

Energy Tidbits

Tehran-based Danial Rahmat: Last 3 Mths, Iran Decided to Sell Most of its Floating Oil & Condensate with Remarkable Discounts

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Source: NBC

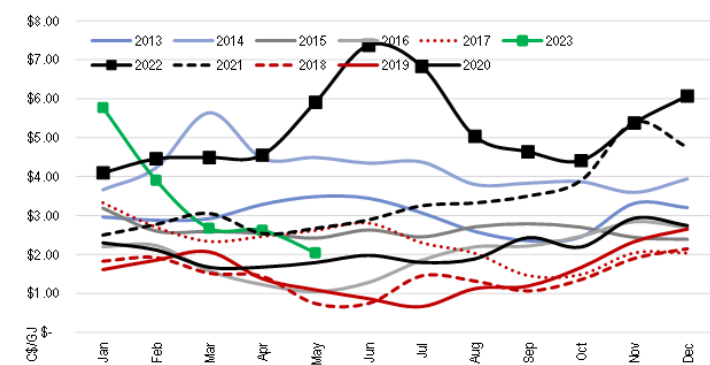
Gas Market Snapshot:

Natural gas started the new month on a negative note, giving up just over nine cents to settle at **\$2.318/MMBtu**. Nymex had closed out April with a strong performance, pushing above \$2.40/MMBtu for the first time since mid-March, but turns out there's no reason to get excited. There's no respite for gas price in the near term as temperatures trend warmer and production is up significantly year-over-year. And it's even more challenging in Western Canada, where we saw a near all-time record injection to close out last week, with summery weather muting gas demand in coming days. There must be some kind of way outta here. This morning, as Nymex pulls back again to **\$2.28/MMBtu**, we shift our focus to the AECO market as a record injection in April prompted a wild revision to our summer estimates and surprise, it's not bullish, per se. That said, price at Nymex can always (or hopefully) move higher, but AECO's in a tough spot unless Henry rises.

Gas News:

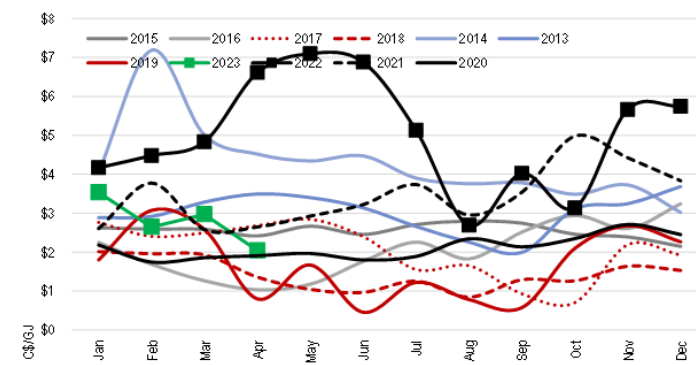
- First, the latest AECO settles were the worst since summer 2020 as May 7a was set at **C\$2.041/GJ** and the April 5a settled at **C\$2.043/GJ**, again a record April injection and a persistent 2-handle Nymex did the trick.

AECO 7a Settlement History



Source: NBC

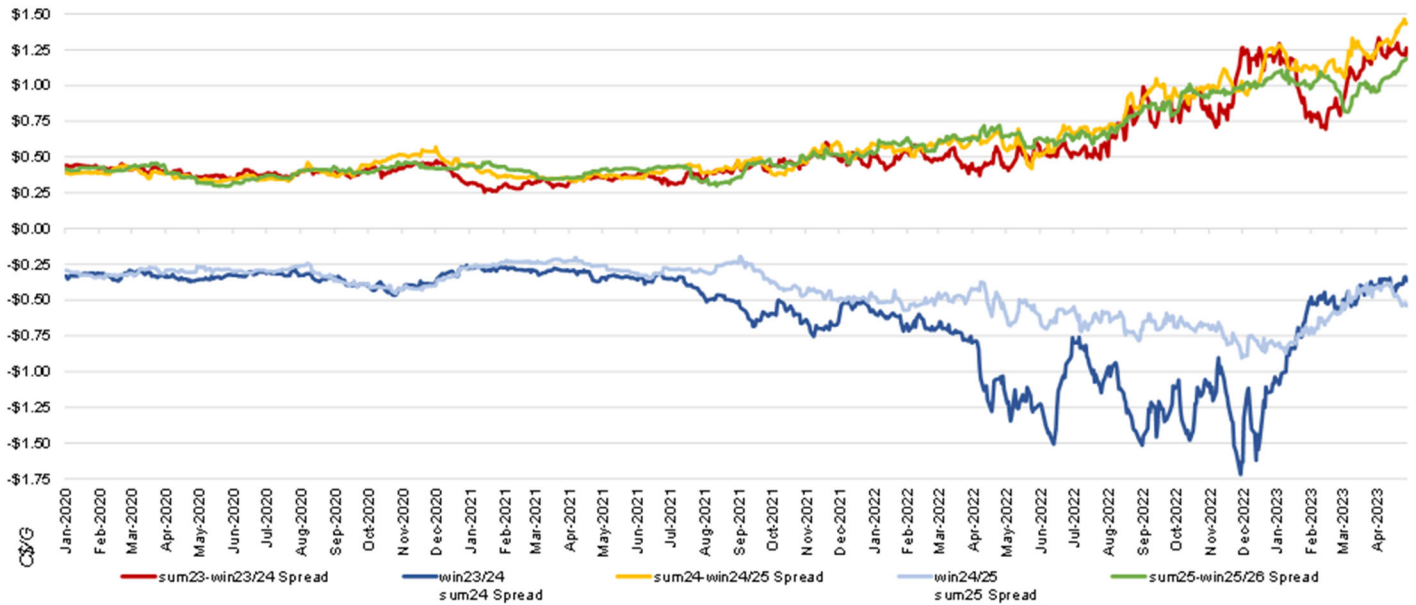
AECO 5a Settlement History



Source: NBC

- Next, we'll admit our shot in dark missed the mark in April, causing this morning's delve into the state of the NGTL market because, boy, were we wrong on our April numbers. In aggregate, our outlook called for a fairly average build of ~19 Bcf (the 10-year average is +18 Bcf), vs the ~43 Bcf that materialized, which means that **we misjudged the daily injection or balance by ~0.76 Bcf/d** (that's more supply or less demand than we were expecting). However, in our defense, entering April we thought EGAT would probably come in to the low side, but demand would ratchet higher and supply instead came in lower. The system has a knack for adjusting when restrictions and maintenance materialize, but not this April. Instead, the system was 2x looser than we thought and the entire strip dropped in the front end, which has led approximate **storage spreads gapping wider – increasing the incentive to inject through the next three summers**, while decreasing the withdrawal incentive for this coming winter.

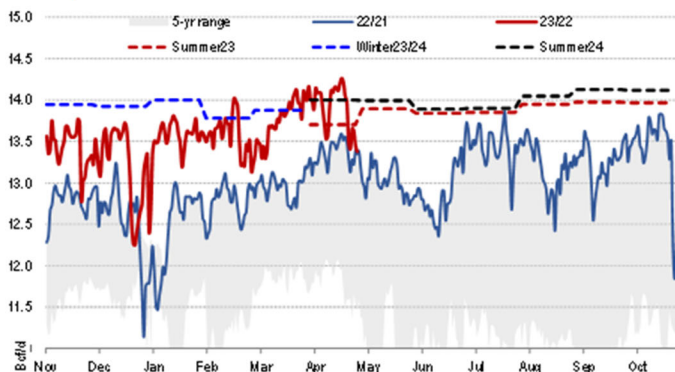
AECO Storage Spreads



Source: NBC

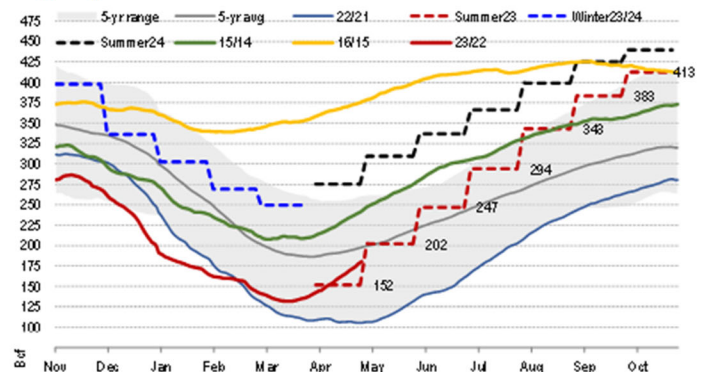
- So, we went back under the hood of our gas model, and **basically (newsflash) there appears to be too much supply on the system this summer**. Receipts have already reached a record this summer – and it’s only April. Get this, the April average was 13.915 Bcf/d and that’s because the last week of April restricted flows to average 13.5 Bcf/d and was running at 14.02 Bcf/d before the planned Northern Corridor outage from April 25-May 3. Actually, please hold as there are more delays on North Corridor as *“the Project is confirmed not to be in-service by May 3, 2023. The current estimate is that the Project will be in-service over the next 3-7 days”*...yet the system still injected 1.3 Bcf/d with 0.8 Bcf/d of supply held back (that means May 7-10?). Despite that, we took a conservative approach and assumed that receipts average 13.91 Bcf/d for the remaining six months of summer. As we show in the subsequent comments, we were even conservatively high on our export and demand figures, but as you can see, inventories still surge to capacity by September. Our updated summer injection is 280 Bcf – identical to last summer – and we might even be light. Under a worst-case scenario, we are conservative (demand too high and supply too low), as **storage returns to full capacity early in the summer, just like the basin saw in August/September 2016**.

NGTL Receipts Seasonal with Forecast



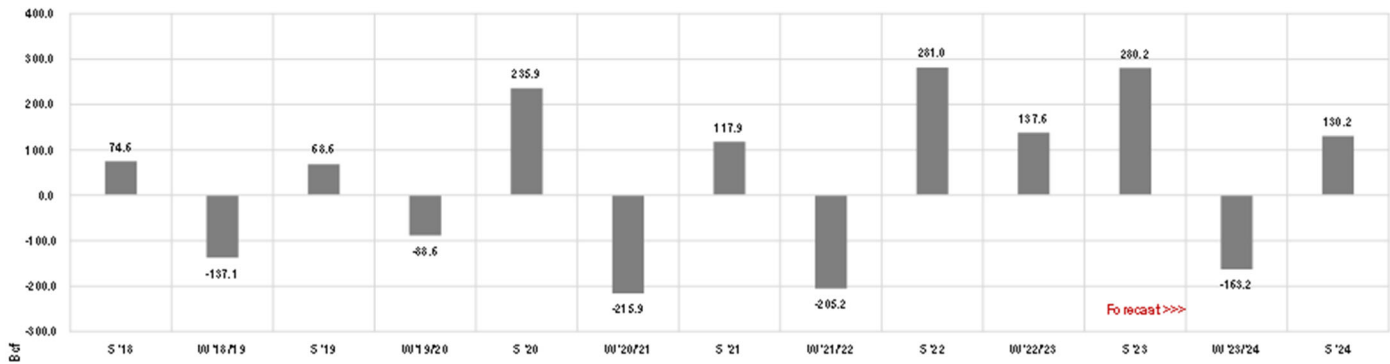
Source: TC Energy, NBC

TC Energy Storage with Forecast



Source: TC Energy, NBC

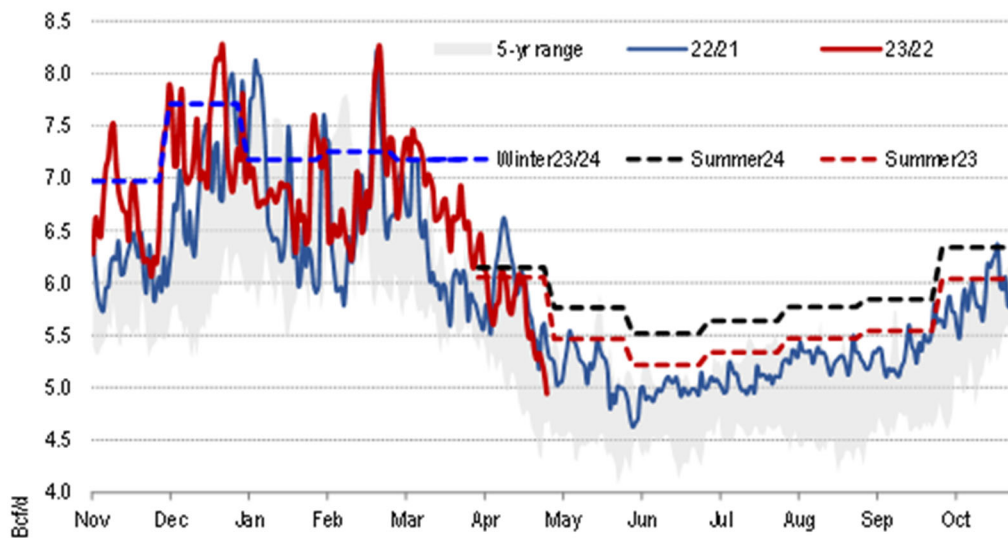
Seasonal NGTL Storage Change



Source: TC Energy, NBC

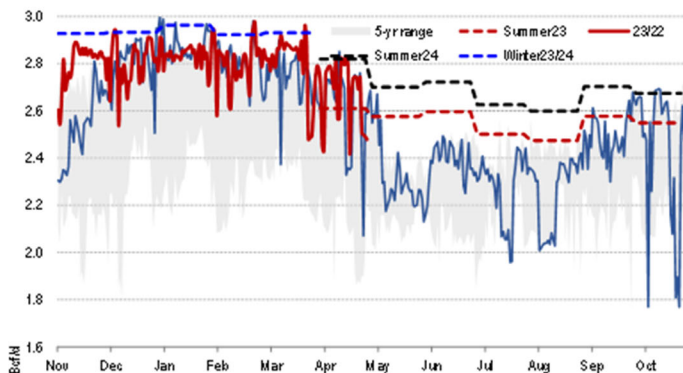
- As we said, we are being “conservative” to the high side this summer and include record demand for the next three seasons – that’s an average of 5.6 Bcf/d this summer 23, 7.3 Bcf/d winter 23/24 and 5.9 Bcf/d in summer 24 that compares to prior highs of 5.4 Bcf/d in summer 22 and 6.9 Bcf/d in winter 23/24. On the export front, we assume that ABC maintains a record the next three seasons as well, while EGAT dampens a bit with all the maintenance this summer, but returns to a record level through winter 23/24 and summer 24. To be frank, EGAT is likely to remain fully contracted, so we’ve had to soften our stance on full dispatch because of the maintenance plan that cuts FT-R. But given that EGAT contracting remains strong record exports likely return. One unknown that we need to acknowledge is how full storage at Dawn gets/stays – this summer’s seen record seasonal storage linger at Dawn and that likely continues to be a headwind for EGAT exports overall. There’s a good chance that if exports remain lower for now, and even if demand sets records, then storage could hit record levels as it did back in 2016.

Intra-Alberta Demand with Forecast



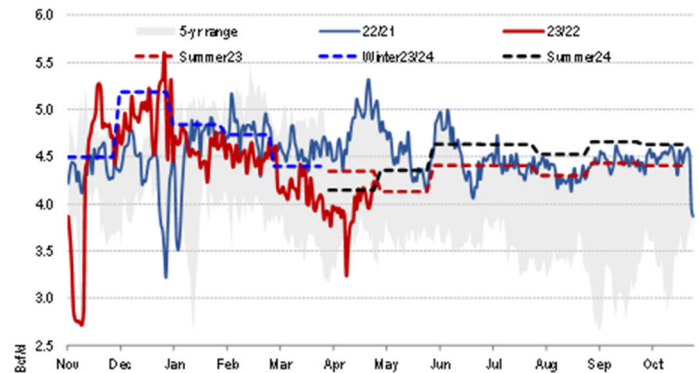
Source: TC Energy, NBC

Alberta Exports at WGAT with Forecast



Source: TC Energy, NBC

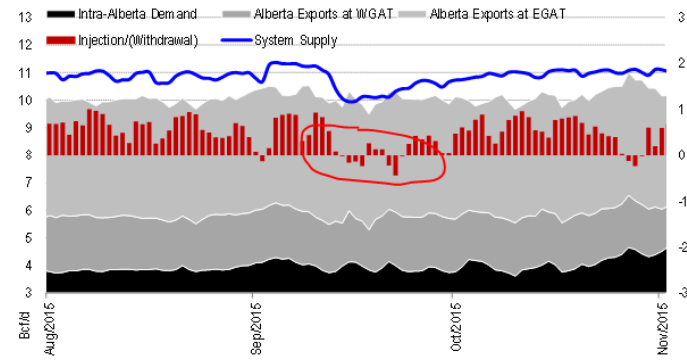
Alberta Exports at EGAT with Forecast



Source: TC Energy, NBC

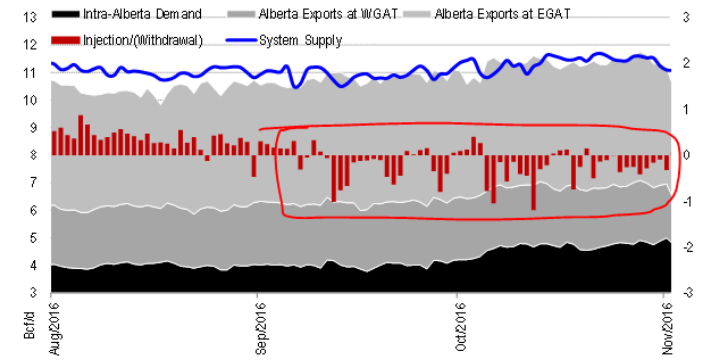
- If you notice the 2015 and 2016 lines above on the storage chart, **storage was forced to withdraw for 8 days in September 2015** after NGTL maintenance reduced receipts by >1 Bcf/d by mid-month. **A similar and more extreme scenario materialized in 2016 with nearly two months of withdrawals through the fall of 2016.** We've already been comparing the old record's injection of ~32 Bcf in April 2015 to this year's April injection record – 43 Bcf – and at the time, balances had injected 0.9 Bcf/d for the first 5 months of summer to ultimately reach storage capacity of 425 Bcf. As storage was filling in the summer of 2015, AECO dropped before bottoming out and only started to rally when Nymex lifted AECO, but basis widened all summer long from near parity in fall 2015 to wider than \$(1)/MMBtu in summer 16. Who knows for sure what 2023 and 2024 summers bring, but **there is precedent to fill early in the year and shut-in production/send more via exports with basis widening.** We'll continue to develop this AECO/NGTL outlook through the coming month and we probably have to adjust something, but it is not looking promising for AECO overall as the basin continues to face excess supply in the wake of restrictions and massive margins to inject.

NGTL Supply vs Intra-Alberta Demand & Exports

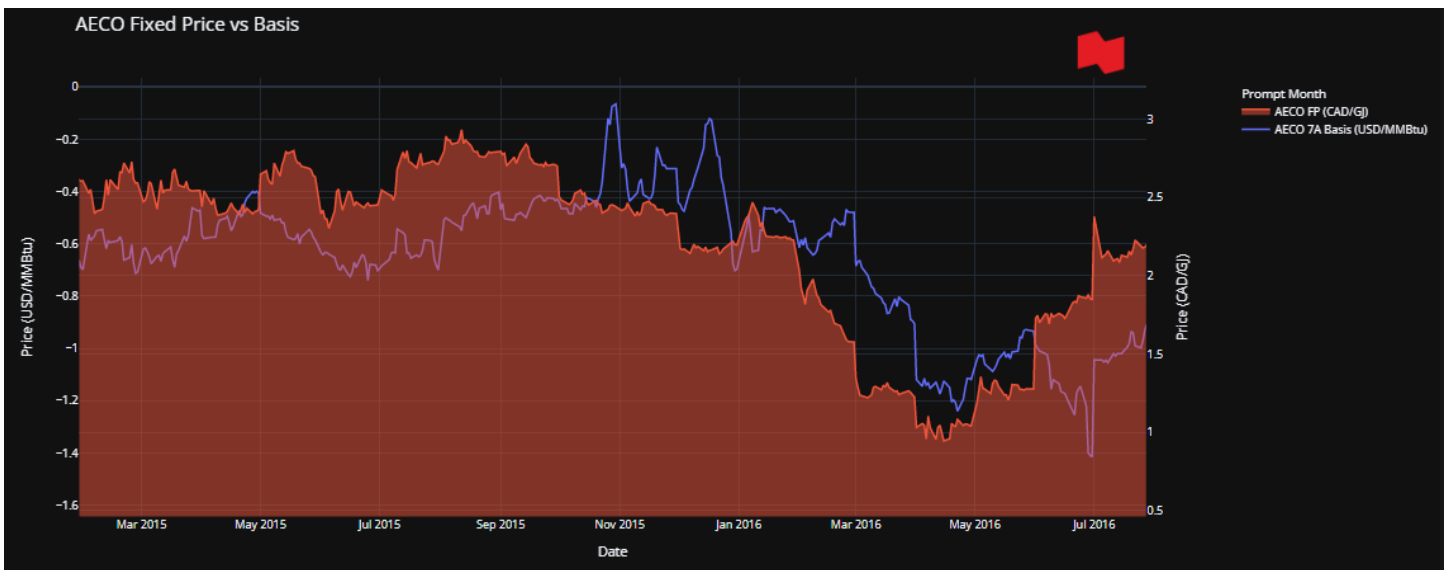


Source: TC Energy, NBC

NGTL Supply vs Intra-Alberta Demand & Exports



Source: TC Energy, NBC



Source: NBC

- If the bull case for AECO hinges on Nymex, then Nymex remains at least partially reliant on some kind of LNG price rally too. Unfortunately, **LNG strength has not been in the cards this spring as mild weather (stagnant demand) and robust LNG imports continues to grind on European and Asian pricing.** Yet another warmer weather revision this morning through the US has weighed on Nymex this morning too, as pressure mounts on gas overall...hopefully cooling demand heats up price soon.



- This morning's cash pricing has AECO at C\$2.11/GJ, Station 2 at C\$1.75/GJ, Nymex Henry Hub at US\$2.10/MMBtu and Dawn at \$2.00/MMBtu.

And we've lost another one – RIP Gordon Lightfoot, legendary Canadian songwriter. He will be missed.

Pricing Indications:

Crude \$USD

Q3 2023	\$73.43
Q4 2023	\$71.96
Cal24	\$69.50

AECO CAD\$/GJ

Spot Alberta Cash	\$2.11
Jun-Oct23	\$1.69
Winter-23/24	\$3.04
Summer-24	\$2.69

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SAF Group created transcript of Shell CEO Wael Sawan on Shell Q1 call on May 4, 2023, 7:30am

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

Sawan is asked about LNG Canada and at 7:41am MT, replies "... LNG Canada first. We continue to be incredibly excited about the prospect of that project coming onstream around the middle of this decade. It's making good progress. The last update I got we are already past the 70% mark in terms of construction on site Coastal GasLink, the developer of the pipeline, is also making good progress. And this is despite what has been of course a difficult period when you consider the Covid disruptions [???] supply chain challenges around the world. So no new guidance other than to say we continue to anticipate startup there **around the middle of the decade**. I look forward to seeing where that goes.

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

SAF Group created transcript of Shell Integrated Business Deep Dive Feb 21, 2022 Wael Sawan.

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

SI 6. 8:36am MT. Sawan *"That brings me to the future. Our current integrated gas business is doing what we said we would do and is on the right trajectory. But we are not yet where we want to be. We have opportunities that we are pursuing to do even better, with our existing assets, but also to position our growth portfolio to one with even stronger returns with lower carbon emissions. Let me expand on that a bit more. For our capital spend, we need to be even more focused with a continued emphasis on value over volume. We have a capital budget of \$4 to \$5 billion a year in the short to medium term. We are making good progress on our two LNG capacity expansion projects under construction. In Canada, Canada LNG surpassed recently the 50% completion mark last October, after three years of construction. The project remains dedicated to have **the first cargo by the middle of this decade**."* He then speaks of Nigeria and that construction there is now firmly underway, and then says *"both these projects are competitively positioned for LNG growth markets in Asia. The same goes for most of our long term project funnel. We have several attractive expansion and backfill projects. A limited number of greenfield LNG projects and several promising low carbon new gaseous projects in early stages of development. For the pre-FID projects, we have an expected average internal rate of return of between 14% and 18%, and a unit technical cost below \$5/mmbtu. With most of these projects clearly having lower costs than the average in the industry. These are good numbers, but you will understand that we strive to push the IRR to the higher end and to push the unit costs down even further. But the long term role of gas depends on efforts to abate emissions and develop cleaner pathways for gas. This is why we continually try to reduce the carbon intensity of our new projects. Take LNG Canada currently under construction. It will run on hydropower and is set to deliver the lowest carbon intensity in the entire industry."*

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

Excerpt TC Energy Q1/23 release

*“Over the winter construction season, the **Coastal GasLink** project progressed in line with our revised cost and schedule and is now approximately 87 per cent complete. The entire project route has been cleared, grading is approximately 99 per cent complete, welding is approximately 95 per cent complete and **we continue to target mechanical completion in late 2023**. We are pleased to announce that construction has progressed through the winter on plan and the compressor station at Wilde Lake has commenced commissioning work, including the recent introduction of natural gas as part of the transition of the facility to operations. Despite the high elevation and winter conditions, we safely completed excavation of Cable Crane Hill ahead of schedule and are now installing the final pipe through this critical path section. More than 85 per cent of all classified water crossings on the project are now complete and, in the first quarter alone, we safely completed the Clore River, Crystal, Lamprey and Owen Creek crossings. To date, over 567 km of the approximately 670 km pipeline has been backfilled with restoration activities underway in many areas. At this stage, the majority of the long-linear pipeline installation is complete and activity is shifting toward discrete work fronts with high criticality. We continue to systematically mitigate the remaining execution risks and remain focused on executing the project on time and with the highest standards of safety, quality and environmental protection. At this time there is no change to the comprehensive cost and schedule risk analysis (CSRA) described in our 2022 Annual Report.”*

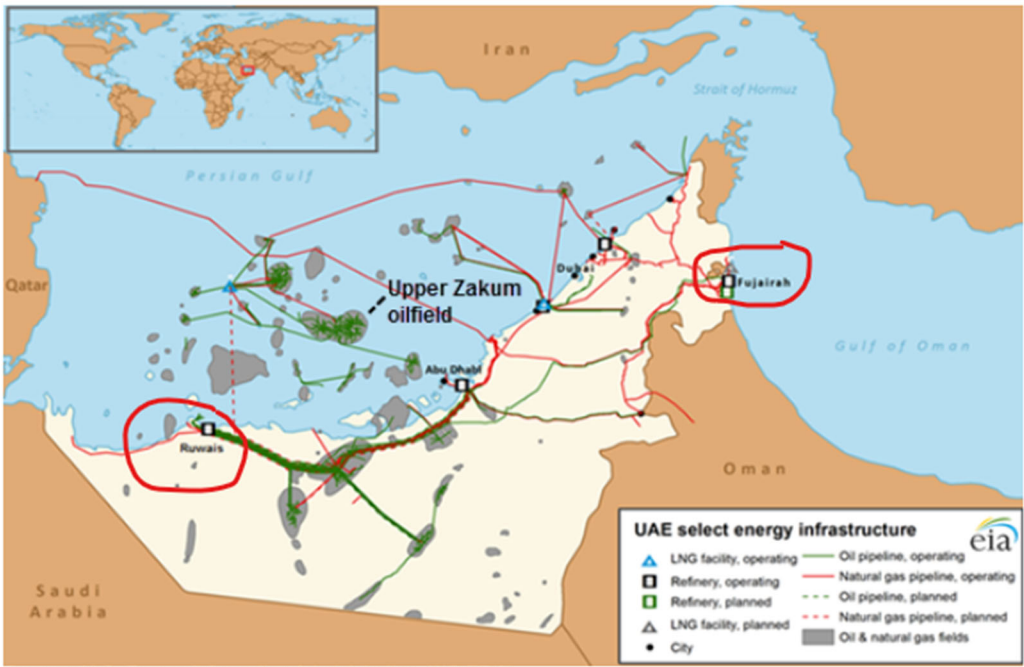
Excerpt TC Energy Q4/22 release

“Coastal GasLink: The Coastal GasLink pipeline project is approximately 84 per cent complete. The entire route has been cleared, grading is more than 96 per cent complete and more than 510 km of pipeline has been welded, lowered and backfilled with restoration activities underway in many areas.

