Asia with the full reopening of China, Hong Kong SAR, Japan, and Taiwan. This resulted in record half-year operating and net profits for the SIA Group.

SIA and Scoot carried 17.4 million passengers in the first six months of FY2023/24, an increase of 52.3% year-on-year. Passenger traffic grew 38.0% from a year before, outpacing the capacity expansion of 29.0%. As a result, the Group passenger load factor (PLF) improved by 5.8 percentage points to 88.8%, the highest ever half yearly PLF. SIA and Scoot achieved record PLFs of 88.0% and 91.3% respectively.

The demand for air freight remained soft due to inventory overhang, as well as geopolitical and macroeconomic headwinds. The cargo load factor fell 8.4 percentage points to 52.7% year-on-year as cargo loads dipped 6.0%, while capacity grew 8.9% mainly due to increased passenger aircraft bellyhold space. Increased competition and softer demand also contributed to the downward pressure on cargo yields, which fell by 46.2% from a year before. Nevertheless, at 41.8 cents per load tonne-kilometre, cargo yields remained 37.0% above pre-pandemic levels¹.

Group revenue rose \$745 million (+8.9%) to \$9,162 million, with the \$1,571 million (+26.3%) increase in passenger flown revenue to \$7,550 million partially offset by a \$1,039 million (-49.5%) decline in cargo flown revenue to \$1,060 million.

Expenditure increased by \$427 million (+5.9%) to \$7,609 million, with the rise in non-fuel expenditure of \$840 million (+18.7%) partially offset by a \$413 million decrease (-15.3%) in net fuel cost. Net fuel cost fell to \$2,283 million mainly due to a 29.2% decrease in fuel prices (-\$1,077 million), despite higher volume uplifted (+\$566 million) and lower fuel hedging gain (+\$173 million). The 18.7% increase in non-fuel expenditure was in-line with the 19.9% increase in overall passenger and cargo capacity.

Overall, the Group recorded an operating profit of \$1,554 million, \$320 million higher than a year before.

The Group posted a net profit of \$1,441 million, \$514 million more than the previous year (+55.4%), on the strong operating performance. The improvement in the bottom line was also aided by the net interest income versus net finance charges last year (+\$222 million) and share of profits versus share of losses of associated companies last year (+\$87 million), partially offset by a higher tax expense (-\$118 million).

Note 1: Based on cargo yield of 30.5 cents per load tonne-kilometre in FY2019/20.

Second Quarter FY2023/24 – Profit and Loss

The Group posted a record quarterly operating profit of \$799 million for the second quarter, an increase of \$121 million (+17.8%) from last year, on the back of the strong demand over the peak summer season.

Group revenue rose \$195 million (+4.3%) year-on-year to \$4,683 million. Passenger flown revenue increased by \$570 million (+17.3%) to \$3,873 million, lifted by the 28.9% growth in traffic. Group PLF increased 2.0 percentage points to 88.6%, as traffic growth outpaced the increase in capacity (+26.0%). Cargo flown revenue dipped 48.3% or \$484 million to \$519 million due to a decline in yield (-48.0%) on weaker demand, coupled with the reinstatement of industry bellyhold cargo capacity. **Nonetheless, cargo yields – at 39.2 cents per load tonne-kilometre – were 28.5% above pre-Covid levels¹.** Cargo loads remained flat year-on-year (-0.5%) while capacity increased 6.0%, resulting in a 3.5 percentage point drop in cargo load factor to 53.5%.

Group expenditure grew by \$74 million (+1.9%) year-on-year to \$3,884 million. This consisted of a \$267 million increase (+11.2%) in non-fuel expenditure that was partially offset by a \$193 million decrease (-13.6%) in net fuel cost. Net fuel cost fell to \$1,230 million, mainly due to a 25.2% drop in fuel prices (-\$478 million) that was partially offset by higher volume uplifted (+\$262 million) and a lower fuel hedging gain (+\$72 million). The increase in non-fuel expenditure was below the 17.0% increase in overall capacity including cargo.

The Group posted a second quarter net profit of \$707 million, an increase of \$150 million (+26.9%) from a year before. The improvement was mainly due to the better operating performance (+\$121 million), a net interest income versus net finance charges last year (+\$78 million), and a surplus on disposal of aircraft, spares, and spare engines (+\$22 million), and partially offset by higher tax expense (-\$56 million).

Balance Sheet

As of 30 September 2023, the Group shareholders' equity was \$17.3 billion, a decline of \$2.5 billion from 31 March 2023. This was due to the redemption in June 2023 of half of the Mandatory Convertible Bonds (MCBs) that were issued in June 2021, which amounted to \$3.4 billion. Total debt balances decreased by \$0.7 billion to \$14.7 billion, mainly due to the repayment of borrowings. Consequently, the Group's debt-equity ratio increased from 0.77 times to 0.85 times.

Cash and bank balances saw a decrease of \$2.8 billion to \$13.5 billion, with the drop in cash balance arising from the redemption of the MCBs, repayment of borrowings, and payment of dividends. This was partially mitigated by the \$2.6 billion of net cash generated from operations, which included proceeds from forward sales. In addition to the cash on hand, the Group retains access to \$2.4 billion of committed lines of credit, all of which remain undrawn. The Group's balance sheet remains healthy and is among the strongest in the industry.

FLEET DEVELOPMENT

SIA added three aircraft to its operating fleet in the second quarter. These comprise one Airbus A350-900 (delivered in July 2023) and two Boeing 787-10s (delivered in August 2023 and September 2023).

As of 30 September 2023, the Group's operating fleet had 202 aircraft comprising 195 passenger aircraft and seven freighters. SIA's operating fleet comprised 140 passenger aircraft² and seven freighters, while Scoot had 55 passenger aircraft³. The Group has 96 aircraft⁴ on order.

With an average age of seven years and one month, the Group operates one of the youngest and most fuel-efficient fleets in the airline industry⁵. This allows its airlines to offer greater comfort and innovative products to customers, while further driving operating efficiency and supporting ongoing efforts to lower carbon emissions.

NETWORK DEVELOPMENT

During the second quarter, SIA reinstated services to Busan while Scoot resumed flights to Jinan, Nanchang, and Shenzhen. As of 30 September 2023, the Group's passenger network⁶ covered 119 destinations in 36 countries and territories. SIA served 75 destinations while Scoot served 67 destinations. The cargo network comprised 124 destinations in 38 countries and territories.

In the Northern Winter operating season (29 October 2023 to 30 March 2024), SIA will re-introduce services to Chongqing (November 2023), Chengdu (December 2023), and Xiamen (between December 2023 and January 2024). As part of the regular review of the Group's network, SIA will operate to Shenzhen in lieu of Scoot with the reinstatement of the full-service carrier's flights from November 2023. SIA will also ramp up frequencies to Guangzhou from November 2023 from daily to double daily. Scoot will resume operations to Kunming and Changsha from November 2023. With these reinstatements, SIA and Scoot will serve 23 destinations in China compared to 25 points pre-pandemic⁷. In addition to the expansion in mainland China, Scoot will deploy supplementary services to Hong Kong SAR, Melbourne, and Sydney from December 2023 to February 2024 to cater to the year-end holiday demand.

Note 2: SIA's 140-passenger aircraft fleet comprised 23 777-300ERs, 12 A380s, 63 A350s, 19 787-10s, seven 737-800s, and 16 737-8s.

Note 3: Scoot's 55-passenger aircraft fleet comprised 10 787-8s, 10 787-9s, 20 A320neos, six A320ceos, and nine A321neos.

Note 4: This comprises 27 Airbus aircraft (two A350s, 12 A320neos, six A321neos, seven A350Fs), 60 Boeing aircraft (31 777-9s, 16 787s, 13 737-8s), and nine Embraer E190-E2 aircraft.

Note 5: The industry average fleet age as of October 2023 is around 15 years, according to CAPA data.

Note 6: Number of destinations, and countries and territories include Singapore.

Note 7: SIA operates to seven destinations (Beijing, Chengdu, Chongqing, Guangzhou, Shanghai, Shenzhen, and Xiamen) while Scoot operates to 17 destinations (Changsha, Fuzhou, Guangzhou, Haikou, Hangzhou, Jinan, Kunming, Nanchang, Nanjing, Nanning, Ningbo, Qingdao, Shenyang, Tianjin, Wuhan, Xi'an, and Zhengzhou).

For the Northern Summer 2024 operating season (31 March 2024 to 26 October 2024), SIA will ramp up services to destinations across its network. This includes restoring Airbus A380 services to Frankfurt, deploying widebody Airbus A350-900 medium-haul aircraft to Cairns and Male, and reinstating direct services between Singapore and Barcelona. Flight frequencies will be increased to reach or exceed pre-pandemic levels across multiple points. These include Ahmedabad (India), Beijing and Shanghai (China), Copenhagen (Denmark), Da Nang (Vietnam), Darwin, Melbourne, and Perth (Australia), Dubai (the United Arab Emirates), Tokyo-Haneda (Japan), and Seattle and Houston (the United States of America). SIA will launch four-times weekly direct flights between Singapore and Brussels in April 2024, subject to regulatory approvals.

SIA Group capacity is expected to reach an average of around 92% of pre-pandemic⁸ levels in December 2023. The Group expects to return to pre-Covid capacity levels within FY2024/25 with the progressive ramp-up of services across the network.

MULTI-HUB STRATEGY

The proposed merger of Air India and Vistara remains on course, with the Competition Commission of India approving the transaction in September 2023. It remains subject to foreign direct investment approval, as well as approvals from other regulators and competition authorities in several jurisdictions including those from India's Directorate General of Civil Aviation, Ministry of Civil Aviation, and National Company Law Tribunal, and the Competition and Consumer Commission of Singapore. When completed, it will give SIA a 25.1% stake in an enlarged Air India Group with a significant presence in all key Indian airline market segments.

SUSTAINABILITY

The SIA Group, the Civil Aviation Authority of Singapore (CAAS), and GenZero, an investment platform owned by Temasek, have completed a 20-month Sustainable Aviation Fuel (SAF) pilot which commenced in February 2022. The pilot supports the goal of creating a long-term secured SAF supply ecosystem for Singapore, one of the recommendations of the International Advisory Panel (IAP) on a Sustainable Air Hub. It affirmed Singapore's operational readiness to deploy SAF, and validated the end-to-end process to bring SAF into Changi Airport. It also generated SAF credits, which were available for sale to corporates and air cargo companies looking to decarbonise their carbon footprint, potentially crowd-sourcing financing to share in the higher costs of SAF. While there was some demand for these SAF credits, the pilot highlighted the need for increased policy support and corporate awareness.

INTERIM DIVIDEND

The Company is declaring an interim dividend of 10 cents per share (tax exempt, one-tier), amounting to \$297 million, for the half-year ended 30 September 2023. The interim dividend will be paid on 22 December 2023 for shareholders as at 7 December 2023.

SUBSEQUENT EVENTS

On 25 October 2023, the Company redeemed all of the S\$600 million 3.16% 5-year Fixed-Rate Notes (“Notes”) upon its maturity. Following the redemption, the Notes have been cancelled in their entirety.

On 7 November 2023, the Company announced its intention to redeem 50% of the remaining MCBs that were issued in June 2021. The accreted principal amount payable, being 110.408% of the principal amount of the MCBs, will be \$1,710.4 million. This redemption will be carried out on a pro-rata basis, with the redemption amount to be paid to eligible bondholders on 26 December 2023.

Upon the completion of the above redemption, the Company would have redeemed 75% of the June 2021 MCBs in total.

OUTLOOK

While the demand for air travel is expected to remain healthy leading up to the end of the financial year, significant capacity restoration across the industry, especially in the Asia-Pacific region, could put pressure on passenger yields. The Group will closely monitor market conditions and adjust its operations as necessary.

The demand for air freight is expected to remain soft in the traditional peak third quarter of FY2023/24, dampened by excess inventories, geopolitical tensions, and macroeconomic headwinds. Bellyhold cargo capacity will increase with the resumption of more passenger flights, putting downward pressure on cargo yields.

Heightened geopolitical risks and macroeconomic uncertainties continue to pose challenges for the airline industry. High fuel prices due to supply risks in the oil market, and inflationary pressures on non-fuel costs are key concerns. The Group has built strong foundations through its two Transformation programmes. It will continue to leverage the strength of its portfolio of airlines, and deploy the right vehicles to the right markets, with growing connectivity between the SIA and Scoot networks. The Group will also continue to invest in industry-leading products and services and seize revenue and growth opportunities, while maintaining cost discipline.

* * *

<https://www.gov.uk/government/speeches/the-kings-speech-2023>

Oral statement to Parliament

The King's Speech 2023

His Majesty's most gracious speech to both Houses of Parliament.

From: [Prime Minister's Office, 10 Downing Street](#) and His Majesty The King

Published 7 November 2023

Location: Palace of Westminster

Delivered on: 7 November 2023



[The King's Speech](#)

My Lords and members of the House of Commons

It is mindful of the legacy of service and devotion to this country set by My beloved Mother, The late Queen, that I deliver this, the first King's Speech in over 70 years.

The impact of Covid and the war in Ukraine have created significant long-term challenges for the United Kingdom. That is why my Government's priority is to make the difficult but necessary long-term decisions to change this country for the better.

My Ministers' focus is on increasing economic growth and safeguarding the health and security of the British people for generations to come.

My Government will continue to take action to bring down inflation, to ease the cost of living for families and help businesses fund new jobs and investment.

My Ministers will support the Bank of England to return inflation to target by taking responsible decisions on spending and borrowing. These decisions will help household finances, reduce public sector debt, and safeguard the financial security of the country.

Legislation will be introduced to strengthen the United Kingdom's energy security and reduce reliance on volatile international energy markets and hostile foreign regimes. This Bill will support the future licensing of new oil and gas fields, helping the country to transition to net zero by 2050 without adding undue burdens on households.

Alongside this, my Ministers will seek to attract record levels of investment in renewable energy sources and reform grid connections, building on the United Kingdom's track-record of decarbonising faster than other G7 economies.

My Government will invest in Network North to deliver faster and more reliable journeys between, and within, the cities and towns of the North and Midlands, prioritising improving the journeys that people make most often.

My Ministers will strengthen education for the long term. Steps will be taken to ensure young people have the knowledge and skills to succeed, through the introduction of the Advanced British Standard that will bring technical and academic routes into a single qualification. Proposals will be implemented to reduce the number of young people studying poor quality university degrees and increase the number undertaking high quality apprenticeships.

My Ministers will take steps to make the economy more competitive, taking advantage of freedoms afforded by the United Kingdom's departure from the European Union. A bill will be brought forward to promote trade and investment with economies in the fastest growing region in the world. My Ministers will continue to negotiate trade agreements with dynamic economies, delivering jobs and growth in the United Kingdom.

My Ministers will introduce new legal frameworks to support the safe commercial development of emerging industries, such as self-driving vehicles, introduce new competition rules for digital markets, and encourage innovation in technologies such as machine learning. Legislation will be brought forward to support the creative industries and protect public interest journalism. Proposals will be published to reform welfare and support more people into work.

My Government will promote the integrity of the Union and strengthen the social fabric of the United Kingdom.

Working with NHS England, my Government will deliver its plans to cut waiting lists and transform the long-term workforce of the National Health Service. This will include delivering on the NHS workforce plan, the first long-term plan to train the doctors and nurses the country needs, and minimum service levels to prevent strikes from undermining patient safety. Record levels of investment are expanding and transforming mental health services to ensure more people can access the support they need. My Government will introduce legislation to create a smokefree generation by restricting the sale of tobacco so that children currently aged fourteen or younger can never be sold cigarettes, and restricting the sale and marketing of e-cigarettes to children.

My Ministers will bring forward a bill to reform the housing market by making it cheaper and easier for leaseholders to purchase their freehold and tackling the exploitation of millions of homeowners through punitive service charges. Renters will benefit from stronger security of tenure and better value, while landlords will benefit from reforms to provide certainty that they can regain their properties when needed.

My Government will deliver a long-term plan to regenerate towns and put local people in control of their future. Legislation will be brought forward to safeguard the future of football clubs for the benefit of communities and fans. A bill will be introduced to deal with the scourge of unlicensed pedicabs in London.

My Government is committed to tackling antisemitism and ensuring that the Holocaust is never forgotten. A bill will progress the construction of a national Holocaust Memorial and Learning Centre in Victoria Tower Gardens.

My Government will act to keep communities safe from crime, anti-social behaviour, terrorism and illegal migration.

A bill will be brought forward to ensure tougher sentences for the most serious offenders and increase the confidence of victims. My Ministers will introduce legislation to empower police forces and the criminal justice system to prevent new or complex crimes, such as digital-enabled crime and child sexual abuse, including grooming.

At a time when threats to national security are changing rapidly due to new technology, my Ministers will give the security and intelligence services the powers they need and will strengthen independent judicial oversight. Legislation will be introduced to protect public premises from terrorism in light of the Manchester Arena attack.

My Government will deliver on the Illegal Migration Act passed earlier this year and on international agreements, to stop dangerous and illegal Channel crossings and ensure it is the government, not criminal gangs, who decides who comes to this country.

My Government will continue to champion security around the world, to invest in our gallant Armed Forces and to support veterans to whom so much is owed. My Ministers will work closely with international partners to support Ukraine, strengthen NATO and address the most pressing security challenges. This includes the consequences of the barbaric acts of terrorism against the people of Israel, facilitating humanitarian support into Gaza and supporting the cause of peace and stability in the Middle East.

My Government will continue to lead action on tackling climate change and biodiversity loss, support developing countries with their energy transition, and hold other countries to their environmental commitments.

The United Kingdom will continue to lead international discussions to ensure that Artificial Intelligence is developed safely.

My Government will host the Global Investment Summit, the European Political Community, and the Energy Conference, leading global conversations on the United Kingdom's most pressing challenges.

I look forward to welcoming His Excellency the President of the Republic of Korea and Mrs. Kim Keon Hee for a State Visit later this month.

My Government will, in all respects, seek to make long-term decisions in the interests of future generations. My Ministers will address inflation and the drivers of low growth over demands for greater spending or borrowing. My Ministers will put the security of communities and the nation ahead of the rights of those who endanger it. By taking these long-term decisions, my Government will change this country and build a better future.

Members of the House of Commons.

Estimates for the public services will be laid before you.

My Lords and Member of the House of Commons.

Other measures will be laid before you.

I pray that the blessing of Almighty God may rest upon your counsels.

Published 7 November 2023

2023-01-09

NuScale Reaches Key Milestone in the Development of the Carbon Free Power Project

PORTLAND, Ore. – January 9, 2023 – NuScale Power Corporation (NYSE: SMR) announced today that the Project Management Committee (PMC) for the Carbon Free Power Project (CFPP) reaffirmed its commitment to NuScale’s industry-leading small modular reactor (SMR) technology by approving a new Budget and Plan of Finance (BPF) and an update to the Development Cost Reimbursement Agreement (DCRA). This key milestone was reached with the receipt and acceptance of the CFPP’s Class 3 Project Cost Estimate (PCE), which further refines the anticipated total cost of the project.

The CFPP will be the first NuScale Power SMR power plant to begin operation in the United States near Idaho Falls, Idaho, at the U.S. Department of Energy’s Idaho National Laboratory. The SMR plant will deploy six, 77-megawatt modules to generate 462 megawatts of carbon-free electricity. The CFPP remains on schedule and is a cost-competitive, carbon-free and dispatchable resource that is an important part of a diversified resource portfolio.

As part of the PCE, NuScale worked with its partners at the Utah Associated Municipal Power Systems (UAMPS) to update the project’s BPF, which is designed to manage and reduce risk to CFPP participants. The BPF provides UAMPS with an option to withdraw from the project and be reimbursed for most out-of-pocket expenses if the CFPP’s price of energy per megawatt hour exceeds a certain threshold. The new DCRA that was approved by the PMC also establishes an updated target price of \$89 per megawatt hour, which reflects the changing financial landscape for the development of energy projects nationwide. NuScale and the CFPP have yet to execute the amendment to the DCRA adopting the new price target.

The Class 3 PCE determined that the cost of the CFPP has been influenced by external factors such as inflationary pressures and increases in the price of steel, electrical equipment and other construction commodities not seen for more than 40 years. For example, the producer price index for commodities such as carbon steel piping and fabricated steel plates have increased by more than 50% since 2020. These inflationary pressures are increasing the costs for all power generation and infrastructure projects.

NuScale’s VOYGR™ SMR power plant remains a competitive source of reliable, affordable and carbon-free power for customers, and we look forward to continuing this strategically critical project with UAMPS and other participating members of the CFPP toward accelerating the deployment of next-generation nuclear energy.

About NuScale Power

NuScale Power (NYSE: SMR) is poised to meet the diverse energy needs of customers across the world. It has developed small modular reactor (SMR) nuclear technology to supply energy for electrical generation, district heating, desalination, commercial-scale hydrogen production, and other process heat applications. The groundbreaking NuScale Power

Module™ (NPM), a small, safe pressurized water reactor, can generate 77 megawatts of electricity (MWe) and can be scaled to meet customer needs. NuScale's 12-module VOYGR™-12 power plant is capable of generating 924 MWe, and NuScale also offers four-module VOYGR-4 (308 MWe) and six-module VOYGR-6 (462 MWe) power plants, as well as other configurations based on customer needs.

Founded in 2007, NuScale is headquartered in Portland, Ore., and has offices in Corvallis, Ore.; Rockville, Md.; Richland, Wash.; and London, UK.

2023-11-08

Utah Associated Municipal Power Systems (UAMPS) and NuScale Power Agree to Terminate the Carbon Free Power Project (CFPP)

PORTLAND, Ore. – Utah Associated Municipal Power Systems (UAMPS) and NuScale Power Corporation (NuScale) (NYSE: SMR) announced today that they have mutually agreed to terminate the Carbon Free Power Project (CFPP).

Despite significant efforts by both parties to advance the CFPP, it appears unlikely that the project will have enough subscription to continue toward deployment. Therefore, UAMPS and NuScale have mutually determined that ending the project is the most prudent decision for both parties.

"Through our work with UAMPS and our partnership with the U.S. Department of Energy, we have advanced our NuScale Power Modules™ to the point that utilities, governments and industrials can rely on a proven small modular reactor (SMR) technology that has regulatory approval and is in active production. Our work with CFPP over the past ten years has advanced NuScale technology to the stage of commercial deployment; reaching that milestone is a tremendous success which we will continue to build on with future customers," said NuScale President and Chief Executive Officer John Hopkins. "NuScale will continue with our other domestic and international customers to bring our American SMR technology to market and grow the U.S. nuclear manufacturing base, creating jobs across the U.S. We thank UAMPS for the collaboration that has enabled this advancement."

"This decision is very disappointing given the years of pioneering hard work put into the CFPP by UAMPS, CFPP LLC, NuScale, U.S. Department of Energy, and the UAMPS member communities that took the leadership role to launch the CFPP," said UAMPS Chief Executive Officer and General Manager Mason Baker. "Yet, this decision is the best course for the UAMPS members participating in the CFPP and doing what is best for those member communities will always be the guiding light in such decisions. We have learned many invaluable lessons during the development of the CFPP that we will carry forward in future development work to meet the future energy needs of the UAMPS member communities. We look forward to continuing to provide innovative and cost-effective new resource solutions to our members, and, at the same time, we hope NuScale is successful in deploying its technology."

Baker concluded, "We are working closely with NuScale and the U.S. Department of Energy on next steps to wind the project down."

About Utah Associated Municipal Power Systems

UAMPS is an interlocal agency of the State of Utah, established in 1980. As a project-based energy services entity, UAMPS provides a variety of power supply, transmission, and other services to its 50 members, which include public power utilities in seven western states: Utah, Arizona, California, Idaho, Nevada, New Mexico, and Wyoming. To learn more, visit UAMPS' website at www.uamps.com.

About CFPP LLC

The CFPP LLC is wholly owned by UAMPS and was created to develop the Carbon Free Power Project on behalf of participating UAMPS members. To learn more, visit CFPP LLC's website at www.cfpllc.com.

About NuScale Power

NuScale Power Corporation (NYSE: SMR) is the industry-leading provider of proprietary and innovative advanced small modular reactor (SMR) nuclear technology, with a mission to help power the global energy transition by delivering safe, scalable, and reliable carbon-free energy. The company's groundbreaking SMR technology is powered by the NuScale Power Module™, a small, safe, pressurized water reactor that can each generate 77 megawatts of electricity (MWe) or 250 megawatts thermal (gross), and can be scaled to meet customer needs through an array of flexible configurations up to 924 MWe (12 modules) of output. As the first and only SMR to have its design certified by the U.S. Nuclear Regulatory Commission, NuScale is well-positioned to serve diverse customers across the world by supplying nuclear energy for electrical generation, district heating, desalination, commercial-scale hydrogen production, and other process heat applications. Founded in 2007, NuScale is headquartered in Portland, Ore.

system design and completion of the intermediate decide for our reactor vessel internals. We continue to consistently deliver on our milestones in this area, demonstrating our team's ability to effectively execute. The progress made here will benefit all of our future customers.

Now on Slide 9, I will discuss NuScale and Utah Associated Municipal Power Systems', or UAMPS, mutual agreement to terminate the carbon-free power project or CFPP. Let me start by saying at CFPP unequivocally as there've been a tremendous success for NuScale. Through our work with UAMPS in partnership with the U.S. Department of Energy, NuScale successfully developed a detailed Level 3 deployment schedule, prepared and submitted a limited work authorization prepared and ready for submission a combined operation based on NuScale's SMR technology, of which approximately 50% of that application is generic.

And we developed our input to a detailed and comprehensive Level 2 project cost estimate. During this time, we also completed the VOYGR-6 standard plant design, submitted our standard designed approval application for a 6-module plant with a power uprate and received NRC approval for a means to get to a site boundary emergency planning zone. Currently, we are in a fabrication phase of our first 6 modules.

Through our participation with CFPP, NuScale successfully advanced our NuScale Power Modules to the point that utilities, governments and industrials can now rely on a proven small module reactor technology that has regulatory approval is an active production and is ready for commercial deployment. It is NuScale's view the project would have achieved the milestone related to project economic competitiveness.

Despite elevated levels of inflation, price and financing costs and supply chain disruptions that have impacted all infrastructure projects, capital costs for CFPP have not increased between the Class 3 and the current Class 2 estimates when adjusted for inflation. I want to emphasize that point because not only have overall capital costs remain stable, the cost for NuScale's SMR technology, which is just one component of the CFPP have remained steady as well. Our ability to control costs even in challenging economic conditions is a testament to the hard work of our engineering and supply chain teams and our EPC partners at floor.

CFPP targeted 80% subscription for the project by year-end. On our last earnings call, we shared the three ways this target might be achieved. First, by existing CFPP participants increasing their current subscription levels; second, by UAMPS members who are not CFPP participants signing on to the project; and third, by CFPP bringing in additional Western public power utilities, investor-owned utilities and data center operators and industrial customers. Despite significant efforts by both parties to advance the CFPP, it appeared unlikely that the project would have enough subscription to support deployment.

Therefore, UAMPS and NuScale mutually determined that in in the project was the most prudent decision for both parties. Importantly, we are working to ensure a successful transfer of long-lead materials for the next 6 NuScale Power Modules currently under development to be used by another customer. NuScale has established our industry-leading position in large part based on our work with the CFPP. Despite not reaching the subscription levels required for this phase of the project continued to our deployment, CFPP was a tremendous success for our business, and I couldn't be prouder of our team and their accomplishments.

We remain bullish on the future and our agreement with ENTRA1 and Standard Power does not even scratch the surface, so to speak, of demand we see around the world. Looking ahead, we believe our partnership with ENTRA1 derisks future projects for many of the commercial challenges we experienced within CFPP. And we look forward to committing our efforts and resources to productive new business development opportunities such as Standard Power.

In summary, our competitive position is stronger than ever. Our continued world-class technology and IP, operational and regulatory excellence, deep nuclear experience, a highly capable partner and a derisked supplier ecosystem will continue to support our ability to generate long-term value for shareholders.

Now I'll hand it over to Ramsey to provide our financial update. Ramsey?

About Plug

Plug Power is building the hydrogen economy as the leading provider of comprehensive hydrogen fuel cell (HFC) turnkey solutions. The Company's innovative technology powers electric motors with hydrogen fuel cells amid an ongoing paradigm shift in the power, energy, and transportation industries to address climate change and energy security, while providing efficiency gains and meeting sustainability goals. Plug Power created the first commercially viable market for hydrogen fuel cell (HFC) technology. As a result, the Company has deployed over 60,000 fuel cell systems for e-mobility, more than anyone else in the world, and has become the largest buyer of liquid hydrogen, having built and operated a hydrogen highway across North America. Plug Power delivers a significant value proposition to end-customers, including meaningful environmental benefits, efficiency gains, fast fueling, and lower operational costs. Plug Power's vertically integrated GenKey solution ties together all critical elements to power, fuel, and provide service to customers such as Amazon, BMW, The Southern Company, Carrefour, and Walmart. The Company is now leveraging its know-how, modular product architecture and foundational customers to rapidly expand into other key markets including zero-emission on-road vehicles, robotics, and data centers.

Cautionary Note on Forward-Looking Statements

This communication contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995 that involve significant risks and uncertainties about Plug Power Inc. ("Plug"), including but not limited to statements about Plug's ability to deliver on its business and strategic objectives and achieve substantial growth; Plug's projections regarding its future financial and market outlook, including its ability to achieve margin expansion and profitability; Plug's plans to improve its service margins; Plug's near-term cost projections and recording of service loss provisions; Plug's expectation that business accelerators will further position it to be a global leader in the green hydrogen industry; the expectation that Plug will be able to significantly expand manufacturing capacity to meet anticipated demand while delivering continued manufacturing cost reduction; the expected production tax credits and other benefits Plug may receive under the Inflation Reduction Act and other policy and regulations; the timing and achievement of expected outputs at Plug's Georgia and Tennessee facilities; the expectation that Plug's construction of hydrogen plants at Louisiana, Texas and New York will provide additional step change in its fuel margin expansion; Plug's beliefs with respect to its sales opportunities and the timing of FID; Plug's expectation regarding the number of material handling sites and new customers; Plug's ability to organically expand Plug's PEM stack manufacturing capacity at its Innovation Center and Gigafactory in Rochester, NY, drive down costs and increase throughput, and achieve expected capacity by the target dates; the expected production at Plug's Vista facility; the belief that Plug's Gigafactory and Vista facility will create a sustainable competitive advantage and industry cost leadership; Plug's ability to complete additional green hydrogen plants in North America, Europe and globally by the target dates and achievement of target production capacities by those dates; the anticipated progress and expected growth of Plug's ability to execute its strategic growth plan through joint ventures; Plug's ability to apply learnings from its Georgia plant to additional plants and the belief that such learnings may improve contracting strategy, reduce construction capital expenditures and ensure completion on targeted timelines; the expected timing for deployment of Plug's stationary power solutions; Plug's plans to roll out power upgrades; Plug's ability to continue to expand manufacturing capabilities and manage supply chain issues, including Plug's belief that current hydrogen supply challenges is a transitory issue; the expected sales pipelines, timing of revenue recognition and bookings, including the expectation that a backlog of new product orders will result in increased sales; and Plug's ability to obtain financing on acceptable terms to fund its forecasted capital expenditure and operating requirements under the current business plan.

You are cautioned that such statements should not be read as a guarantee of future performance or results as such statements are subject to risks and uncertainties. Actual performance or results may differ materially from those expressed in these statements as a result of various factors, including, but not limited to, that we continue to incur losses and might never achieve or maintain profitability; our ability to continue as a going concern; that we will need to raise additional capital to fund our operations and such capital may not be available to us; global economic uncertainty, including supply chain disruptions, credit tightening, inflationary pressures, and high interest rates; that we may not be able to obtain from our hydrogen suppliers a sufficient supply of hydrogen at competitive prices or the risk that we may not be able to produce hydrogen internally at competitive prices; that we may not be able to expand our business or manage our future growth effectively; that delays in or not completing our product development and hydrogen plant construction goals may adversely affect our revenue and profitability; that we may not be able to convert all of our backlog into revenue and cash flows; the benefit that we will receive under the Inflation Reduction Act; that we may not be able to successfully execute on our joint ventures; and our ability to manufacture and market products on a profitable and large-scale commercial basis. For a further description of the risks and uncertainties that could cause actual results to differ from those expressed in these forward-looking statements, as well as risks relating to the business of Plug in general, see Plug's public filings with the Securities and Exchange Commission, including the "Risk Factors" section of Plug's Annual Report on Form 10-K for the year ended December 31, 2022, Plug's Quarterly Reports on Form 10-Q for the quarters ended March 31, 2023 and June 30, 2023 as well as any subsequent filings. Readers are cautioned not to place undue reliance on these forward-looking statements. The forward-looking statements are made as of the date hereof and are based on current expectations, estimates, forecasts and projections as well as the beliefs and assumptions of management. We disclaim any obligation to update forward-looking statements except as may be required by law.

Plug Investor Contact

Roberto Friedlander

Q3 09/11/23

Ola Borten Moe is Minister of Research and Higher Education since 2021. Previously, he also served as Minister of Petroleum and Energy from 2011 to 2013.

<https://www.facebook.com/SPolabortenmoe/posts/pfbid02FhTrNJAApZa6m392J41EgiRbFzG6ffgq12n3JAwqYQVL3cR7p9ztixMQiR1wG6qXI>



Ola Borten Moe

January 6 · 🌐

Det er stadig mer åpenbart at vi alt for lenge har oppført som om det er ubegrenset tilgang på fornybar og rimelig strøm i Norge. Faktum er enkelt og greit at det er mangel på energi i kraftsystemene våre. Svært høye priser og frykt for forsyningsikkerheten dokumenterer dette. Vi må derfor selvsagt få et langt mer realistisk forhold til hva vi bruker energi på. Og vi må få et bevist forhold til enkle faktorer som ressurseffektivitet og virkningsgrad. Hydrogen er sikkert bra til mye, men faktum er at det er et høyeksplosivt lagringsmedium med store energitap i begge ender av prosessen. Om du bruker 100 kwh strøm til å produsere hydrogen vil du sitte igjen med en energimengde i hydrogen tilsvarende 50 kwh. Halvparten av energien er med andre ord tapt. Om du videre skal bruke dette hydrogenet i en brenselcelle taper du ytterligere 50%. Om du kjører det i en turbin for å produsere strøm taper du 70%. Med andre ord får du en utnyttelsesgrad i en bil på ca 25% eller 25 kwh av de opprinnelige 100 kwh pga energitap i prosessene. I en enkel turbin er tapet enda større. Denne strømmen/energien kunne alternativt blitt brukt direkte all den tid den tas fra nettet i Norge med en utnyttelsesgrad til for eksempel oppvarming, produksjon eller transport på 90-100%! Om Statkraft sammen med NEL lykkes med å etablere 2 gw elektrolyse av hydrogen i Norge tilsvarer det en energimengde på ca 17,5 twh, eller om lag 12-13% av all kraftproduksjon i Norge. Med 75% energitap er det 14 twh, eller 10% av all norsk kraftproduksjon rett i dass. Det er etter mitt skjønns lysår unna å være forsvarlig eller fornuftig. Vi trenger all den energien vi har og får til langt mer fornuftige ting enn å fyre for kråka.



STATKRAFT.NO
Nel og Statkraft legger grunnlaget for en verdikjede for grønt hydrogen i Norge
Hydrogenteknologiselskapet Nel og Europas største leverandør av fornybar energi, Statkraft, signerte nylig en kontrakt for leveranse av 40 MW elektrolyseutstyr og vil dermed samarbeide om å skape en sterk verdikjede...

👍 505

161 comments 108 shares

Google Translate of Moe's above Facebook posting

It is increasingly obvious that for far too long we have acted as if there is unlimited access to renewable and affordable electricity in Norway. The fact is plain and simple that there is a lack of energy in our power systems. Very high prices and fears about security of supply document this. **We must therefore of course have a far more realistic relationship with what we use energy for.** And we must have a proven relationship with simple factors such as resource efficiency and effectiveness. **Hydrogen is certainly good for many things, but the fact is that it is a highly explosive storage medium with large energy losses at both ends of the process. If you use 100 kwh of electricity to produce hydrogen, you will be left with an amount of energy in hydrogen corresponding to 50 kwh. In other words, half of the energy is lost. If you are going to use this hydrogen in a fuel cell, you lose a further 50%. If you run it in a turbine to produce electricity, you lose 70%. In other words, you get a utilization rate in a car of about 25% or 25 kwh of the original 100 kwh due to energy loss in the processes. In a simple turbine, the loss is even greater. Alternatively, this current/energy could have been used directly all the time it is taken from the grid in Norway with a utilization rate for, for example, heating, production or transport of 90-100%! If Statkraft together with NEL succeeds in establishing 2 gw electrolysis of hydrogen in Norway, this corresponds to an energy quantity of approximately 17.5 twh, or approximately 12-13% of all power production in Norway. With a 75% energy loss, that's 14 twh, or 10% of all Norwegian power production right there. It is, in my opinion, light years away from being justifiable or reasonable. We need all the energy we have and can do for far more sensible things than fighting for the crow.**

New Study Finds Electric Vehicles Are Driven Less Than Gas Cars

One of the largest studies to date finds the current generation of EV owners drive far fewer miles than owners of gas vehicles, translating to lower emissions savings from EVs.