*Subsequent to execution of the July 2022 agreements, the project has faced material cost pressures that reflect challenging conditions in the Western Canadian labour market, shortages of skilled labour, impacts of contractor underperformance and disputes, as well as other unexpected events, including drought conditions and erosion and sediment control challenges. A CSRA was conducted to assess current market conditions and potential risks and uncertainties facing the remaining project scope. As a result of the CSRA, the estimate of the cost to complete the pipeline has increased to approximately \$14.5 billion. This estimate excludes potential cost recoveries and incorporates contingencies for certain factors that may be outside the control of Coastal GasLink LP such as labour conditions, contractor performance and weather-related events. **The work plan continues to target mechanical completion by year-end 2023, with commissioning and restoration work continuing into 2024 and 2025.** TC Energy expects to fund the incremental project costs and is actively pursuing cost mitigants and recoveries that may partially offset a portion of these costs, some of which may not be conclusively determined until after the pipeline is in service. The CSRA review also considered the potential impact of an extension of construction well into 2024. In that event, costs would increase further by up to \$1.2 billion.*

This increase in the capital cost estimate for the project and our corresponding funding requirements were indicators that a decrease in the value of our equity investment had occurred.

As a result, we completed a valuation assessment and concluded that the fair value of our investment was below its carrying value at December 31, 2022. We determined that this was an other-than-temporary impairment of our equity investment in Coastal GasLink LP and, as a result, we recognized a pre-tax impairment of \$3.0 billion (\$2.6 billion after tax) in fourth quarter 2022. The pre-impairment carrying value of our investment in Coastal GasLink LP at December 31, 2022 consisted of amounts in Equity investments (\$2.8 billion) and Loans receivable from affiliates (\$250 million), which were reduced to a nil balance. Due to the funding provisions of the July 2022 agreements, we expect to fund an additional \$3.3 billion related to the revised estimated capital cost to complete the Coastal GasLink pipeline. A portion of this funding is expected to be impaired. We will continue to assess for other-than-temporary declines in the fair value of our investment and the extent of any additional impairment charges will depend on our valuation assessment performed at the respective reporting date. Refer to Note 7, Coastal GasLink, of our Consolidated financial statements for additional information.”



Source: U.S. Energy Information Administration, IHS EDIN

Instead of Fujairah

UAE Opts to Build New LNG Plant at Ruwais Instead of Fujairah

2023-05-02 07:55:11.341 GMT

By Anthony Di Paola

(Bloomberg) -- The

company said it had evaluated all options for locations and decided that Ruwais benefited from being closer to some of Adnoc's major facilities, which include gas fields and petrochemical plants.

Adnoc hasn't disclosed the cost of the plant, but they typically require billions of dollars of investment.

France's TotalEnergies to Buy LNG from UAE Under \$1 Billion Deal

Fujairah sits outside the Strait of Hormuz, the chokepoint at the entrance to the Persian Gulf, through which about a fifth of global oil exports pass.

The UAE is ramping up gas production to feed local power plants and a growing chemicals industry, as well meet rising demand for LNG in Europe and Asia.

On Monday, Adnoc announced a three-year deal worth roughly \$1.2 billion at today's prices to supply LNG to TotalEnergies SE.

To contact the reporter on this story: Anthony Di Paola in Dubai at adipaola@bloomberg.net

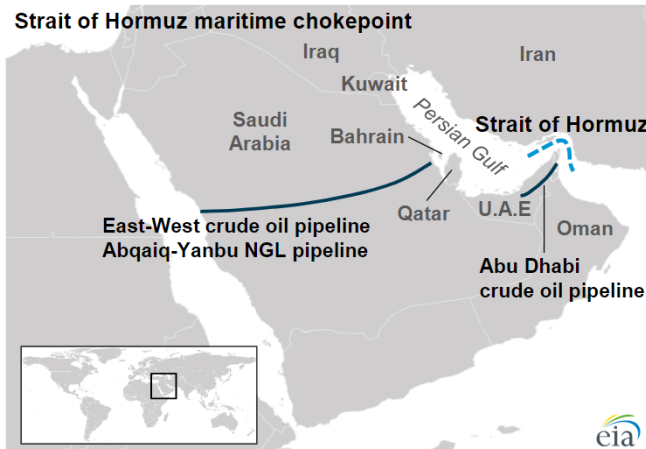
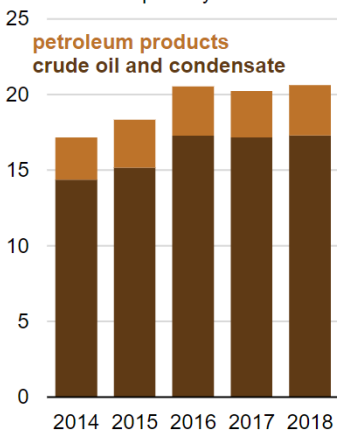
To contact the editors responsible for this story:

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.

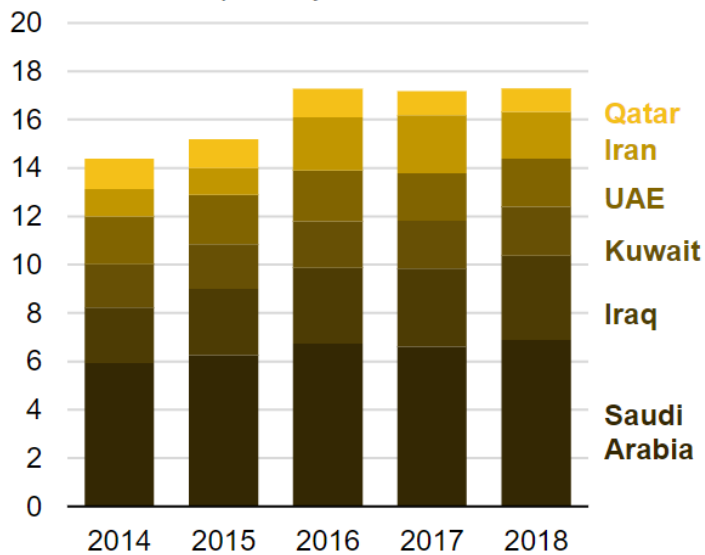
Based on tanker tracking data published by [ClipperData](#), Saudi Arabia moves the most crude oil and condensate through the Strait of Hormuz, most of which is exported to other countries (less than 0.5 million b/d transited the strait in 2018 from Saudi ports in the Persian Gulf to Saudi ports in the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

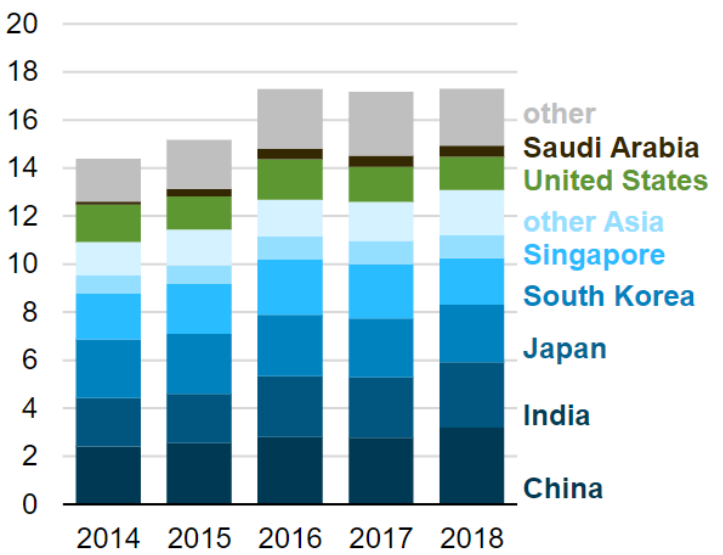
by origin

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.

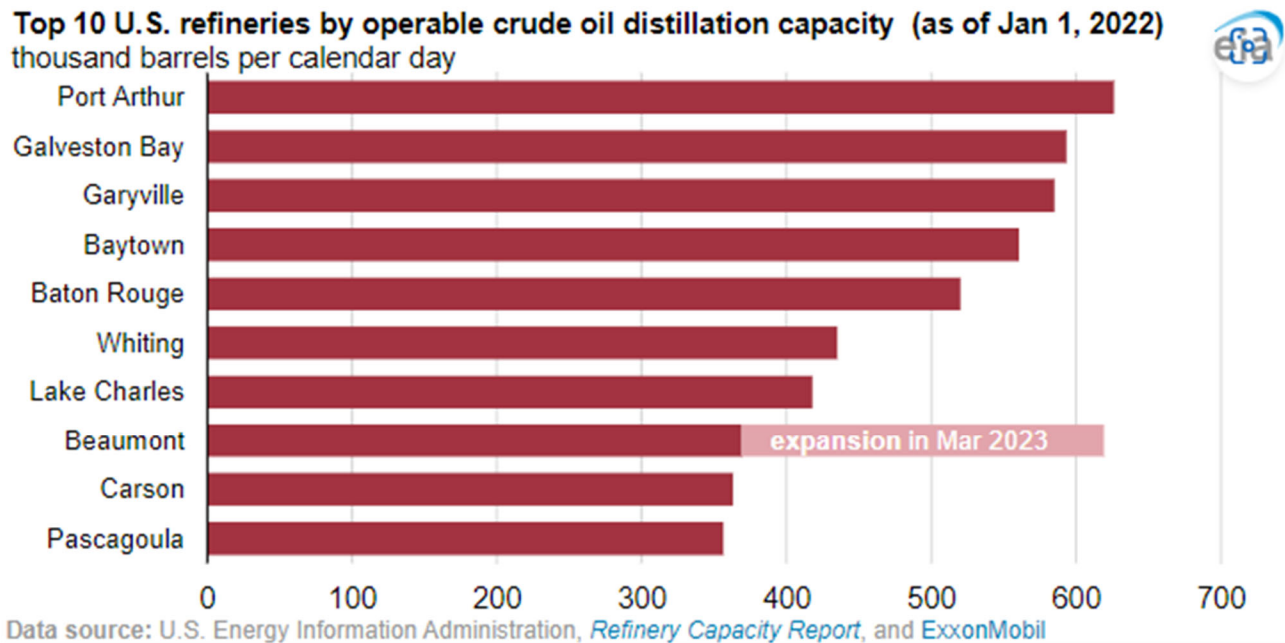
In 2018, the United States imported about 1.4 million b/d of crude oil and condensate from Persian Gulf countries through the Strait of Hormuz, accounting for about 18% of total U.S. crude oil and condensate imports and 7% of total U.S. petroleum liquids consumption.

Principal contributor: Justine Barden

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

MAY 2, 2023

[Beaumont refinery expansion boosts Gulf Coast petroleum refining capacity](#)



March 16, ExxonMobil [announced](#) the beginning of operations at the expansion of its Beaumont refinery, adding 250,000 barrels per day (b/d) of capacity, according to the company's announcement. The expansion makes the oil refinery one of the largest in the United States as measured by crude oil distillation capacity. According to ExxonMobil, the total capacity of the Beaumont facility is now 630,000 b/d.

The Beaumont expansion is the first major refinery capacity expansion to come online since the COVID-19 pandemic, which caused several refinery capacity closures over the course of [2020](#) and [2021](#). U.S. refinery distillation capacity decreased from 19.0 million b/d at the start of 2020 to 17.9 million b/d at the start of 2022. In June, we expect to update our [Refinery Capacity Report](#) with information about refinery capacity at the start of 2023. That report will not include the Beaumont capacity addition because it was not operational at the start of 2023.

Beaumont's added capacity is the largest of a cluster of new capacity expected to come online in 2023 and 2024, much of it concentrated on the U.S. Gulf Coast. The region has historically been the largest refining hub in the United States and accounts for 8 of the 10 [largest refineries in the country](#). New refinery capacity in the region capitalizes on growing U.S. crude oil production. The region also benefits from existing infrastructure for shipping refined products to the East Coast, to Mexico (the largest destination for U.S. gasoline exports), and to other destinations by way of available coastal tanker loading facilities.

Increased refinery capacity and, as a result, increased gasoline and diesel production should reduce [fuel prices this summer](#) compared with 2022. At the same time, more refinery production may be offset, at least in part, by a combination of higher crude oil prices, increasing consumption, and low fuel inventories.

Global refinery capacity also decreased during 2020 and 2021, which drew down global inventories and increased calls on U.S. exporters to meet consumption needs in other markets. Other [international refinery capacity additions](#) have been coming online or are expected to come online later this year as well, particularly in the Middle East, Nigeria, India, and China. These expansions will likely increase global supply of refined products and lower [crack spreads](#).

Principal contributor: Kevin Hack

Oil production increased 2.61% in Colombia during the month of March

May 3, 2023. Minenergy Bogota.

Sector: Hydrocarbons

According to the National Hydrocarbons Agency (ANH), oil production during March 2023 was 771,732 barrels per day on average, higher than that registered in the same month of 2022 when it reached 752,143 barrels on average.

- During the third month of the year, a discovery notice was reported in the Tororoi-1 well of the E&P LLA-87 contract. In addition, 8 exploratory wells and 55 development wells were drilled.

Minenergy. Bogotá, D.C., May 03, 2023. The National Hydrocarbons Agency (ANH) reported that the audited oil production during March 2023 was 771,732 average barrels per day, 2.61% higher than that registered in the same month of 2022 when it reached 752,143 average barrels per day.

Compared to February 2023, daily oil production registered an increase of 1.55% (771,732 bopd vs 759,953* bopd). The increase in production between March and February 2023 was mainly presented in the fields: Quifa, Caño Sur Este, Rumba, Pendare, La Belleza, Hamaca and Kitáro.

The annual average production, between March 2022 and the same month of 2023, was 768,427 barrels of oil per day, which represents an increase of 3.31% compared to what was registered for the previous year, when it reached 743,777.

Meanwhile, the ANH also reported that the average gas production marketed during March 2023 presented a decrease of 1.21% compared to the same month of 2022 (1,065 mpcd vs. 1,078 mpcd). Compared to February 2023, the average production of gas marketed in the third month of the year registered a fall of 1.48% (1,065 mpcd vs 1,081 mpcd).

During March 2023, a discovery notice was reported in the Tororoi-1 well of the E&P LLA-87 contract. Additionally, 8 exploratory wells and 55 development wells were drilled.

Regarding the acquisition of exploratory seismic, during the third month of the year 204.45 km were reported, distributed in 197.33 km 2D equivalent, which correspond to the exploitation agreement CE MAGDALENA MEDIO in the Flamencos 3D program and 7.12 km corresponding to the E&P SSJN-1 RC7 Partridges contract, in the SSJN-1-2D-2021 program. The accumulated advance of the year to the March cut-off completes 431.09 total km.

() In the February 2023 bulletin, the oil production reported by the ANH was 757,339 bopd. In the recent information delivered, the ANH made an update and adjustment of February 2023 oil production to 759,953 bopd. It is important to note that the figures presented may be subject to corrections, updates and/or modifications in the process of approving forms of production or creation of resources in the system. of official information SOLAR. The average monthly production does not include the production of fields that have not yet been created and/or reported in the system.*

Russia's Oil-Refining Rate Drops Further Amid Maintenance

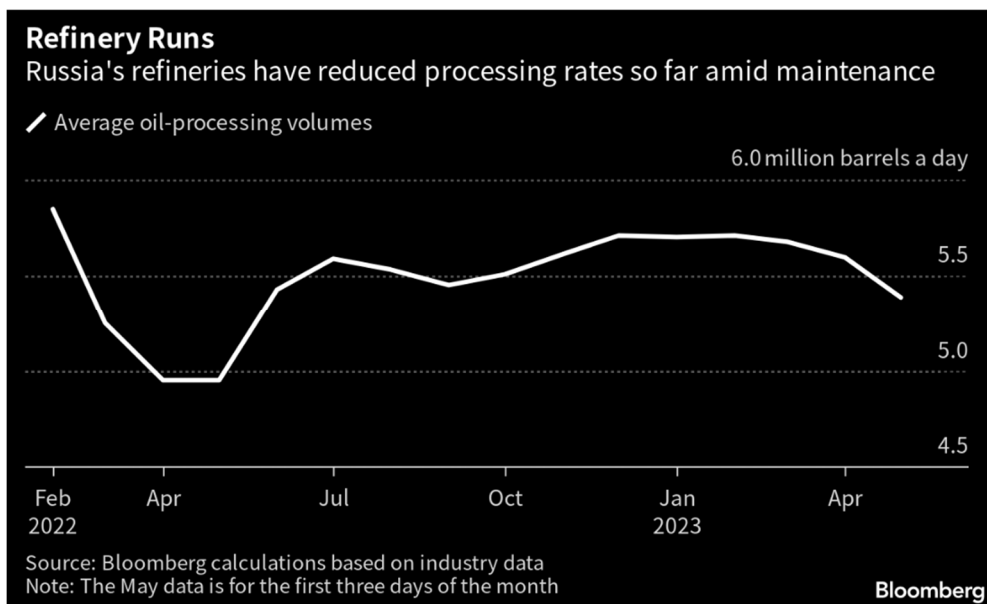
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By Bloomberg News

(Bloomberg) -- Russia's refineries processed less oil in early May due to seasonal maintenance, reducing domestic demand for crude as Moscow said it was cutting production.

The nation's facilities refined an average of 5.39 million barrels a day of crude from May 1-3, according to a person familiar with the matter. That's 216,000 barrels a day, or 3.9%, lower than the average for most of April, which itself was down 1.4% from March.

Moscow classified its oil-output statistics last year due to their "sensitive" nature as the country was target by Western sanctions over the invasion of Ukraine. In absence of official production data, the amount of Russian crude being processed domestically has been closely followed by analysts as a potential indicator.



Russia pledged to cut its crude output by 500,000 barrels a day in March, compared with February, and keep it at that level all year. Deputy Prime Minister Alexander Novak has said that the cutback were implemented, but the country's seaborne exports have been robust, prompting questions about whether the cuts are really happening.

See also: [Russia Pipeline Data Offer Scant Evidence of Oil Output Cuts](#)

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Table 3. Oil Exporters: Real Oil and Non-Oil GDP Growth*(Year-over-year percent change)*

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
REAL NON-OIL GDP GROWTH						
Oil exporters	5.6	-3.7	5.8	4.0	3.7	3.5
Algeria	4.7	-4.1	2.1	3.2	3.0	2.7
Azerbaijan	7.9	-2.9	7.2	9.0	4.2	3.6
Bahrain	6.4	-5.6	3.3	5.5	3.6	4.5
Iran ¹	3.9	2.9	4.3	2.5	2.0	2.0
Iraq	10.0	-20.2	21.1	3.2	2.8	4.2
Kazakhstan	6.8	-2.0	5.5	4.6	3.4	3.3
Kuwait	5.2	-7.5	3.4	3.9	3.4	3.5
Libya	3.2	-19.4	5.9	-5.1	13.6	8.5
Oman	5.1	-4.5	3.2	1.2	2.0	2.5
Qatar ²	10.3	-4.5	2.8	5.4	2.7	2.5
Saudi Arabia	5.6	-3.0	5.7	4.8	4.9	4.2
Turkmenistan	4.7	-1.8	1.7	2.3	2.2	2.3
United Arab Emirates	5.7	-5.4	5.8	6.0	3.8	3.9
CCA oil and gas exporters	7.0	-2.1	5.3	5.2	3.4	3.2
MENA oil exporters	5.5	-3.9	5.9	3.8	3.7	3.5
Memorandum						
Arab World oil exporters	6.0	-6.1	6.4	4.2	4.2	3.9
GCC	5.9	-4.1	5.2	4.9	4.2	3.9
MENA oil exporters excl. conflict-affected countries and Iran	5.6	-4.6	4.8	4.3	4.4	3.9
REAL OIL GDP GROWTH						
Oil Exporters	2.6	-3.7	4.4	7.3	2.4	2.9
Algeria	-0.7	-10.2	10.5	1.7	0.7	1.7
Azerbaijan	9.7	-6.4	2.8	-3.3	0.5	0.3
Bahrain	0.3	-0.1	-0.3	-1.8	0.1	0.1
Iran ¹	-0.4	8.8	10.5	2.9	2.1	2.1
Iraq	10.3	-12.6	-0.7	11.9	4.3	2.4
Kazakhstan	6.0	-4.7	-0.6	-1.7	7.6	10.7
Kuwait	2.7	-9.8	-0.3	11.6	-0.9	2.0
Libya	7.8	-35.5	45.0	-17.0	20.0	8.3
Oman	1.5	-0.9	2.4	9.6	1.1	9.5
Qatar ²	7.5	-2.0	-0.3	2.3	1.9	0.7
Saudi Arabia	1.8	-6.6	0.2	15.3	0.4	1.3
Turkmenistan	...	-8.8	20.1	-0.6	2.9	1.2
United Arab Emirates	2.3	-3.8	-0.7	11.1	2.8	3.8
CCA oil and gas exporters	7.4	-5.6	2.8	-1.9	5.6	7.4
MENA oil exporters	2.3	-3.5	4.6	8.6	1.9	2.3
Memorandum						
Arab World oil exporters	3.1	-7.5	2.7	10.3	1.9	2.4
GCC	2.3	-5.4	0.0	12.4	1.0	2.2
MENA oil exporters excl. conflict-affected countries and Iran	2.3	-6.9	3.1	10.2	1.6	2.4

Sources: National authorities; and IMF staff estimates and projections.

¹ Iran's data reflect the recently published national accounts by the Central Bank of Iran based on 2016 constant prices. Data prior to 2011 are extrapolated by staff to harmonize the base year.² Qatar's data reflect the recently-published national accounts based on 2018 constant prices. Data prior to 2011 are extrapolated by staff to harmonize the base year and will be revised once official data are released.

Table 4. Crude Oil and Natural Gas Production
(Millions of barrels per day or millions of barrels of oil equivalent per day)

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
CRUDE OIL PRODUCTION						
Oil exporters	26.92	26.03	27.22	29.80	30.13	30.96
Algeria	1.13	0.95	0.92	0.98	0.98	0.97
Azerbaijan	0.69	0.69	0.69	0.66	0.65	0.65
Bahrain	0.20	0.19	0.19	0.19	0.19	0.19
Iran	3.48	2.02	2.48	2.58	2.62	2.65
Iraq	2.81	4.00	3.97	4.44	4.63	4.74
Kazakhstan	1.44	1.76	1.76	1.73	1.86	2.05
Kuwait	2.52	2.44	2.43	2.71	2.68	2.73
Libya	1.25	0.30	1.21	1.00	1.20	1.30
Oman	0.88	0.95	0.97	1.06	1.07	1.20
Qatar	0.71	0.55	0.55	0.55	0.55	0.55
Saudi Arabia	9.12	9.22	9.13	10.57	10.49	10.59
Turkmenistan	0.22	0.18	0.18	0.18	0.18	0.18
United Arab Emirates	2.56	2.77	2.74	3.14	3.04	3.15
CCA oil and gas exporters	2.25	2.64	2.63	2.56	2.68	2.88
MENA oil exporters	24.67	23.39	24.58	27.24	27.44	28.08
<i>Memorandum</i>						
Arab World oil exporters	21.19	21.37	22.10	24.65	24.82	25.43
GCC	16.00	16.12	16.00	18.23	18.01	18.41
MENA oil exporters excl. conflict-affected countries and Iran	18.38	17.37	18.13	20.21	20.19	20.68
NATURAL GAS PRODUCTION						
Oil exporters	11.01	17.03	18.16	18.71	19.31	19.75
Algeria	1.53	1.50	1.86	1.83	1.86	1.91
Azerbaijan	0.33	0.62	0.79	0.83	0.88	0.92
Bahrain	0.29	0.44	0.45	0.45	0.45	0.45
Iran	2.46	4.24	4.33	4.46	4.60	4.73
Iraq	0.00	0.00	0.00	0.00	0.00	0.00
Kazakhstan	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	0.23	0.26	0.26	0.28	0.29	0.29
Libya	0.18	0.10	0.18	0.15	0.18	0.19
Oman	0.56	0.77	0.84	0.98	1.04	1.04
Qatar	2.57	4.56	4.56	4.70	4.82	4.85
Saudi Arabia	1.77	2.28	2.34	2.48	2.57	2.65
Turkmenistan	1.13	1.16	1.44	1.43	1.48	1.50
United Arab Emirates	0.90	1.10	1.09	1.12	1.16	1.19
CCA oil and gas exporters	0.95	1.78	2.24	2.26	2.37	2.42
MENA oil exporters	10.06	15.24	15.92	16.45	16.95	17.33
<i>Memorandum</i>						
Arab World oil exporters	7.60	11.00	11.59	11.99	12.35	12.60
GCC	5.96	9.41	9.55	10.01	10.31	10.49
MENA oil exporters excl. conflict-affected countries and Iran	7.60	11.00	11.59	11.99	12.35	12.60

Sources: National authorities; and IMF staff estimates and projections.

Table 5. Crude Oil and Natural Gas Exports
(Millions of barrels per day or millions of barrels of oil equivalent per day)

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
CRUDE OIL EXPORTS						
ME&CA Oil Exporters	19.74	18.81	19.40	21.52	22.03	22.69
Algeria	0.66	0.36	0.37	0.38	0.38	0.38
Azerbaijan	0.57	0.56	0.56	0.53	0.52	0.52
Bahrain	0.16	0.15	0.15	0.15	0.15	0.15
Iran	1.81	0.40	0.75	0.85	0.89	0.92
Iraq	2.50	3.43	3.44	3.65	3.89	4.04
Kazakhstan	1.20	1.45	1.35	1.34	1.45	1.63
Kuwait	1.70	1.83	1.78	1.91	1.91	1.97
Libya	0.98	0.24	0.98	0.81	0.98	1.06
Oman	0.77	0.78	0.78	0.94	0.96	0.97
Qatar	0.65	0.47	0.48	0.50	0.51	0.51
Saudi Arabia	6.89	6.63	6.23	7.58	7.44	7.48
Turkmenistan	0.07	0.07	0.07	0.07	0.06	0.06
United Arab Emirates	2.31	2.42	2.45	2.81	2.88	3.01
CCA oil and gas exporters	1.82	2.09	1.98	1.93	2.03	2.20
MENA oil exporters	17.93	16.72	17.42	19.59	20.00	20.49
<i>Memorandum</i>						
Arab World oil exporters	16.12	16.32	16.66	18.73	19.11	19.56
GCC	12.48	12.29	11.87	13.89	13.86	14.09
MENA oil exporters excl. conflict-affected countries and Iran	14.12	12.89	13.22	15.09	15.22	15.52
NATURAL GAS EXPORTS						
ME&CA Oil Exporters	4.20	5.60	6.23	6.18	6.32	6.40
Algeria	1.19	0.92	1.19	1.07	1.08	1.08
Azerbaijan	0.15	0.28	0.36	0.39	0.44	0.47
Bahrain	0.00	0.00	0.00	0.00	0.00	0.00
Iran	0.13	0.31	0.32	0.32	0.33	0.34
Iraq	0.00	0.00	0.00	0.00	0.00	0.00
Kazakhstan	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	0.13	0.17	0.18	0.19	0.19	0.20
Libya	0.07	0.02	0.09	0.07	0.09	0.09
Oman	0.20	0.25	0.25	0.27	0.26	0.26
Qatar	1.61	2.62	2.61	2.61	2.63	2.64
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00
Turkmenistan	0.62	0.59	0.79	0.76	0.81	0.81
United Arab Emirates	0.43	0.44	0.45	0.48	0.50	0.52
CCA oil and gas exporters	0.67	0.86	1.15	1.16	1.25	1.28
MENA oil exporters	3.76	4.74	5.08	5.02	5.08	5.12
<i>Memorandum</i>						
Arab World oil exporters	3.64	4.42	4.76	4.70	4.75	4.79
GCC	2.37	3.49	3.49	3.56	3.58	3.61
MENA oil exporters excl. conflict-affected countries and Iran	3.64	4.42	4.76	4.70	4.75	4.79

Sources: National authorities; and IMF staff estimates and projections.

Table 6. Breakeven Oil Prices*(U.S. dollars per barrel)*

	Average				Projections	
	2000–2019	2020	2021	2022	2023	2024
FISCAL BREAKEVEN OIL PRICE¹						
Oil exporters						
Algeria	102.1	89.6	111.4	85.7	112.4	111.9
Azerbaijan	51.9	66.3	57.9	63.6	77.0	78.2
Bahrain	83.2	113.7	134.8	133.6	126.2	129.1
Iran	85.6	546.5	259.4	278.3	351.7	375.4
Iraq	75.8	56.6	53.3	66.3	75.8	76.4
Kazakhstan	...	192.1	183.5	95.5	99.8	83.9
Kuwait ²	46.8	76.2	62.4	63.2	70.7	66.3
Libya	71.7	141.7	52.0	85.1	64.4	62.2
Oman	69.1	86.4	76.7	62.1	72.2	66.4
Qatar	45.1	49.3	46.5	44.7	44.8	41.5
Saudi Arabia	80.4	76.3	83.6	85.8	80.9	75.1
Turkmenistan	...	40.5	32.3	37.3	38.1	40.0
United Arab Emirates	49.9	51.7	53.1	55.1	55.6	54.8
EXTERNAL BREAKEVEN OIL PRICE³						
Oil exporters						
Algeria	85.2	80.2	79.4	75.2	74.2	83.5
Azerbaijan	57.4	64.8	69.5	85.9	60.4	63.1
Bahrain	52.5	84.6	34.6	39.4	40.5	45.7
Iran	40.4	36.7	44.5	48.8	47.2	44.1
Iraq	65.3	53.7	56.1	75.7	67.4	76.5
Kazakhstan	86.7	80.5	123.9	65.8	102.4	96.2
Kuwait	37.8	37.1	33.0	43.4	45.1	46.2
Libya	54.3	58.0	57.2	86.0	61.5	55.5
Oman	71.3	75.6	75.7	85.1	64.1	62.2
Qatar	50.6	43.5	43.4	46.3	40.2	42.7
Saudi Arabia	55.4	50.8	57.1	52.7	54.7	57.0
Turkmenistan	...	25.9	21.7	31.4	30.7	31.8
United Arab Emirates	45.7	18.5	16.8	36.8	39.4	35.3

Sources: National authorities; and IMF staff estimates and projections.

¹ The oil price at which the fiscal balance is zero.² Kuwait's fiscal breakeven oil price is calculated using the fiscal balance before the 10 percent revenue transfer to the Future Generations Fund and includes investment income.³ The oil price at which the current account balance is zero.

Table 7. Consumer Price Inflation
(Year-over-year percent change)

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
Middle East and Central Asia	7.2	10.4	12.8	14.3	15.9	12.0
Oil Exporters	6.7	8.7	11.0	13.6	12.1	8.7
Algeria	3.9	2.4	7.2	9.3	8.1	7.7
Azerbaijan	6.2	2.8	6.7	13.8	11.3	8.0
Bahrain	1.8	-2.3	-0.6	3.6	2.2	2.2
Iran	17.9	36.4	40.1	49.0	42.5	30.0
Iraq	9.5	0.6	6.0	5.0	6.6	1.6
Kazakhstan	8.3	6.8	8.0	15.0	14.8	8.5
Kuwait	2.9	2.1	3.5	3.9	3.3	2.6
Libya	7.9	1.5	2.9	4.5	3.4	2.9
Oman	2.1	-0.9	1.5	2.8	1.9	2.4
Qatar	3.5	-2.5	2.3	5.0	3.0	2.7
Saudi Arabia	1.8	3.4	3.1	2.5	2.8	2.3
Turkmenistan	6.5	6.1	19.5	11.5	6.7	10.7
United Arab Emirates	3.2	-2.1	-0.1	4.8	3.4	2.0
Emerging Market and Middle-Income Countries	7.1	8.2	7.8	11.5	21.5	17.1
Armenia	3.5	1.2	7.2	8.7	7.1	5.0
Egypt	9.9	5.7	4.5	8.5	21.6	18.0
Georgia	5.0	5.2	9.6	11.9	5.9	3.2
Jordan	3.2	0.4	1.3	4.2	3.8	2.9
Lebanon	2.7	84.9	...	...	...	...
Morocco	1.5	0.6	1.4	6.6	4.6	2.8
Pakistan	7.4	10.7	8.9	12.1	27.1	21.9
Syrian Arab Republic	...	...	...	...	...	...
Tunisia	...	5.6	5.7	8.3	10.9	9.5
West Bank and Gaza	2.8	-0.7	1.2	3.7	3.2	2.7
Low-Income Developing Countries	13.9	38.9	67.0	38.1	24.7	19.4
Afghanistan	8.3	5.6	...	...	...	...
Djibouti	...	1.8	1.2	5.5	3.2	3.2
Kyrgyz Republic	7.1	6.3	11.9	13.9	11.3	7.8
Mauritania	4.8	2.4	3.6	9.6	9.5	7.0
Somalia	...	4.3	4.6	6.8	4.2	3.8
Sudan	21.2	163.3	359.1	138.8	71.6	51.9
Tajikistan	11.5	8.6	9.0	6.6	5.4	6.5
Uzbekistan	14.0	12.9	10.8	11.4	11.8	9.9
Yemen	14.6	19.6	26.0	29.1	16.8	17.3
CCA	8.9	7.4	9.6	13.0	11.8	8.5
CCA oil and gas exporters	7.7	5.9	9.2	14.3	13.0	8.7
CCA oil and gas importers	11.0	9.9	10.3	11.0	10.0	8.1
CCA emerging market and middle-income countries	4.3	3.5	8.6	10.5	6.4	4.0
CCA low-income developing countries	13.0	11.7	10.7	11.1	11.0	9.3
MENA	7.1	10.9	13.9	14.8	14.8	11.1
MENA oil exporters	6.6	9.0	11.3	13.5	12.0	8.7
MENA oil importers	8.5	15.2	20.5	18.0	22.0	17.1
MENA emerging market and middle-income countries	7.1	6.8	7.1	11.2	19.1	14.9
MENA low-income developing countries	17.1	92.1	175.9	83.2	45.9	35.0
Memorandum						
Regional groups						
Arab World	4.8	6.1	9.1	8.9	9.9	7.7
Arab World oil exporters	3.0	1.3	3.2	4.2	3.9	2.8
GCC	2.3	1.3	2.2	3.3	2.9	2.3
MENA excl. fragile and conflict-affected states	6.8	8.4	9.6	12.6	13.9	10.8
MENA oil exporters excl. conflict-affected countries and Iran	2.6	1.4	2.8	4.1	3.6	3.0
MENAP	7.1	10.8	13.2	14.4	16.4	12.5
MENAP oil importers	8.0	13.5	16.3	15.9	23.7	18.8
North Africa	7.7	11.3	15.8	13.9	17.9	14.7
Fragile and conflict-affected states	9.1	29.4	52.4	33.5	22.4	13.6
Conflict-affected countries	8.1	3.3	8.1	7.5	7.6	3.2

Sources: National authorities; and IMF staff estimates and projections.

Table 13. Oil Exporters: General Government Non-Oil Fiscal Balance*(Percent of non-oil GDP)*

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
ME&CA Oil Exporters	-36.8	-31.0	-29.0	-31.1	-29.9	-28.0
Algeria ¹	-35.7	-25.9	-24.5	-24.4	-29.5	-25.4
Azerbaijan ²	-28.8	-32.3	-24.9	-17.5	-21.1	-20.1
Bahrain ¹	-29.6	-28.9	-27.8	-24.3	-22.6	-22.0
Iran ³	-10.9	-6.4	-5.9	-5.9	-7.3	-7.6
Iraq ¹	-84.2	-61.7	-59.8	-72.7	-72.0	-69.0
Kazakhstan	-8.8	-12.1	-11.5	-9.4	-9.7	-8.3
Kuwait ⁴	-58.4	-72.1	-64.8	-66.2	-72.9	-68.3
Libya	-87.4	-33.2	-146.6	-197.1	-170.6	-163.8
Oman ¹	-50.9	-54.7	-44.4	-40.4	-39.2	-36.4
Qatar	-72.6	-33.9	-31.0	-30.4	-28.2	-25.5
Saudi Arabia ¹	-47.9	-34.9	-29.8	-31.2	-27.8	-26.3
Turkmenistan ⁵	-6.3	-4.4	-2.7	-3.4	-3.4	-3.2
United Arab Emirates ⁶	-21.9	-18.5	-16.0	-16.4	-16.2	-15.8
CCA oil and gas exporters	-13.1	-13.8	-12.0	-9.7	-10.4	-9.3
MENA oil exporters	-39.1	-33.4	-31.2	-33.8	-32.5	-30.6
<i>Memorandum</i>						
Arab World oil exporters	-46.9	-36.3	-34.7	-37.4	-36.0	-33.9
GCC	-43.2	-34.4	-30.1	-31.0	-29.1	-27.3
MENA oil exporters excl. conflict-affected countries and Iran	-44.5	-33.6	-32.0	-33.5	-31.9	-29.9

Sources: National authorities; and IMF staff estimates and projections.

¹ Central government.² General government includes state budget, Nakhchevan AR, State Oil Fund of Azerbaijan (SOFAZ), and State Social Protection Fund.³ Central government including Targeted Subsidy Organization.⁴ Central government and Social Security Fund.⁵ State budget.⁶ Consolidated accounts of the federal government and the emirates, including extra-budgetary funds.

Table 18. Current Account Balance*(Billions of U.S. dollars)*

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
Middle East and Central Asia	139.4	-102.9	130.3	360.9	167.5	99.1
Oil Exporters	169.9	-64.1	179.5	426.6	218.7	151.6
Algeria	4.1	-18.7	-4.6	14.0	1.6	-5.8
Azerbaijan	5.7	-0.2	8.3	21.3	13.5	13.0
Bahrain	0.7	-3.2	2.6	4.0	2.3	1.8
Iran, Islamic Republic of	16.4	-0.7	11.1	16.7	6.7	7.2
Iraq	1.2	-18.4	16.0	31.4	11.8	-7.1
Kazakhstan	-1.0	-7.6	-7.9	6.3	-4.7	-5.1
Kuwait	30.5	4.2	32.4	52.6	32.4	27.7
Libya	8.1	-4.0	2.9	1.2	5.6	6.7
Oman	0.8	-12.3	-4.3	3.7	2.2	1.5
Qatar	18.3	-2.9	26.5	58.6	42.1	33.6
Saudi Arabia	59.5	-22.8	44.3	152.8	66.0	38.9
Turkmenistan	-3.2	1.4	4.2	4.4	3.8	2.6
United Arab Emirates	27.6	21.1	48.0	59.6	35.3	36.6
Emerging Market and Middle-Income Countries	-28.0	-30.1	-38.2	-56.5	-37.1	-38.5
Armenia	-0.6	-0.5	-0.5	0.0	-0.4	-0.8
Egypt	-4.2	-11.2	-18.4	-16.6	-10.9	-11.6
Georgia	-1.2	-2.0	-1.9	-0.8	-1.1	-1.3
Jordan	-2.0	-2.5	-3.7	-3.6	-3.1	-2.8
Lebanon	-7.8	-3.7	...	...	...	...
Morocco	-3.3	-1.4	-3.2	-6.0	-5.2	-5.1
Pakistan	-4.7	-4.4	-2.8	-17.4	...	...
Syrian Arab Republic	...	...	...	...	...	...
Tunisia	-2.6	-2.5	-2.8	-4.0	-3.5	-2.9
West Bank and Gaza	-1.4	-1.9	-1.5	-2.3	-2.3	-2.3
Low-Income Developing Countries	-2.5	-8.6	-10.9	-9.2	-14.1	-14.0
Afghanistan	2.4	2.2	...	...	...	...
Djibouti	...	0.4	0.0	-0.2	-0.1	-0.1
Kyrgyz Republic	-0.5	0.4	-0.7	-3.0	-1.2	-1.2
Mauritania	-0.6	-0.6	-0.8	-1.5	-0.8	-1.0
Somalia	...	-0.7	-1.3	-1.4	-1.4	-1.4
Sudan	-3.5	-6.0	-2.5	-3.1	-3.4	-3.5
Tajikistan	-0.4	0.3	0.7	0.7	-0.2	-0.3
Uzbekistan	0.9	-3.0	-4.8	1.2	-3.3	-3.8
Yemen	-0.5	-1.6	-1.5	-2.0	-3.7	-2.8
CCA	1.2	-11.2	-2.6	30.1	6.3	3.1
CCA oil and gas exporters	3.0	-6.4	4.6	32.0	12.5	10.5
CCA oil and gas importers	-1.8	-4.8	-7.3	-1.9	-6.2	-7.4
CCA emerging markets and middle-income countries	-1.8	-2.5	-2.5	-0.8	-1.6	-2.1
CCA low-income developing countries	0.0	-2.3	-4.8	-1.2	-4.7	-5.3
MENA	140.8	-89.5	135.8	348.2	169.2	104.9
MENA oil exporters	166.9	-57.7	174.9	394.6	206.2	141.0
MENA oil importers	-26.1	-31.8	-39.1	-46.4	-36.9	-36.1
MENA emerging markets and middle-income countries	-21.4	-23.2	-33.0	-38.3	-27.5	-27.4
MENA low-income developing countries	-4.7	-8.6	-6.1	-8.1	-9.4	-8.7
Memorandum						
Regional groups						
Arab World	124.4	-88.8	124.6	331.5	162.5	97.7
Arab World oil exporters	150.5	-57.0	163.7	377.9	199.4	133.8
GCC	137.4	-15.9	149.4	331.4	180.5	140.0
MENA excl. fragile and conflict-affected states	145.2	-53.1	127.0	330.3	165.1	117.9
MENA oil exporters excl. conflict-affected countries and Iran	149.5	-38.6	147.7	346.5	187.7	140.9
MENAP	138.2	-91.7	133.0	330.8	161.2	95.9
MENAP oil importers	-28.6	-34.0	-41.9	-63.8	-44.9	-45.1
North Africa	-1.9	-44.0	-29.5	-16.1	-16.8	-23.2
Fragile and conflict-affected states	-2.3	-34.1	8.8	17.9	4.1	-13.0
Conflict-affected countries	2.3	-18.5	13.3	28.1	6.7	-11.2

Sources: National authorities; and IMF staff estimates and projections.

Table 20. Gross Official Reserves

(Billions of U.S. dollars)

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
Middle East and Central Asia	907.8	1083.7	1130.8	1177.0	1198.4	1204.5
Oil Exporters	789.6	893.0	941.3	1009.1	1022.5	1018.2
Algeria	103.1	46.9	45.4	59.8	63.2	59.1
Azerbaijan	5.4	6.4	7.1	9.0	9.2	9.4
Bahrain	3.3	2.2	4.7	4.5	5.2	5.6
Iran ¹	70.5	13.8	17.7	25.4	23.2	21.4
Iraq	45.6	54.4	64.2	97.0	99.4	93.1
Kazakhstan	19.9	35.7	34.4	35.2	37.1	36.3
Kuwait	21.5	48.3	45.1	46.4	54.5	57.9
Libya	67.4	69.3	77.7	79.1	83.6	87.5
Oman	11.0	15.0	19.7	17.6	20.5	21.4
Qatar	19.0	40.9	42.2	47.3	50.4	52.2
Saudi Arabia ²	379.4	453.7	455.4	459.9	445.6	436.7
Turkmenistan	...	...	...	...	...	...
United Arab Emirates ³	50.5	106.5	127.8	127.8	130.6	137.5
Emerging Market and Middle-Income Countries	93.1	136.3	142.1	119.5	124.9	134.8
Armenia	1.5	2.6	3.2	4.1	4.1	4.1
Egypt	23.7	37.2	39.4	31.5	36.1	42.9
Georgia	1.8	3.9	4.3	4.9	4.8	5.0
Jordan	10.3	17.0	19.0	18.0	18.4	18.0
Lebanon ⁴	25.4	17.7	...	...	...	...
Morocco	19.4	36.0	35.6	31.8	32.7	33.0
Pakistan	9.5	12.2	17.3	9.8	11.0	11.7
Syrian Arab Republic	...	...	...	...	...	...
Tunisia	6.2	9.1	8.7	7.9	9.1	10.1
West Bank and Gaza	0.5	0.7	0.9	0.9	...	...
Low-Income Developing Countries	25.1	54.3	47.4	48.4	51.0	51.5
Afghanistan	...	9.8	...	...	...	...
Djibouti	0.2	0.7	0.6	0.5	0.6	0.6
Kyrgyz Republic ⁵	1.3	2.6	2.8	2.5	2.2	2.0
Mauritania	0.5	1.5	2.3	1.9	2.1	2.2
Somalia	...	...	...	...	...	...
Sudan ⁶	1.4	1.6	2.3	2.1	1.9	1.8
Tajikistan	0.4	2.2	2.5	3.7	4.4	4.8
Uzbekistan	14.0	34.9	35.1	36.4	39.1	39.3
Yemen	4.2	1.0	1.7	1.3	0.7	0.8
CCA	44.4	88.3	89.4	95.8	101.0	100.9
CCA oil and gas exporters	25.2	42.0	41.5	44.2	46.3	45.7
CCA oil and gas importers	19.1	46.3	47.9	51.6	54.6	55.2
CCA emerging markets and middle-income countries	3.3	6.5	7.5	9.0	8.9	9.1
CCA low-income developing countries	15.8	39.8	40.4	42.6	45.7	46.1
MENA	851.0	973.4	1024.1	1071.3	1086.4	1091.9
MENA oil exporters	764.4	851.0	899.9	964.9	976.1	972.5
MENA oil importers	86.6	122.4	124.3	106.5	110.3	119.4
MENA emerging markets and middle-income countries	80.3	117.6	117.3	100.7	105.1	114.0
MENA low-income developing countries	6.3	4.8	7.0	5.8	5.2	5.4
Memorandum						
Regional groups						
Arab World	780.4	959.6	1006.4	1045.9	1063.3	1070.5
Arab World oil exporters	693.8	837.2	882.1	939.4	953.0	951.1
GCC	484.6	666.6	694.9	703.4	706.8	711.3
MENA excl. fragile and conflict-affected states	718.5	828.7	863.7	880.4	892.0	898.6
MENA oil exporters excl. conflict-affected countries and Iran	655.1	782.8	817.9	842.4	853.6	858.0
MENAP	863.5	995.3	1041.4	1081.2	1097.4	1103.6
MENAP oil importers	99.1	144.4	141.6	116.3	121.3	131.1
North Africa	221.9	202.4	212.1	214.7	229.3	237.2
Fragile and conflict-affected states	156.1	154.4	160.4	191.0	194.4	193.3
Conflict-affected countries	...	65.1	...	...	...	...

Sources: National authorities; and IMF staff estimates and projections.

¹ In line with the Balance of Payments Manual (paragraph 6.75), the series of Gross International Reserves has been amended to reflect the amount of external assets that is readily available and controlled by the monetary authorities after the re-introduction of financial sanctions. Staff estimates that only 10 percent of the previously reported gross international reserves other than Iran's SDR holdings and reserve position at the Fund were readily available for BOP purposes in 2019. Starting from 2020, gross international reserves are assumed to accumulate or decumulate with the estimated BOP surpluses or deficits, and from 2021 with the new SDR allocation approved in August 2021. For instance, in 2021, total gross reserves are estimated at about \$122 bn, while total usable reserves are estimated at \$17.7 bn.

² Saudi Arabia Monetary Agency gross foreign assets.

³ Central bank only. Excludes overseas assets of sovereign wealth funds.

⁴ Excludes gold and encumbered assets.

⁵ Gross international reserves exclude reserve assets in non-convertible currencies.

⁶ Gross international reserves include a large portion of unreconciled claims.

Table 22. Gross Official Reserves
(In months of next year's imports)

	Average				Projections	
	2000–19	2020	2021	2022	2023	2024
Middle East and Central Asia	9.6	9.1	7.8	8.0	7.8	7.4
Oil Exporters	11.0	10.3	8.9	9.4	9.0	8.4
Algeria	25.4	12.7	11.3	13.4	13.1	11.7
Azerbaijan	4.6	4.7	4.6	6.6	6.5	6.4
Bahrain	2.2	1.0	1.8	1.7	1.8	1.9
Iran ¹	10.9	2.2	2.6	3.9	3.5	3.2
Iraq	8.1	9.0	7.3	11.0	9.6	8.8
Kazakhstan	5.6	8.7	7.0	7.1	7.3	6.9
Kuwait	6.6	12.9	9.4	9.2	10.3	10.5
Libya	...	...	...	...	...	...
Oman	5.0	4.9	4.8	4.5	5.2	5.3
Qatar	5.0	8.0	7.1	8.0	8.0	7.9
Saudi Arabia ²	24.7	25.6	21.6	20.3	18.3	16.6
Turkmenistan	...	...	...	...	...	...
United Arab Emirates ³	2.9	4.0	3.9	3.9	3.9	3.8
Emerging Market and Middle-Income Countries	5.4	5.5	4.5	4.0	4.1	4.2
Armenia	4.1	5.1	3.8	4.1	3.9	3.8
Egypt	5.8	5.5	4.6	3.7	4.1	4.5
Georgia	2.8	4.2	3.3	3.6	3.4	3.2
Jordan	6.9	8.7	7.7	7.5	7.8	7.5
Lebanon ⁴	10.6	12.1	...	...	...	...
Morocco	6.7	7.2	5.8	5.5	5.4	5.3
Pakistan	2.9	2.3	2.5	1.7	1.7	1.7
Syrian Arab Republic	...	...	...	...	...	...
Tunisia	3.5	4.5	3.6	3.4	3.9	4.2
West Bank and Gaza	1.0	0.8	0.9	0.9	...	...
Low-Income Developing Countries	6.4	7.9	6.9	6.5	6.3	5.8
Afghanistan	...	...	...	...	...	...
Djibouti ⁵	...	1.6	1.3	1.1	1.0	1.0
Kyrgyz Republic ⁶	4.3	5.3	3.8	3.7	3.1	2.7
Mauritania	1.9	4.3	4.6	4.5	5.2	5.1
Somalia	...	...	...	...	...	...
Sudan	2.1	2.1	2.7	2.3	2.0	1.9
Tajikistan	1.7	6.3	5.9	7.6	8.3	8.5
Uzbekistan	11.2	15.1	12.0	11.0	10.2	8.9
Yemen	6.4	1.1	1.7	1.1	0.6	0.7
CCA	5.8	8.8	7.1	7.3	7.2	6.7
CCA oil and gas exporters	5.3	7.7	6.4	7.0	7.2	6.8
CCA oil and gas importers	6.5	10.1	7.7	7.6	7.2	6.6
CCA emerging markets and middle-income countries	3.3	4.5	3.5	3.8	3.6	3.4
CCA low-income developing countries	8.3	12.6	9.9	9.5	9.0	8.0
MENA	10.3	9.5	8.2	8.4	8.2	7.8
MENA oil exporters	11.4	10.5	9.0	9.5	9.1	8.6
MENA oil importers	5.9	5.9	4.9	4.3	4.5	4.6
MENA emerging markets and middle-income countries	6.2	6.5	5.2	4.6	4.9	5.0
MENA low-income developing countries	4.0	1.9	2.5	2.0	1.7	1.7
Memorandum						
Regional groups						
Arab World	10.3	10.0	8.5	8.7	8.4	8.0
Arab World oil exporters	11.6	11.2	9.6	10.0	9.5	8.9
GCC	10.7	11.4	9.7	9.6	9.2	8.8
MENA excl. fragile and conflict-affected states	10.7	9.7	8.4	8.5	8.2	7.8
MENA oil exporters excl. conflict-affected countries and Iran	11.9	11.4	9.8	9.9	9.5	8.9
MENAP	9.9	9.1	7.8	8.1	7.8	7.5
MENAP oil importers	5.4	5.2	4.4	3.8	3.9	4.0
North Africa	10.6	7.0	5.9	5.9	6.1	5.9
Fragile and conflict-affected states	7.6	7.5	6.1	8.3	7.7	7.2
Conflict-affected countries	8.0	7.9	6.7	9.9	8.8	8.0

Sources: National authorities; and IMF staff estimates and projections.

¹ In line with the Balance of Payments Manual (paragraph 6.75), the series of Gross International Reserves has been amended to reflect the amount of external assets that is readily available and controlled by the monetary authorities after the re-introduction of financial sanctions. Staff estimates that only 10 percent of the previously reported gross international reserves other than Iran's SDR holdings and reserve position at the Fund were readily available for BOP purposes in 2019. Starting from 2020, gross international reserves are assumed to accumulate or decumulate with the estimated BOP surpluses or deficits, and from 2021 with the new SDR allocation approved in August 2021. For instance, in 2021, total gross reserves are estimated at about \$122 bn, while total usable reserves are estimated at \$17.7 bn.

² Saudi Arabia Monetary Agency gross foreign assets.

³ Central bank only. Excludes overseas assets of sovereign wealth funds.

⁴ Gold and encumbered assets are excluded.

⁵ The ratio of reserves to total imports understates the reserve coverage since a large part of imports reflect re-export activities.

⁶ Reserve assets in non-convertible currencies are excluded.

Libya will produce more than 1.5 million barrels of oil per day in 2023: AGOCO chairman

Provision of budget, continued and fast development, stability in Libya and oil sector - all contributing factors

by [Ibrahim Senusi](#) [February 14, 2023](#)



AGOCO chairman Gatrani said Libya can increase production to 1.5 million bpd this year (Photo: AGOCO).

The continuation of the Arabian Gulf Oil Company's (AGOCO) development operations at this pace will inevitably lead to Libya reaching a production rate of more than 1.5 million barrels of oil per day in 2023, AGOCO chairman Salah Gatrani said in an exclusive statement to *Libya Herald*.

He said this was because of the stability witnessed by the country in general, and by the oil sector in particular. Therefore, he continued, the Gulf Company has developed its own plan within the efforts of the National Oil Corporation (NOC). Libya has been unable to maintain production beyond 1.2 million bpd.

Gatrani was commenting to *Libya Herald* following Sunday's AGOCO's meeting on developing reserves and increasing oil production in the sector companies, attended by relevant AGOCO and NOC management.

The AGOCO chairman said that his company has already begun to implement the plan prepared by the NOC to raise production and increase reserves.

Training, localising and developing new techniques

He said AGOCO had actually delayed several projects to raise the efficiency of the employees in the company, including a cooperation project with KAMCO Oil Services Company to raise the efficiency

of employees, localize and develop technology in the company, and keep pace with global updates in the fields of drilling oil wells and extracting crude oil.