November 6, 2023

Media Contact:

Cate Douglass, cdouglass@gwu.edu

WASHINGTON (November 6, 2023) - Mass adoption of electric vehicles (EV) is a key part of plans to decarbonize the United States' energy system. As EV ownership in the U.S. increases, understanding how much EV owners are driving their cars informs everything from climate and energy models to U.S. policy and energy planning. Thus far, the assumption among modelers and regulatory bodies like the Environmental Protection Agency (EPA) has been that EV owners drive their cars about the same number of miles as owners of gas vehicles. New research published in Joule, however, challenges that assumption and suggests we may be overestimating emissions savings from EVs.

In one of the largest studies on EV mileage to date, researchers at the George Washington University and the National Renewable Energy Laboratory examined odometer data from 12.9 million used cars and 11.9 million used SUVs between 2016 and 2022. They found that battery electric vehicle (BEV) cars were driven almost 4,500 fewer miles annually than gas cars. The study found a gap for both cars and SUVs: electric cars had traveled 7,165 miles while gas-powered cars had traveled 11,642 miles annually, and electric SUVs traveled 10,587 miles while their gas-powered counterparts traveled 12,945 miles annually.

"People often assume that buying an EV is good for the environment, and it generally is, but the impacts scale with mileage," John Helveston, study co-author and Assistant Professor of Engineering Management and Systems Engineering at GW, says. "Our study shows that the current generation of EV owners aren't using them as much as gas cars. For maximum impact, we need the highest-mileage drivers behind the wheel of EVs rather than low-mileage drivers." Because EVs generally have lower emissions over their lifetime, replacing a higher-mileage gasoline vehicle with an EV results in larger emissions savings, all else being equal.

The researchers also compared miles traveled in Tesla versus non-Tesla BEVs, given Tesla's prominence in the EV market and other features like higher-range vehicles and a well-established fast-charging network. Nonetheless, they found that while Teslas were driven more than other EVs, Teslas were still driven less than conventional gas cars. The study did show that plug-in hybrid and hybrid vehicles were driven similarly to gas vehicles, however.

The study has implications for policymakers and regulators who are drafting and implementing emissions regulations, as the findings challenge current assumptions about how far people are driving their electric vehicles. For example, the [latest analysis](#) from the EPA assumes EVs are already driven the same number of miles as conventional gas cars.

"If you're going to craft a model that predicts how much emissions can be saved from EV adoption, that model heavily depends on how much you think EVs will be driven. If federal agencies are overestimating true mileage, that results in overestimating the emissions savings," Helveston adds. "We need to better understand not just who is buying EVs, but how they're driving them. What trips are EV owners substituting for a cleaner trip in an EV, and what trips are EV owners not taking?"

While not a focus of the study, Helveston suggested a couple of factors that may be affecting how far EV owners are driving their cars, including a lack of charging infrastructure that may limit EV owners' ability to reliably take longer-distance trips. Researchers also suggest multi-vehicle households may be another reason behind these findings; people who own EVs often own multiple vehicles, and they may be spreading out their annual miles over each of them, resulting in lower overall mileage on the EV.

"The magnitude of data used in this study posed several technical challenges, but I hope our efforts can inform policy around the impacts of EV adoption", said Lujin Zhao, a GW Ph.D. student who led the study.

The study's findings also have implications for the electricity grid as it means the anticipated electricity consumption from EV adoption may be lower than utilities are planning for. Additionally, the researchers say it's also important to consider that making a battery-powered EV typically results in higher upfront emissions compared to making a gasoline vehicle. Helveston and the research team says it will take longer to compensate for those higher up-front emissions if people aren't driving the EV enough.

The study, "[Quantifying Electric Vehicle Mileage in the United States](#)," was published in Joule.

Quantifying electric vehicle mileage in the United States

- [Lujin Zhao](#)
- [Elizabeth R. Ottinger](#)
- [Arthur Hong Chun Yip](#)
- [John Paul Helveston](#) ²
- [Show footnotes](#)

Published: October 24, 2023 DOI: <https://doi.org/10.1016/j.joule.2023.09.015>

Highlights

- •
BEVs accumulate fewer annual miles than CVs: 7,165 versus 11,642 (cars)
- •
Tesla BEVs have higher annual miles than non-Teslas: 8,786 versus 6,235 (cars)
- •
Larger range BEVs are driven more, though diminishing returns are noticed
- •
CV mileage shows higher sensitivity to cost increases than BEV mileage

Summary

We deliver comprehensive, high-resolution estimates of annual vehicle miles traveled (VMT) in the United States for battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), hybrid electric vehicles (HEVs), and conventional gasoline vehicles (CVs) using odometer readings from 12.5 million used cars and 11.4 million used sport utility vehicles (SUVs) listed between 2016 and 2022. Although CVs, HEVs, and PHEVs are driven similarly, BEV cars average 4,477 fewer miles annually. Teslas are driven more than other BEVs, yet still less than CVs. Similar differences in VMT across powertrains exist for SUVs, though SUVs are driven more than cars in all powertrains. Driving range has a non-linear relationship with VMT for BEV cars: every 10 additional miles of range equates to 631 additional annual miles for low-range BEVs (<100 miles of range) but only 85 annual miles for high-range BEVs (>200 miles of range). BEV cars also show less sensitivity in annual VMT to operating cost changes compared with CVs. Results provide an important context for modelers anticipating increased electricity consumption from PEV adoption.

13 hours ago - [Technology](#)

EVs are driven less than gas-powered models: study

- [Ben Geman](#)

, author of

[Axios Generate](#)

Evidence is piling up that [electric vehicles](#) are driven much less than gas-powered models, which could sap the tech's power against climate change if the trend continues.

Driving the news: A [new peer-reviewed paper](#) analyzed odometer readings of used cars listed from 2016 to 2022.

- Fully electric cars average nearly 4,500 fewer miles annually than conventional models.
- Battery SUVs also saw a gap, although not as large.

The big picture: The data may signal comparatively fewer high-mileage drivers are making the switch, the authors say.

- And EV owners may be using them as a second car alongside a gasoline model, researchers writing in *Joule* suspect.
- "Range anxiety" due to "immature" charging infrastructure may be a factor.

Why it matters: "For maximum impact, we need the highest-mileage drivers behind the wheel of EVs rather than low-mileage drivers," co-author John Helveston, an engineering professor at George Washington University, said in a statement.

Catch up fast: Multiple studies using different methods have reached some version of this conclusion about EV miles.

- For instance, in 2021 we [covered a study](#) of California driving habits based on home electricity data.

Yes, but: Only a surveillance state could create a perfect window into drivers' habits, so every study has limitations.

- One here: this dataset only captures EVs that owners got rid of. That could tilt the data toward drivers who decided the tech was a "poor fit."
- And relying on used car data means the analysis is weighted toward older models.

The bottom line: The big question is whether EV drivers today — and going forward — better mimic gas-powered car owners.

- "I would echo the caveat from the authors that these analyses tell us mostly about older EVs. It will be interesting in future work to examine driving patterns for newer EVs," UC-Berkeley's Lucas Davis, who wrote a [separate study](#), tells me via email.

Go deeper: Helveston [explained the findings](#) in a post on X.





<https://twitter.com/JohnHelveston/status/1721549741022982342>



John Paul Helveston ( @jhelvy@fediscience.org)

@JohnHelveston



Are #EVs   driven as far as conventional gasoline vehicles (CVs) 
?

Our latest study with Lujin Zhao, Eliese Ottinger, and @arthurhcyip published in @Joule_CP suggests the answer is “NO”...or at least “not yet”

A  on the study...

doi.org/10.1016/j.joule...

Joule

 CellPress

Article

Quantifying electric vehicle mileage in the United States

Lujin Zhao,¹ Elizabeth R. Ottinger,¹ Arthur Hong Chun Yip,² and John Paul Helveston^{1,3,*}

SUMMARY

We deliver comprehensive, high-resolution estimates of annual vehicle miles traveled (VMT) in the United States for battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), hybrid electric vehicles (HEVs), and conventional gasoline vehicles (CVs) using odometer readings from 12.5 million used cars and 11.4 million used sport utility vehicles (SUVs) listed between 2016 and 2022. Although CVs, HEVs, and PHEVs are driven similarly, BEV cars average 4,477 fewer miles annually. Teslas are driven more than other BEVs, yet still less than CVs. Similar differences in VMT across powertrains exist for SUVs, though SUVs are driven more than cars in all powertrains. Driving range has a non-linear relationship with VMT for BEV cars: every 10 additional miles of range equates to 631 additional annual miles for low-range BEVs (<100 miles of range) but only 85 annual miles for high-range BEVs (>200 miles of range). BEV cars also show less sensitivity in annual VMT to operating cost changes compared with CVs. Results provide an important context for modelers anticipating increased electricity consumption from PEV adoption.

CONTEXT & SCALE

Mass adoption of plug-in electric vehicles (PEVs) is a critical component of plans to decarbonize the US energy system. Understanding current PEV usage helps inform future planning. Analyzing the odometer readings from millions of used cars and SUVs listed between 2016 and 2022 reveals that battery electric vehicles (BEVs) have accumulated fewer annual miles than conventional gasoline vehicles (CVs): 7,165 compared with 11,642 for cars, and 10,184 compared with 12,979 for SUVs. Tesla BEVs have accumulated more annual miles than non-Teslas: 8,786 compared with

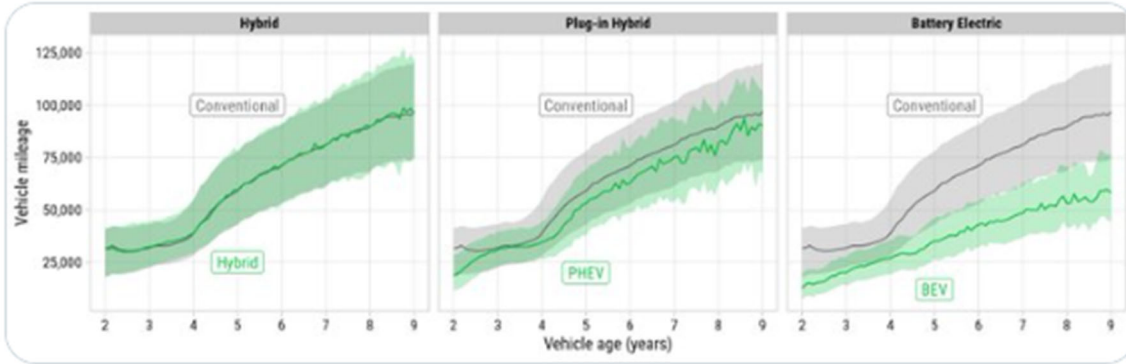
8:26 AM · Nov 6, 2023 · 5,751 Views



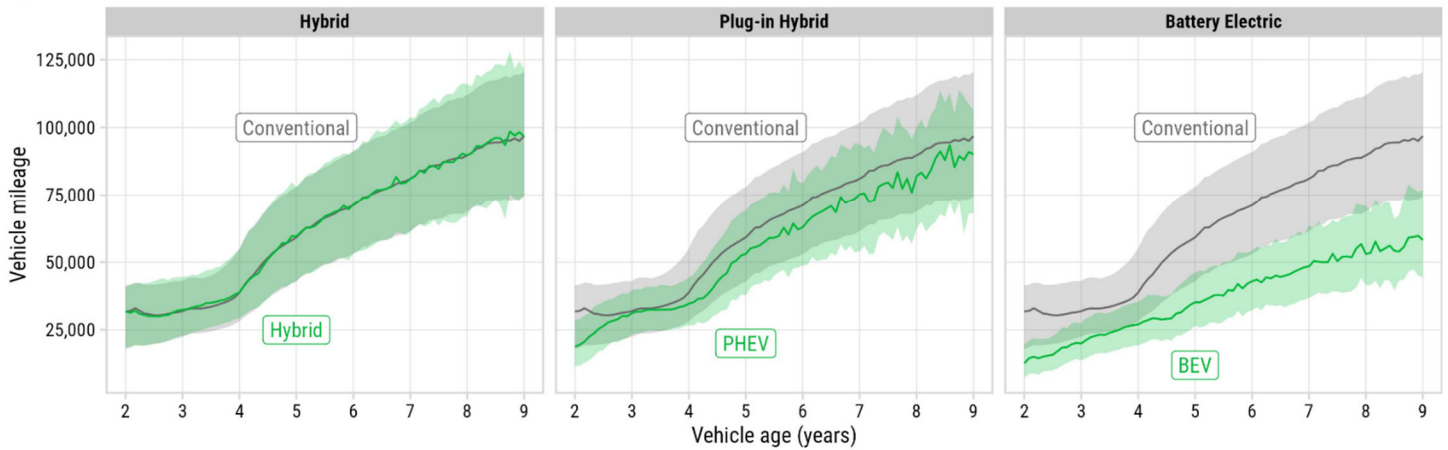
John Paul Helveston (@jhelvy@fediscience.org)
@JohnHelveston



Drawing on millions of used vehicle listings between 2016 and 2022 (including 188,727 EVs), we find that while HEVs and PHEVs have been driven similarly to conventional vehicles (CVs), BEV cars have averaged 4,477 fewer miles annually.



8:26 AM · Nov 6, 2023 · 237 Views





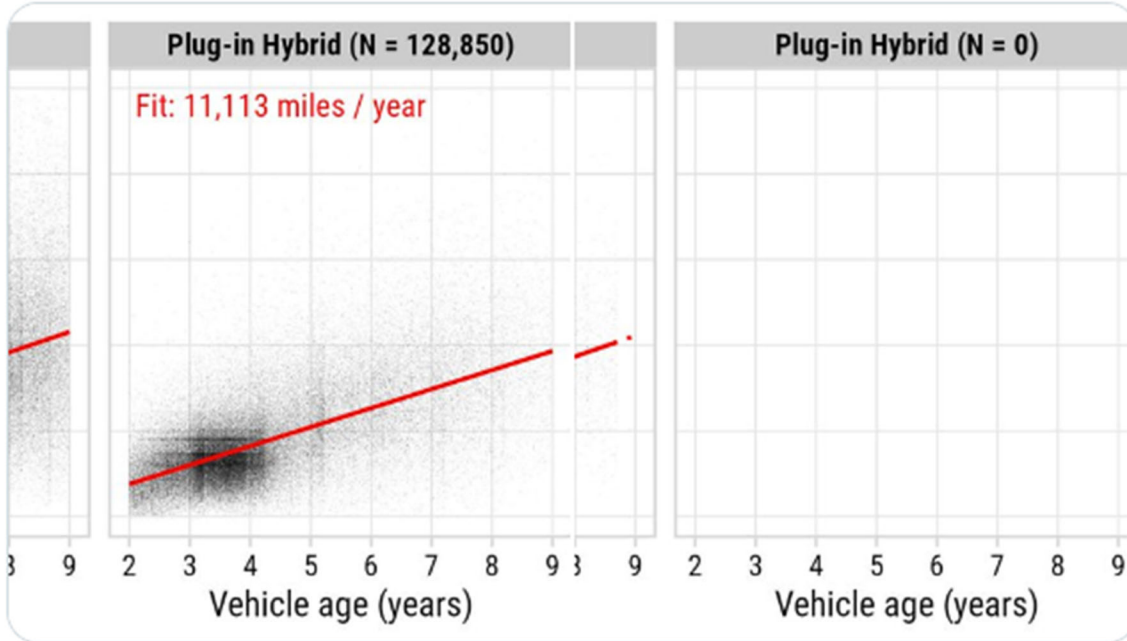
John Paul Helveston (@jhelvy@fediscience.org)
@JohnHelveston



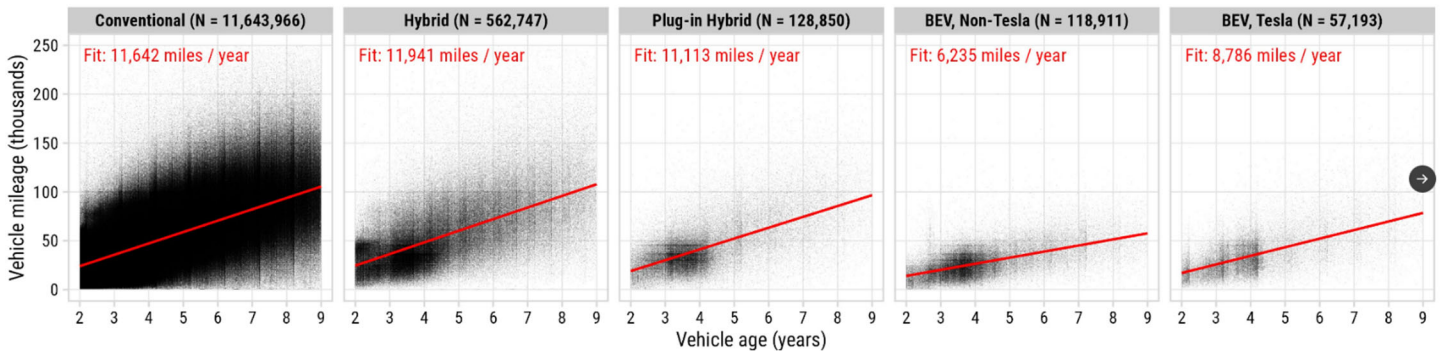
Lower BEV annual mileage is observed for both cars and SUVs

🚗 Cars: 7,165 (BEV) vs. 11,642 (CV)

🚙 SUVs: 10,587 (BEV) vs. 12,945 (CV)



8:26 AM · Nov 6, 2023 · 206 Views





John Paul Helveston (@jhelvy@fediscience.org)

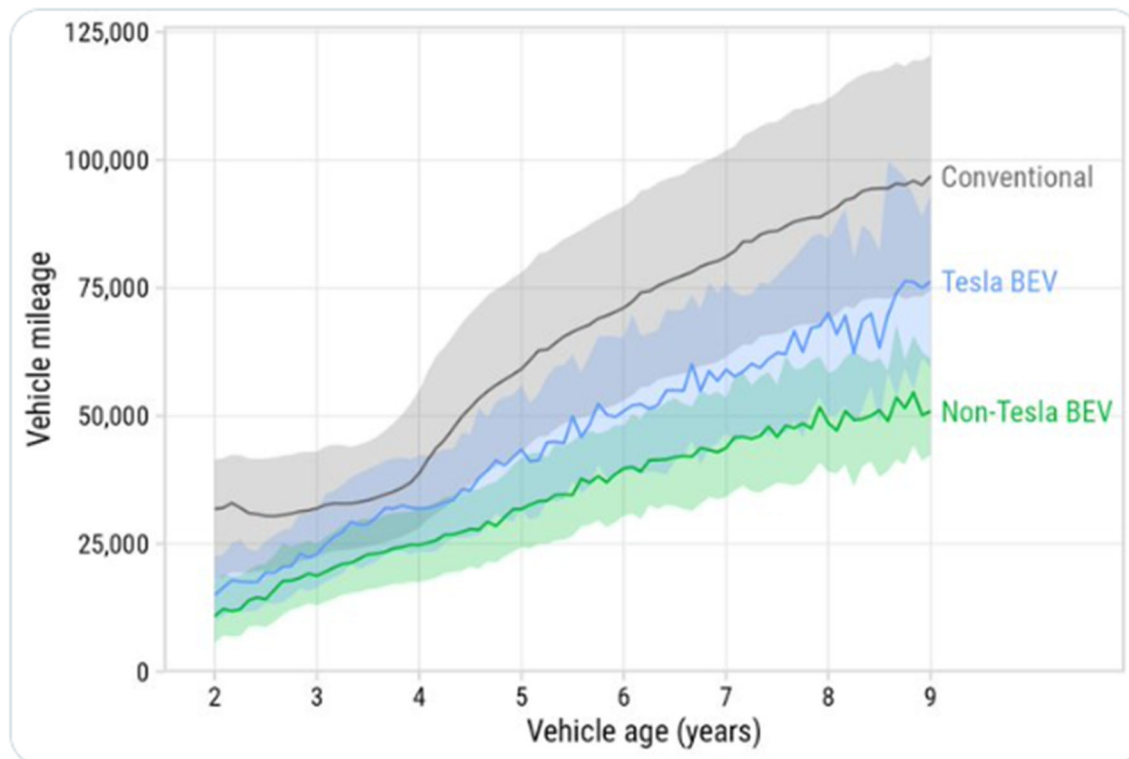
@JohnHelveston



@Tesla BEVs have notably been driven more than non-Teslas:

Cars: 8,786 (Tesla) vs. 6,235 (non-Tesla)

SUVs: 9,136 (Tesla) vs. 8,463 (non-Tesla)



8:26 AM · Nov 6, 2023 · 1,149 Views



John Paul Helveston (@jhelvy@fediscience. @JohnHelveston · Nov 6 ...