Gatrani referred to the conclusion of a training course for workers in the Nafoura field in the field of production engineering on the use of new techniques of electrical narratives and their applications to evaluate rock layers in oil-producing wells as well as water injection wells.

NOC is providing finance after securing it from government

He commended the NOC for supporting its oil companies financially, especially after allocating a good budget to the sector from the Abd Alhamid Aldabaiba government, which positively affected the entire oil sector, as several oil wells have returned to production and the completion of preparations in several new wells.

At the meeting Gatrani referred to the speech by NOC chairman Farhat Bengdara at a previous expanded meeting on the NOC's strategic plan to raise production and develop reserves. He pointed to the importance of this plan, which he said requires concerted efforts to achieve it and provide the necessary capabilities that would ensure access to the target smoothly. The most important of these capabilities, he said, is the steady cash flow as well as overcoming and developing all the problems that hinder the productive process.

AGOCO expected to increase most production

Speaking at the meeting, Khalifa Abdul Sadig, NOC board member, said that this meeting is very important and strategic to increase production and develop reserves in AGOCO, which, he said, constitutes the largest percentage of this plan. He said the NOC is counting on AGOCO to increase production, develop reserves, and counting on it for the success of the NOC's increased production plan. He admitted that the challenges are great, but with a strong will and wise management, Libya will be able to achieve the goals and results.

Tags: [AGOCO Arabian Gulf Oil Company](#)

<https://english.news.cn/20230506/ed01bd16a68840d480247956fd691dbe/c.html>

May Day holiday queues reveal China's economic strength

Source: Xinhua Editor: huaxia

2023-05-06 15:54:15

TAIYUAN, May 6 (Xinhua) -- At the entrance of the Taishan scenic area in Taiyuan, the capital of north China's Shanxi Province, visitors formed a long queue that stretched for dozens of meters. Staff members generously provided them with free bottled water and ice pops.

"What they've done was very sweet and lifted our spirits," said a tourist surnamed Li, coming from more than 100 km away.

Almost every major tourist destination was flooded with a sea of faces during the five-day May Day holiday, which concluded on Wednesday. The sweet burden of the influx of tourists is a fraction of the booming Chinese economy on the fast track to recovery.

Chinese people made 274 million domestic trips during the five-day break, soaring 70.83 percent from the same holiday of last year and up about 19 percent from 2019 before the COVID-19 outbreak, the Ministry of Culture and Tourism said.

Tourism revenue reached 148.06 billion yuan (about 21.4 billion U.S. dollars), surging 128.9 percent from last year.

The strong growth can be partly attributed to pent-up travel demand after the pandemic. Many netizens have called the experience of lining up for restaurants, tickets and popular tourist attractions "familiar."

Authorities and business practitioners across China are yearning for tourists to return, and have launched a variety of promotions to woo them and further boost local economic growth.

The Huogongdian scenic area in Changsha, a popular tourist city in central China's Hunan Province, welcomed more than 20,000 visitors daily on average during the holiday.

Pingyao, one of the best-preserved ancient walled cities in China and a UNESCO World Heritage site in Shanxi Province, saw over 230,000 tourist arrivals during the holiday.

The heat wave of the holiday economy has even spread from offline to online. Baidu Maps has introduced the function of a "real-time queuing radar," which allows users to check the traffic flow and parking spaces in real time.

"The app can automatically guide us to a parking lot with more spots available," said Chen Erfeng, a tourist to Pingyao.

Official data shows a total of 12,800 A-level tourist attractions were opened during the May Day holiday, accounting for 86 percent of the total. A total of 31,100 commercial performances were held nationwide, with box office revenue exceeding 1.5 billion yuan during the period.

"It's a much-needed booster for the tourism industry," said Geng Yejiang, a professor at Shanxi University's school of economics and management.

While many prefer trendy cities to visit during the holiday, rural tourism also registered a sharp surge, propelled by China's rural revitalization campaign.

According to data from online travel agency Trip.com Group, the overall order for rural tours on the platform during the May Day holiday more than doubled that in the same period of 2019, and many opted for a longer stay in the countryside.

"The countryside is becoming more and more beautiful. It's wonderful to chill out or camp with several friends in the rural area," said a tourist surnamed Yang from Shanghai. ■

Xi stresses building of modern industrial system and high-quality population development

Source: Xinhua

Editor: huaxia

2023-05-06 21:36:31

BEIJING, May 6 (Xinhua) -- President Xi Jinping, also general secretary of the Communist Party of China (CPC) Central Committee, chairman of the Central Military Commission and director of the Central Commission for Financial and Economic Affairs (CCFEA), presided over the first meeting of the commission under the 20th CPC Central Committee on Friday afternoon. He stressed that the work of the commission should be well carried out and underlined research and efforts on speeding up the building of the country's modern industrial system and advancing Chinese modernization with support from the high-quality development of the population. In his important speech at the meeting, Xi stressed that the newly grouped CCFEA should continue to play its role in formulating major guidelines for economic work and further strengthening and improving the centralized, unified leadership of the CPC Central Committee over economic work. A modern industrial system is the material and technological foundation of a modern country, and the focus of the economic development should be placed on the real economy to provide solid material support for China to realize its Second Centenary Goal, Xi said. Population development is of vital importance to the rejuvenation of the Chinese nation, and efforts must be made to improve the overall population quality so as to support Chinese modernization.

Li Qiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, Chinese premier and deputy director of the CCFEA, Cai Qi, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, a member of the CPC Central Committee Secretariat and a member of the CCFEA, and Ding Xuexiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, Chinese vice premier and a member of the CCFEA, attended the meeting.

At the meeting, reports on accelerating the building of a modern industrial system were heard from the National Development and Reform Commission, the Ministry of Science and Technology, the Ministry of Industry and Information Technology, and the Ministry of Agriculture and Rural Affairs, and so were reports on supporting Chinese modernization with high-quality population development from the National Development and Reform Commission, the National Health Commission, the Ministry of Human Resources and Social Security, and the Ministry of Education.

It was noted at the meeting that economic development is the Party's central work. To strengthen the Party's leadership over economic work is an integral part of strengthening the overall leadership of the Party. The CCFEA bears heavy responsibilities and plays an important role as an important institutional arrangement of the CPC Central Committee to lead economic work. To do a good job, the CCFEA under the 20th CPC Central Committee must fully and faithfully apply the new development philosophy on all fronts, accelerate the creation of a new development pattern and pursue high-quality development. It is imperative to strengthen strategic planning, bolster systems thinking, promote coordinated implementation, and intensify investigations and research to put into good practice the national development strategy in a consistent manner. The meeting examined and approved Work Regulations for the Central Commission for Financial and Economic Affairs and Detailed Regulations for the Office of the Central Commission for Financial and Economic Affairs.

It was stressed at the meeting that to accelerate modernizing the industrial system with the real economy as the pillar concerns whether China can take the strategic initiative when it comes to its future development and global competition. We must grasp the opportunity of the new scientific and technological revolution which involves artificial intelligence among others, adapt to the requirement for harmony between humanity and nature, maintain and strengthen the advantages of a complete industrial system with strong capabilities of coordination, and effectively accumulate innovation factors worldwide, so as to ensure that the industries are smarter, greener and more integrated, and build a more complete, advanced, safe and modernized industrial system. We must maintain the real economy as the mainstay and prevent it from being sidelined, take steady and incremental steps instead of going after what is big and foreign and maintain an integrated development of

primary, secondary and tertiary industries and prevent them from being isolated and opposite to each other. We must also keep promoting the transformation and upgrading of traditional industries rather than eliminating them as "low-end industries," and adhere to openness and cooperation instead of divorcing ourselves from reality.

It was noted at the meeting that industrial policies under the new development stage must be improved, top priority must be given to safeguarding industrial security, top-level design for strategic fields must be enhanced, and industrial policies must be more coordinated. Greater efforts should be made to achieve breakthroughs in core technologies in key areas and strengthen support for strategic resources, and the principal position of enterprises in sci-tech innovation should be ensured with institutional arrangements. Greater attention should be given to enhancing the application of technologies in grain production and breaking through the restrictions of natural conditions such as cultivated land on agricultural production. It is important to make full use of the advantage of the super-sized market, with efforts to integrate the strategies of domestic demand expansion and innovation-driven development, and promote opening up and cooperation of the industrial and supply chains. Vigorous efforts should be made to build world-class enterprises, cherish and care for outstanding entrepreneurs, and train master craftsmen and highly skilled workers.

It was pointed out at the meeting that the current population development in China is characterized by the trend of birthrate decline, population aging, and differentiation in regional population growth, so the new situation of population development in China must be fully understood and correctly viewed. We should focus on the strategic arrangement of building a strong country and achieving national rejuvenation, perfect the strategy for population development in the new era, and understand, adapt to and guide the new normal of population development. Efforts should be made to improve the overall quality of the population, maintain an appropriate birthrate and population size, and speed up the development of modern human resources with good quality, sufficient quantity, optimized structure and reasonable distribution, so that Chinese modernization will be advanced with support from the high-quality development of the population. It is necessary to apply systems thinking in planning the population development, promote high-quality population development through reform and innovation, closely integrate high-quality population development with high quality of life for the people, and promote well-rounded development of individuals and common prosperity for everyone.

The meeting stressed the need to deepen the reform and innovation of education and health services, regard the construction of an education power as a strategic project for high-quality population development, and comprehensively improve the scientific and cultural literacy, health, and intellectual and moral level of the population. It is imperative to introduce and improve policies to support childbirth, develop a childcare service system that can benefit all so as to alleviate the burden of raising children on households, and build a society friendly to childbirth and child care to promote steady population growth in the long run. Efforts should be made to develop and make good use of human resources, stabilize labor participation rate, and bolster the efficient use of human resources. It is important to implement proactive national strategies in response to the population aging, promote the building of a basic system for elderly care services, develop silver economy, and accelerate the building of a multi-layered, multi-pillared elderly care insurance system to make sure that the seniors have a sense of security, worthiness and happiness. The relationship between population and economy and society must be well coordinated, and so must be that between population and resources and environment. Work should be done to improve regional economic layout and territorial spatial system, optimize the population structure, and safeguard the population security to promote the high-quality development of the population.

Members of the CCFEA were present. Leading officials of relevant central Party and government departments attended the meeting. ■

Breaking | China population: 2022 marks first decline in 60 years

- Mainland China's overall population fell to 1.4118 billion last year, as the growth rate hit negative 0.6 per thousand people
- Official results show how China's demographic crisis continues to deepen, while illustrating how widespread shifts to pronatalist policies are not producing the desired results

Luna Sun in Beijing

Published: 10:00am, 17 Jan, 2023

[Why you can trust SCMP](#)

2022 officially marked the year China saw its first population decline in six decades, with the national birth rate falling to a record low. And the deepening demographic crisis threatens far-reaching implications for China's already slowing economic growth.

China's overall population plummeted by 850,000 people – to 1.4118 billion in 2022, from 1.4126 billion a year earlier, the National Bureau of Statistics (NBS) said.

Mothers in China had 9.56 million babies last year, a 9.98 per cent drop from 10.62 million in 2021.

The national birth rate fell to a record low of 6.77 births for every 1,000 people in 2022, down from 7.52 in 2021, and marking the lowest rate since records began in 1949.

The national death rate was 7.37 per thousand last year, putting the national growth rate at negative 0.6 per thousand people.

China's population includes 31 provinces, autonomous regions and municipalities, as well as servicemen, but excludes foreigners. It does not include Hong Kong, Macau or Taiwan.

High child-rearing costs, the new generation's shifting ideologies on family and marriages, as well as the slowing economic growth amid China's draconian coronavirus policies, were all blamed for catalysing the population decline.

Population growth had been slowing since 2016, and although Beijing has resolved to reverse the trend and boost childbirths with a raft of pronatalist policy support measures, both at central and local levels, they largely failed to make a significant difference in raising people's willingness to start families and give birth, with China's population eventually coming to a decline last year.

In 2021, China eased birth restrictions to allow couples to have three children, entitling them to childcare and other benefits. And having more babies was not to be effectively punished.

As world population hits 8 billion, China frets over too few babies

Policies also shifted to pronatalism. Local governments responded by launching a variety of measures to boost birth rates, including doling out cash awards, offering housing and education discounts, giving more parental days off, better social security benefits, and other perks.

Shenzhen is among the latest cities to incentivise childbirth via cash handouts. Couples having one to three children in the city will be eligible for subsidies totalling as much as 19,000 yuan (US\$2,800). But how effective these measures will be remains unclear, and maternity surveys across the country have shown that incentives remain insufficient, and that most couples are simply unwilling to have a third child.

With China's population decline, India is projected to overtake China as the world's most populous country this year, according to the United Nations.

The UN also expects China's population to drop to 1.313 billion by 2050 and fall below 800 million by 2100.

The demographic crisis arising from so few newborns, coupled with a rapidly ageing population, will undoubtedly have wide-ranging economic implications.

More to follow...



Caixin China General Manufacturing PMI™

Business conditions moderate slightly in April

Latest PMI data pointed to a marginal deterioration in overall business conditions across China's manufacturing sector during April. Firms signalled only a fractional rise in output amid a renewed drop in overall new business. Subdued demand conditions contributed to a further fall in overall employment in the sector, but helped to ease supply chain pressures, with lead times for inputs improving slightly. At the same time, average input costs declined at the quickest rate since January 2016, supporting a steeper reduction in selling prices as firms looked to attract new business.

When assessing the 12-month outlook for output, firms were hopeful that customer demand will pick up and drive production volumes higher. Notably, the degree of optimism was the second-strongest in two years.

The headline seasonally adjusted *Purchasing Managers' Index™ (PMI™)* – a composite indicator designed to provide a single-figure snapshot of operating conditions in the manufacturing economy – slipped from the neutral level of 50.0 in March to 49.5 in April. This signalled the first deterioration in the health of the manufacturing sector for three months, albeit one that was marginal overall.

Softer demand conditions were a key factor weighing on the performance of the sector, with total new orders falling slightly for the first time in three months. A number of firms indicated that sluggish market conditions and weaker-than-expected customer spending had dampened sales. Underlying data indicated that the fall was largely driven by softer domestic demand, as new export work was broadly stable.

Production growth meanwhile slowed for the second straight month in April, with output rising fractionally overall. Firms that recorded higher output often linked this to the return to more normal business operations.

In line with the trend seen for output, purchasing activity increased at the softest rate for three months in the latest survey period. Inventories of both pre- and post-production items were meanwhile little-changed compared to the previous month. A number of firms expressed a reluctance to stock build due to the softer demand environment.

Suppliers' delivery times improved for the third time in as many months in April. Companies often noted that vendors were less busy or that they had requested quicker lead times. That said, the rate at which delivery times shortened was only marginal.

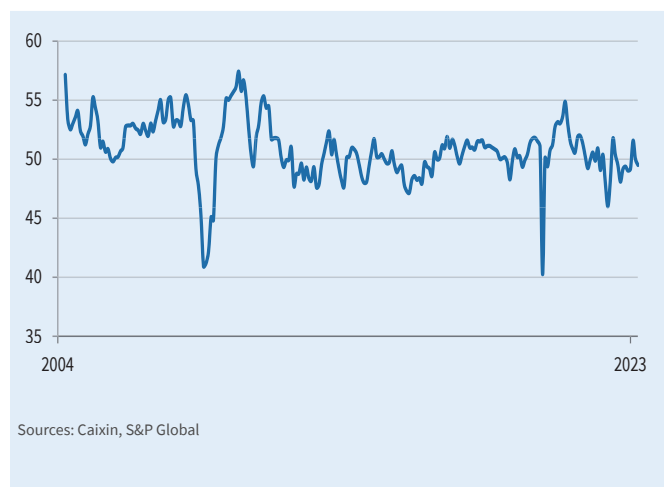
Muted client demand led firms to cut their staffing levels again in April, and at the quickest pace in three months. This was often through the non-replacement of voluntary leavers, though there were also reports of firms trimming headcounts to cut costs. Backlogs of work meanwhile expanded for the fourth month in a row, albeit at a modest pace.

Manufacturers registered the first fall in average input costs for seven months in April, with the rate of decline the quickest recorded since the start of 2016. Lower prices for some raw materials and fuel were linked to the renewed drop in expenses. Cost savings were often passed on to customers in the form of lower selling prices, which were cut at the fastest rate since December 2015, as firms sought to attract new business.

Optimism towards the 12-month outlook for output improved, as firms were hopeful that customer spending would pick up in the months ahead. New product releases, supportive state policies and investment in new equipment were also expected to drive growth.

China General Manufacturing PMI

sa, >50 = improvement since previous month



Sources: Caixin, S&P Global

Key findings:

Output expands only fractionally...

...as demand conditions soften

Input costs and selling prices fall at quickest rates in over seven years

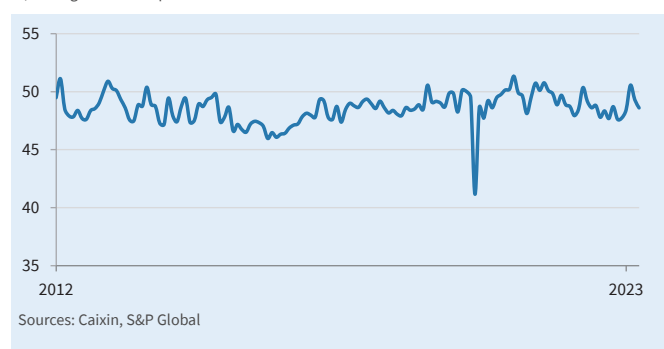
New Export Orders Index

sa, >50 = growth since previous month



Employment Index

sa, >50 = growth since previous month



Commenting on the China General Manufacturing PMI™ data, Dr. Wang Zhe, Senior Economist at Caixin Insight Group said:

“The Caixin China General Manufacturing PMI in April dropped 0.5 points from the previous month to 49.5, slipping into contractionary territory for the first time in three months. This suggests that China’s economic recovery significantly slowed after Covid-19 infections peaked at the start of this year, given that the index stood at 51.6 and 50 in February and March, respectively.

“Manufacturing supply ticked up marginally, but demand contracted. While the economy continued to recover in the post-Covid era, the rebound was weaker than expected, with the subindex for output standing only slightly above 50. The recovery in demand was even worse. Domestic demand became a main drag, as the subindex for total new orders fell back into contraction. The gauge for new export orders remained stable as more Covid restrictions were lifted, but external demand remained limited.

“Employment in the sector deteriorated further. The subindex for employment only climbed above 50 once in February 2023 since March 2022. In April, the job market contracted for the second straight month and at a sharper pace. As market demand remained subdued, businesses trying to slash costs were reluctant to hire more workers, with some even announcing layoffs. Meanwhile, backlogs of work grew marginally, with the corresponding measure staying in expansionary territory for the fourth consecutive month.

“Prices plunged with the gauges for input and output prices both dropping well below 50 in April, logging new lows since January 2016 and December 2015, respectively. Input prices were dragged by falling energy and raw material costs, while fees charged to customers were weighed down by sluggish demand. In April, the gauge for output prices stumbled below 50 for the 11th time in the past 12 months.

“Suppliers’ delivery times continued to shorten. In February and March, delivery times accelerated mainly due to eased Covid restrictions. However,

logistics volume fell in April, which boosted the speed of deliveries, with the subindex for suppliers’ delivery times continuing to stand above 50. In addition, manufacturers’ willingness to replenish inventories remained subdued, with stocks of raw materials and finished products staying largely stable.

“Manufacturers remained highly optimistic, with the reading for their expectations for future output in April significantly higher than the long-term average, as they expressed strong confidence in market demand recovery and the implementation of relevant supportive policies.

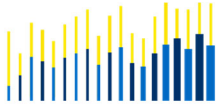
“In a nutshell, manufacturing activity weakened in April. Manufacturing supply saw a marginal slowdown of expansion, demand dipped month-on-month, the labor market worsened further, logistics was relatively smooth, inventories remained stable, and prices plunged. Despite all these factors, businesses maintained high confidence in the economic outlook.

“A recent slew of official first-quarter economic data beat market expectations, suggesting that China’s economy was recovering at a fast pace after the country lifted Covid controls. Yet it remains to be seen if the rebound is sustainable after a short-term release of pent-up demand. The Caixin China manufacturing PMI in April, in particular, pointed to the fact that the economic recovery has yet to find a stable footing. Employment is also a prominent issue faced by the current economy, especially for young people. Recently, deflation has become a hot topic in the market. The rapid decline in the gauges for input and output prices should draw enough attention. In the future, relevant policies should focus on expanding domestic demand, stabilizing employment and improving expectations, as well as improving the monetary transmission mechanism and creating a virtuous circle of economic development.”

RBC Capital Markets thanks you for consideration of Michael Tran (Thematic Research) in the 2023 Institutional Investor All-America Research Poll.



DIGITAL INTELLIGENCE STRATEGY | RESEARCH



RBC Elements™

Driving insights through data

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Digital Intelligence Strategy: RBC Connected Vehicle x Gas Station Visits Tracker

Quantifying Societal Behavior at the Pump

May 4, 2023

RBC Capital Markets, LLC

Michael Tran (Commodity and Digital Intelligence Strategist) (212) 266-4020; michael.tran@rbccm.com



Our Thesis: We are adding to our suite of real time mobility indicators by launching a geospatial intelligence led interactive web app that tracks daily visits across US gas stations ([link](#)*). Our nowcasting platform provides read-throughs for the oil market, as well as for CPG companies in the c-store channel. Our mosaic of leading indicators (incl the [GOAT index](#)) currently suggest a weaker than consensus outlook for the

upcoming summer driving season, gasoline demand wise. That said, our views evolve alongside our data. Our app updates every Wednesday morning.

- Tracking real-time visits to US gas stations helps us nowcast US gasoline demand, as well as providing important read-throughs for CPG companies in the c-store channel. In partnership with **RBC Elements™**, our in-house data science team (special thanks to David Jiang-Gorsline), we utilize connected vehicle data to track refueling at more than 135k individual gas stations across the US (our sample comprises over 90% of total fueling stations and roughly a fifth of vehicles on the road). We geo-fence each station and overlay **IoT data** to monitor the daily flow of connected vehicles through each gas station. Further, we superimpose **census data** across each of the gas stations to delineate the location and the corresponding income bracket for which each of the 135,000 gas stations reside. In doing so, we can monitor how re-fueling habits differ across various income brackets in real time.
- Naturally, a strong correlation exists between our visits data and weekly **implied demand** for gasoline published by the EIA. This should surprise no one. We calculate the raw (notional) correlation to be approximately 70% and the correlation in week-over-week percentage changes to be approximately 40%.
- Nowcasting is the fundamental backbone of what our Digital Intelligence Strategy platform stands for, and as such, we have launched an **interactive web application** for users, like yourself, to navigate PADD by PADD and state by state refueling trends, in real time. Our site, which updates with weekly data every Wednesday morning, should provide meaningful read-throughs from gasoline demand to the consumer's propensity to travel, to convenience store traffic to the impact of energy inflation. The link to the site can be found, [here*](#). Please bookmark and check **back every Wednesday morning for updates**.
- **Households located in the most affluent census blocks, particularly those based in areas with an annual median household income greater than \$225,000 are seeing visits to the pump down more than 14% vs pre-COVID. For census blocks with annual household incomes below \$200,000, visits to gas stations trend 'only' -1.2% below pre-COVID levels. The figures are even more telling in regions with incomes below \$100,000, where there is minimal distinguishable (-0.8%) change to current levels relative to pre-COVID. More affluent cohorts likely have higher EV adoption rates and an increased ability to work from home which contribute to the drop off in gas station visits among this cohort (see Page 4).**
- Income levels and work from home tell part of the story, but not the entire story. **Geography matters!** The US West Coast, naturally, has seen the sharpest tapering of gas station visits of all the US regions. Visits to the pump so far this year are off by 8.6% vs 2019 year-to-date metric. This comes as no surprise given that the West Coast has among the highest EV penetration rates in the country and the tech industry has long-led the work from home movement. Tech layoffs and steep gasoline taxes also contribute to this phenomenon.
- Consumers are allocating a historically small amount of their wallet to gasoline, which has enabled consumers to better-absorb changes in gasoline prices. Currently, gasoline spend as a percentage of overall **personal consumption expenditures** (PCE) sits at 2.4%. This figure clocked in at 3.3% when pump prices hit records last June. Since 2010, gasoline spend as a percentage of PCE averaged 2.8%. While there was plenty of wallet pinching when prices punched in at records last year, we do not expect prices to impede demand this summer.
- Most importantly, see pages 9-11 for insight from our **equity research colleagues**: Irene Nattel (C-stores), Nik Modi (Consumer Staples) and TJ Schulz (Refining).

* If error is encountered uploading website, please refresh page. Website is best viewed in Chrome.

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Headlines

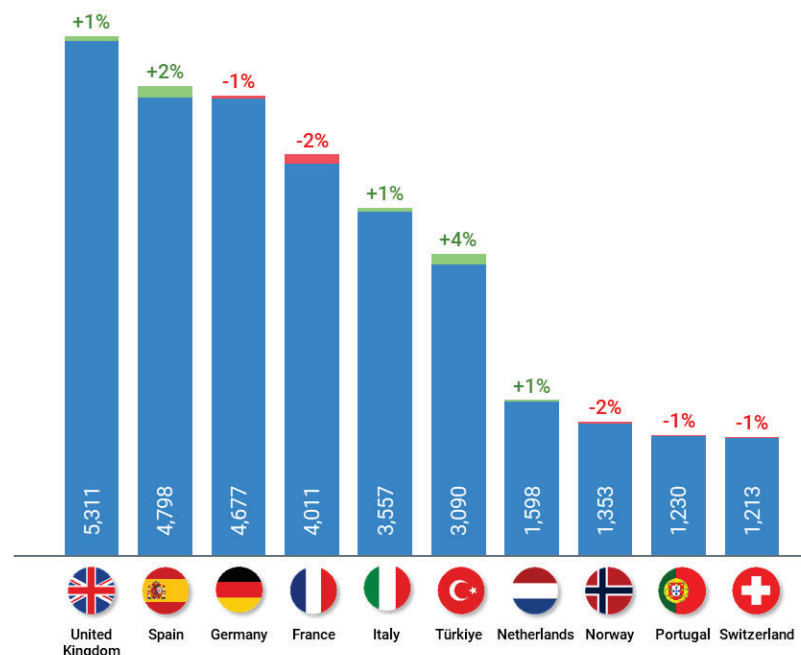
(Week 26 Apr - 02 May 2023)

- The Network recorded 28,204 average daily flights (+7% vs 2022), increasing (+1%) vs the previous week and standing at 92% of 2019 levels.
- Commercial airlines have now deployed their summer capacities (e.g. easyJet, British Airways, Vueling, Ryanair and Wizz Air), hence little change compared to the previous week.
- In April, the number of flights in the Network was 90% of the 2019 levels, matching the base scenario of the flight forecast released in December 2022.
- On the first two days of May, network traffic was affected by industrial action in France, the continuation of a series of strikes which started earlier this year (reform of pension law).
- For this reason, France accounted for 58% of all en-route ATFM delays last week.
- Arrival and Departure punctuality continue to be affected by the long-term French industrial action. They are around 6 percentage points below 2019.
- The Jet fuel price closed at 2.25 USD/gallon on 28 April, decreasing (-9%) on last edition. Current prices have decreased by 21% compared to the ones at the beginning of the year.