A recent study by @iseecars finds similar results in model year 2020 BEVs

See Cars **iSeeCars.com - Cars** @iseecars · Jun 1

The most and least driven electric cars study

*EVs vs gas-powered cars: Electric cars cost 47% more but are driven 29% less twitter.com/CNET/status/16...



1



234



John Paul Helveston (@jhelvy@fediscience. @JohnHelveston · Nov 6 ...

We also find a non-linear relationship between BEV range and mileage:

Every 10 miles of range translates to 631 additional annual miles for low-range BEVs (<100 miles of range) but only 85 annual miles for high-range BEVs (>200 miles of range)



1



172





John Paul Helveston (@jhelvy@fediscience.org)

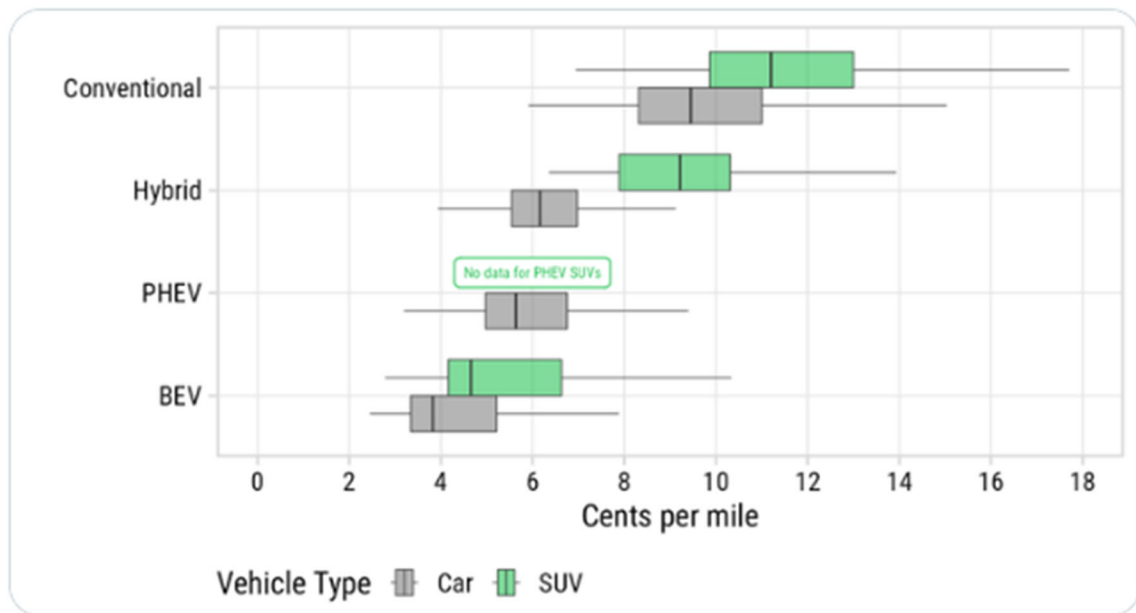
@JohnHelveston



BEV mileage for cars is also less sensitive to changes in operating cost:

For every 1 cent per mile increase, CVs were driven 136 fewer annual miles but BEVs just 59.

This is expected given BEVs' considerably lower operating costs:



8:27 AM · Nov 6, 2023 · 1,208 Views



John Paul Helveston (@jhelvy@fediscience. @JohnHelveston · Nov 6 ...

Understanding EV mileage is crucial for planning and policy making. In its latest rulemaking, @EPA assumes EVs are already driven the same number of miles as CVs. Our study shows that this is an optimistic assumption inconsistent with historical usage.

nepis.epa.gov/Exe/ZyPDF.cgi?...

Based on these study results and the transparency with which they communicate data and findings, there is no evidence that PEVs are driven more than ICE vehicles, and study results do not conflict regarding whether annual eVMT is less for PEVs. EPA concludes that the existing empirical evidence does not support the conclusion that average annual eVMT differs from annual VMT for ICE vehicles. Therefore, EPA analyses use the same annual VMT for PEVs as for ICE vehicles in the No Action case.



1



1



170



John Paul Helveston (@jhelvy@fediscience. @JohnHelveston · Nov 6 ...

Likewise, large climate and energy models (e.g. the REPEAT project, @JesseJenkins @ErinNMayfield @WeiPeng_Pton) rely on accurate assumptions of vehicle mileage and should consider these findings in updated versions of their models.



3



2



229



John Paul Helveston (@jhelvy@fediscience. @JohnHelveston · Nov 6 ...

You can read more on the implications of the study in the GW press release



mediarelations.gwu.edu

New Study Finds Electric Vehicles Are Driven Less Than Expected
One of the largest studies to date finds the current generation of EV owners drive far fewer miles than ...



196



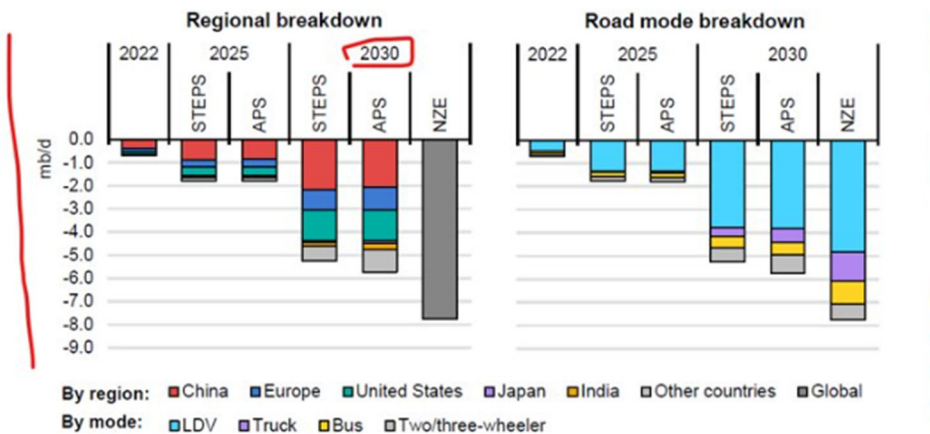
To help policy makers prioritise charging strategies according to the size of their EV fleet and their power system configuration, the IEA has developed a [guiding framework](#) and [online tool](#) for EV grid integration.

Oil displacement

The growing EV stock will reduce oil use, which today accounts for over 90% of total final consumption in the transport sector. Globally, the projected EV fleet in 2030 displaces more than 5 million barrels per day (mb/d) of diesel and gasoline in the STEPS and almost 6 mb/d in the APS, up from about 0.7 mb/d in 2022. For reference, Australia consumed around 1 mb/d of oil products across all sectors in 2021.

However, recent price volatility for critical minerals that are important inputs to battery manufacturing, and market tension affecting supply chains, are a stark reminder that in the transition to electromobility, energy security considerations evolve and require regular reconsideration.

Figure 3.13. Oil displacement by region and mode, 2022-2030



IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario; LDV = light-duty vehicle. Oil displacement based on internal combustion engine (ICE) vehicle fuel consumption to cover the same mileage as the EV fleet.

Oil displacement increases from 0.7 mb/d in 2022 to nearly 6 mb/d in 2030 if pledges supporting electromobility in road transport around the world are fulfilled.

Box 3.2 How much oil really gets displaced by electric vehicles?

Oil displacement through the use of EVs can be estimated by assuming that the distance (total kilometres) travelled by EVs by segment each year would have otherwise been travelled by ICE vehicles or hybrid electric vehicles (HEVs) (based on the stock shares of each). In the case of PHEVs, only the distance covered by electricity gets included. The stock average fuel consumption of gasoline and diesel vehicles determines the total liquid fuel displacement, where the biofuel portion is taken out of the estimate based on regional blending rates. As a result, it can be estimated that in 2022, the stock of EVs displaced 700 000 barrels of oil per day.

This method of estimation assumes that EVs replace ICE or hybrid vehicles of the same segment, as opposed to some other means of transport, i.e. an electric car replaces an ICE car. The accuracy of this assumption is uncertain, in particular with respect to two-wheelers. In IEA analysis, only two-wheelers that fit the United Nations Economic Commission for Europe (UNECE) classification of L1 or L3 are considered. This definition excludes micromobility options such as electric-assisted bicycles and low-speed electric scooters, leading to a significantly lower stock (around 80% lower) than when including micromobility segments.

Whether or not electric micromobility avoids oil use is uncertain, as it might displace manual bicycles or walking rather than ICE two-wheelers. At the same time, there is evidence that in some cases micromobility [displaces personal car or taxi trips](#). The estimate of the amount of oil use that is avoided by two-wheeled micromobility therefore strongly depends on the assumptions about the mode that is being displaced.

The case of China, which represents over 95% of the global stock of two-wheeled electric micromobility, is a good example. Assuming that all two-wheeled micromobility in China replaces conventional ICE two-wheelers would increase oil displacement by 260 kb/d (or 160%). If instead electric micromobility was assumed to replace only bus trips, then the total oil displacement from two-wheelers in China would increase by just 10 kb/d (10%). However, if it was assumed that they displaced car trips, then oil use avoided by two-wheelers in China would be more than 1 mb/d higher. Including oil displacement from the two-wheeled electric micromobility segment in China alone can therefore increase the estimated 2022 global oil displacement from all electric vehicles anywhere from 1% to 160%. But there is significant uncertainty as to whether any oil is displaced at all.

← Thread



National Cyber Security Coordinator @AUCyberSecCoord



The Australian Government continues to work with DP World Australia to resolve a nationally significant cyber incident that has affected operations at a number of ports around the country.

10:30 PM · Nov 11, 2023 · 11.5K Views

1 16 24 3

See similar posts

Post your reply

Reply



National Cyber Security Coordinator @AUCyberSecCoord · 7h
Today (Sunday 12 November 2023), I again convened the National Coordination Mechanism to bring together government agencies and the maritime and logistics sectors as part of the response to the incident. This followed earlier technical and Ministerial briefings with the company.

1 1 3 583



National Cyber Security Coordinator @AUCyberSecCoord · 7h
DP World's IT system remains disconnected from the internet, significantly impacting their operations in Brisbane, Sydney, Melbourne and Fremantle. Our priority remains assisting DP World to restore their systems, which will allow cargo operations to recommence.

1 4 4 682



National Cyber Security Coordinator @AUCyberSecCoord · 7h
DP World today advised the Australian Government that the timeframe for interruptions to continue is likely to be a number of days, rather than weeks.

1 3 5 1.9K



National Cyber Security Coordinator @AUCyberSecCoord · 7h
They also advised that despite the disruption, they are able to access sensitive freight at the ports if necessary – for example, in a medical emergency.

1 1 5 772



National Cyber Security Coordinator @AUCyberSecCoord · 7h
We are continuing to develop our understanding of the flow on impacts to Australia's logistics system.

1 4 515



National Cyber Security Coordinator @AUCyberSecCoord · 7h
The National Emergency Management Agency, the Department of Infrastructure, Transport, Regional Development, Communications and the Arts and the Office of Supply Chain Resilience in the Department of Industry, Science and Resources will work with DP World to ensure that... [Show more](#)

1 2 5 1.2K



National Cyber Security Coordinator @AUCyberSecCoord · 7h
While I understand there is interest in determining who may be responsible for the cyber incident, our primary focus at this time remains on resolving the incident and supporting DP World to restore their operations.

1 1 4 953



National Cyber Security Coordinator @AUCyberSecCoord · 7h
The Australian Federal Police is continuing to investigate the incident.

2 6 1K

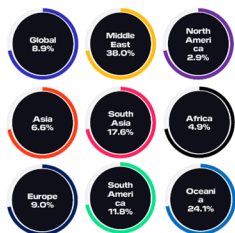
DP WORLD – PORTS & TERMINALS

OUR GLOBAL FOOTPRINT

DP World is a global leader in container terminal operations and manages **92 million TEU** of capacity. DP World's container capacity is focused on faster growing markets and high margin origin & destination cargo.

Average life of port concessions is approximately **32 years**

DP WORLD MARKET SHARE (BY THROUGHPUT)*



*Source: Drewry Global Container Terminal Operators AR 2023/2024

<https://www.dpworld.com/investors/financials-presentations/key-figures>

Volumes Overview



		2018	2019	2020	2021	2022
Gross Capacity	TEU mn	90.8	91.8	93.3	91.7	92.5
Gross Throughput	TEU mn	71.4	71.2	71.2	77.9	79.0
Gross Capacity Utilization	%	78.7	77.6	76.3	84.9	85.5
Consolidated Capacity	TEU mn	49.7	54.2	57.9	56.0	57.0
Consolidated Throughput	TEU mn	36.8	39.9	41.7	45.4	46.1
Consolidated Capacity Utilization	%	74.0	73.7	72.0	81.1	80.9

Select all 2018 2019 2020 2021 2022

Asia Pacific and Indian Subcontinent



		2018	2019	2020	2021	2022
Consolidated Throughput	TEU '000	8,810.0	9,316.0	8,766.0	10,232.0	9,658.0
Revenue	USD mn	678.4	615.6	793.3	1,920.8	2,598.9
Adjusted EBITDA	USD mn	501.7	347.5	362.8	728.7	1,000.6
Profit After Tax	USD mn	409.0	254.0	246.6	509.3	678.3

Select all 2018 2019 2020 2021 2022

Australia and Americas



		2018	2019	2020	2021	2022
Consolidated Throughput	TEU '000	4,156.0	7,368.0	9,821.0	10,881.0	11,410.0
Revenue	USD mn	961.1	1,401.6	1,713.3	2,215.3	2,928.8
Adjusted EBITDA	USD mn	340.2	437.2	590.2	806.8	1,005.2
Profit After Tax	USD mn	222.9	223.1	319.3	509.1	654.7

Select all 2018 2019 2020 2021 2022

Middle East, Europe and Africa



		2018	2019	2020	2021	2022
Consolidated Throughput	TEU '000	23,794.0	23,246.0	23,161.0	24,310.0	25,025.0
Revenue	USD mn	4,006.7	5,668.8	6,026.0	6,641.8	11,599.5
Adjusted EBITDA	USD mn	2,104.1	2,726.0	2,595.5	2,739.6	3,447.8
Profit After Tax	USD mn	1,505.4	1,979.1	1,682.2	1,777.3	2,153.8

Select all 2018 2019 2020 2021 2022



Plug Reports Third Quarter 2023 Results with Revenue of \$199M

2023 overall financial performance has been negatively impacted by unprecedented supply challenges in the hydrogen network in North America.

We believe this hydrogen supply challenge is a transitory issue, especially as we expect our Georgia and Tennessee facilities to produce at full capacity by year-end.

Lessons from ramping up our Georgia green hydrogen facility coupled with our manufacturing ramp, diversity of products, and major new customer wins reinforce Plug's leadership position in the global green hydrogen economy.

- **The liquid hydrogen market in North America has been severely constrained by multiple frequent force majeure events, leading to volume constraints which has delayed Plug's deployments and service margin improvements:** Plug continues to manage through a historically difficult hydrogen supply environment by leveraging our logistics assets and team members to transport hydrogen across the US to support customer operations as well as implementing contingency plans in various regions of the country. Despite this challenging industry environment, we have achieved 21% sequential gross margin improvement in 3Q 2023 compared to 2Q 2023 in our fuel business.
- **Despite hydrogen supply challenges impacting overall company gross margin, we have seen margin expansion in certain new products:** Reported GAAP gross loss of (69%), was impacted negatively by equipment sales mix, service contract loss accruals, and continued negative fuel margins. Despite these factors, the Company saw margin expansion across certain new product platforms.



- **Georgia green hydrogen plant nearing major milestone:** We are completing the final step of the commissioning process for the liquefiers/cold box. Liquid production is anticipated between November 15th and year-end. Also, developments at Louisiana, Texas and New York are expected to provide an additional step change in our fuel margin expansion. Our gas plant in Georgia has now been operating for almost a year supporting high pressure tube trailer filling for Plug as well as other customers. Unprecedented hydrogen supply challenges in the US only further reinforces our vertically integrated strategy and need for a resilient generation network to support multiple applications.
- **Electrolyzer sales grew greater than three times quarter over quarter. Multiple large-scale orders validate Plug’s position as a go-to electrolyzer supplier for industrial scale projects:** Since our second quarter 2023 call, Plug has line of sight to an additional 1 GW of electrolyzer orders to our backlog, including 550 MW for Fortescue in Australia and 280 MW for Arcadia e-Fuels in Denmark.
- **Liquefier and cryogenics business continues rapid growth - sales pipeline now exceeding \$1.1B:** Plug’s cryogenics and liquefier business revenue increased approximately three times year over year (YoY), while margins have expanded by an even greater improvement in the same period.
- **Average sales cycle continues to accelerate in our material handling business** given the value proposition of our product and increased market awareness of our solutions. Recently, Plug has added multiple global customers including Tyson, Ryder, STEF and others.
- **Large-scale stationary manufacturing is ramping up, with first units operating at customer sites:** Stationary power manufacturing lines are commissioned, with customer orders increasing across EV charging, data centers, and microgrid opportunities. Plug is on track to deliver multiple units in the fourth quarter of 2023, with expected substantial growth in 2024 and beyond.





- **Service accrual charge reflects higher near-term cost projections, which have been impacted by delay in roll out of certain reliability investments:** In the third quarter of 2023, the Company has incurred a non-cash charge of \$41.6 million. This charge reflects the projection for future costs to service our existing fleet through the remainder of their service contract. The severe hydrogen shortages have negatively affected direct cost of service as well as the timing for implementation of fleet upgrades into customer operated equipment. These factors have been compounded by certain cost increases from inflation impacts on labor, materials and overhead. The Company is continuing to monitor the current cost trends and hydrogen market dynamics. If these trends continue, the Company may have to record additional service loss provisions in future periods.
- **Plug's Gigafactory and Vista facilities represent global manufacturing excellence that we believe will create a sustainable competitive advantage and industry cost leadership:** Plug has increased our manufacturing footprint from 50 thousand sq. ft. to nearly 1 million sq. ft. With minimal additional capital investment, Plug believes it can significantly expand our manufacturing capacity to meet anticipated demand while delivering continued manufacturing cost reduction.

As Plug manages through short-term hydrogen supply disruption, we are focused on operational scale, in-house hydrogen generation and policy tailwinds to further the Company's position as a global leader in the green hydrogen industry.

We believe four key business accelerators position the Company to dramatically change our operations and financials in coming quarters, following what have been unprecedented challenges that have arisen from hydrogen supply disruptions in 2023.

1. Business Expansion:

- **Diverse New Product Platforms:** Electrolyzers, liquefiers, cryogenics, and new fuel cell applications are beginning to become an increasing share of our revenue while we continue to add multiple large customers in our material handling business. Business opportunities remain robust, and expansion of these platforms will be instrumental in achieving our top line growth, but more importantly establishes a clear path to margin expansion and profitability.
- **Large Scale Electrolyzer Customers:** Over 1 GW of new electrolyzer opportunities, including Fortescue and Arcadia, illustrate how Plug's scale and technology are equating to industrial-scale electrolyzer orders.



- **Partnerships Reaching Scale Globally:** Plug and SK's current activities include the use of products across our entire platform. AccionaPlug is progressing the 15TPD plant in Spain. Hyvia joint venture (JV) is well positioned to deliver robust growth in 2024 and beyond, with multiple test pilots ongoing and fuel cell vans available for commercial use today.

2. Margin Enhancement Roadmaps:

- **Hydrogen Generation:** Fuel margin rate improved by 21% sequentially from Q2 2023. Margin improvement was achieved despite numerous force majeure events within the hydrogen network that impacted as much as one-third of the US liquid hydrogen supply. Plug's logistics capabilities and contingency plans have allowed us to manage this difficult environment. We expect this is transitory as we expect Georgia and Tennessee facilities to come on-line by year-end. We believe we have effectively managed this situation considering hydrogen pricing has reached over \$30/kg on the West Coast.
- **Manufacturing Scale:** Plug has already established a world-class manufacturing presence with the ability to meaningfully expand manufacturing capacity with minimal or no additional capital expenditure. This sets the stage for continued cost reduction.
- **Simplifying Designs and Improving Performance:** Service cost improvements remain a key focus area for the Company in order to drive overall margin within the material handling business. As part of this effort, Plug has deployed several fleet wide initiatives in 2023 implementing upgrades for in service equipment that will improve power density, reliability, and life of the fuel cell components in material handling applications. Equipment upgrades include a combination of software operability improvements as well as new hardware. Plug continues to target 30% per unit service cost decrease over the medium-term, as we see the results of these enhancements, continued increase of the fleet mix to latest technology, release of new product stack platforms with higher power density, and the rollout of power upgrades planned for 2024.

3. Future Funding Roadmaps: Given our forecasted capital expenditure and operating requirements under the current business plan, and the Company's existing cash and liquidity position, the Company will need to access additional capital in the market to fund its activities. The Company is pursuing a number of debt capital and project financing solutions.

- **Corporate Debt Solutions:** We are evaluating varied debt financing solutions to support our growth.
- **US Department of Energy (DOE) Loan Program:** Currently, Plug is working towards a conditional commitment from the DOE Loan Program Office to finance plants in our green hydrogen network.
- **Project Finance and Plant Equity Partners:** Our MOU with Fortescue contemplates Fortescue having a 40% equity stake in Plug's Texas hydrogen plant and for Plug to take up to a 25% equity stake in Fortescue's Phoenix hydrogen plant. We will continue to evaluate partners to lower our capital expenditure needs.



4. Policy and Regulations:

- **Guidance for the Inflation Reduction Act (IRA) Production Tax Credit (PTC) is expected before year-end:** We believe that the guidance will be beneficial to the development of Plug's green hydrogen platform, serve as a catalyst for final investment decisions (FIDs) on multiple hydrogen projects, and support future deployments of our fuel cell units and systems.
- **Hydrogen Hubs:** The DOE announced \$7 Billion for Regional Hydrogen Hubs. Plug is engaged in all seven hubs and a corporate sponsor in five of the announced hubs. This involvement, along with Plug's expansive product portfolio, sets up the Company to play a substantial role in these programs.
- **EU Renewable Energy Directive (RED):** RED mandates renewable hydrogen use in transport, industry, buildings, and district heating and cooling, with targets of 42% green hydrogen by 2030 and 60% by 2035 in the European Union (EU). The adoption of this policy, along with the Net Zero Industry Act and Hydrogen Bank pilot auctions, represents meaningful government incentives to accelerate hydrogen adoption across the region.

Green Hydrogen Generation Network and Plant Updates

Our Georgia plant represents a first-of-a-kind facility, which has come with invaluable learnings. Some of the key lessons learned are already benefiting Plug as we are building additional plants in various locations.

- **Improved contracting strategy:** We have been able to secure a lump sum contract for engineering, procurement and construction (EPC) work at our Texas plant. This will meaningfully reduce construction capital expenditures versus the "time & materials" contract employed in Georgia.
- **EPC scope of work:** Turnkey contracts include the entire scope of the plant, ensuring continuity and timeliness of plant construction.
- **Procedure development:** The project execution team has been able to optimize construction and commissioning procedures based on experience with each plant component in Georgia.
- **Construction team members and facility oversight:** The team has identified multiple key positions to lead construction and commissioning activities across our network to ensure efficient installation of key components. This includes lead mechanical supervisors and additional electrical and instrumentation engineers.
- **Timeline management for first-of-kind projects:** Timelines at Georgia, and key changes listed above, allow our project execution timelines to have lower risk and greater oversight, ensuring completion of future plants on targeted timelines.



In light of these learnings, we are also updating schedules for current plants under construction.

Site	Land	PPA	Construction Permits	Start Construction	Commissioning	Target Full Production
Georgia	✓	✓	✓	✓	✓	1 st 15 TPD Q4 '23
Louisiana	✓	✓	✓	✓	Q2 '24	2024
New York	✓	✓	✓	✓	2024	2025
Texas	✓	✓	✓	✓	2024	2025
Other Projects	Exploring production at multiple potential locations			1H '24	2024	2025

US Green Hydrogen Network:

Georgia: We are completing the final step of the commissioning process for the liquefiers/cold box. Liquid production is anticipated between November 15th and year-end.

Olin JV - Louisiana: Construction continues with site grading, with the turnkey provider mobilizing for installation of the liquefaction package in November. The commissioning plan has been developed to ensure a smooth process from construction through commissioning and start-up.

Texas: Construction began at the site with our hydrogen facility EPC contractor, Kiewit. Work is ongoing for on-site grading, access roads, the power transmission line, and on-site substation.

Alabama, New York: We continue to work in collaboration with New York Power Authority and National Grid to complete and energize the substation, which remains the gating item to achieve the full 74 TPD capacity in the first half of 2025.

Other Projects: Plug is actively evaluating several sites for potential new or expanded production capabilities, with a focus on achieving up to 45 TPD of liquid hydrogen output.



European Green Hydrogen Network:

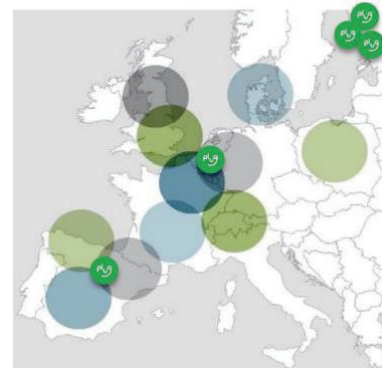
Port of Antwerp: We expect all permits to be obtained in 2024, which would allow it to move to the construction phase in the course of the following year. Meanwhile, conversations with off-takers are progressing, with the plant's targeted production already oversubscribed by over tenfold.

Acciona JV: The JV is actively advancing the development of our first three projects, which target curtailed renewable energy sources. This will be the first 15 MW green hydrogen plant in Spain, which we expect to be on track for commissioning in the latter half of 2024.

Finland: Feasibility studies are being finalized, with the aim to start the next engineering phase in the first quarter of 2024. The plants aim for a total capacity of 850 TPD, with FID expected by 2026.

Other Projects: Plug is developing small-scale sites throughout Europe, driven by Plug customers' demand for hydrogen, notably in the United Kingdom and Germany.

Targets for EU and Global Network
2,500+ TPD Globally by YE 2030
1,000 TPD in Europe by YE 2030



Plug continues to capture large-scale projects globally, with IRA guidance as a potential catalyst for project FIDs in the US

We continue to track new orders in our previously disclosed 7.5 GW pipeline of near-term projects approaching FID.

- Arcadia eFuels has selected Plug to provide a 280 MW electrolyzer system to Arcadia's Vordingborg plant for the production of sustainable aviation fuel.

- Plug is the preferred supplier of 550 MW electrolyzers for Fortescue’s proposed Gibson Island Project. The plant is expected to produce approximately 385,000 metric tons of green ammonia a year.



The near-term focus of customers remains on industrial applications. Low-carbon mandates in the EU, hydrogen PTC in the US, and other low carbon fuel standards globally are driving investment. Plug’s experience across our plant network and with customers has allowed continuous optimization of our offering for industrial scale plant customers.

Cryogenics and Liquefier Business Delivers Strong Revenue Growth and Further Product Diversification

Cryogenics solutions and liquefier sales contributed \$35.4 million to Q3 revenue. The sales pipeline includes up to \$1.1B of opportunities, including multiple programs that may be able to begin revenue recognition in the fourth quarter of 2023, depending on contract timing. We anticipate bookings and revenue will continue to be lumpy in the near-term while we pursue these opportunities and seek to build our liquefier backlog.



Customer Demand in High-Power Stationary Application Creates Significant Hydrogen Offtake Opportunities

Plug commissioned our first high-power stationary units in the field in the third quarter of 2023 and expects the business to continue growing in 2024 and beyond. A variety of end users for this product are creating a large sales pipeline for both the stationary products and hydrogen offtake.

EV Charging: 1 – 5 MW of additional power for a site is needed for EV fleets, creating challenges with grid availability, upgrade costs, and electricity pricing swings. Our application solves time to power, cost of power, and reliability issues, while demanding up to 1TPD+ of hydrogen for a 1 MW unit.

Micro-grids and Peaker Plants: Hydrogen for large-scale (1 MW – 1 GW+) backup power and peak power is gaining traction as grid intermittency and physical limits of battery backup make alternatives difficult. Hydrogen can address both scalability and duration for sites with backup power needs beyond 6-8 hours.

Data Center Prime and Peak Power: Growing demand for cloud and AI processing is stressing grid capacity globally. Plug's value proposition for data centers includes time to power, limited impact to current data center architecture, true zero-emissions, and 100% renewable matching.

Material Handling Customer Diversity is Driving Broad-Based Growth

Our pedestal customers are continuing to grow their business in the US and Europe, with 11 total pedestal customers in the US and Europe. Plug remains focused on improving service and power purchase agreement margins for material handling and is executing internal initiatives to drive costs down as we scale our business.

Plug's newest pedestal customer, Tyson, showed overwhelmingly positive results when analyzing their business case for integrating Plug's fuel cells. This included a 13-15% productivity gain, 17M pounds of estimated carbon footprint reduction annually, and 50,000 annual labor hours saved across eight sites.



A driving factor in our global material handling growth is the reduction in product lead times from our new manufacturing sites, coupled with the maturity of our solution following years of successful implementation. The sales cycle has decreased meaningfully given the value proposition of our product and we have added multiple customers including Tyson, Ryder and STEF.

World-Class Global Manufacturing Facilities Drive Operating Leverage

The Innovation Center and Gigafactory in Rochester, NY reached its initial nameplate capacity of 100 MW of electrolyzer stacks per month in May 2023. The factory design allows for continued expansion and automation, which will enable Plug to drive down costs and increase throughput over time with additional equipment. The Company plans to organically expand its proton exchange membrane (PEM) stack manufacturing capacity in Rochester well beyond 2.5 GW per year. We believe this could result in greater than 4 GW of electrolyzer capacity, and over 200,000 fuel cell stacks produced per year by 2030.

Additionally, we are nearing completion on the balance of the manufacturing lines at our Vista Fuel Cell Manufacturing facility in Slingerlands, NY. The Vista facility spans 407,000 square feet, with the ability to expand to 800,000 square feet to meet the growing demand for our fuel cell products. This massive expansion in Plug's fuel cell manufacturing for material handling represents a four-fold increase YoY. The site targets capacity by 2030 to produce 80,000 GenDrive units, 500 MW of 1-3 MW stationary power units, and 20,000 ProGen engines.

Summary of Third Quarter Financials

Revenue was \$199M in the quarter, compared to \$189M for the third quarter of 2022, up 5% YoY. Overall, company gross margin was negative 69%, compared to negative 24% for the third quarter of 2022. The equipment line item now consists of a blended margin from established fuel cell applications in the material handling sector and our rapidly expanding new product lines such as electrolyzers, on-road mobility solutions, stationary power units, cryogenic equipment, and liquefiers.

The unprecedented number of hydrogen facilities in the market running below nameplate capacity has caused significant hydrogen shortages impacting deployment schedules, fuel prices, system



efficiencies, service on hydrogen infrastructures, and timing of varied reliability program rollouts. The network has seen improvement recently, and we expect liquid hydrogen production from both the Georgia and Tennessee facilities will have substantial impacts on network disruptions.

Service costs have been affected as hydrogen disruptions have delayed the roll out of upgrades at both new and existing customer sites. These factors have been compounded by certain cost increases from inflation impacts on labor, materials and overhead. Upgrades in the field also take a period of time to create meaningful cost improvements, as aging units in the field continue to require additional service. In the interim, given the impact on service and near-term cost projections, we have recorded additional service loss accrual for open contracts. Improvements to our service margin profile are planned to be addressed through the roll out of a new GenDrive platform in 2024, continued upgrades at existing facilities, and operational continuity from lower hydrogen supply disruptions.

Delivering on Roadmap and Margin Expansion Remains Key Corporate Focus

Plug remains focused on building a global green hydrogen ecosystem and delivering on its growth objectives, margin expansion and path to profitability. We look forward to updating you all on our next call.

Handwritten signature of Andrew Marsh in black ink.

Andrew Marsh,
President and CEO

Handwritten signature of Paul Middleton in black ink.

Paul Middleton,
Chief Financial Officer

A conference call will be held on Thursday, November 9, 2023.

Join the call:

- Time: 4:30 pm ET
- Toll-free: 877-407-9221 or +1 201-689-8597
- Direct webcast: https://event.webcasts.com/starthere.jsp?ei=1637631&tp_key=7e3a258c08

The webcast can also be accessed directly from the Plug homepage (www.plugpower.com). A playback of the call will be available online for a period of time following the call.



About Plug

Plug Power is building the hydrogen economy as the leading provider of comprehensive hydrogen fuel cell (HFC) turnkey solutions. The Company's innovative technology powers electric motors with hydrogen fuel cells amid an ongoing paradigm shift in the power, energy, and transportation industries to address climate change and energy security, while providing efficiency gains and meeting sustainability goals. Plug Power created the first commercially viable market for hydrogen fuel cell (HFC) technology. As a result, the Company has deployed over 60,000 fuel cell systems for e-mobility, more than anyone else in the world, and has become the largest buyer of liquid hydrogen, having built and operated a hydrogen highway across North America. Plug Power delivers a significant value proposition to end-customers, including meaningful environmental benefits, efficiency gains, fast fueling, and lower operational costs. Plug Power's vertically integrated GenKey solution ties together all critical elements to power, fuel, and provide service to customers such as Amazon, BMW, The Southern Company, Carrefour, and Walmart. The Company is now leveraging its know-how, modular product architecture and foundational customers to rapidly expand into other key markets including zero-emission on-road vehicles, robotics, and data centers.