Top 10 Busiest States

On week 26 Apr - 02 May 2023

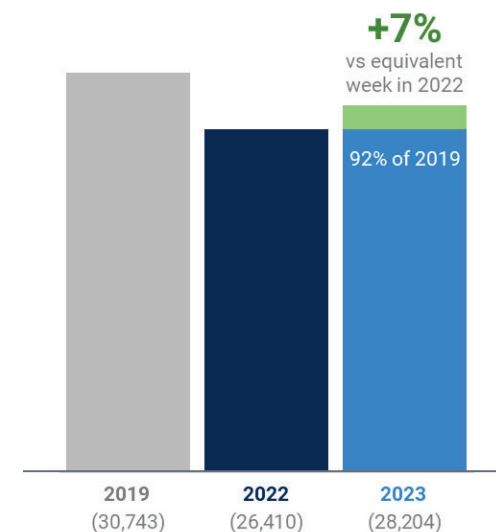
(all flights incl. overflights compared with previous week)



Traffic Situation

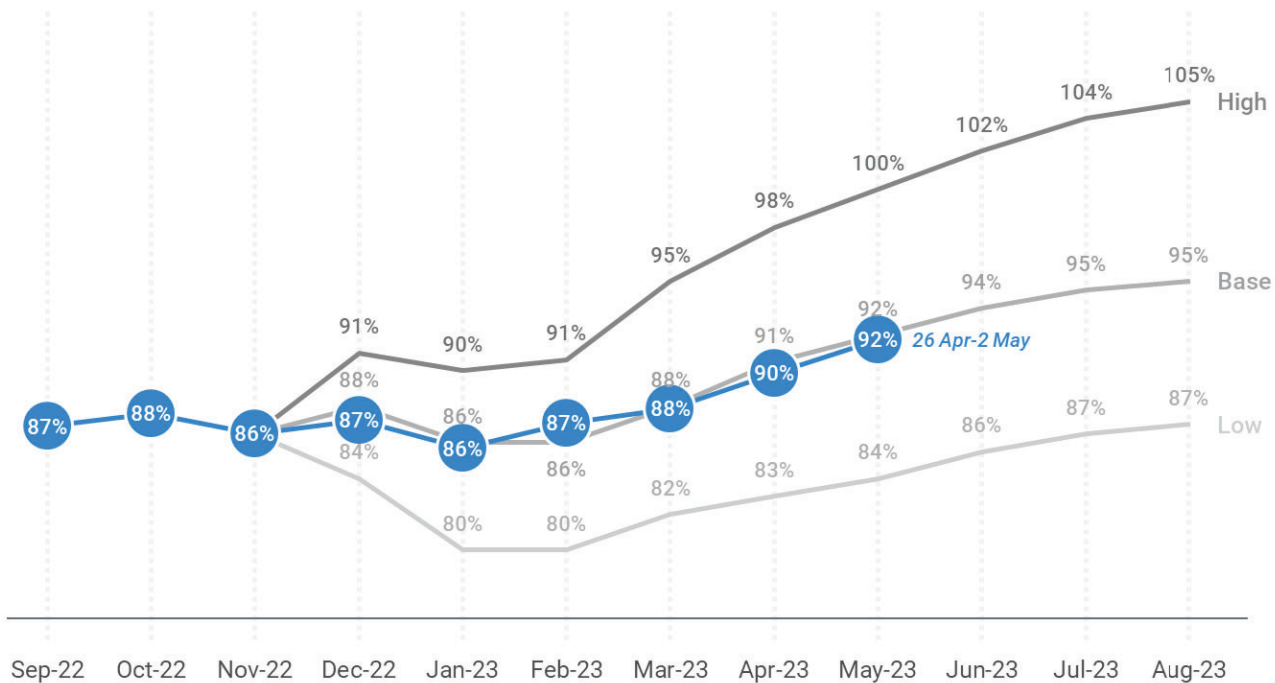
Average daily flights (including overflights)

Week 26 Apr - 02 May 2023



Overall Situation Compared to the EUROCONTROL Traffic Scenarios

(base year 2019)



Publication date: December 2022



- ➔ The latest EUROCONTROL Traffic scenarios were published on 16 December 2022.
- ➔ Since that date, network traffic has evolved around the base scenario.
- ➔ Flights in April 2023 closed at 90% of April 2019 levels in line with our base scenario (91%).
- ➔ It is too soon to derive a preliminary value for May 2023, hence the average figure over the week 26 Apr – 02 May, standing at 92% of 2019 corresponding week, is shown on the graph.
- ➔ On a year-to-date basis, network traffic is at 87% of 2019 and +18% vs 2022.

Top 10 Countries

Dep/Arr to the equivalent week in 2019

Week 26 Apr - 02 May 2023

No.	Country	Average daily flights	% prev week	% prev year	% 2019
1.	United Kingdom	5,311	+1%	S +6%	W -10%
2.	Spain	4,798	+2%	S +7%	W -0%
3.	Germany	4,677	-1%	W -0%	W -19%
4.	France	4,011	-2%	S +1%	W -12%
5.	Italy	3,557	+1%	S +7%	W -2%
6.	Türkiye	3,090	+4%	S +19%	S +8%
7.	Netherlands	1,598	+1%	S +0%	W -10%
8.	Norway	1,353	-2%	W -2%	S +7%
9.	Portugal	1,230	-1%	S +8%	S +4%
10.	Switzerland	1,213	-1%	S +7%	W -7%



✈ The top 10 States recorded similar traffic levels (+0.6%) on the previous week. No change in the ranking compared to the previous edition.

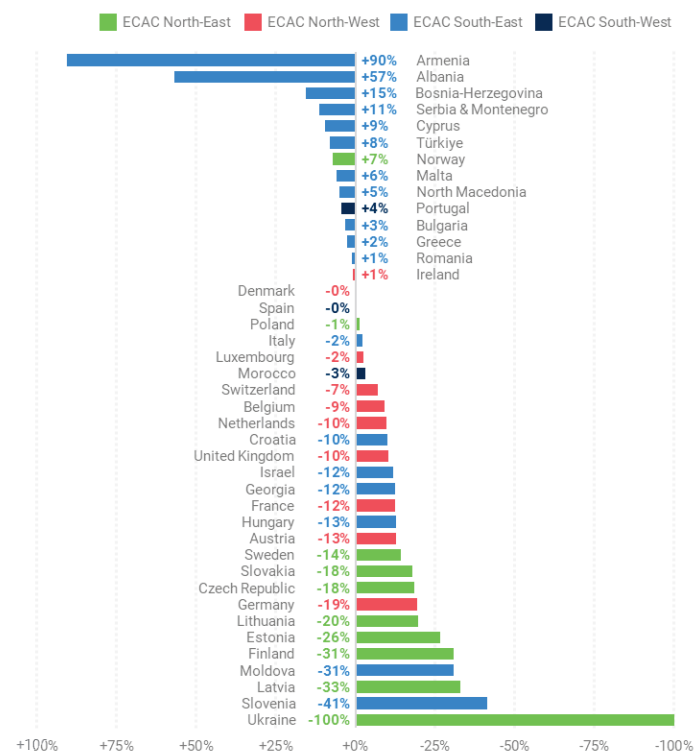
✈ Türkiye recorded a growth rate of 4%, owing to increases from Russian operators (Aeroflot, Red Wings) as well as charter airlines (Enter Air). Spain posted a 2% increase due to light aircraft operators and increased regional operations with Canary Islands.

✈ Only three States have now recorded growth above 2019 (Türkiye, Norway and Portugal). Spain and Italy are relatively close to the pre-COVID levels. All other States are still between 19% and 10% below 2019 levels.

States in the EUROCONTROL Network

Compared to the equivalent week in 2019

Dep/Arr flights for week 26 Apr - 02 May 2023



Top 10 Aircraft Operators

Week 26 Apr - 02 May 2023 (avg daily flights)

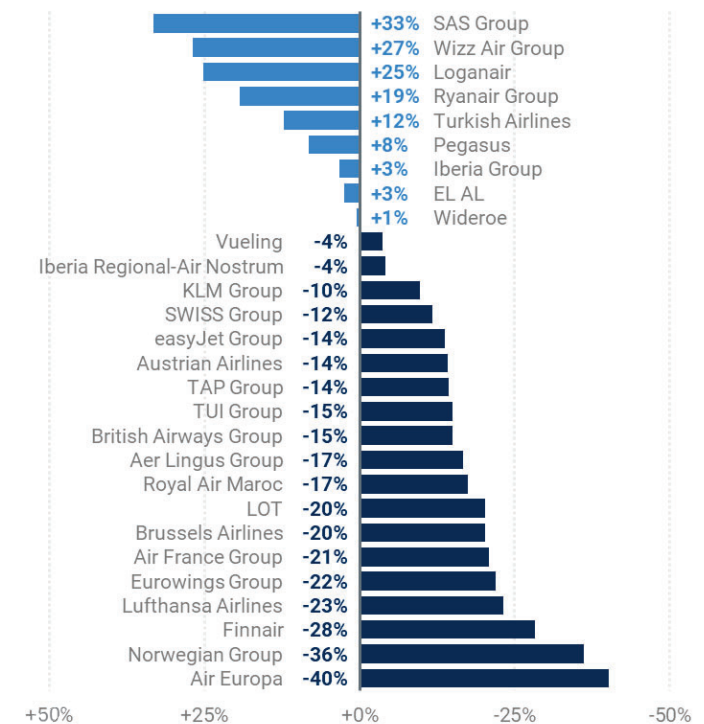
No.	Aircraft operator	Average daily flights	% prev week	% prev year	% 2019
1.	Ryanair Group	3,014	+1%	S +7%	S +19%
2.	easyJet Group	1,561	+0%	S +2%	W -14%
3.	Turkish Airlines	1,521	-1%	S +17%	S +12%
4.	Lufthansa Airlines	1,177	+1%	W -1%	W -23%
5.	Air France Group	1,012	-3%	W -1%	W -21%
6.	KLM Group	837	+3%	S +5%	W -10%
7.	British Airways Group	802	-0%	S +18%	W -15%
8.	Wizz Air Group	796	-1%	S +10%	S +27%
9.	SAS Group	643	-2%	S +8%	S +33%
10.	Vueling	622	+0%	S +6%	W -4%



- The top 10 aircraft operators recorded the same number of flights on the previous week, ranging from -3% (Air France) to +3% (KLM).
- Last week, five airlines had a stable number of operations compared to the week before (easyJet, British Airways and Vueling as well as Ryanair and Wizz Air, to a certain extent).
- KLM posted a 3% growth on the week before as the operator added flights on the flows Netherlands ↔ Germany and Netherlands ↔ Greece. Turkish Airlines has reduced its flights on some domestic routes (Istanbul to Adana, Diyarbakir) as well as its flights with Saudi Arabia (Istanbul to Jeddah)
- Four airlines within the top 10 surpassed their 2019 flight levels: SAS (+33%), Wizz Air (+27%), Ryanair (+19%) and Turkish Airlines (+12%).

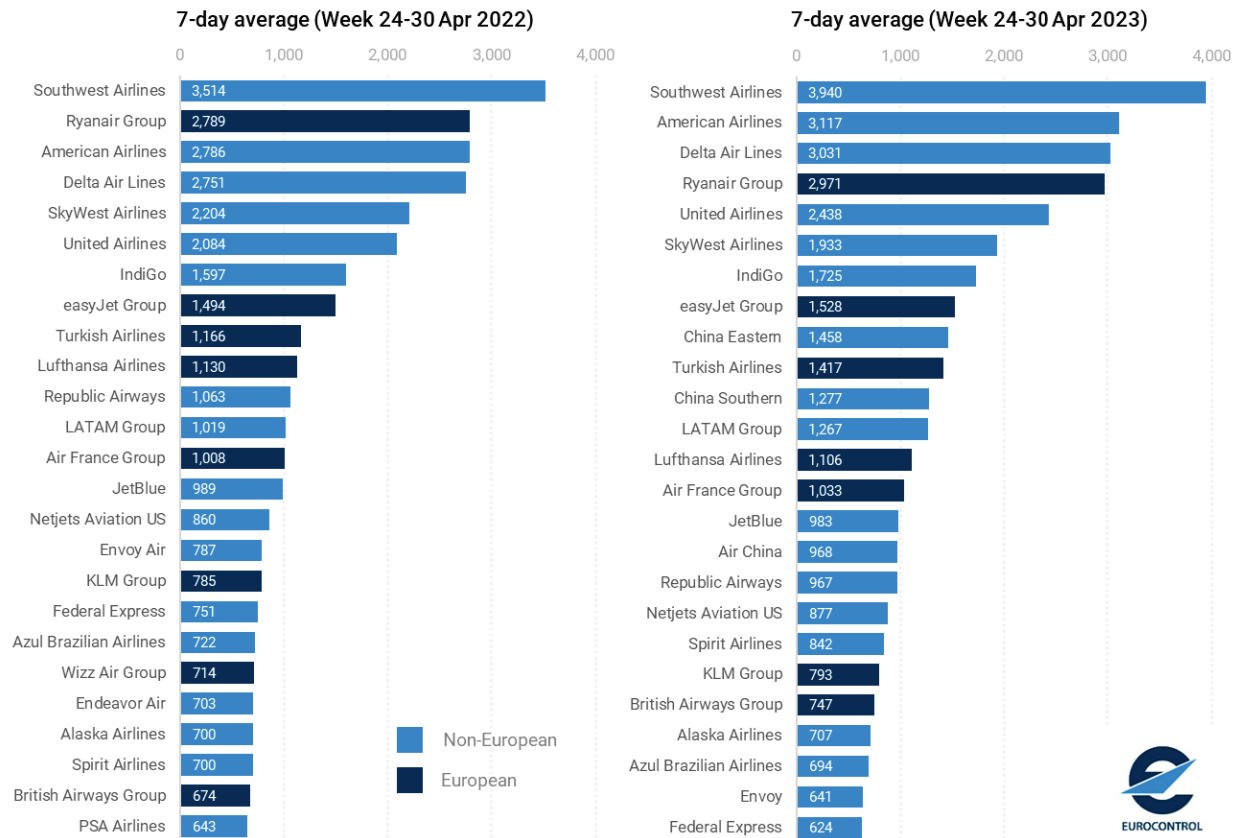
Aircraft Operators in the EUROCONTROL Network

Compared to the equivalent week in 2019
Dep/Arr flights for week 26 Apr - 02 May 2023



Top 25 Global Aircraft Operators

(average daily departure flights)



Over the last week:

- ➔ Seven European airlines are ranked in the Top 25 global aircraft operators (one missing compared to 2022).
- ➔ The first European aircraft operator (4th) is Ryanair (down one place compared to two weeks ago).
- ➔ The other European airlines in the Top 10 are easyJet (8th) and Turkish Airlines (10th).
- ➔ The top 15 is complemented by Lufthansa (13th) and Air France (14th).
- ➔ KLM and British Airways are ranked 20th and 21st.
- ➔ Wizz Air is the only European airline that has slipped out of the top 25 since 2022.

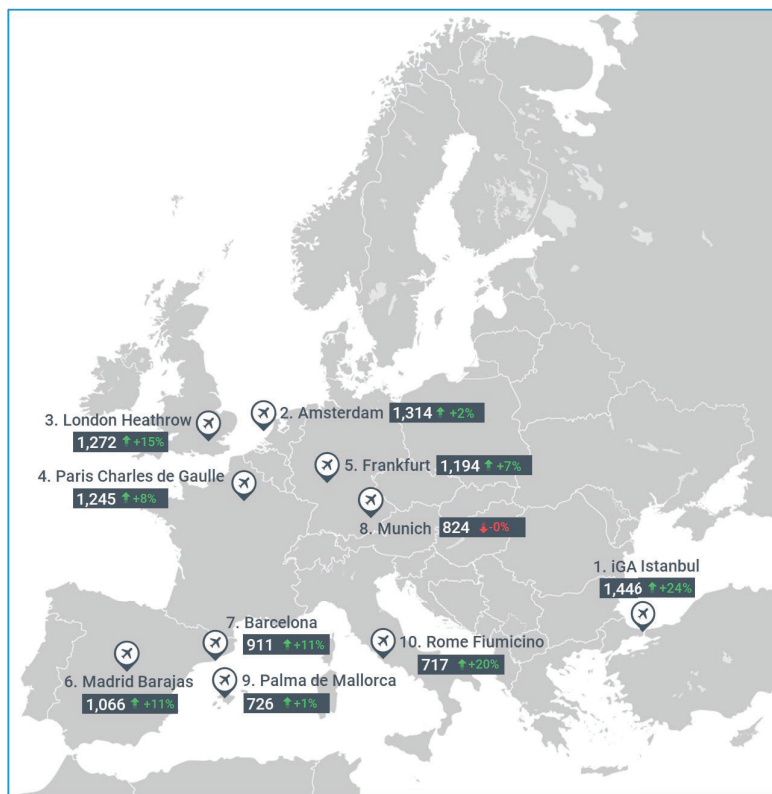


Top 10 Airports

Airport Ranking

Week 26 Apr - 02 May 2023 (vs 2019)

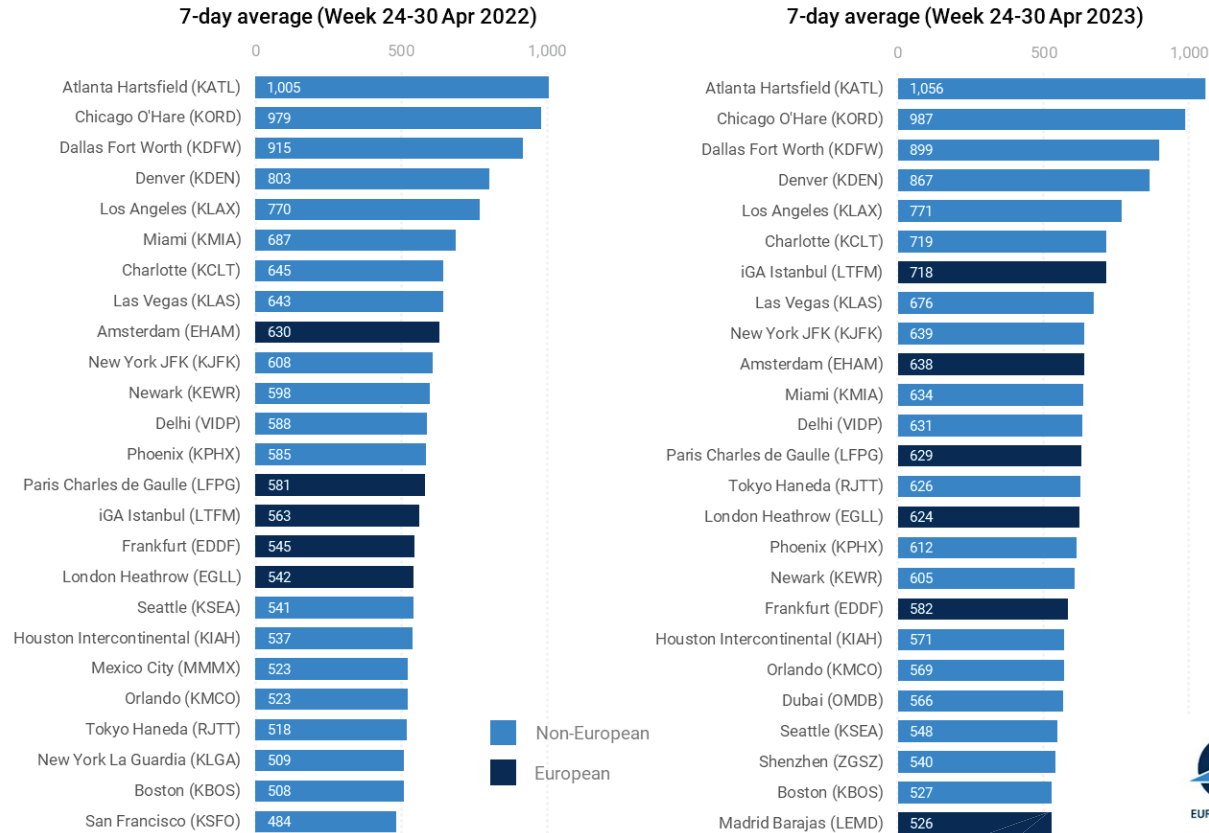
No.	Airport	Avg. daily dep/arr flights	vs 2022	vs 2019
1.	iGA Istanbul	1,446	S +24%	S +21%
2.	Amsterdam	1,314	S +2%	W -10%
3.	London Heathrow	1,272	S +15%	W -5%
4.	Paris Charles de Gaulle	1,245	S +8%	W -13%
5.	Frankfurt	1,194	S +7%	W -18%
6.	Madrid Barajas	1,066	S +11%	W -10%
7.	Barcelona	911	S +11%	W -9%
8.	Munich	824	W -0%	W -26%
9.	Palma de Mallorca	726	S +1%	S +7%
10.	Rome Fiumicino	717	S +20%	W -17%



- ➔ Some changes in the ranking compared to the previous edition: swap between Paris CDG and London Heathrow. Palma de Mallorca entered the Top 10. And London Gatwick exited.
- ➔ Almost all airports experienced sustained growth on 2022; ranging from 1% (Palma de Mallorca) to 24% (iGA Istanbul).
- ➔ iGA Istanbul and Palma de Mallorca are the two airports in 2023 amongst the top 10 surpassing their 2019 levels.

Top 25 Global Airport Departures

(average daily departure flights)



Over the last week:

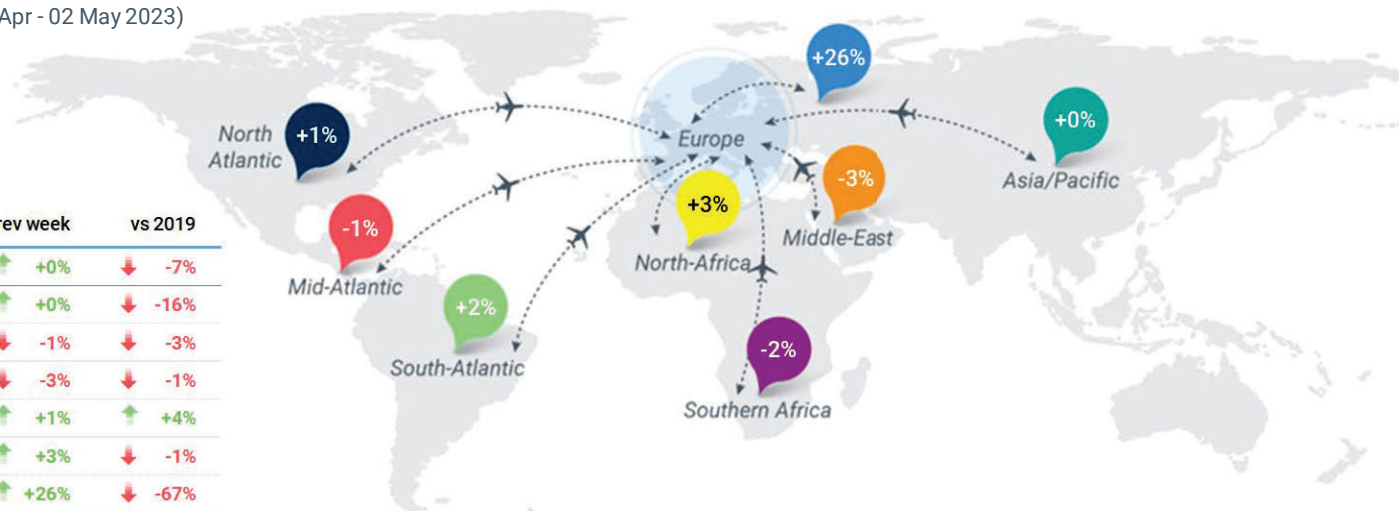
- ➔ Six European airports are ranked in the Top 25 of global airport departures (one more than in 2022).
- ➔ The first European airport (7th) is iGA Istanbul.
- ➔ The other European airports in the Top 25 are Amsterdam (10th), CDG (13th), Heathrow (15th), Frankfurt (18th) and Madrid (25th).
- ➔ Last year, at the same period, Madrid was not part of the Top 25.



Traffic Flows

(average daily departure/arrival flights for week 26 Apr - 02 May 2023)

Region	Average daily flights	vs prev week	vs 2019
Intra-Europe	22,057	↑ +0%	↓ -7%
Europe ↔ Asia/Pacific	669	↑ +0%	↓ -16%
Europe ↔ Mid-Atlantic	169	↓ -1%	↓ -3%
Europe ↔ Middle-East	1,386	↓ -3%	↓ -1%
Europe ↔ North Atlantic	1,192	↑ +1%	↑ +4%
Europe ↔ North-Africa	1,103	↑ +3%	↓ -1%
Europe ↔ Other Europe	363	↑ +26%	↓ -67%
Europe ↔ South-Atlantic	167	↑ +2%	↓ -6%
Europe ↔ Southern Africa	289	↓ -2%	↓ -4%
Non Intra-Europe	5,339	↑ +1%	↓ -14%



- ✈ The main traffic flow was intra-European with 22,057 daily flights last week, in line with the previous week. Inter-Continental flows recorded 5,339 daily flights on average last week, +1% vs the previous week.
- ✈ The second regional flow is between Europe and the Middle-East with 1,386 average daily flights last week, showing a decrease of 3% vs the previous week.
- ✈ The third flow is with North America with 1,192 daily flights, stable (+1%) on the previous week.
- ✈ Flows with Other Europe (incl. Russian Federation) are still lagging behind and were at -67% compared to 2019.
- ✈ Flows between Europe and Asia/Pacific are still lagging behind, to a lesser extent, at -16% compared to 2019. European flows with China (incl. Hong-Kong) recorded 172 daily flights on average over 23-29 April 2023.
- ✈ Sudan's civil aviation authority has suspended air navigation services within the Khartoum FIR.

Top 10 Long Haul Country-Pairs

(average daily departure/arrival flights for the last week)

Week 26 Apr - 02 May 2023

No.	Country pair	Average daily flights	% prev week	% prev year		% 2019	
1.	UK ↔ US	305	-1%	↑	+23%	↓	-1%
2.	Germany ↔ US	161	+3%	↑	+5%	↑	+6%
3.	France ↔ US	108	-4%	↑	+6%	↓	-4%
4.	Netherlands ↔ US	77	-2%	↑	+15%	↓	-6%
5.	Ireland ↔ US	64	+2%	↑	+18%	↑	+4%
6.	Italy ↔ US	63	+0%	↑	+30%	↑	+7%
7.	Spain ↔ US	62	+2%	↑	+12%	↑	+2%
8.	UAE ↔ UK	55	+2%	↑	+25%	↑	+14%
9.	Russia ↔ UAE	41	-6%	↑	+107%	↑	+1681%
10.	Switzerland ↔ US	39	+1%	↑	+28%	↑	+15%



- ➔ No change in the ranking over the previous week for the top 10 Long-haul Country-Pairs, except for Spain ↔ US and Italy ↔ US swapping ranks and Switzerland ↔ US which entered the top 10.
- ➔ Half of the flows posted an increase on previous week (ranging from 0% to 3%).
- ➔ Eight of the top 10 Long Haul Country-Pairs are with the US, the main three being between US and UK, Germany and France.
- ➔ All flows posted an increase on 2022 (same week).
- ➔ All but three flows are now above 2019 levels.
- ➔ To be noted: the increase in the number of flights in 2023 on the flow Russia ↔ UAE vs 2022 and 2019.

<https://www.albertandp.ca/ndp-wont-raise-taxes>

Commitment

1 min read

Rachel Notley won't raise your personal income taxes

Keeping life more affordable for Albertans...

Albertans are struggling to pay the bills as they face the worst affordability crisis in 40 years.

At the same time, wages have failed to keep pace with inflation. In fact, Albertans have lost the most purchasing power in the country with a recent report concluding that the Alberta Advantage is “melting away” under the UCP.

As a result, Albertans are falling further behind.