Cautionary Note on Forward-Looking Statements

This communication contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995 that involve significant risks and uncertainties about Plug Power Inc. ("Plug"), including but not limited to statements about Plug's ability to deliver on its business and strategic objectives and achieve substantial growth; Plug's projections regarding its future financial and market outlook, including its ability to achieve margin expansion and profitability; Plug's plans to improve its service margins; Plug's near-term cost projections and recording of service loss provisions; Plug's expectation that business accelerators will further position it to be a global leader in the green hydrogen industry; the expectation that Plug will be able to significantly expand manufacturing capacity to meet anticipated demand while delivering continued manufacturing cost reduction; the expected production tax credits and other benefits Plug may receive under the Inflation Reduction Act and other policy and regulations; the timing and achievement of expected outputs at Plug's Georgia and Tennessee facilities; the expectation that Plug's construction of hydrogen plants at Louisiana, Texas and New York will provide additional step change in its fuel margin expansion; Plug's beliefs with respect to its sales opportunities and the timing of FID; Plug's expectation regarding the number of material handling sites and new customers; Plug's ability to organically expand Plug's PEM stack manufacturing capacity at its Innovation Center and Gigafactory in Rochester, NY, drive down costs and increase throughput, and achieve expected capacity by the target dates; the expected production at Plug's Vista facility; the belief that Plug's Gigafactory and Vista facility will create a sustainable competitive advantage and industry cost leadership; Plug's ability to complete additional green hydrogen plants in North America, Europe and globally by the target dates and achievement of target production capacities by those dates; the anticipated progress and expected growth of Plug's ability to execute its strategic growth plan through joint ventures; Plug's ability to apply learnings from its Georgia plant to additional plants and the belief that such learnings may improve contracting strategy, reduce construction capital expenditures and ensure completion on targeted timelines; the expected timing for deployment of Plug's stationary power solutions; Plug's plans to roll out power upgrades; Plug's ability to continue to expand manufacturing capabilities and manage supply chain issues, including Plug's belief that current hydrogen supply challenges is a transitory issue; the expected sales pipelines, timing of revenue recognition and bookings, including the expectation that a backlog of new product orders will result in increased sales; and Plug's ability to obtain financing on acceptable terms to fund its forecasted capital expenditure and operating requirements under the current business plan.

You are cautioned that such statements should not be read as a guarantee of future performance or results as such statements are subject to risks and uncertainties. Actual performance or results may differ materially from those expressed in these statements as a result of various factors, including, but not limited to, that we continue to incur losses and might never achieve or maintain profitability; our ability to continue as a going concern; that we will need to raise additional capital to fund our operations and such capital may not be available to us; global economic uncertainty, including supply chain disruptions, credit tightening, inflationary pressures, and high interest rates; that we may not be able to obtain from our hydrogen suppliers a sufficient supply of hydrogen at competitive prices or the risk that we may not be able to produce hydrogen internally at competitive prices; that we may not be able to expand our business or manage our future growth effectively; that delays in or not completing our product development and hydrogen plant construction goals may adversely affect our revenue and profitability; that we may not be able to convert all of our backlog into revenue and cash flows; the benefit that we will receive under the Inflation Reduction Act; that we may not be able to successfully execute on our joint ventures; and our ability to manufacture and market products on a profitable and large-scale commercial basis. For a further description of the risks and uncertainties that could cause actual results to differ from those expressed in these forward-looking statements, as well as risks relating to the business of Plug in general, see Plug's public filings with the Securities and Exchange Commission, including the "Risk Factors" section of Plug's Annual Report on Form 10-K for the year ended December 31, 2022, Plug's Quarterly Reports on Form 10-Q for the quarters ended March 31, 2023 and June 30, 2023 as well as any subsequent filings. Readers are cautioned not to place undue reliance on these forward-looking statements. The forward-looking statements are made as of the date hereof and are based on current expectations, estimates, forecasts and projections as well as the beliefs and assumptions of management. We disclaim any obligation to update forward-looking statements except as may be required by law.

Plug Investor Contact

Roberto Friedlander
investors@plugpower.com

Plug Media Contact

Kristin Monroe
Allison+Partners
PlugPR@allisonpr.com

[Table of Contents](#)

1. Nature of Operations

Plug Power Inc. (the "Company," "Plug," "we" or "our") is facilitating the paradigm shift to an increasingly electrified world by innovating cutting-edge hydrogen and fuel cell solutions. While we continue to develop commercially viable hydrogen and fuel cell product solutions, we have expanded our offerings to support a variety of commercial operations that can be powered with green hydrogen. We provide electrolyzers that allow customers — such as refineries, producers of chemicals, steel, fertilizer and commercial refueling stations — to generate hydrogen on-site. We are focusing our efforts on (a) industrial mobility applications, including electric forklifts and electric industrial vehicles, at multi-shift high volume manufacturing and high throughput distribution sites where we believe our products and services provide a unique combination of productivity, flexibility, and environmental benefits; (b) stationary power systems that will support critical operations, such as data centers, microgrids, and generation facilities, in either a backup power or continuous power role and replace batteries, diesel generators or the grid for telecommunication logistics, transportation, and utility customers; and (c) production of hydrogen. Plug expects to support these products and customers with an ecosystem of vertically integrated products that produce, transport, store and handle, dispense, and use hydrogen for mobility and power applications.

Liquidity, Capital Resources and Going Concern

The Company's working capital was \$1.3 billion at September 30, 2023, which included unrestricted cash and cash equivalents of \$110.8 million and restricted cash of \$225.8 million. In addition, the Company had available-for-sale securities and equity securities of \$388.8 million and \$67.8 million, respectively, as of September 30, 2023.

Since inception, the Company has financed its operations with proceeds from the sales of equity securities, convertible notes, debt and redeemable convertible preferred stock. As of September 30, 2023, the Company had an accumulated deficit of \$3.8 billion. The Company has continued to experience negative cash flows from operations and net losses. The Company incurred net losses attributable to common stockholders of \$726.4 million for the nine months ended September 30, 2023, and net losses attributable to common stockholders of \$724.0 million, \$460.0 million and \$596.2 million for the years ended December 31, 2022, 2021 and 2020, respectively. The net cash used in operating activities for the nine months ended September 30, 2023, was \$863.9 million and the net cash used in operating activities for the year ended December 31, 2022 and 2021 was \$828.6 million and \$358.2 million, respectively. The Company expects to generate operating losses for the foreseeable future as it continues to devote significant resources to expand its current production and manufacturing capacity, construct hydrogen plants and fund the acquisition of additional inventory to deliver our end-products and related services.

In light of the Company's projected capital expenditure and operating requirements under its current business plan, the Company is projecting that its existing cash and available for sale and equity securities will not be sufficient to fund its operations through the next twelve months from the date of issuance of this Quarterly Report on Form 10-Q. These conditions and events raise substantial doubt about the Company's ability to continue as a going concern. In accordance with Accounting Standards Update ("ASU") No. 2014-15, "Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern (Subtopic 205-40)," management has evaluated whether there are conditions and events, considered in the aggregate, that raise substantial doubt about the Company's ability to continue as a going concern within one year after the date of the condensed consolidated financial statements are issued and has determined that the Company's ability to continue as a going concern is dependent on its ability to raise additional capital. To alleviate the conditions and events that raise substantial doubt about the Company's ability to continue as a going concern, management is currently evaluating several different options to enhance the Company's liquidity position, including the sale of securities, incurrence of debt or other financing alternatives. The Company's plan includes various financing solutions from third parties with a particular focus on corporate level debt solutions, investment tax credit related project financings and loan guarantee programs, and/or large scale hydrogen generation infrastructure project financing. Those plans are not final and are subject to market and other conditions not within the Company's control. As such, there can be no assurance that the Company will be successful in obtaining sufficient funding. Accordingly, management has concluded under the accounting standards that these plans do not alleviate substantial doubt about the Company's ability to continue as a going concern.



BANK OF CANADA
BANQUE DU CANADA

Remarks by Carolyn Rogers
Senior Deputy Governor
Advocis Vancouver
November 9, 2023
Vancouver, British Columbia

Financial stability in a world of higher interest rates

Introduction

Good morning. I'd like to start by thanking Advocis Vancouver for inviting me here today. And thank you for the kind introduction.

The Bank of Canada's main job is to control inflation, but we also play a critical role in promoting the stability of the Canadian financial system. Each spring, we publish the *Financial System Review* (FSR), which outlines risks and vulnerabilities that could test the system's resilience. We also update Canadians on financial stability issues in a speech every autumn, as I am doing today.

Given the forceful response by central banks since early 2022 to get inflation under control, this year's FSR focused on the adjustment of the financial system, globally and in Canada, to the large and rapid increase in interest rates.¹

Since the FSR, we've seen more evidence that the financial system is continuing to adjust. But there is more adjustment to come as past interest rate increases work their way through the system.

Your view of current interest rates probably depends, at least in part, on your age. On one hand, if you had a mortgage in the 1970s or early '80s, today's rates may not seem very high. On the other hand, young people buying homes today are facing some of the highest borrowing costs they've ever seen.

In any case, we've all been through a lengthy period of very low interest rates. Before rates started rising last year, they had been unusually low for a long stretch of time that started during the 2008–09 global financial crisis. And it may be tempting to believe the low rates that we all got used to will eventually come back. But there are reasons to think they may not.

¹ For more information, see Bank of Canada, [Financial System Review—2023](#) (May 2023).

I would like to thank Russell Barnett, Claudia Godbout and Louis Morel for their help in preparing this speech.

Adjusting to a world of higher interest rates would be a big change for everyone in the financial system—from governments, businesses and households to financial planners and investors. Financial stability and resilience are all about adjusting to change—gradually and proactively. Adjusting early and bit by bit lowers the risk of having to take more abrupt and possibly destabilizing steps later.

So today I'm going to talk about why it's important for the stability and resilience of the financial system that people plan for and adjust to a potentially higher interest rate environment. I'll touch briefly on why we could end up in such a world going forward. Then I'll touch on some of the adjustments we're already seeing and what else we could see as the process continues.

I'm aiming to be brief to allow plenty of time for questions and discussion.

Why interest rates could stay higher than we're used to

Let me start by saying the Bank's monitoring of the financial system doesn't lead to a forecast of likely outcomes for the financial system or the economy.

So, I want to be clear that when I talk about interest rates, I'm not making predictions about the path for monetary policy. I'm not here to tell you whether our policy rate has peaked or when it might start going down.

What I will share with you are those factors we see as having an impact on the direction of long-term interest rates, some of the reasons we could see rates stay higher for longer and why it's important to adjust proactively to that possibility.

The Bank's policy interest rate is currently at 5%. But from the global financial crisis through the first two years of the COVID-19 pandemic, the policy rate was close to zero much of the time, and it never topped 1.75%. In fact, the trend for a range of interest rates that affect borrowing costs in the financial system was downward for several years too.

My former colleague, Deputy Governor Paul Beaudry, spoke about the reasons for this in a speech last June.² He described the structural forces at a global level that, for many years, combined to push long-term interest rates lower in Canada and other advanced economies. These forces included aging baby boomers that were saving more, China and other developing nations joining the global economy and fewer attractive investment opportunities for businesses. Paul also explained that some of these forces look to have peaked and could start reversing. This would put upward pressure on interest rates.

We also look now to be in an era of higher levels of government debt. And geopolitical risks, such as an escalation of the war in Ukraine or the war in Israel and Gaza, could push rates higher globally—if they were to affect energy prices and supply chains in ways that could have a lasting impact on inflation.

² P. Beaudry, "[Economic progress report: Are we entering a new era of higher rates?](#)" (speech to the Greater Victoria Chamber of Commerce, Victoria, British Columbia, June 8, 2023).

All this obviously involves a lot of uncertainty. But it's not hard to see a world where interest rates are persistently higher than what people have grown used to.

What adjusting to higher interest rates looks like

Globally, the adjustment to higher interest rates is well underway. Risk-free long-term rates in a range of major economies have risen by about 300 basis points since mid-2021, when global inflationary pressures started to build. It's therefore become more expensive for individual and corporate borrowers to service their debts. At the same time, financial institutions are facing higher funding costs.³

This all leaves less wiggle room for the global financial system if a shock, such as an abrupt tightening of financial conditions, were to occur. And we've already seen a few of these shocks. There was the stress in the UK gilt market last autumn. And there were the stresses that emerged in the US and Swiss banking sectors this past March. Both episodes were triggered, in part, by a sharp rise in bond yields that caught parts of the financial system off guard.

Those earlier stresses didn't lead to stress in the Canadian financial system. But, as a small open economy, Canada likely wouldn't be immune if severe global stress were to re-emerge and persist. As we outlined in the FSR, such severe stress could interact with existing vulnerabilities, like high household debt.

To make sure the Canadian financial system remains resilient to future stress, proactive adjustments to higher interest rates need to continue.

The adjustment so far

We know from the data, including those from responses to our surveys, that Canadians are adjusting—and feeling some pressure—as they juggle the combined effects of inflation and higher interest rates.

The pace of credit growth among households has slowed considerably since the Bank started raising interest rates. In recent months, household credit growth on a year-over-year basis has been about 3%, the slowest pace since the early 1990s. We've seen a big drop in applications for residential mortgages, while banks' mortgage approval rates remain roughly unchanged. This suggests the slowdown is being driven by a drop in demand for credit rather than by a tightening of lending standards. That lines up with the slowdown we've seen in consumer spending, especially on goods people tend to buy on credit.

While households aren't adding to their debt levels as much, some are finding it harder to deal with existing debt. Delinquency rates on credit cards, car loans and unsecured lines of credit have either returned to, or slightly surpassed, pre-pandemic levels. And some households look to be relying more on credit cards: the share of accounts with utilization rates above 90% has been increasing.

³ International Monetary Fund, [Global Financial Stability Report: Financial and Climate Policies for a High-Interest-Rate Era](#) (Washington, DC, October 2023).

Delinquency rates on mortgages, meanwhile, are still lower than before the pandemic.⁴ And, to date, households with mortgages are showing only a modest increase in financial stress related to their non-mortgage debt.

For businesses, the pace of credit growth has also slowed. And, as with households, the slowdown appears to be mainly driven by demand.⁵

Many businesses have seen their debt-servicing costs rise at the same time as their revenue growth has been slowing. However, the data suggest most can still service their existing debt, and while business insolvencies have risen in almost all industries, they are still largely in line with levels seen before the pandemic.⁶

The banking sector is also adjusting. As interest rates have risen, banks have raised the rates they pay on term deposits, with one-year rates for guaranteed investment certificates reaching above 5%—their highest level in more than 20 years. Depositors have reacted by shifting money from demand deposits into higher-paying term deposits. This is good news for savers, but it also means higher funding costs for banks. And higher funding costs are typically passed on to borrowers.

Banks are also keeping larger capital and liquidity buffers than before the pandemic and putting more cash aside to deal with potential credit losses. This helps them prepare for the effects of a slowing economy and is exactly the sort of proactive adjustment we'd expect to see.

The adjustment still to come

That's the story so far. But more adjustment is coming.

A key area we're watching is high levels of fixed-payment mortgage debt. In all, around 40% of mortgage holders have seen higher payments since early 2022. By the end of 2026, virtually all remaining mortgage holders will go through a renewal cycle and, depending on the path for interest rates, may face significantly higher payments.

In combination with credit stress indicators, our consumer surveys help us gauge how Canadians are adjusting, or planning to adjust, to higher payments. Many respondents say their mortgage payments are close to or greater than the maximum they could handle without cutting other spending.⁷ And most say they think the impact of higher interest rates is no more than half done. Despite greater financial pressure though, most mortgage holders still expect they will be able to manage higher payments when they renew.

We see a similar dynamic in the responses to our business surveys. In our latest Business Outlook Survey, published in October, just under half of the companies

⁴ For more information, see the "[Indicators of financial vulnerabilities](#)" page on the Bank's website.

⁵ The latest data from the [Senior Loan Officer Survey](#) are available on the Bank's website.

⁶ Data from FactSet show that, among publicly traded non-financial corporations, only around 3% of outstanding debt is held by firms whose earnings can no longer cover their interest payments.

⁷ For more information, see Bank of Canada, [Canadian Survey of Consumer Expectations—Third Quarter of 2023](#) (October 2023).

we spoke to said they think the impact of higher interest rates is just beginning for them. Another 30% said they think it is half done.⁸ Even so, most businesses said they're confident they can manage their debts despite the added pressure.

It's early though, and the effects of higher interest rates are still working their way through the economy. We'll need to keep a close eye on both credit stress indicators and survey data to gauge how businesses and households are adjusting.

Conclusion

It's time for me to wrap up and to hear from all of you.

My objective today was not to offer a prediction on the path of interest rates. Rather, what I hoped to do was give you a sense of some of the things that may affect longer-term interest rates and, particularly, to stress the importance of adjusting proactively to a future where interest rates may be higher than they've been over the past 15 years.

The Bank will continue to monitor the impact that higher interest rates are having on the economy, and we'll continue to update Canadians on what we are seeing.

And we will remain focused on bringing inflation the rest of the way to our 2% target, so that Canadians can save, invest and plan with more certainty.

Thank you for listening today. I'm looking forward to a great discussion.

⁸ See Bank of Canada, [Business Outlook Survey—Third Quarter of 2023](#) (October 2023).

SAF

Dan Tsubouchi @Energy_Tidbits · 3h

Lost in translation.

English headline is wrong..

Iraq "keenness" to get a deal, but no deal yet.

Will this round of Iraq/Kurdistan discussions lead to a deal to let Kurd #Oil flow thru Turkey? ie. will Baghdad cut back non-Kurd oil to stay within quota.

... Show more



2 10 1.8K

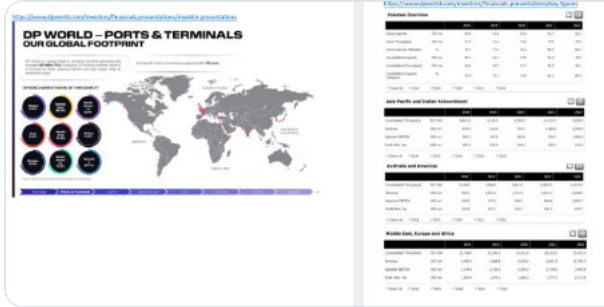
SAF

Dan Tsubouchi @Energy_Tidbits · 4h

Cyber attack shuts down @DPWorld AUS port ops at Sydney, Melbourne, Brisbane & Fremantle. See thread.

Haven't seen any reports that cyber attack has hit any DP outside of AUS. Reminder DP is dominant in AUS, but also big ports player around the world.

#OOTT



National Cyber Security Coordinator @AUCyberSecCoord · 10h The Australian Government continues to work with DP World Australia to resolve a nationally significant cyber incident that has affected operations at a number of ports around the country.

3 2 2.6K



Dan Tsubouchi @Energy_Tidbits · 22h



Let's hope US 10-yr gets back to 3.5% or lowerf.

Extended the @lisaabramowicz1 graph back to 01/01/20 and added S&P to remind of prior correlations for periods of money market inflows/outflows.

#OOTT



Lisa Abramowicz @lisaabramowicz1 · Nov 10



Cash funds remain among the most popular asset classes and are set for a record year of inflows at \$1.4 trillion in 2023: Bank of America strategists



2

4

2.9K



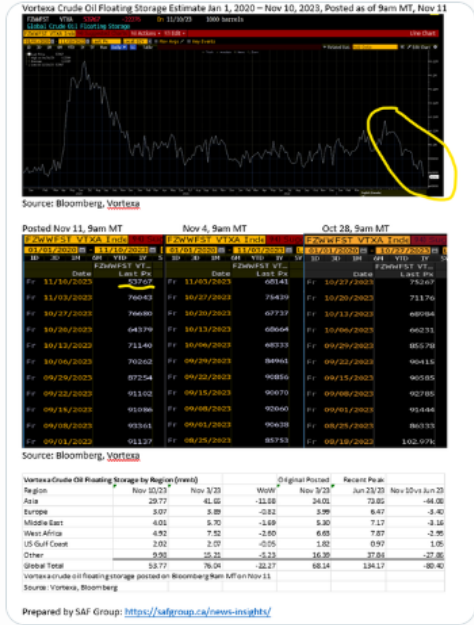
SAF

Dan Tsubouchi @EnergyTidbits · Nov 11
#Oil bulls should like this.

Floating oil storage 53.77 mmb at 11/10, only <60 mmb since Covid.

Some upward revisions to Oct wks but only to low 70's mmb, which is low as only been 5 wks (incl 11/10, 10/20) below 70 mmb since Covid.

Thx @Vortexa @business
#OOT



6 28 82 14K

SAF

Dan Tsubouchi @EnergyTidbits · Nov 11
Hoped for 1st US nuclear SMR project terminated

NuScale 33%

Likely reason is cost as couldn't get to 80% subscription for power

01/09/23 cost cranked up to \$89/MWh

Didn't disclose new Class 2 cost est other than was adj for inflation

...

Show more

Development of the Carbon Free Power Project

PORTLAND, Ore. - January 9, 2023 - **Baldwin Power Corporation (NYSE: BMR)** announced today that the Project Management Committee (PMC) for the Carbon Free Power Project (CFPP) reaffirmed its commitment to **Spalding** industry leading small modular reactor (SMR) technology by approving a new Budget and Plan of Finance (BPF) as an update to the Development Cost Estimation Agreement (DCEA). The key objectives were reached with the receipt and acceptance of the CFPP's Class 1 Project Cost Estimate (PCE) which further refines the anticipated total cost of the project.

The CFPP will be the first **Baldwin Power SMR** power plant to begin operation in the United States near Idaho Falls, Idaho, in the U.S. Department of Energy's Idaho National Laboratory. The BPF plan will factor in 77 megawatt modules to generate 662 megawatts of carbon-free electricity. The CFPP remains on schedule and a cost-competitive carbon-free and dispatchable resource that is an important part of a diversified energy portfolio.

As part of the PCE, **Baldwin** worked with its partner the Idaho-based **Headlight Power Systems (HPS)** to update the project's BPF, which is designed to manage and reduce (due to CFPP) risk. The BPF provides a BPF with options to withdraw from the project and be reimbursed for most out-of-pocket expenses if the CFPP's price of energy per megawatt hour exceeds a certain threshold. The BPF also includes a BPF that was approved by the HPS as a project target price of \$17 per megawatt hour, which is the industry financial benchmark for the development of energy projects. **Baldwin** and the CFPP have yet to receive the assessment to DCEA, subject to the new pricing.

The Class 1 PCE demonstrates that the cost of the CFPP has been influenced by several factors such as inflationary pressures and increases in the price of steel, electrical equipment and other construction materials and more for more than 40 years. For example, the purchase price for construction such as carbon steel piping and valves has increased by more than 200% since 2020. These inflationary pressures are increasing the cost for all power generation and infrastructure projects.

Baldwin's VORTRON™ SMR power plant provides a competitive source of reliable, affordable and carbon-free power for customers and will lead forward in maintaining the strategically-retail project with **CAMP** and other participating members of the CFPP forward as well as the deployment of cost-generation power.

About Baldwin Power

Baldwin Power (NYSE: BMR) is pleased to meet the diverse energy needs of customers across the world. It has developed small modular reactor (SMR) nuclear technology to supply energy for industrial processes, district heating, desalination, commercial-scale hydrogen production, and other process heat applications. The groundbreaking **Baldwin Power** VORTRON™ SMR power plant provides a competitive source of reliable, affordable and carbon-free power for customers and will lead forward in maintaining the strategically-retail project with **CAMP** and other participating members of the CFPP forward as well as the deployment of cost-generation power.

Nuclear™ (NPP), a small, safe pressurized water reactor, can generate 17 megawatts of electricity (MWe) and can be scaled to meet customer needs. **Baldwin's** 17-module **VORTRON™** system design and completion of the intermediate design for our reactor vessel materials. We continue to successfully deliver on our customers in this area, demonstrating our ability to effectively manage the program made here will benefit all of our future customers.

How we deliver it will deliver **Baldwin** and **Headlight Power Systems** an **SMR** industrial agreement to generate the carbon-free power project of **CFPP**. Our plan for the world as **CFPP** internationally will be to be a leader in the industry. Through our work with **CAMP** and other industry partners, we have established a strong relationship with our customers. Through our work with **CAMP** and other industry partners, we have established a strong relationship with our customers. Through our work with **CAMP** and other industry partners, we have established a strong relationship with our customers.

CFPP is a competitive source for the business, and provides the project of our future customers.

CFPP is a competitive source for the business, and provides the project of our future customers.

CFPP is a competitive source for the business, and provides the project of our future customers.


9 9 3.1K

Dan Tsubouchi @Energy_Tidbits · 2h
It's another reminder why the #EnergyTransition is going to take way longer, cost way more and be a bumpy/rocky road.

#Aramco CEO Nasser has been warning on the cost of Green Hydrogen.

#NatGas will be needed for way longer.
#OOTT

Dan Tsubouchi @Energy_Tidbits · 3h
Read the fine print!
Math isn't working for core #GreenHydrogen business of \$PLUG
"the risk that we may not be able to produce hydrogen internally at ...
[Show more](#)



3 replies, 4 retweets, 15 likes, 2.5K views

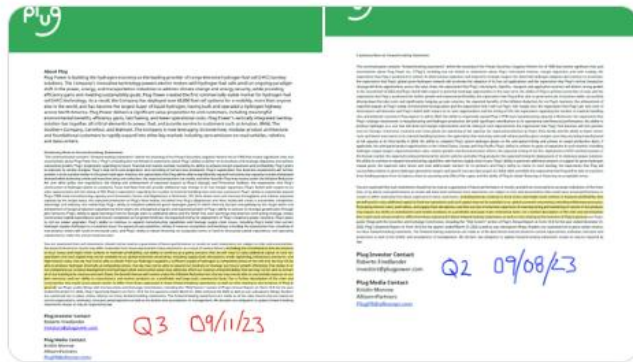
Dan Tsubouchi @Energy_Tidbits · 3h
Read the fine print!

Math isn't working for core #GreenHydrogen business of \$PLUG

"the risk that we may not be able to produce hydrogen internally at competitive prices" \$PLUG Q3, wasn't in Q2.

#NatGas will be needed for way longer.

#OOTT



Dan Tsubouchi @Energy_Tidbits · 5h
Great reminder that investors shouldn't/can't just rely on a company Q3 letter but have to go to filed 10Q to get the full reveal.

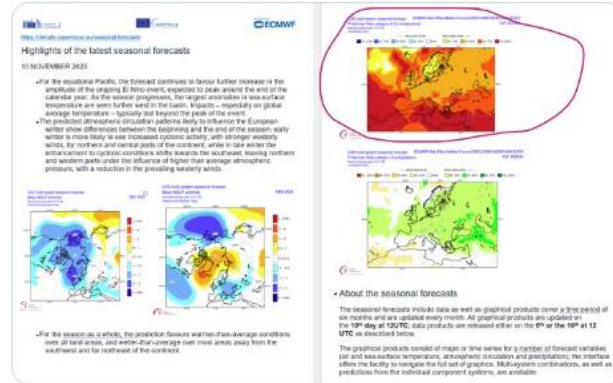
Note 📌 Plug Power Q3 release vs Q3 10Q on its ...
[Show more](#)

5 replies, 11 likes, 5.3K views

SAF Dan Tsubouchi @Energy_Tidbits · 5h Good news for Europeans

The #1 factor driving power prices is winter temperatures and Copernicus updated Dec/Jan/Feb temperature outlook is for another warmer than average winter across Europe.

As seen in 2023, a warm winter can hold back EU #NatGas prices for all year #OOTT



4 10 1.9K

SAF Dan Tsubouchi @Energy_Tidbits · 5h Great reminder that investors shouldn't/can't just rely on a company Q3 letter but have to go to filed 10Q to get the full reveal.

Note Plug Power Q3 release vs Q3 10Q on its financial position.

Shares down 37%.

#OOTT

1 2 8 4.2K

SAF

Dan Tsubouchi @Energy_Tidbits · 9h
Agreed, he is explaining Saudi Oil 101.

...

Summer heat = more #Oil used to generate electricity for A/C i.e. less for export.

Aug 2023 was 726,000 b/d, +414,000 b/d vs Jan 2023.

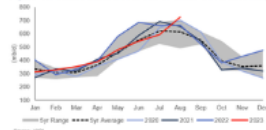
See 📍 SAF 10/22/23 Energy Tidbits graph.

Thx @SVakhshouri for flagging...
[Show more](#)

Excerpt SAF Group Oct 22, 2023 Energy Tidbits memo

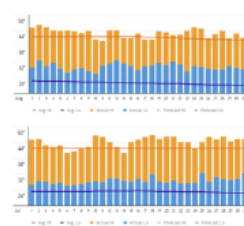
Oil: Saudi use of oil for electricity up big in August i.e. less oil available for export
The key seasonal theme for Saudi oil exports is that, all things being equal, Saudi can export more oil in winter months as it uses less oil for electricity and, conversely, it would have less oil for export in summer months as it uses more oil for electricity i.e. air conditioning. Note that a normal peak to trough decline is ~400,000 b/d. If there is less oil used for electricity, then there is more oil for export and vice versa. The JODI data for Saudi Arabia of supply and demand for August (LRIHC) was updated on Monday. Saudi used more oil for electricity in August vs. July. Both July and Aug were hot, but we expect the increased oil for electricity demand in Aug was due to it being hot even in the night, some lows that were over in the low 30C every night i.e. more air conditioning/electricity demand to sleep. Oil used for electricity generation in August was 726,000 b/d (vs August 2022 of 664,000 b/d) and July was 592,000 b/d (vs July 2022 of 661,000 b/d). Also note that this year fits the normal trough-to-peak swing of 400,000 b/d. The low was 312,000 b/d in Jan, and we just saw 726,000 b/d in Aug. Below are the AccuWeather Temp maps for Riyadh for August and July.

Figure 40: Saudi Arabia Direct Use of Crude Oil for Electricity Generation



Source: JODI, SA

Figure 41: Riyadh Temperature Recaps for August (top) and July (bottom)



Source: AccuWeather

Prepared by SAF Group <https://safgroup.ca/news-insights/>

Dr. Sara Vakhshouri @SVakhshouri · Nov 9

Saudi Energy Minister on #oil price drop: demand is healthy & speculators are to blame for the recent drop. OPEC exports don't indicate increased production. Shipments are seasonal, dipping in summer & rebounding in Sep & Oct; not a sign of output changes. [bloomberg.com/news/articles/...](https://www.bloomberg.com/news/articles/...)



2

4

2K





Dan Tsubouchi @Energy_Tidbits · 6h
Suez Canal 101



US confirms MQ-9 drone shot down off coast of Yemen (getting closer to Bab el Mandeb) by Houthi. @JenGriffinFNC

All tankers/cargo ships via Suez go thru Red Sea & Bab el Mandeb.

Yet drone/missiles being shot down in Red Sea doesn't seem to bring risk?
#OOT

<https://www.eia.gov/totalenergy/weekly/infocus/4107/>
[The Bab el-Mandeb Strait is a strategic route for oil and natural gas shipments](#)

The Bab el-Mandeb Strait is a sea route chokepoint between the Horn of Africa and the Middle East, connecting the Red Sea to the Gulf of Aden and Arabian Sea. Most exports of petroleum and natural gas from the Persian Gulf that transit the Suez Canal and the Strait of Hormuz pass through both the Bab el-Mandeb and the Suez Canal.

The Strait is a narrow channel about 20 miles (32 km) wide, which is critical to global energy security. The Bab el-Mandeb Strait is 18 miles wide at its narrowest point, limiting transit traffic to two 2-mile-wide channels for eastbound and westbound shipments. Closure of the Bab el-Mandeb Strait could keep tankers enroute in the Persian Gulf from transiting the Suez Canal or reaching the SUEZ Canal Pipeline, forcing them to divert around the southern tip of Africa, which would increase transit time and shipping costs. In 2018, an estimated 1.2 million barrels per day (bbl) of crude oil, condensate, and refined petroleum products flowed through the Bab el-Mandeb Strait toward Europe, the United States, and Asia, an increase from 1.1 million bbl in 2014. Total petroleum flows through the Bab el-Mandeb Strait accounted for about 3% of total seaborne-banded petroleum (crude oil and refined petroleum products) in 2017. About 3.6 million bbl flowed northward toward Europe, another 2.6 million bbl flowed in the opposite direction (mainly to Asian markets such as Singapore, China, and India).

Total petroleum and LNG flows through the Bab el-Mandeb Strait (2014-2018)

Year	Crude oil, condensate, and petroleum products (million barrels per day)	Liquefied natural gas (LNG) (million cubic feet per day)
2014	~1.1	~0.5
2015	~1.1	~0.5
2016	~1.1	~0.5
2017	~1.2	~0.5
2018	~1.2	~0.5

Source: U.S. Energy Information Administration, based on data from the Strait of Hormuz, Bab el-Mandeb Strait, and Suez Canal.

Before 2015, volumes of liquefied natural gas (LNG) passing through the Bab el-Mandeb Strait matched those passing through the Suez Canal because the Red Sea did not have any LNG infrastructure. In 2015, both Jordan and Egypt began importing small volumes of LNG into Red Sea ports, and these countries' imports of LNG peaked in 2016 at 1.4 billion cubic feet per day, 80% of which was delivered through the Bab el-Mandeb Strait. More recently, as new natural gas fields in Egypt have come online, the need for Egypt to import LNG has decreased. Like flows to Egypt, total northbound flows of LNG via the Bab el-Mandeb have also decreased since 2016 as northbound flows to other destinations have remained fairly constant.

Dan Tsubouchi @Energy_Tidbits · Nov 2
Suez Canal 101

- Houthis to continue missile/drones at ISR
 - IDF says Houthi missiles/drones shot down OVER the Red Sea.
 - IDF says increasing navy ships IN Red Sea....
- [Show more](#)

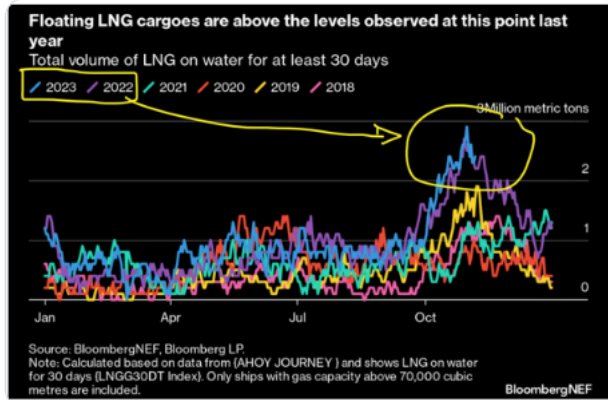
3 comments, 7 retweets, 19 likes, 4.2K views

SAF Dan Tsubouchi @Energy_Tidbits · 9h
 Warmer than normal temps in Nov is not a good start to winter #LNG #NatGas prices

Record high 2.4 million tons of LNG in floating storage vs yr ago 2.2 and 5-yr ave 1.4.

Reminder, warm winter 22/23 kept a lid on prices in all of 2023.

Thx @BloombergNEF #OOTT



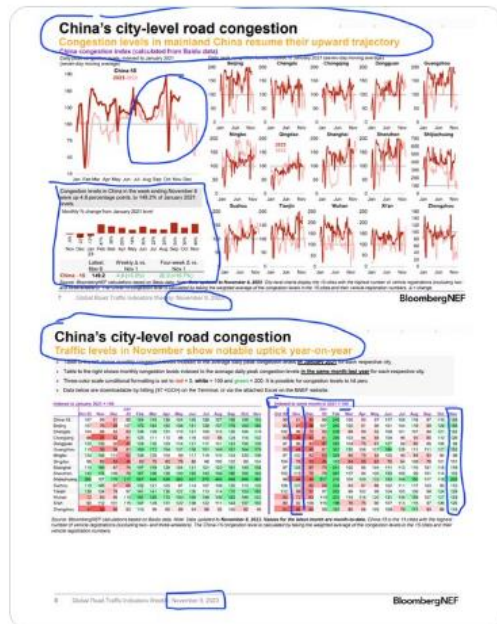
6 8 1.9K

SAF Dan Tsubouchi @Energy_Tidbits · 9h
 Positive China mobility indicator.

China Baidu city-level road congestion for Nov MTD 2023 for Top 15 cities are 128% of Nov 2021 levels.

Nov 2022 was 81% of Nov 2021 levels as Q4/22 still had Covid restrictions.

Thx @BloombergNEF.
 #OOTT



5 8 1.8K

SAF

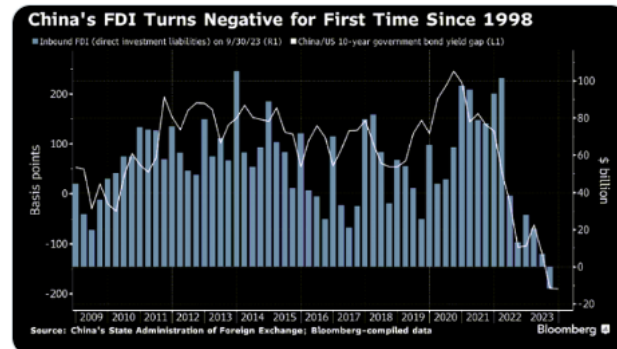
Dan Tsubouchi @Energy_Tidbits · 18h
Here's why China recovery is slow

Huge exodus in foreign direct investment in China & more FDI flowing out for 1st time.

Q3/23 saw \$11.8b outflow, vs recent \$101b in Q1/22.

Foreign co's drive disproportionate trade, tax revenue & urban employment.