Rather than helping, the UCP has made a bad situation worse by increasing fees, tuition, auto insurance, and utilities.

On top of this, they increased personal income taxes by hundreds of millions of dollars.

An NDP government will not raise personal income taxes. This will allow Albertans to keep more money in their pocket and cover the bills.

We commit to NO personal income tax increases.

<https://www.unitedconservative.ca/annoucement/tax-cuts-for-all-albertans/>

Tax Cuts for all Albertans

The United Conservative Party is committed to making life more affordable by **cutting taxes for all Albertans** starting with personal income taxes.

A re-elected UCP government will create a new 8% bracket on income under \$60,000. This means every Alberta earning \$60,000 or more will save \$760 – that’s over \$1,500 per family! Albertans earning less than \$60,000 will see a full 20% reduction to their provincial tax bill under this tax cut.

These tax cuts will provide meaningful, timely tax relief to Albertans at a time when they need it most.

“This tax cut will result in real and significant savings that can be put towards housing, life’s other necessities, planning for the future, or whatever else is a priority for Albertans. After all, it’s your money. You earned it, not the government,” said UCP Leader Danielle Smith.

The new tax cut for all Albertans is just the beginning.

A re-elected UCP government will also extend the Fuel Tax Holiday until December 31, 2023, saving Albertans 13 cents per a litre at the pump. This is a savings of around \$10, on average, every time you fill up your vehicle, and will assist Albertans to offset the Notley-Trudeau carbon tax that makes everything Albertans need to live more expensive.

United Conservatives will also continue to index all tax brackets to keep up with inflation, a move that will further assist us to better shield Albertans from the costs of the federal NDP-Liberal coalition's irresponsible spending, spiralling debt and carbon tax.

A memo from the Parliamentary Budget Officer shows the average Alberta family will pay \$710 out of pocket on the federal carbon tax this year, that's after their so-called rebates. By 2030, the NDP-Liberal alliance will be picking an additional \$2,000 a year out of the pockets of Albertans with their carbon tax!

United Conservatives will not stand for this. A UCP government will work to axe the carbon tax altogether because the best way governments can help address affordability is by ensuring you, the taxpayer, keep more money in your pocket.

This commitment to lowering taxes builds on our No Take Hike Guarantee, the UCP's pledge to not increase personal or business taxes. We will formalize this guarantee in government by expanding the Taxpayer Protection Act to ensure no future government can increase personal or business taxes without first getting approval from Albertans in a referendum.

In comparison, when the NDP were in office, they hiked taxes and fees 97 times and raised the business tax by 20%, causing businesses and people to leave in droves. The NDP's high taxes resulted in a record 13 consecutive quarters of people leaving Alberta for other provinces, while businesses closed their doors, industries were forced to lay off workers and investment dried up.

“The choice this election couldn't be clearer. It's a choice between a UCP government that will cut your taxes and make life more affordable and an NDP government that will make you pay more across the board, from taxes, to fuel, to groceries, and beyond,” said Smith. “It's a choice between moving Alberta forward and building a brighter future or returning to the NDP's costly and failed policies. We can't afford to go back.”

Since taking office, United Conservatives have restored Alberta's tax advantage, meaning Albertans are paying \$20 billion less in taxes than the next lowest taxed province.

We've also seen record investments and greater economic diversification after cutting Notley's high corporate tax rate of 12% down to 8%. That tax cut generated a record \$6.4 billion in corporate tax revenue that helps to pay for high-quality healthcare, schools, and supports to help Albertans manage inflation.

We need to continue growing the Alberta Advantage so our province remains the best place in the world to raise a family and build a business. That means having a responsible plan for spending, growth, and stability that keeps taxes low and the cost of living affordable.

Together, we will build a stronger, more resilient and more prosperous Alberta today and for our future generations.

Read the full news release [here](#).

Women are more skeptical of electric cars than men — and won't accept less than a 350-mile range

Early EV adopters want the newest tech in an electric car. That's not so true for the next waves of buyers. Getty Images

- Men make up most early adopters of electric cars, while women account for most EV skeptics.
- Higher-income consumers are more likely to adopt or consider going electric.
- Those skeptical about EVs aren't willing to accept a range lower than 353 miles.

policy.

If automakers want to make their multi-billion-dollar electric car ambitions happen, they need to know who their target customers are and what buyers are looking for in an EV.

Notably, well-off millennial men have largely been leading the charge on EV purchases.

But on a more granular level, US consumers fall into three camps as it relates to electric cars, according to consultancy Berylls and data from market researcher Ipsos: Early adopters, considerers, and skeptics.

Here is who they are and what they're looking for.

Early adopters

Socio-demographics	Details
Mean age	42 years
Gender	31% female
Have children	69%
Mean income	\$112,690
Live in major cities	64%
Minimum accepted range	247 miles

Source: Ipsos 2022 Mobility Navigator Module 1, Berylls

"On the early adopter side, we're looking at a much younger and male-focused population versus the EV skeptics that are a little bit older, tend to skew more towards female," Cameron Gormley, senior consultant at Berylls, told Insider. These buyers are also generally less financially-motivated. The adopters' top three prioritized vehicle features include addressing concerns about CO2 emissions and air pollution, vehicles that are unique, and a vehicle that keeps its value. They're also the most flexible of buyers regarding the range they're looking for in an EV.

"This customer group is more so interested in a futuristic looking vehicle, something that's unique that might separate from them from the crowd, that might have all the digital system features," Gormley said.

Buyers considering EVs

Socio-demographics	Details
Mean age	45 years
Gender	47% female
Have children	68%
Mean income	\$106,910
Live in major cities	49%
Minimum accepted range	244 miles

The considerers' top features include the best of both worlds, and consider both cost and lifestyle factors: They want a vehicle that keeps its value, a vehicle with good fuel economy, and a vehicle that is fun to drive.

"The considerers and the skeptics, they're more so interested in your traditional vehicles, not necessarily some of the high-tech features," Gormley said. Given that, "I think we'll potentially start to see a shift in terms of what the range of features within electric vehicles is."

Car shoppers skeptical about EVs

Socio-demographics	Details
Mean age	57 years
Gender	61% female
Have children	27%
Mean income	\$86,890
Live in major cities	11%
Minimum accepted range	353 miles

The skeptics' top features are primarily financially driven: They want a vehicle with good fuel economy, a vehicle that keeps its value, and a vehicle with a low total cost of ownership.

Actual driving habits and perceptions of what an EV can provide don't seem to align.

"Those who are in the skeptic camp said that they wanted a higher range, however, actually drove the least amount on average per year," Gormley said. "Part of that might be a lack of education in terms of what they think an EV can provide for them in terms of range."



The 2023 Kia Niro EV. Kia

What types of electric cars EV shoppers want overall

"If we look at the F-150 being the most-selling vehicle, you would expect to see pickup trucks dominating the market," Berylls associate partner Henning Ludes said. "But actually from our own analysis, SUVs will be the key electrification driver."

The firm expects SUVs to make up 60% of US EV sales in 2030, pickups to account for 15%, and other vehicles to make up 25%.

Executive summary

Electric car sales break new records with momentum expected to continue through 2023

Electric car markets are seeing exponential growth as sales exceeded 10 million in 2022. A total of 14% of all new cars sold were electric in 2022, up from around 9% in 2021 and less than 5% in 2020. Three markets dominated global sales. China was the frontrunner once again, accounting for around 60% of global electric car sales. More than half of the electric cars on roads worldwide are now in China and the country has already exceeded its 2025 target for new energy vehicle sales. In Europe, the second largest market, electric car sales increased by over 15% in 2022, meaning that more than one in every five cars sold was electric. Electric car sales in the United States – the third largest market – increased 55% in 2022, reaching a sales share of 8%.

Electric car sales are expected to continue strongly through 2023. Over 2.3 million electric cars were sold in the first quarter, about 25% more than in the same period last year. We currently expect to see 14 million in sales by the end of 2023, representing a 35% year-on-year increase with new purchases accelerating in the second half of this year. As a result, electric cars could account for 18% of total car sales across the full calendar year. National policies and incentives will help bolster sales, while a return to the exceptionally high oil prices seen last year could further motivate prospective buyers.

There are promising signs for emerging electric vehicle (EV) markets, albeit from a small base. Electric car sales are generally low outside the major markets, but 2022 was a growth year in India, Thailand and Indonesia. Collectively, sales of electric cars in these countries more than tripled compared to 2021, reaching 80 000. For Thailand, the share of electric cars in total sales came in at slightly over 3% in 2022, while both India and Indonesia averaged around 1.5% last year. In India, EV and component manufacturing is ramping up, supported by the government's USD 3.2 billion incentive programme that has attracted investments totalling USD 8.3 billion. Thailand and Indonesia are also strengthening their policy support schemes, potentially providing valuable experience for other emerging market economies seeking to foster EV adoption.

Landmark EV policies are driving the outlook for EVs closer to climate ambitions

Market trends and policy efforts in major car markets are supporting a bright outlook for EV sales. Under the IEA Stated Policies Scenario (STEPS), the global outlook for the share of electric car sales based on existing policies and firm objectives has increased to 35% in 2030, up from less than 25% in the previous outlook. In the projections, China retains its position as the largest market for electric cars with 40% of total sales by 2030 in the STEPS. The United States doubles its market share to 20% by the end of the decade as recent policy announcements drive demand, while Europe maintains its current 25% share.

Projected demand for electric cars in major car markets will have profound implications on energy markets and climate goals in the current policy environment. Based on existing policies, oil demand from road transport is projected to peak around 2025 in the STEPS, with the amount of oil displaced by electric vehicles exceeding 5 million barrels per day in 2030. In the STEPS, emissions of around 700 Mt CO₂-equivalents are avoided by the use of electric cars in 2030.

The European Union and the United States have passed legislation to match their electrification ambitions. The European Union adopted new CO₂ standards for cars and vans that are aligned with the 2030 goals set out in the Fit for 55 package. In the United States, the Inflation Reduction Act (IRA), combined with adoption of California's Advanced Clean Cars II rule by a number of states, could deliver a 50% market share for electric cars in 2030, in line with the national target. The implementation of the recently proposed emissions standards from the US Environmental Protection Agency is set to further increase this share.

Battery manufacturing continues to expand, encouraged by the outlook for EVs. As of March 2023, announcements on battery manufacturing capacity delivered by 2030 are more than sufficient to meet the demand implied by government pledges and would even be able to cover the demand for electric vehicles in the Net Zero Emissions by 2050 Scenario. It is therefore well possible that higher shares of sales are achievable for electric cars than those anticipated on the basis of current government policy and national targets.

As spending and competition increase, a growing number of more affordable models come to market

Global spending on electric cars exceeded USD 425 billion in 2022, up 50% relative to 2021. Only 10% of the spending can be attributed to government support, the remainder was from consumers. Investors have also maintained confidence in EVs, with the stocks of EV-related companies consistently

outperforming traditional carmakers since 2019. Venture capital investments in start-up firms developing EV and battery technologies have also boomed, reaching nearly USD 2.1 billion in 2022, up 30% relative to 2021, with investments increasing in batteries and critical minerals.

SUVs and large cars dominate available electric car options in 2022. They account for 60% of available BEV options in China and Europe and an even greater share in the United States, similar to the trend towards SUVs seen in internal combustion engine (ICE) car markets. In 2022, ICE SUVs [emitted](#) over 1 Gt CO₂, far greater than the 80 Mt net emissions reductions from the electric vehicle fleet that year. Battery electric SUVs often have batteries that are two- to three-times larger than small cars, requiring more critical minerals. However, last year electric SUVs resulted in the displacement of over 150 000 barrels of oil consumption per day and avoided the associated tailpipe emissions that would have been generated through burning the fuel in combustion engines.

The electric car market is increasingly competitive. A growing number of new entrants, primarily from China but also from other emerging markets, are offering more affordable models. Major incumbent carmakers are increasing ambition as well, especially in Europe, and 2022-2023 saw another series of important EV announcements: fully electric fleets, cheaper cars, greater investment, and vertical integration with battery-making and critical minerals.

Consumers can choose from an increasing number of options for electric cars. The number of available electric car models reached 500 in 2022, more than double the options available in 2018. However, outside of China, there is a need for original equipment manufacturers (OEMs) to offer affordable, competitively priced options in order to enable mass adoption of EVs. Today's level of available electric car models is still significantly lower than the number of ICE options on the market, but the number of ICE models available has been steadily decreasing since its peak in the mid-2010s.

Focus expands to electrification of more vehicle segments as electric cars surge ahead

Electrification of road transport goes beyond cars. Two or three-wheelers are the most electrified market segment today; in emerging markets and developing economies, they outnumber cars. Over half of India's three-wheeler registrations in 2022 were electric, demonstrating their growing popularity due to government incentives and lower lifecycle costs compared with conventional models, especially in the context of higher fuel prices. In many developing economies, two/three-wheelers offer an affordable way to get access to mobility, meaning their electrification is important to support sustainable development.

The commercial vehicle stock is also seeing increasing electrification. Electric light commercial vehicle (LCV) sales worldwide increased by more than 90% in 2022 to more than 310 000 vehicles, even as overall LCV sales declined by nearly 15%. In 2022, nearly 66 000 electric buses and 60 000 medium- and heavy-duty trucks were sold worldwide, representing about 4.5% of all bus sales and 1.2% of truck sales. Where governments have committed to reduce emissions from public transport, such as in dense urban areas, electric bus sales reached even higher shares; in Finland, for example, electric bus sales accounted for over 65% in 2022.

Ambition with respect to electrifying heavy-duty vehicles is growing. In 2022, around 220 electric heavy-duty vehicle models entered the market, bringing the total to over 800 models offered by well over 100 OEMs. A total of 27 governments have [pledged to achieve 100% ZEV bus and truck sales by 2040](#) and both the United States and European Union have also proposed stronger emissions standards for heavy-duty vehicles.

EV supply chains and batteries gain greater prominence in policy-making

The increase in demand for electric vehicles is driving demand for batteries and related critical minerals. Automotive lithium-ion (Li-ion) battery demand increased by about 65% to 550 GWh in 2022, from about 330 GWh in 2021, primarily as a result of growth in electric passenger car sales. In 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries. Only five years prior, these shares were around 15%, 10% and 2%, respectively. Reducing the need for critical materials will be important for supply chain sustainability, resilience and security, especially given recent price developments for battery material.

New alternatives to conventional lithium-ion are on the rise. The share of lithium-iron-phosphate (LFP) chemistries reached its highest point ever, driven primarily by China: around 95% of the LFP batteries for electric LDVs went into vehicles produced in China. Supply chains for (lithium-free) sodium-ion batteries are also being established, with over 100 GWh of manufacturing capacity either currently operating or announced, almost all in China.

The EV supply chain is expanding, but manufacturing remains highly concentrated in certain regions, with China being the main player in battery and EV component trade. In 2022, 35% of exported electric cars came from China, compared with 25% in 2021. Europe is China's largest trade partner for both electric cars and their batteries. In 2022, the share of electric cars manufactured in China and sold in the European market increased to 16%, up from about 11% in 2021.

EV supply chains are increasingly at the forefront of EV-related policy-making to build resilience through diversification. The Net Zero Industry Act, proposed by the European Union in March 2023, aims for nearly 90% of the European Union’s annual battery demand to be met by EU battery manufacturers, with a manufacturing capacity of at least 550 GWh in 2030. Similarly, India aims to boost domestic manufacturing of electric vehicles and batteries through Production Linked Incentive (PLI) schemes. In the United States, the Inflation Reduction Act emphasises the strengthening of domestic supply chains for EVs, EV batteries and battery minerals, laid out in the criteria to qualify for clean vehicle tax credits. As a result, between August 2022 and March 2023, major EV and battery makers announced cumulative post-IRA investments of at least USD 52 billion in North American EV supply chains – of which 50% is for battery manufacturing, and about 20% each for battery components and EV manufacturing.

Trends and developments in EV markets

Electric light-duty vehicles

Electric car sales continue to increase, led by China

Electric car sales¹ saw another record year in 2022, despite supply chain disruptions, macro-economic and geopolitical uncertainty, and high commodity and energy prices. The growth in electric car sales took place in the context of globally contracting car markets: total car sales in 2022 dipped by 3% relative to 2021. Electric car sales – including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) – exceeded 10 million last year, up 55% relative to 2021.² This figure – 10 million EV sales worldwide – exceeds the total number of cars sold across the entire European Union (about 9.5 million vehicles) and is nearly half of the total number of cars sold in China in 2022. In the course of just five years, from 2017 to 2022, EV sales jumped from around 1 million to more than 10 million. It previously took five years from 2012 to 2017 for EV sales to grow from 100 000 to 1 million, underscoring the exponential nature of EV sales growth. The share of electric cars in total car sales jumped from 9% in 2021 to 14% in 2022, more than 10 times their share in 2017.

Over 26 million electric cars were on the road in 2022, up 60% relative to 2021 and more than 5 times the stock in 2018

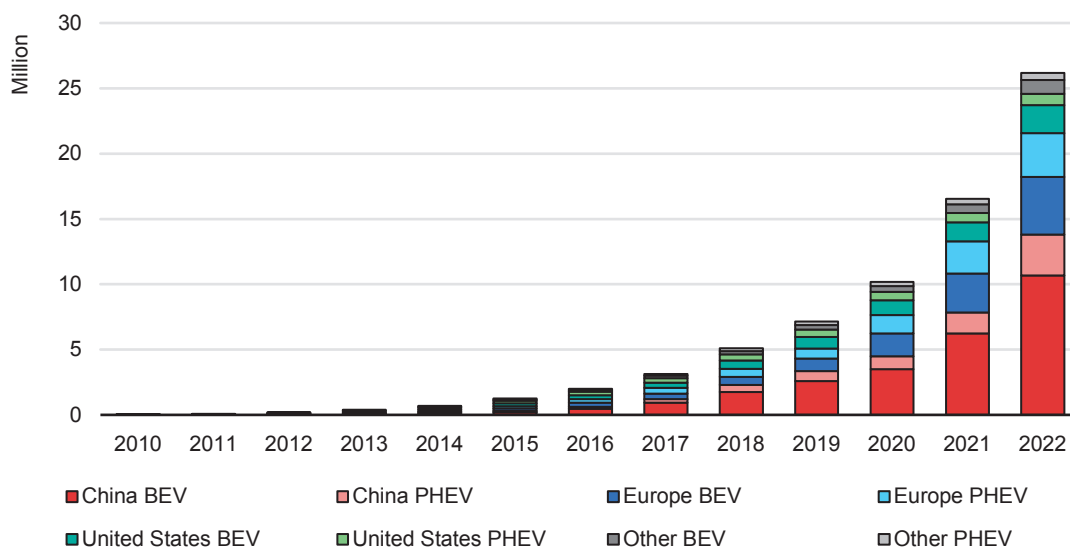
Increasing sales pushed the total number of electric cars on the world's roads to 26 million, up 60% relative to 2021, with BEVs accounting for over 70% of total annual growth, as in previous years. As a result, about 70% of the global stock of electric cars in 2022 were BEVs. The increase in sales from 2021 to 2022 was just as high as from 2020 to 2021 in absolute terms – up 3.5 million – but relative growth was lower (sales doubled from 2020 to 2021). The exceptional boom in 2021 may be explained by EV markets catching up in the wake of the coronavirus

¹ The term sales, as used in this report, represents an estimate of the number of new vehicles hitting the roads. Where possible, data on new vehicle registrations is used. In some cases, however, only data on retail sales (such as sales from a dealership) are available. See Box 1.2 for further details. The term car is used to represent passenger light-duty vehicles and includes cars of different sizes, sports utility-vehicles and light trucks.

² Unless otherwise specified, the term electric vehicle is used to refer to both battery electric and plug-in hybrid electric vehicles but does not include fuel cell electric vehicles. For a brief description of the trends related to fuel cell electric vehicles, see Box 1.3.

(Covid-19) pandemic. Seen in comparison to recent years, the annual growth rate for electric car sales in 2022 was similar to the average rate over 2015-2018, and the annual growth rate for the global stock of electric cars in 2022 was similar to that of 2021 and over the 2015-2018 period, showing a robust recovery of EV market expansion to pre-pandemic pace.

Figure 1.1 Global electric car stock in selected regions, 2010-2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Electric car stock in this figure refers to passenger light-duty vehicles. In “Europe”, European Union countries, Norway, and the United Kingdom account for over 95% of the EV stock in 2022; the total also includes Iceland, Israel, Switzerland and Türkiye. Main markets in “Other” include Australia, Brazil, Canada, Chile, Mexico, India, Indonesia, Japan, Malaysia, New Zealand, South Africa, Korea and Thailand.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: IEA analysis based on country submissions, ACEA, EAFO, EV Volumes and Marklines.

Over 26 million electric cars were on the road in 2022, up 60% relative to 2021 and more than five times the stock in 2018.

Half of the world’s electric cars are in China

The increase in electric car sales varied across regions and powertrains, but remains dominated by the People’s Republic of China (hereafter “China”). In 2022, BEV sales in China increased by 60% relative to 2021 to reach 4.4 million, and PHEV sales nearly tripled to 1.5 million. The faster growth in PHEV sales relative to BEVs warrants further examination in the coming years, as PHEV sales still remain lower overall and could be catching up on the post-Covid-19 boom only now; BEV sales in China tripled from 2020 to 2021 after moderate growth over 2018-2020. Electric car sales increased even while total car sales dipped by 3% in 2022 relative to 2021.

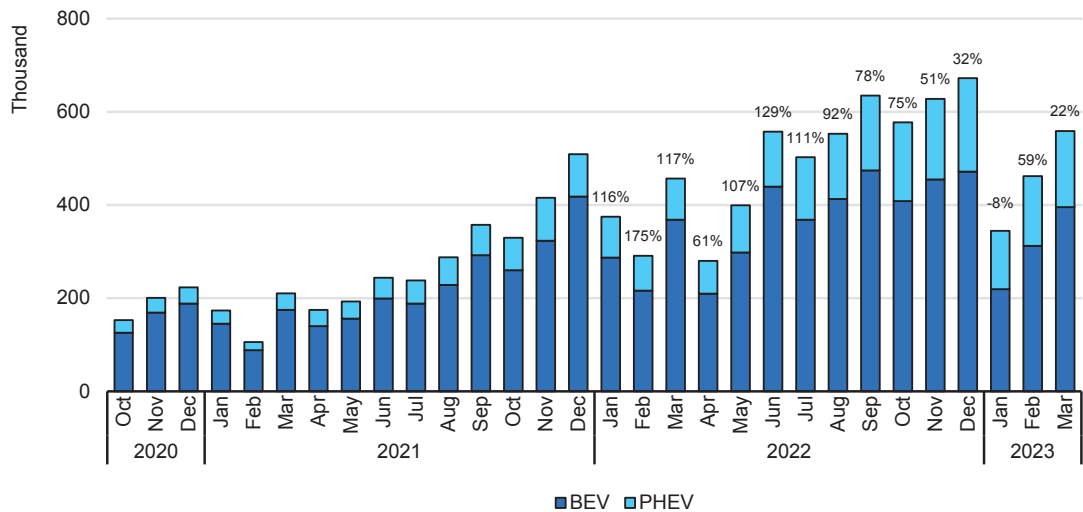
China accounted for nearly 60% of all new electric car registrations globally. For the first time in 2022, China accounted for more than 50% of all the electric cars on the world's roads, a total of 13.8 million. This strong growth results from more than a decade of sustained policy support for early adopters, including an [extension of purchase incentives](#) initially planned for phase-out in 2020 to the end of 2022 due to Covid-19, in addition to non-financial support such as rapid roll-out of charging infrastructure and stringent registration policies for non-electric cars.

In 2022, the share of electric cars in total domestic car sales reached 29% in China, up from 16% in 2021 and under 6% between 2018 and 2020. China has therefore [achieved](#) its 2025 national target of a 20% sales share for so-called new energy vehicles (NEVs)³ well in advance. All indicators point to further growth: although the national NEV sales target is yet to be updated by China's Ministry of Industry and Information Technology (MIIT), which is responsible for the automotive industry, the objective of greater road transport electrification is re-affirmed in multiple strategy documents. China aims to reach a [50%](#) sales share by 2030 in so-called "key air pollution control regions", and [40% across the country](#) by 2030 to support the national action plan for carbon peaking. If recent market trends continue, China's 2030 targets may also be reached ahead of time. Provincial governments are also supporting adoption of NEVs, with 18 provinces to date having set NEV targets.

Support at the regional level in China has also helped to advance some of the world's largest EV makers. Shenzhen-based BYD has supplied most of the city's electric buses and taxis, and its leading position is also reflected in Shenzhen's ambition of reaching a [60%](#) NEV sales share by 2025. Guangzhou, which has a 50% NEV sales share by 2025 target, [facilitated](#) the expansion of Xpeng Motors to become one of the national EV frontrunners.

³ NEVs (China) include BEVs, PHEVs and fuel cell electric vehicles.

Figure 1.2 Monthly new electric car registrations in China, 2020-2023



IEA. CC BY 4.0.

Note: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Percentage labels in 2022-2023 refer to year-on-year growth rates relative to the same month in the previous year.
Source: IEA analysis based on EV Volumes.

Electric car sales in China have been steadily increasing since 2020, but future trends will warrant further examination given that purchase incentives ended in 2022.

Whether China’s electric car sales share will remain significantly above the 20% target in 2023 remains uncertain, as sales may have been especially high in anticipation of incentives being phased out at the end of 2022. Sales in January 2023 [plunged](#), and while this is in part due to the timing of the Chinese New Year, they were nearly 10% lower than sales in January 2022. However, electric car sales caught up in February and March 2023, standing nearly 60% above sales in February 2022 and more than 25% above sales in March 2022, thereby bringing sales in the first quarter of 2023 more than 20% higher than in the first quarter of 2022.

Growth remained steady in Europe despite disruptions

In Europe,⁴ electric car sales increased by more than 15% in 2022 relative to 2021 to reach 2.7 million. Sales grew more quickly in previous years: annual growth stood at more than 65% in 2021 and averaged 40% over 2017-2019. In 2022, BEV sales rose by 30% relative to 2021 (compared to 65% growth in 2021 relative to 2020) while PHEV sales dipped by around 3%. Europe accounted for 10% of global growth in new electric car sales. Despite slower growth in 2022, electric car

⁴ Europe includes European Union countries, Iceland, Israel, Norway, Switzerland, Türkiye, and the United Kingdom.