...
[Show more](#)



8 13 2.9K

SAF

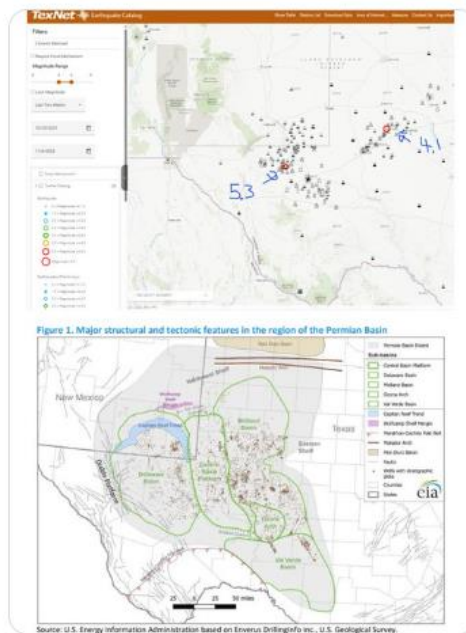
Dan Tsubouchi @Energy_Tidbits · 12h
#Permian.

5.3 earthquake just now in Delaware Basin.

Too early to know if is linked to the normal reason of waste water disposal.

Permian earthquakes not normally linked to fracking.

#OOTT



2 9 2.6K

SAF

Dan Tsubouchi @EnergyTidbits · 14h
2024 is huge year for Cdn #Oil #NatGas

...

Ready for 11/03 #Shell #LNGCanada to start 1.8 bcf/d Phase 1. #CoastalGasLink "to be ready to deliver commissioning gas to the LNG Canada facility by the end of the year". TC Q3.

Trans Mountain #TMX 590,000 b/d start in Q1/24. #OOT

CEO Message

In the third quarter of 2023, we made significant progress towards our 2023 strategic priorities that include safely executing on major projects including Coastal GasLink and Southeast Gateway, bringing other capacity capital projects into service, accelerating our deleveraging by advancing our \$5+ billion asset divestiture program, and continuing to maximize the value and performance of our assets through safe operations and reliable service.

Project execution: Coastal GasLink achieves mechanical completion, while continuing to advance Southeast Gateway
We are pleased to announce that the Coastal GasLink project has achieved mechanical completion ahead of our year-end target. In October, the project achieved 100 per cent pipe installation following the final weld at the base of Cable Crane Hill. This monumental milestone includes the installation of all 800 water crossings and the successful hydrotesting of the full length of the 670 km pipeline. Achieving mechanical completion allows us to safely commence the introduction of natural gas. With the most challenging work completed, we have substantially mitigated the remaining risks associated with the project, and the cost estimate of approximately \$14.5 billion remains on track. Throughout the remainder of 2023, the project will complete pipeline commissioning activities to be ready to deliver commissioning gas to the LNG Canada facility by the end of the year, and we will continue reclamation work in 2024. In Mexico, our team made important progress on the Southeast Gateway Pipeline project. Land rights and rights of way negotiations have closed, and all critical permits for onshore construction have been received. Onshore construction at the three landfill sites continues to progress on plan, with all land acquisitions complete. Offshore engineering is complete and concrete coating is on track, supporting offshore installation which is expected to commence prior to the end of 2023. We also placed the lateral section of the VDR pipeline into commercial service, serving power generation in the state of Guanajuato. With the support of the Comisión Federal de Electricidad (CFE) and state governments, we are targeting the south section of VDR to be in service by the second half of 2024.

SAF Dan Tsubouchi @EnergyTidbits · Nov 3



#Shell CEO #LNGCanada 1.8 bcf/d Phase 1 update.

#CoastalGasLink completed the "golden weld" ie. 100% pipe installation.

...
[Show more](#)

2

6

28

6.7K

Share icons

SAF

Dan Tsubouchi @Energy_Tidbits · 23h

Gasoline demand stronger for longer vs EV fcsts. EVs aren't displacing ICE mileage on per car basis.

@GWmedia. BEV driven 4,500 fewer miles/yr vs ICE. EVs 7,165 vs ICE 11,642. EV SUV 10,587 vs ICE SUV 12,945. mediarelations.gwu.edu/new-study-find...

See 📌 04/26/23 thread on this point #OOTT

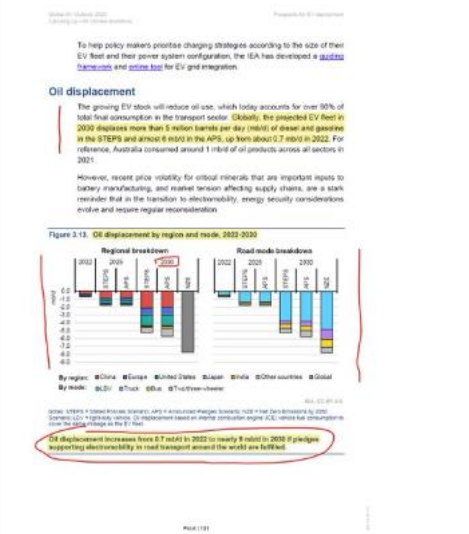
SAF — Dan Tsubouchi @Energy_Tidbits · Apr 26
1/7.

@IEA Global EVs Outlook 2023

#Oil Bears and Bulls will both love it!...

Show more

Excerpt IEA Global EV Outlook 2023, released Apr 26, 2023 <https://iea.blob.core.windows.net/assets/61cf1562-ea8c-498a-8201-91971f15dc32/GEVO2023.pdf>



1

6

19

8.7K

🔖

↗

Dan Tsubouchi @Energy_Tidbits · Nov 7
 Russia keeps shipping more #Oil than committed.

See @JLeeEnergy great weekly recap

11/05 wk: down ~400 kbd WoW.

But 4-wk average still 3.48 mmb/d, flat WoW and still ~200 kbd over over committed.

#OOTT

The screenshot shows two news articles side-by-side. The left article, 'Russia's Crude Shipments are Running Close to a Four-Month High', reports that Russia's oil exports rose to 3.48 million barrels per day in the week ending October 29, up from 3.47 million in the previous week. It notes that this is the highest level since April 2022. The right article, 'Russia's Sustains Crude', discusses how Russia's oil exports have remained resilient despite sanctions, with a 4-week average of 3.48 million barrels per day. It mentions that Russia's oil exports are still about 200,000 barrels per day over the committed level.

Dan Tsubouchi @Energy_Tidbits · 13m
 Air +/- from Singapore Airlines Q2.

Negative: macroeconomic headwinds, continued soft demand for air cargo

Positive: Adding China flights this winter to get close to pre-Covid.

Positive: Expect international to reach or exceed pre-Covid summer 2024.

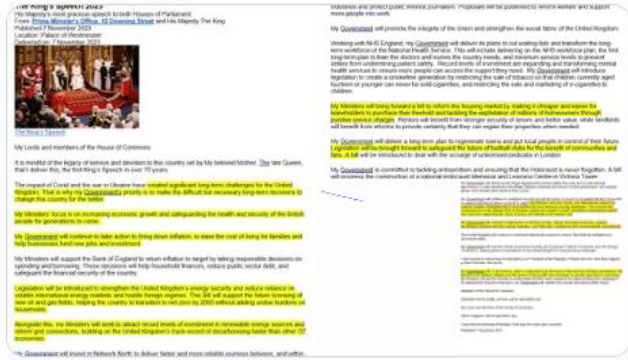
#OOTT

The screenshot shows a PDF document titled 'APORIS AVIATION' with the heading 'NO OVER SUMMER PEAK SEASON SECOND HALF-YEAR RESULTS OR: THE SIA CHECKUP'. The document includes a table of financial metrics and a detailed text report. The table shows metrics for Q2 2023, Q2 2022, and Q2 2021. The text report discusses the company's performance, including revenue, operating profit, and cash flow, and mentions the addition of China flights.

Metric	Q2 2023	Q2 2022	Q2 2021
Revenue	1,102	1,062	1,012
Operating Profit	212	182	152
EBITDA	242	212	182
Free Cash Flow	152	122	92

Dan Tsubouchi @Energy_Tidbits · 2h
 UK Sunak "focus is on increasing economic growth" "ease the cost of living" "strengthen UK's energy security" "future licensing of new #Oil #NatGas fields"

No mention #NetZero. "decarbonizing faster than other G7" "continuing to lead action on tackling Climate Change"
 #OOTT



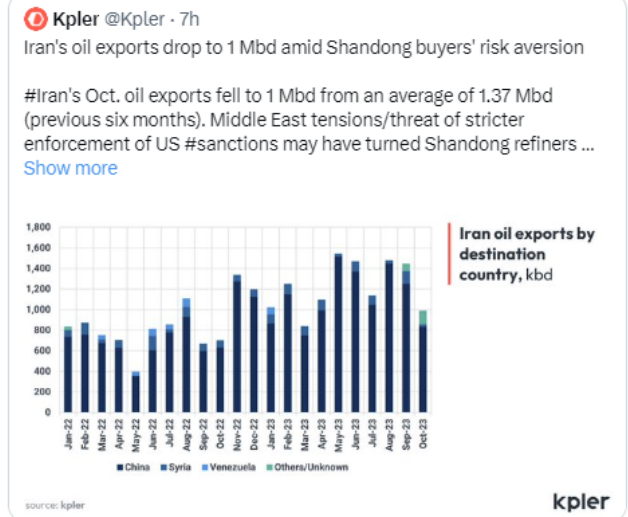
1.4K

Dan Tsubouchi @Energy_Tidbits · 4h
 Floating oil in storage.

Less China #Oil imports from Iran = More Iran oil scrambling for a home and/or more Iran oil moving into floating storage

If China is taking less Iran oil, Iran doesn't have many other options to move their oil.

Thx @Kpler.
 ...
 Show more



4K

SAF

Dan Tsubouchi @Energy_Tidbits · 11h
EU #NatGas industrial demand destruction.

...

#Engie: 10-20% from main industrial customers, "don't think it will worsen, but we think it's quite structural"

Note warning warm start to this winter hitting #NatGas demand, "not hugely significant right now".

#OOTT

Bloomberg Terminal

Q - Unidentified Participant
 Thank you so much for taking my questions and congratulations for these strong results. I have two if you don't mind. The first one is just to sort of help us calibrate your view of the future and it is basically on gas demand. Very simple. Where do you see gas demand in 24 and 25? Do you see the bounce back or are you more on the cautious side and see where the gas demand has fallen in Europe? We don't expect it to come back. That would be a good piece in the puzzle to sort of understand how you see the future. That would be helpful. Thank you.

The second question is quite straightforward. What is your spread over the Wack for your renewables projects? New business in onshore please. And if you can, it would be really helpful if you break it down a little bit by region, specifically what you're achieving in the US and Asia for example. Thank you.

A - Unidentified Speaker

Page 13 of 15

INITIAL DRAFT

Company Name: Engie SA
 Company Ticker: ENG.PF Equity
 Date: 2023-11-07

Maybe I'll start on the gas demand. And here I'm talking about gas demand that we see in Europe from our main industrial customers. Depending on the size of these customers today, we have not seen the demand recovery from what happened last year. So in other words, we have a range of ten to 20% demand destruction depending again on the type of activities of our customers.

And we think that this is here to stay to a large extent obviously this winter because the volumes of gas demand are not hugely significant right now. So it's a little bit difficult to tell you with certainty, but we anticipate that these are the type of demand extraction that we have seen post Ukraine war that will stay with us.

We don't think that it will worsen, but we think it's quite structural and of course, given our business, our results and of course the role, the critical role of our gas infrastructure, it has

A - Catherine MacGregor (BIO 15917076 <GO>)
 Little impact, but of course a little bit more tariff spread for our customers on the infrastructure side, but it is not you know for us critical to our business model. Maybe you want to take the question on the spread of the work.

🗨️ 6 ❤️ 15 📊 2.9K 📌 🔄

SAF

Dan Tsubouchi @Energy_Tidbits · 19h

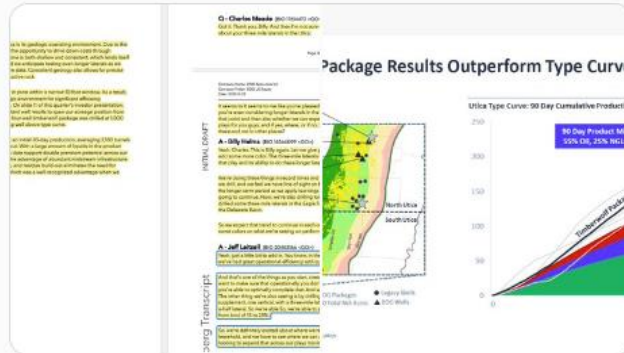
Contiguous land is value add in all shale/tight plays incl Cdn plays like Montney.

10/11 tweet \$XOM 4-mile in Permian.

10/13 tweet 3 mile in Bakken. twitter.com/Energy_Tidbits...

11/13 \$EOG 3-mile success in Utica & also doing in Eagle Ford & Delaware Basin.

Show more



Dan Tsubouchi @Energy_Tidbits · Oct 11

Contiguous land has big value!

Exxon call just started, CEO opens with "Pioneer, arguably the best Permian pure play co. with the largest undeveloped Tier 1 inventory in the Midland Basin. Their acreage is also highly contiguous which is ..."

1 4 10 6.3K

SAF

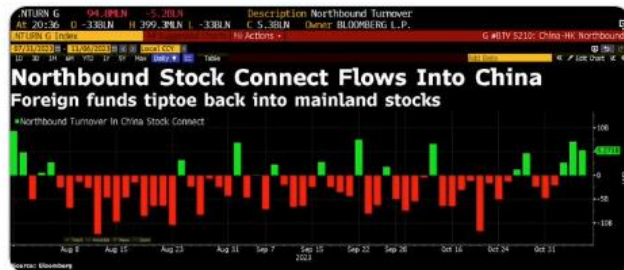
Dan Tsubouchi @Energy_Tidbits · 20h

First 3 consecutive days of foreign funds net inflows into China mainland stocks since Aug 1.

See @business "foreign funds tiptoe back into mainland stocks".

Maybe some foreign funds are think the bottom is near.

#OOTT



2 7 2.3K

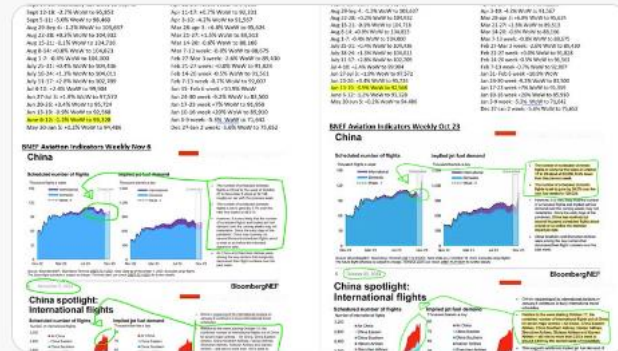


Dan Tsubouchi @EnergyTidbits · 4h
Another stalled China economy indicator.

1. China scheduled domestic flights for Oct 31-Nov 6 was -0.2% WoW to 92,146, which is back to Jun 6-12 week.
2. Lookahead next 4-wks flights to 96,510 vs Oct 23 next 4-wks of 129,038.

Thx @BloombergNEF Claudio Lubis

...
[Show more](#)



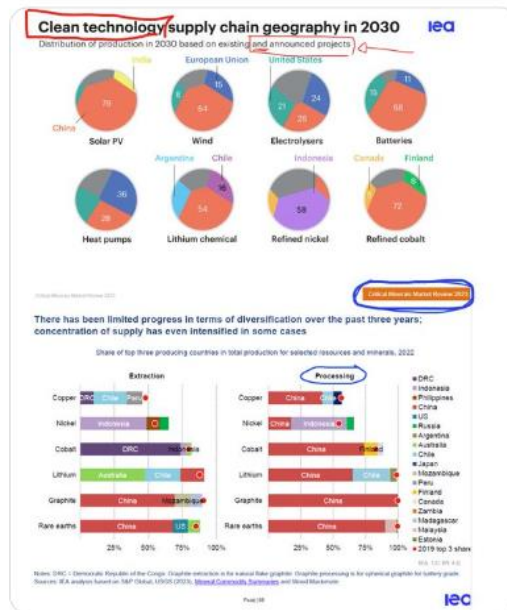
🗨️ 🔄 🍀 4 📊 1.1K 📌 ⬆️

SAF Dan Tsubouchi [@Energy_Tidbits](#) · 5h
 How can the #EnergyTransition not take longer, cost more and be a rocky road?

US, EU want to squeeze out China.

[@IEA](#) shows China dominates supply chain for both clean technology AND critical minerals.

#NatGas will be needed for way longer.
 #OOTT



International Energy Agency [@IEA](#) · 9h
 Energy transitions bring new risks to energy security

For example, clean technology & critical mineral supply chains are highly geographically concentrated

...
[Show more](#)

3 4 2.6K



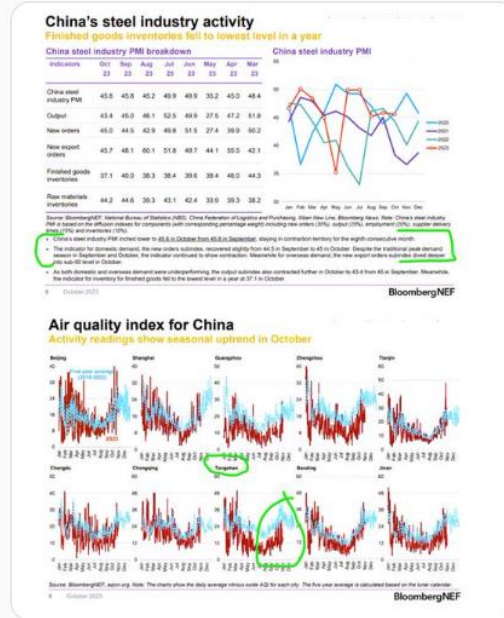
Dan Tsubouchi @Energy_Tidbits · 16h
Indicator China economy still not recovered

...

China steel industry PMI "staying in contraction territory for the 8th consecutive month"

Exception to increasing N2O reading is Tangshan, major steel city in Hebei province that produces ~¼ of China steel.

Thx @BloombergNEF #OOTT



🗨️ 6 ❤️ 18 📊 4.4K 📌 📤



Dan Tsubouchi @Energy_Tidbits · Nov 5
No surprise, Saudi & Russia announced continuing voluntary cuts thru Dec 31, 2023.

...

Hard to see them add #Oil back into physical market in Q1/24 as Q1 every year is normally seasonally lower than the preceding Q4.

spa.gov.sa/en/N1991842
tass.com/economy/1702043
#OOTT

🗨️ 1 🔄 6 ❤️ 45 📊 6.5K 📌 📤