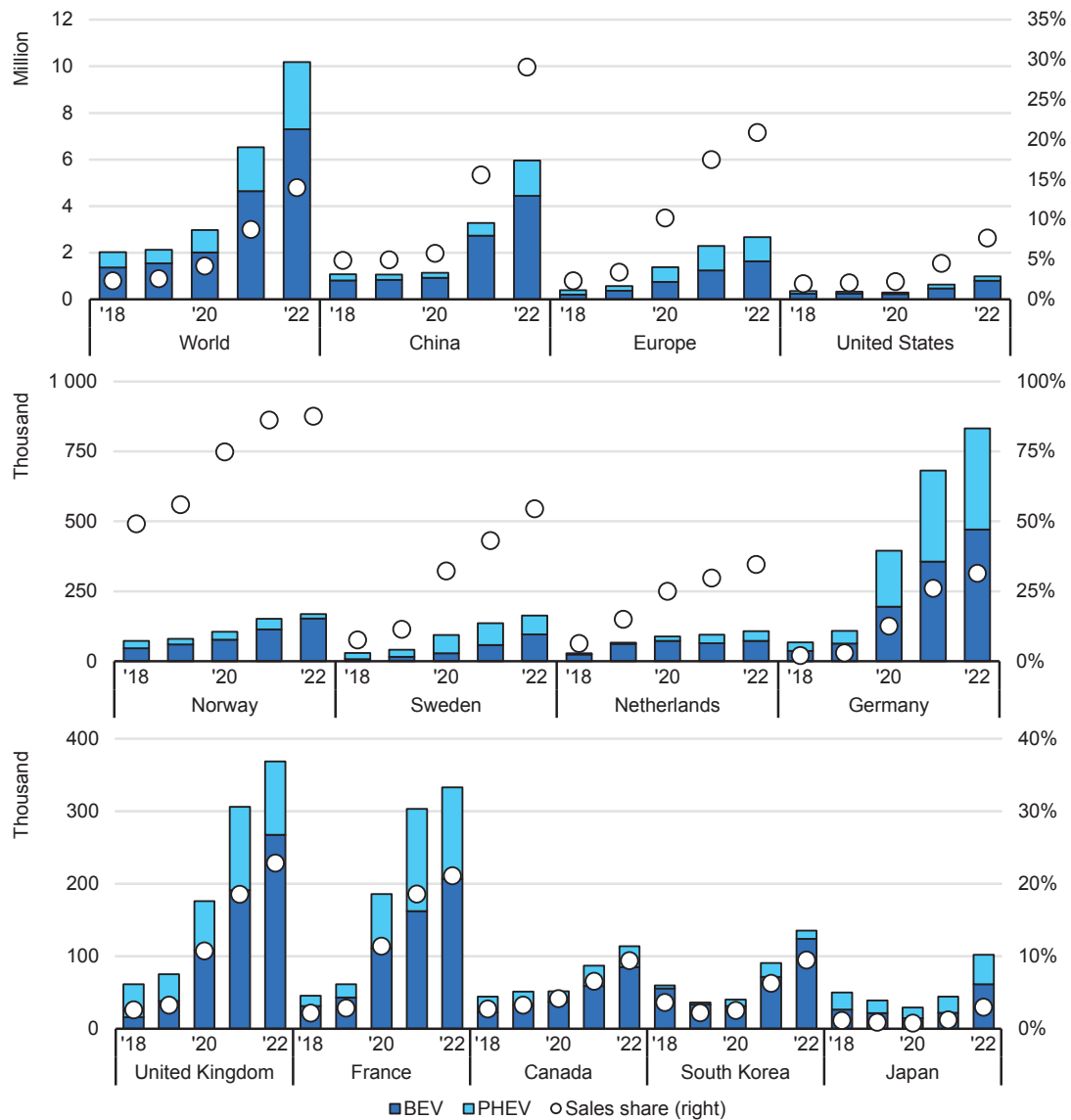
sales are still increasing in Europe in the context of continued contraction in car markets: total car sales in Europe dipped by 3% in 2022 relative to 2021.

The slowdown seen in Europe relative to previous years was, in part, a reflection of the exceptional growth in electric car sales that took place in 2020 and 2021 in the European Union, as manufacturers quickly adjusted corporate strategy to comply with the CO₂ emission [standards](#) passed in 2019. These standards covered the 2020-2024 period, with EU-wide emission targets becoming stricter only from 2025 and 2030 onwards.

High energy prices in 2022 had a mixed impact on the competitiveness of EVs relative to internal combustion engine (ICE) cars. Gasoline and diesel prices for ICE cars spiked, but residential electricity tariffs (with relevance for charging) also increased in some cases. Higher electricity and gas prices also increased manufacturing costs for both ICE and EV cars, with some carmakers arguing that high energy prices could [restrict](#) future investment for new battery manufacturing capacity.

Europe remained the world's second largest market for electric cars after China in 2022, accounting for 25% of all electric car sales and 30% of the global stock. The sales share of electric cars reached 21%, up from 18% in 2021, 10% in 2020 and under 3% prior to 2019. European countries continued to rank highly for the sales share of electric cars, led by Norway at 88%, Sweden at 54%, the Netherlands at 35%, Germany at 31%, the United Kingdom at 23% and France at 21% in 2022. In volume terms, Germany is the biggest market in Europe with sales of 830 000 in 2022, followed by the United Kingdom with 370 000 and France with 330 000. Sales also exceeded 80 000 in Spain. The share of electric cars in total car sales has increased tenfold in Germany since before the Covid-19 pandemic, which can in part be explained by increasing support post-pandemic, such as purchase incentives through the [Umweltbonus](#), and a frontloading of sales in 2022 in [expectation](#) of subsidies being further reduced from 2023 onwards. However, in Italy, electric car sales decreased from 140 000 in 2021 to 115 000 in 2022, and they also decreased or stagnated in Austria, Denmark and Finland.

Figure 1.3 Electric car registrations and sales share in selected countries and regions, 2018-2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Passenger light-duty vehicles only. Major markets at the top. Other countries (middle, bottom) ordered by the share of electric car sales in total car sales. Y-axes do not have the same scale to improve readability.

Source: IEA analysis based on country submissions, ACEA, EAFO, EV Volumes and Marklines.

Electric car sales exceeded 10 million in 2022, up 55% relative to 2021. Sales in China increased by 80% and accounted for 60% of global growth. Growth in Europe remained high (up 15%) and accelerated in the United States (up 55%).

Sales are expected to continue increasing in Europe, especially following [recent policy](#) developments under the 'Fit for 55' package. New rules set stricter CO₂ emission standards for 2030-2034 and target a 100% reduction in CO₂ emissions for new cars and vans from 2035 relative to 2021 levels. In the nearer term, an

incentive mechanism operating between 2025 and 2029 will reward manufacturers that achieve a 25% car sales share of zero- and low-emission cars (17% for vans). In the first two months of 2023, battery electric car sales were already [up](#) by over 30% year-on-year, while overall car sales increased by just over 10% year-on-year.

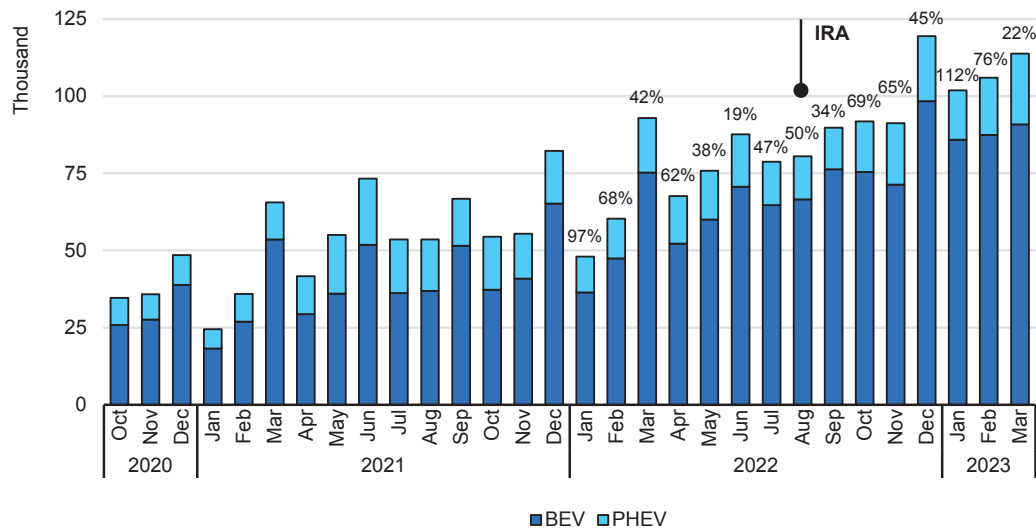
The United States confirms return to growth

In the United States, electric car sales increased 55% in 2022 relative to 2021, led by BEVs. Sales of BEVs increased by 70%, reaching nearly 800 000 and confirming a second consecutive year of strong growth after the 2019-2020 dip. Sales of PHEVs also grew, albeit by only 15%. The increase in electric car sales was particularly high in the United States, considering that total car sales dropped by 8% in 2022 relative to 2021, a much sharper decrease than the global average (minus 3%). Overall, the United States accounted for 10% of the global growth in sales. The total stock of electric cars reached 3 million, up 40% relative to 2021 and accounting for 10% of the global total. The share of electric cars in total car sales reached nearly 8%, up from just above 5% in 2021 and around 2% between 2018 and 2020.

A number of factors are helping to increase sales in the United States. A greater number of available models, beyond those offered by Tesla, the historic leader, helped to close the [supply](#) gap. Given that major companies like Tesla and General Motors had already reached their subsidy cap under US support in previous years,⁵ new models from other companies being available means that more consumers can benefit from purchase incentives, which can be as high as USD 7 500. Awareness is increasing as government and companies lean towards electrification: in 2022, a quarter of Americans expect that their next car will be electric, [according](#) to the American Automobile Association. Although charging infrastructure and driving range have improved over the years, they remain major [concerns](#) for US drivers given the typically long travel distances and lower popularity and limited availability of alternatives such as rail. However, in 2021 the Bipartisan Infrastructure Law strengthened support for EV charging, allocating USD 5 billion in total funding over the 2022-2026 period through the National Electric Vehicle Infrastructure Formula Program, as well as USD 2.5 billion in competitive grants over the same period through the Charging and Fueling Infrastructure Discretionary Grant Program.

⁵ Manufacturer caps were [still in place](#) for sales taking place in 2022, with models by carmakers having sold over 200 000 EVs losing eligibility for the purchase incentive, even if they were manufactured in North America following [requirements](#) under the IRA. Caps were removed starting from 2023.

Figure 1.4 Monthly new electric car registrations in the United States, 2020-2023



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle; “IRA” refers to the Inflation Reduction Act. Percentage labels in 2022-2023 refer to year-on-year growth rates relative to the same month in the previous year. Source: IEA analysis based on EV Volumes.

Monthly sales of electric cars have been steadily increasing in the United States, with further growth expected in 2023 as a result of strengthened policy support.

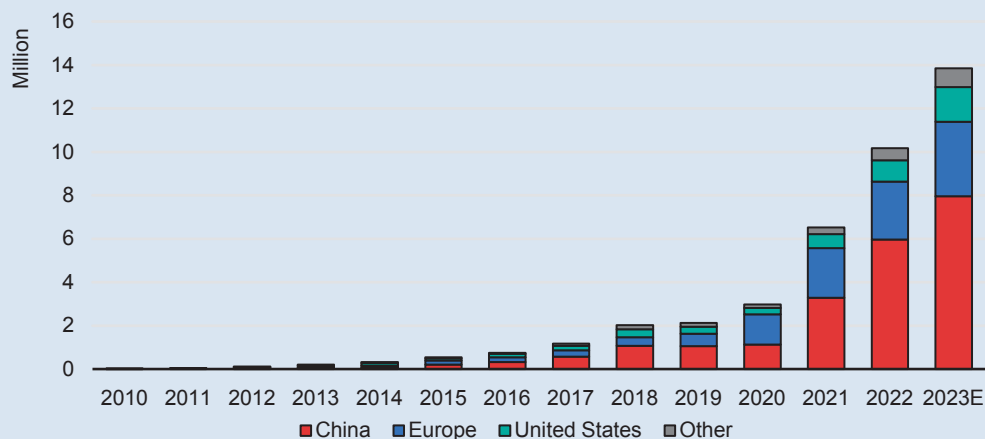
The acceleration in sales growth could continue in 2023 and beyond thanks to recent new [policy](#) support (see [Prospects for electric vehicle deployment](#)). The Inflation Reduction Act (IRA) has triggered a [rush by global electromobility companies](#) to expand US manufacturing operations. Between August 2022 and March 2023, major EV and battery makers announced cumulative post-IRA investments of [USD 52 billion](#) in North American EV supply chains, of which 50% is for battery manufacturing, and about 20% each for battery components and EV manufacturing. Overall, company announcements including tentative commitments for US investments for future battery and EV production add up to around [USD 75-108 billion](#). As an example, Tesla plans to [relocate](#) its Berlin-based lithium-ion battery gigafactory to Texas, where it will work in [partnership](#) with China’s CATL, and to manufacture next-generation EVs [in Mexico](#). Ford also announced a [deal with CATL](#) for a battery plant in Michigan, and [plans](#) to increase electric car manufacturing sixfold by the end of 2023 relative to 2022, at 600 000 vehicles per year, scaling up to 2 million by 2026. BMW is seeking to [expand](#) EV manufacturing at its plant in South Carolina following the IRA. Volkswagen chose Canada for its [first battery plant outside Europe](#), which will begin operations in 2027, and is also investing USD 2 billion in its plant in South Carolina. While these investments can be expected to lead to high growth in the years to come, the impact may only fully be seen from 2024 onwards as plants come online.

In the immediate term, the IRA has [constrained](#) eligibility requirements for purchase incentives, as vehicles need to be produced in North America in order to qualify for a subsidy. However, electric car sales have remained strong since August 2022 (Figure 1.4), and the first months of 2023 have been no exception: In the first quarter of 2023, electric car sales increased 60% compared to the same period in 2022, potentially boosted by the January 2023 removal of the subsidy caps for manufacturers, which means models by market leaders can now benefit from purchase incentives. In the longer-term, the list of models eligible for subsidies is expected to expand.

Box 1.1 The 2023 outlook for electric cars is bright

Early indications from first quarter sales of 2023 point to an upbeat market, supported by cost declines as well as strengthened policy support in key markets such as the United States. Globally, our current estimate is therefore for nearly 14 million electric cars to be sold in 2023, building on the more than 2.3 million already sold in the first quarter of the year. This represents a 35% increase in electric car sales in 2023 compared to 2022 and would bring the global electric sales share to around 18%, up from 14% in 2022.

Electric car sales, 2010-2023



IEA. CC BY 4.0.

Note: 2023 sales ("2023E") are estimated based on market trends through the first quarter of 2023.
 Source: IEA analysis based on EV Volumes.

Electric car sales in the first three months of 2023 have shown strong signs of growth compared to the same period in 2022. In the United States, more than 320 000 electric cars were sold in the first quarter of 2023, 60% more than over the same period in 2022. Our current expectation is for this growth to be sustained throughout the year, with electric car sales reaching over 1.5 million in 2023, bringing the electric car sales share in the United States up to around 12% in 2023.

In China, electric car sales were off to a rough start in 2023, with January sales being 8% lower than in January 2022. The latest available data suggests a quick recovery: over the entire first quarter of 2023, electric car sales in China were more than 20% higher than in the first quarter of 2022, with more than 1.3 million electric cars being registered. For the remainder of 2023, we expect the generally favourable cost structure of electric cars to outweigh the effects of the phase-out of the NEV subsidy. As a result, our current expectation is for electric car sales in China to be more than 30% higher than in 2022 and reach around 8 million by the end of 2023, reaching a sales share of over 35% (from 29% in 2022).

Based on recent trends and tightening CO₂ targets not going into effect until 2025, the growth of electric car sales in Europe is expected to be the lowest of the three largest markets. In the first quarter of 2023, electric car sales in Europe increased by around 10% compared to the same period in 2022. For the full year, we currently expect electric car sales to increase by over 25%, with one-in-four cars sold in Europe being electric.

Outside of the major EV markets, electric car sales are expected to reach around 900 000 in 2023 – 50% higher than in 2022. Electric car sales in India in the first quarter of 2023 are already double what they were in the same period in 2022. In India and across all regions outside the three major EV markets, electric car sales are expected to represent 2-3% of car sales in 2023, a relatively small yet growing share.

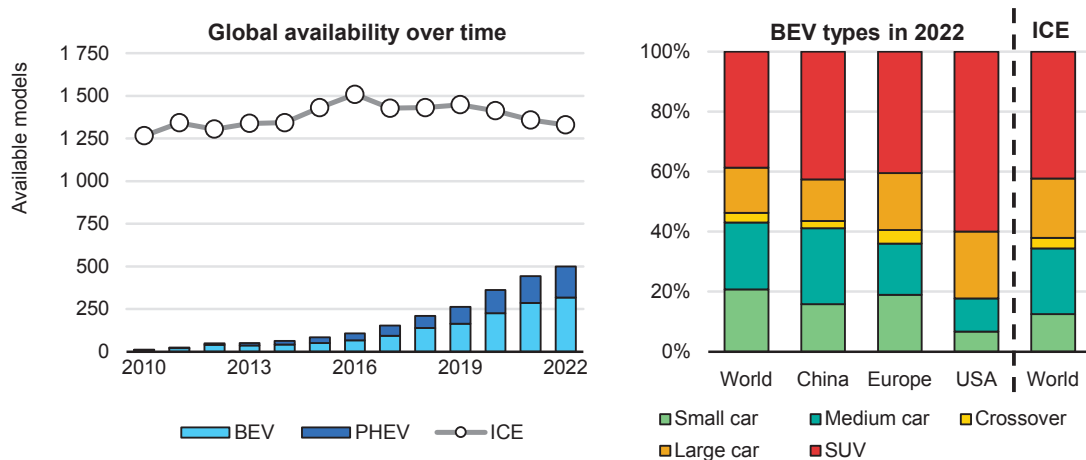
There are, of course, downside risks to the 2023 outlook: a sluggish global economy and the phase-out of subsidies for NEVs in China could reduce 2023 growth in global electric car sales. On the upside, new markets may open up more quickly than anticipated, as persistent high oil prices make the case for EVs stronger in an increasing number of settings. And new policy developments, such as the April 2023 proposal from the US Environmental Protection Agency (EPA) to strengthen GHG emissions standards for cars, may send signals that boost sales even before going into effect.

The number of electric car models rises, especially for large cars and SUVs, at the same time as it decreases for conventional cars

The race to electrification is increasing the number of electric car models available on the market. In 2022, the number of available options reached 500, up from below 450 in 2021 and more than doubling relative to 2018-2019. As in previous years, China has the broadest portfolio with nearly 300 available models, double the number available in 2018-2019, prior to the Covid-19 pandemic. This remains nearly twice as many as in Norway, the Netherlands, Germany, Sweden, France and the United Kingdom, which all have around 150 models available, more than

three times as many as before the pandemic. In the United States, there were fewer than 100 models available in 2022, but twice as many as before the pandemic; and 30 or fewer were available in Canada, Japan and Korea.

Figure 1.5 Car model availability by powertrain, 2010-2022 (left), and breakdown of available cars by powertrain and segment in 2022 (right)



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid vehicle; ICE = internal combustion engine; SUV = sports utility vehicle; USA = United States. Analysis based on models for which there was at least one new registration in a given year; a model on sale but never sold is not counted, and as such actual model availability may be underestimated. In the chart on the right-hand side, distribution is based on the number of available models, not sales-weighted. Small cars include A and B segments. Medium cars include C and D segments. Crossovers are a type of sports utility vehicle (SUV) built on a passenger car platform. Large cars include E and F segments and multi-purpose vehicles.

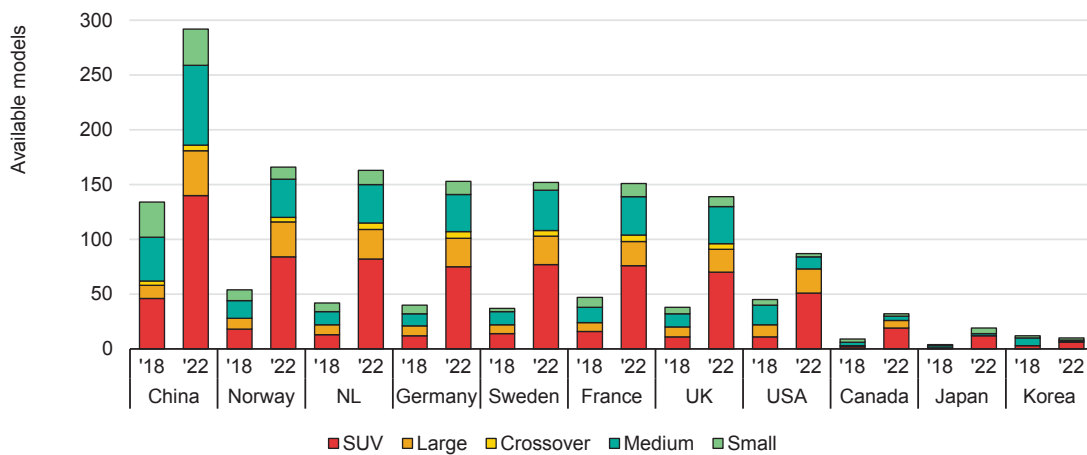
Source: IEA analysis based on Marklines.

The number of available electric car models reached 500 in 2022 but remains far below the number of ICE options. Large cars and SUVs still account for over half of available BEVs.

The 2022 trend reflects the increasing maturity of EV markets and demonstrates that carmakers are responding to increasing consumer demand for electric cars. However, the number of electric car models available remains much lower than that of conventional ICE cars, which has remained above 1 250 since 2010 and peaked at 1 500 in the middle of the past decade. In recent years, the number of ICE models sold has been steadily [decreasing](#), at a compound annual growth rate of minus 2% over the 2016-2022 period, reaching about 1 300 models in 2022. This dip varies across major car markets and is most pronounced in China, where the number of available ICE options was 8% lower in 2022 than in 2016, versus 3-4% lower in the United States and Europe over the same period. This could result from contracting car markets and a progressive shift towards EVs among major carmakers. Looking forward, the total number of ICE models available could remain stable, while the number of [new models](#) shrinks, if carmakers focus on electrification and keep selling existing ICE options rather than increasing budgets to develop new models.

In contrast to ICE models, EV model availability has been growing quickly, at a compound annual growth rate of 30% over the 2016-2022 period. Such growth is to be expected in a nascent market with a large number of new entrants bringing innovative products to the market, and as incumbents diversify their portfolios. Growth has been slightly lower in recent years: the annual growth rate stood at around 25% in 2021 and 15% in 2022. In the future, the number of models can be expected to continue to increase quickly, as major carmakers expand their EV portfolios and new entrants strengthen their positions, particularly in emerging markets and developing economies (EMDEs). The historic number of ICE models available on the market suggests that the current number of EV options could double, at least, before stabilising.

Figure 1.6 Electric car model availability in selected countries by size, 2018-2022



IEA. CC BY 4.0.

Notes: NL = the Netherlands; UK = United Kingdom; USA = United States; SUV = sports utility vehicle. Includes battery electric vehicles and plug-in hybrid electric vehicles. Countries are ordered by the number of available models in 2022. Analysis based on models for which there was at least one new registration in a given year; a model on sale but never sold is not counted, and as such actual model availability may be underestimated.

Source: IEA analysis based on Marklines.

In 2022, 7 countries had around 150 EV models or more available for sale, up from 50 in 2018. The number of large models is increasing more quickly than that of small models.

SUVs and large car models dominate both EV and ICE markets

A major concern for global car markets – both EV and ICE – is the overwhelming dominance of SUVs and large models among available options. Carmakers are able to generate higher revenues from such models, given higher profit margins, which can cover some of the investments made in developing electric options. In certain cases, such as in the United States, larger vehicles can also benefit from less stringent fuel economy standards, hence creating an incentive for carmakers to slightly increase the vehicle size of a car for it to qualify as a light truck.

However, large models are more expensive, which poses significant affordability issues across the board, and all the more so in EMDEs. Large models also have

implications for sustainability and supply chains, being equipped with larger batteries that require more critical minerals. In 2022, the sales-weighted average battery size of small battery electric cars ranged from 25 kWh in China to 35 kWh across France, Germany and the United Kingdom, and about 60 kWh in the United States. In comparison, the average for battery electric SUVs was around 70-75 kWh in these countries, and within the 75-90 kWh range for large car models.

[Transitioning](#) from ICE to electric is a priority for achieving net zero emissions targets, regardless of vehicle size, but mitigating the impacts of higher battery sizes will also be important. In France, Germany and the United Kingdom in 2022, the sales-weighted average weight of a battery electric SUV was 1.5 times higher than the average small battery electric car, requiring greater amounts of steel, aluminium and plastic; the battery in the SUV was twice as large, requiring about 75% more critical minerals. The CO₂ emissions associated with materials processing, manufacturing and assembly can be estimated at more than 70% higher as a result.

At the same time, in 2022, electric SUVs resulted in the displacement of over 150 000 barrels per day of oil consumption and avoided the associated tailpipe emissions that would have been generated through burning the fuel in combustion engines. Although electric SUVs represented roughly 35% of all electric passenger light-duty vehicles (PLDVs) in 2022, their share of oil displacement was even higher (about 40%), as SUVs tend to be driven more than smaller cars. Of course, smaller vehicles generally require less energy to operate and less materials to build, but electric SUVs certainly remain favourable to ICE vehicles.

In 2022, ICE SUVs [emitted](#) more than 1 Gt CO₂, far greater than the 80 Mt net emissions reductions from the electric vehicle fleet that year. While total car sales decreased by 0.5% in 2022, SUV sales increased by 3% relative to 2021, accounting for about 45% of total car sales, with noticeable growth in the United States, India and Europe. Of the 1 300 available options for ICE cars in 2022, more than 40% were SUVs, compared to fewer than 35% for small and medium cars. The total number of available ICE options went down from 2016 to 2022, but the drop was only for small and medium cars (down 35%) while large cars and SUVs increased (up 10%).

Similar trends are observed in EV markets. Around 16% of all SUVs sold were electric in 2022, which is above the overall market share of EVs and demonstrates consumer preferences for SUVs regardless of whether they are an ICE vehicle or EV. Nearly 40% of all BEV models available in 2022 were SUVs, which is equivalent to the shares of small and medium car options combined. Other large models accounted for more than 15%. Just 3 years before, in 2019, small and medium models accounted for 60% of all available models, and SUVs just 30%.

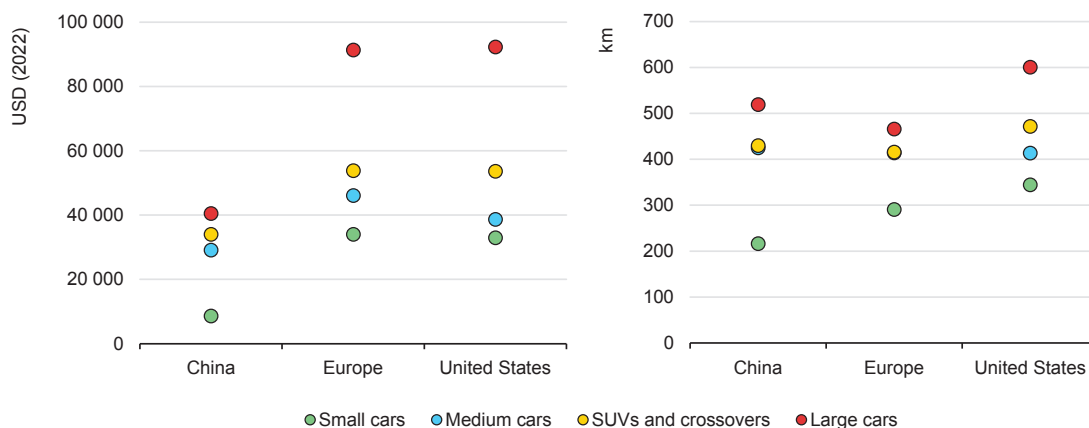
In China and Europe, SUVs and large models accounted for 60% of available BEV options in 2022, on par with the world average. As a comparison, ICE SUVs and large models accounted for about 70% of available ICE options in these regions,

suggesting that electric cars currently remain somewhat smaller than their ICE equivalents. Announcements by some major European carmakers indicate that there could be a greater focus on smaller, more popular models in the years to come. For example, [Volkswagen](#) has announced the launch of a compact model for the European market under EUR 25 000 by 2025 and under EUR 20 000 by 2026-2027, as a means to appeal to a broader consumer base. In the United States, over 80% of available BEV options in 2022 were SUVs or large car models, which is greater than the share of ICE SUVs or large models at 70%. Looking ahead, more electric SUVs are to be expected in the United States, should recent policy announcements on [expansion](#) of IRA incentives to more SUVs be implemented. Following the IRA, the US Treasury has been [revising](#) vehicle classifications, and in 2023 changed the eligibility criteria for clean vehicle credits relevant to smaller SUVs, which are now eligible if priced under USD 80 000, up from the previous limit of USD 55 000.

Electric cars remain much cheaper in China

The growth in electric car sales in China has been underpinned by sustained policy support, but also cheaper retail prices. In 2022, the sales-weighted average price of a small BEV in China was below USD 10 000. This is significantly less than the prices of small BEVs found in Europe and the United States, where the sales-weighted average price exceeded USD 30 000 in the same year.

Figure 1.7 Sales-weighted average retail price (left) and driving range (right) of BEV passenger cars in selected countries, by size, in 2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; SUV = sports utility vehicle. 'Europe' is based on data only from France, Germany and the United Kingdom. Retail prices collected in 2022-2023, before subsidy.

Source: IEA analysis based on EV Volumes.

In 2022, BEV passenger cars remained much cheaper in China, which explains in part higher adoption rates there.

In China, the best-selling electric cars in 2022 were the Wuling Mini BEV, a small model priced at under USD 6 500, and BYD's Dolphin, another small model, below USD 16 000. Together, these two models accounted for nearly 15% of Chinese BEV passenger car sales, illustrating the appetite for smaller models. To compare, the best-selling small BEVs across France, Germany and the United Kingdom – Fiat's 500, Peugeot's e-208 and Renault's Zoe – were all priced above USD 35 000. Few small BEVs were sold in the United States, limited mainly to Chevrolet's Bolt and the Mini Cooper BEV, which are priced around USD 30 000. Tesla's Y Model was the best-selling BEV passenger car in both the selected European countries (priced at more than USD 65 000) and the United States (more than USD 50 000).⁶

Chinese carmakers have focused on developing smaller and more affordable models in advance of their international peers, cutting down costs following years of tough competition domestically. Hundreds of small EV manufacturers have entered the market since the 2000s, benefitting from a variety of public support schemes, including subsidies and incentives for both consumers and manufacturers. The majority of these firms went bankrupt due to competition as subsidies were gradually phased out, and the market has since consolidated around a dozen frontrunners, which have succeeded in developing small and cheap electric cars for the Chinese market. Vertical integration of battery and EV supply chains from mineral processing to battery and EV manufacturing, as well as cheaper labour, manufacturing and access to finance across the board, have also contributed to developing cheaper models.

Meanwhile, carmakers in Europe and the United States – both early developers such as Tesla and incumbent major manufacturers – have mostly focused on larger or more luxurious models to date, hence offering few options affordable for mass-market consumers. However, the small options available in these countries typically offer greater performance than those in China, such as longer driving range. In 2022, the sales-weighted average range of small BEVs sold in the United States was nearly 350 km, while in France, Germany and the United Kingdom it was just under 300 km, compared to under 220 km in China. For other segments, the differences are less significant. The broader availability of public charging points in China may, in part, explain why consumers there have been more willing to opt for lower driving ranges than their European or American counterparts.

In 2022, Tesla heavily reduced the price of its models on two occasions as competition increased, and many carmakers have also announced cheaper options in the coming years. While these announcements warrant further examination, this trend could indicate that the price gap between small electric cars and incumbent ICE options could progressively close during this decade.

⁶ However, Tesla has decreased car prices several times since the publication of the IRA in the United States, in part to boost sales as competition gets tougher (see [section on corporate strategy and finance](#)).

Actual vehicle range depends on the loaded vehicle weight, duty cycle, aerodynamics and drivetrain efficiency, as well as environmental factors such as temperature. In addition, as no harmonised test procedure currently exists to measure electric range for medium- and heavy-duty vehicles in any of the major markets where deployment of electric trucks has begun, manufacturers can determine their own methods to declare the electric range of the commercially available and announced models. However, any standardised test procedure would need to consider complicated issues of non-motive energy consumption (e.g. heating ventilation and air conditioning in buses, cooling in refrigerated trucks), as well as the potential for buses and trucks to be used in vehicle-to-grid applications (as [has been demonstrated](#), for instance, with [electric school buses](#) in the United States). In light of such considerations, a first regulatory step could be to mandate that electric medium- and heavy-duty vehicle makers measure and disclose the usable battery energy according to a yet-to-be-developed standardised measurement procedure.

Charging infrastructure

Public charging points are increasingly necessary to enable wider EV uptake

While most of the charging demand is currently met by home charging, publicly accessible chargers are increasingly needed in order to provide the same level of convenience and accessibility as for refuelling conventional vehicles. In dense urban areas, in particular, where access to home charging is more limited, public charging infrastructure is a key enabler for EV adoption. At the end of 2022, there were 2.7 million public charging points worldwide, more than 900 000 of which were installed in 2022, about a 55% increase on 2021 stock, and comparable to the pre-pandemic growth rate of 50% between 2015 and 2019.

Slow chargers

Globally, more than 600 000 public slow charging points¹¹ were installed in 2022, 360 000 of which were in China, bringing the stock of slow chargers in the country to more than 1 million. At the end of 2022, China was home to more than half of the global stock of public slow chargers.

Europe ranks second, with 460 000 total slow chargers in 2022, a 50% increase from the previous year. The Netherlands leads in Europe with 117 000, followed by around 74 000 in France and 64 000 in Germany. The stock of slow chargers

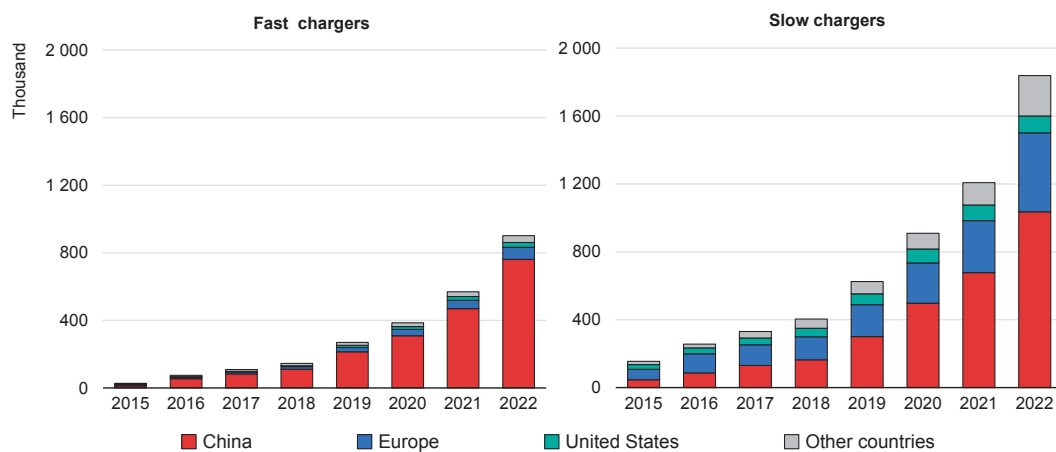
¹¹ Slow chargers have power ratings less than or equal to 22 kW. Fast chargers are those with a power rating of more than 22 kW and up to 350 kW. "Charging points" and "chargers" are used interchangeably and refer to the individual charging sockets, reflecting the number of EVs that can charge at the same time. "Charging stations" may have multiple charging points.

in the United States increased by 9% in 2022, the lowest growth rate among major markets. In Korea, slow charging stock has doubled year-on-year, reaching 184 000 charging points.

Fast chargers

Publicly accessible fast chargers, especially those located along motorways, enable longer journeys and can address range anxiety, a barrier to EV adoption. Like slow chargers, public fast chargers also provide charging solutions to consumers who do not have reliable access to private charging, thereby encouraging EV adoption across wider swaths of the population. The number of fast chargers increased by 330 000 globally in 2022, though again the majority (almost 90%) of the growth came from China. The deployment of fast charging compensates for the lack of access to home chargers in densely populated cities and supports China’s goals for rapid EV deployment. China accounts for total of 760 000 fast chargers, but more than [70%](#) of the total public fast charging pile stock is situated in just ten provinces.

Figure 1.13 Installed publicly accessible light-duty vehicle charging points by power rating and region, 2015-2022



IEA. CC BY 4.0.

Note: Values shown represent number of charging points.
 Source: IEA analysis based on country submissions.

Installed publicly accessible charging points have increased by around 55%, with accelerated deployment led by China and Europe.

In Europe the overall fast charger stock numbered over 70 000 by the end of 2022, an increase of around 55% compared to 2021. The countries with the largest fast charger stock are Germany (over 12 000), France (9 700) and Norway (9 000). There is a clear ambition across the European Union to further develop the public charging infrastructure, as indicated by provisional agreement on the proposed

Alternative Fuels Infrastructure Regulation (AFIR), which will set electric charging coverage requirements across the trans-European network-transport (TEN-T).¹² An [agreement](#) between the European Investment Bank and the European Commission will make over EUR 1.5 billion available by the end of 2023 for alternative fuels infrastructure, including electric fast charging.

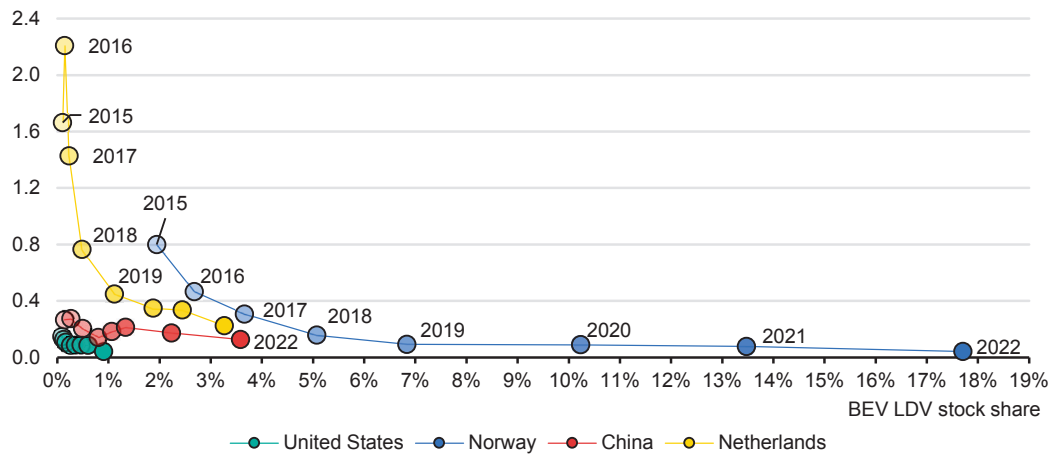
The United States installed 6 300 fast chargers in 2022, about three-quarters of which were Tesla Superchargers. The total stock of fast chargers reached 28 000 at the end of 2022. Deployment is expected to accelerate in the coming years following government approval of the [National Electric Vehicle Infrastructure Formula Program](#) (NEVI). All US states, Washington DC, and Puerto Rico are participating in the programme, and have already been allocated USD 885 million in funding for 2023 to support the build-out of chargers across 122 000 km of highway (see [Policy support for EV charging infrastructure](#)). The US Federal Highway Administration has announced new national standards for federally funded EV chargers to ensure consistency, reliability, accessibility and compatibility. [As a result](#) of the new standards, Tesla has announced it will open a portion of its US Supercharger (where Superchargers represent 60% of the total stock of fast chargers in the United States) and Destination Charger network to non-Tesla EVs.

Ratio of electric LDVs per public charger

Deployment of public charging infrastructure in anticipation of growth in EV sales is critical for widespread EV adoption. In Norway, for example, there were around 1.3 battery electric LDVs per public charging point in 2011, which supported further adoption. At the end of 2022, with over 17% of LDVs being BEVs, there were 25 BEVs per public charging point in Norway. In general, as the stock share of battery electric LDVs increases, the charging point per BEV ratio decreases. Growth in EV sales can only be sustained if charging demand is met by accessible and affordable infrastructure, either through private charging in homes or at work, or publicly accessible charging stations.

¹² Previously a directive, the proposed AFIR, once formally approved, would become a binding legislative act, stipulating, among other things, a maximum distance between chargers installed along the TEN-T, the primary and secondary roads within the European Union.

Figure 1.14 Public charging points per battery electric light-duty vehicle ratio in selected countries against battery electric light-duty vehicle stock share, 2015-2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; LDV = light-duty vehicle. Charging points include only publicly available chargers, both fast and slow. Shading grows darker each year.

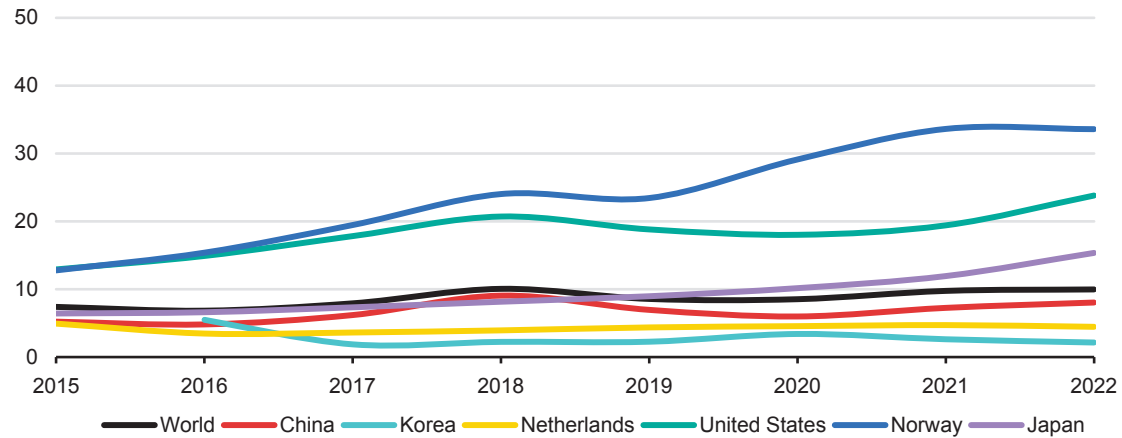
Source: IEA analysis based on country submissions.

In many advanced markets, as the stock share of battery electric LDVs increased, the charging point per BEV ratio has decreased.

While PHEVs are less reliant on public charging infrastructure than BEVs, policy-making relating to the sufficient availability of charging points should incorporate (and encourage) public PHEV charging. If the total number of electric LDVs per charging point is considered, the global average in 2022 was about ten EVs per charger. Countries such as China, Korea and the Netherlands have maintained fewer than ten EVs per charger throughout past years. In countries that rely heavily on public charging, the number of publicly accessible chargers has been expanding at a speed that largely matches EV deployment.

However, in some markets characterised by widespread availability of home charging (due to a high share of single-family homes with the opportunity to install a charger) the number of EVs per public charging point can be even higher. For example, in the United States, the ratio of EVs per charger is 24, and in Norway is more than 30. As the market penetration of EVs increases, public charging becomes increasingly important, even in these countries, to [support](#) EV adoption among drivers who do not have access to private home or workplace charging options. However, the optimal ratio of EVs per charger will differ based on local conditions and driver needs.

Figure 1.15 Electric light-duty vehicle per public charging point, 2010-2022



IEA. CC BY 4.0.

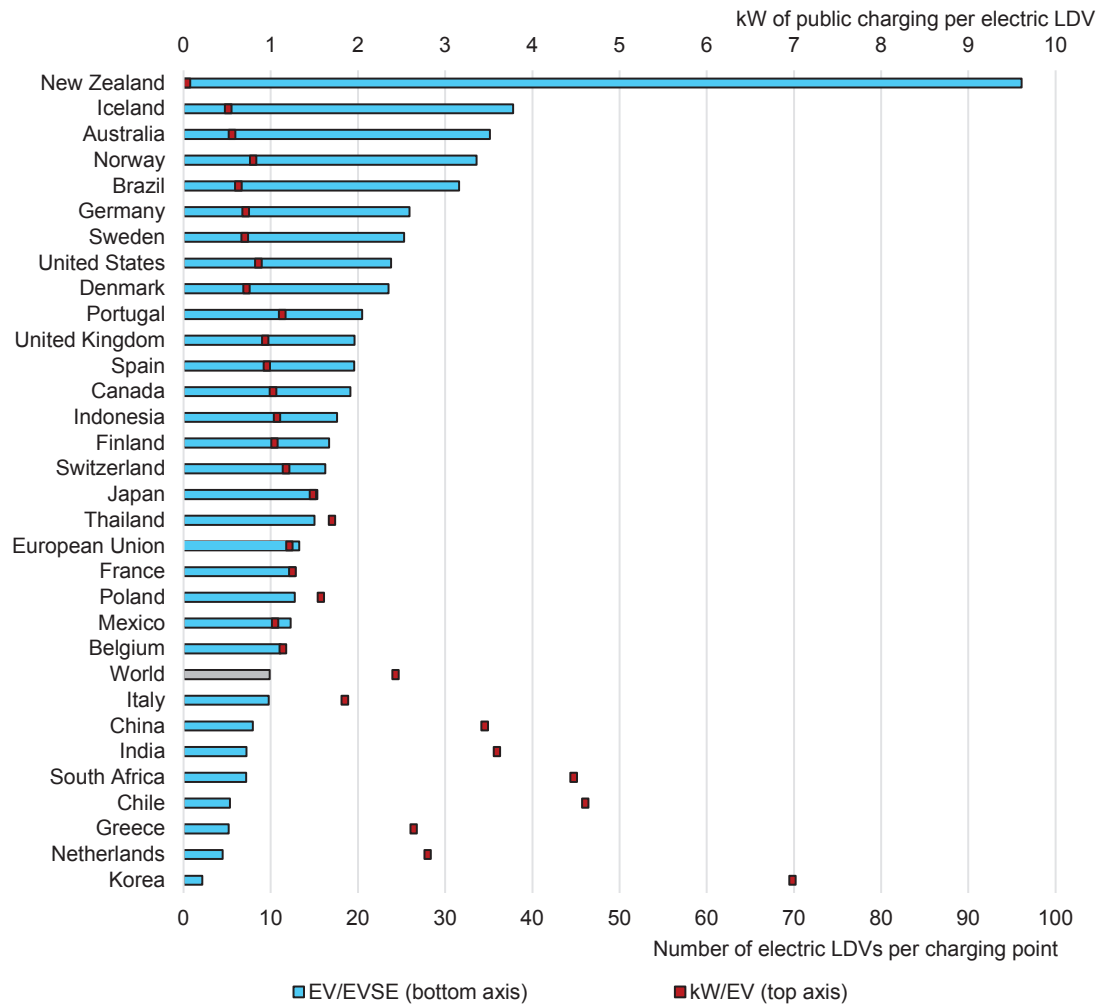
Note: Charging points include only publicly available chargers, both fast and slow.
 Source: IEA analysis based on country submissions.

Countries show different speeds in public charging deployment as the number of EVs on the road increases.

Perhaps more important than the number of public chargers available is the total public charging power capacity per EV, given that fast chargers can serve more EVs than slow chargers. During the early stages of EV adoption, it makes sense for available charging power per EV to be high, assuming that charger utilisation will be relatively low until the market matures and the utilisation of infrastructure becomes more efficient. In line with this, the European Union’s [provisional agreement](#) on the AFIR includes requirements for the total power capacity to be provided based on the size of the registered fleet.

Globally, the average public charging power capacity per electric LDV is around 2.4 kW per EV. In the European Union, the ratio is lower, with an average around 1.2 kW per EV. Korea has the highest ratio at 7 kW per EV, even with most public chargers (90%) being slow chargers.

Figure 1.16 Number of electric light-duty vehicles per public charging point and kW per electric light-duty vehicle, 2022



IEA. CC BY 4.0.

Notes: EV = electric vehicle; EVSE = electric vehicle supply equipment; LDV = light-duty vehicle. Kilowatts per EV are estimated assuming 11 kW for slow and 50 kW for fast chargers. Official national metrics might differ from these values as they can rely on more granular data.

Source: IEA analysis based on country submissions.

The number of electric light-duty vehicles per public EV charging point varies dramatically between countries, ranging from about 2 vehicles per charging point in Korea to almost 100 in New Zealand.

Charging needs for heavy-duty vehicles

In the regions where electric trucks are becoming commercially available, battery electric trucks can compete on a TCO basis with conventional diesel trucks for a growing range of operations, not only urban and regional, but also in the [heavy-duty](#) tractor-trailer regional and long-haul segments. Three parameters that determine the time at which [TCO parity](#) is reached are tolls; fuel and operations

costs (e.g. the difference between diesel and electricity prices faced by truck operators, and reduced maintenance costs); and CAPEX subsidies to reduce the gap in the upfront vehicle purchase price. Since electric trucks can provide the same operations with lower lifetime costs (including if a discounted rate is applied), the [time horizon](#) in which vehicle owners expect to recuperate upfront costs is a key factor in determining whether to purchase an electric or conventional truck.

The economics for electric trucks in long-distance applications can be substantially improved if charging costs can be reduced by maximising “off-shift” (e.g. night-time or other longer periods of downtime) slow charging, securing bulk purchase contracts with grid operators for “mid-shift” (e.g. during breaks), fast (up to 350 kW), or ultra-fast (>350 kW) charging, and exploring smart charging and vehicle-to-grid opportunities for extra income.

Electric trucks and buses will rely on off-shift charging for the majority of their energy. This will be largely achieved at private or semi-private charging depots or at public stations on highways, and often overnight. Depots to service growing demand for heavy-duty electrification will need to be developed, and in many cases may require distribution and transmission grid upgrades. Depending on vehicle range requirements, depot charging will be sufficient to cover most operations in urban bus as well as urban and regional truck operations.

The [major constraint](#) to rapid commercial adoption of electric trucks in [regional and long-haul operations](#) is the [availability of “mid-shift” fast charging](#). Although the majority of energy requirements for these operations could come from “off-shift” charging, fast and ultra-fast charging will be needed to extend range such that operations currently covered by diesel can be performed by battery electric trucks with little to no additional dwell time (i.e. waiting). Regulations that mandate rest periods can also provide a time window for mid-shift charging if fast or ultra-fast charging options are available en route: the European Union requires 45 minutes of break after every 4.5 hours of driving; the United States mandates 30 minutes after 8 hours.

Most commercially available direct current (DC) fast charging stations currently enable power levels ranging from 250-350 kW. The European Union’s Alternative Fuels Infrastructure Regulation (AFIR) aims to enable mid-shift charging across the EU’s core TEN-T network, which covers 88% of total long-haul freight activity, and along other key freight corridors. The [provisional agreement](#) reached by the European Council and Parliament includes a gradual process of infrastructure deployment for electric heavy-duty vehicles starting in 2025. Recent studies of power requirements for regional and long-haul truck operations in the [United States](#) and [Europe](#) find that charging power higher than 350 kW, and as high as 1 MW, may be required to fully recharge electric trucks during a 30- to 45-minute break.

Recognising the need to scale up fast or ultra-fast charging as a prerequisite for making both regional and, in particular, long-haul operations technically and economically viable, in 2022 Traton, Volvo, and Daimler established an independent joint venture, [Milence](#). With EUR 500 million in collective investments from the three heavy-duty manufacturing groups, the initiative aims to deploy more than 1 700 fast (300 to 350 kW) and ultra-fast (1 MW) charging points across Europe.

Multiple charging standards are currently in use, and technical specifications for ultra-fast charging are under development. Ensuring maximum possible convergence of charging standards and interoperability for heavy-duty EVs will be needed to avoid the cost, inefficiency, and challenges for vehicle importers and international operators that would be created by manufacturers following divergent paths.

In China, co-developers China Electricity Council and CHAdeMO's "ultra ChaoJI" are developing a charging standard for heavy-duty electric vehicles for up to several megawatts. In Europe and the United States, specifications for the CharIN Megawatt Charging System (MCS), with a potential maximum power of [4.5 MW](#), are under development by the International Organization for Standardization (ISO) and other organisations. The final MCS specifications, which will be needed for commercial roll-out, are expected for 2024. After the first megawatt charging site offered by Daimler Trucks and Portland General Electric (PGE) in 2021, at least [twelve high-power charging projects](#) are planned or underway in the United States and Europe, including charging of an electric Scania truck in Oslo, Norway, at a speed of [over 1 MW](#), [Germany's HoLa project](#), and the Netherlands Living Lab Heavy-Duty and [Green Transport Delta](#) Charging Stations, as well as investments and projects in Austria, Sweden, Spain and the United Kingdom.

Commercialisation of chargers with rated power of 1 MW will require significant investment, as stations with such high-power needs will incur significant costs in both installation and grid upgrades. Revising public electric utility business models and power sector regulations, co-ordinating planning across stakeholders and smart charging can all help to [manage grid impacts](#). Direct support through pilot projects and financial incentives can also accelerate demonstration and adoption in the early stages. A recent study outlines some [key design considerations](#) for developing MCS rated charging stations:

- Planning charging stations at highway depot locations near transmission lines and substations can be an optimal solution for minimising costs and increasing charger utilisation.
- "Right-sizing" connections with direct connections to transmission lines at an early stage, thereby anticipating the energy needs of a system in which high shares of freight activity have been electrified, rather than upgrading distribution grids on an

ad-hoc and short-term basis, will be critical to reduce costs. This will require structured and co-ordinated planning between grid operators and charging infrastructure developers across sectors.

- Since transmission system interconnections and grid upgrades can take 4-8 years, siting and construction of high-priority charging stations will need to begin as soon as possible.

[Alternative solutions](#) include installing stationary storage and integrating local renewable capacity, combined with smart charging, which [can help reduce](#) both infrastructure costs related to grid connection and electricity procurement costs (e.g. by enabling truck operators to minimise cost by arbitraging price variability throughout the day, taking advantage of vehicle-to-grid opportunities, etc.).

Other options to provide power to electric heavy-duty vehicles (HDVs) are [battery swapping](#) and electric road systems. Electric road systems can transfer power to a truck either via inductive coils¹³ in a road, or through conductive connections between the vehicle and road, or via catenary (overhead) lines. Catenary and other dynamic charging options may hold promise for [reducing the uncertainty](#) of system-level costs in the transition to zero-emission regional and long-haul trucks, [competing](#) favourably in terms of total capital and operating costs. They can also help to reduce battery capacity needs. [Battery demand](#) can be further reduced, and utilisation further improved, if electric road systems are designed to be compatible not only with trucks but also electric cars. However, such approaches would require inductive or in-road designs that come with greater hurdles in terms of technology development and design, and are more capital intensive. At the same time, electric road systems pose significant challenges resembling those of the rail sector, including a greater need for standardisation of paths and vehicles (as illustrated with trams and trolley buses), compatibility across borders for long-haul trips, and appropriate infrastructure ownership models. They provide less flexibility for truck owners in terms of routes and vehicle types, and have high development costs overall, all affecting their competitiveness relative to regular charging stations. Given these challenges, such systems would most effectively be deployed first on heavily used freight corridors, which would entail close co-ordination across various public and private stakeholders. Demonstrations on public roads to date in [Germany](#) and [Sweden](#) have relied on champions from both [private](#) and public entities. Calls for electric road system pilots are also being considered in the China, India, the [United Kingdom](#) and the United States.

¹³ Inductive solutions are further from commercialisation and face challenges to deliver sufficient power at highway speeds.

in 2022, and the company has set a target of 4 000 battery swap stations globally by 2025. The company [claims](#) their swap stations can perform over 300 swaps per day, charging up to 13 batteries concurrently at a power of 20-80 kW.

NIO also announced plans to [build battery swap stations in Europe](#) as their battery swapping-enabled car models became available in European markets towards the end of 2022. The first NIO battery swap station in Sweden was opened in [November 2022](#), and by the end of 2022, ten NIO battery swap stations had been opened across Norway, Germany, Sweden and the Netherlands. In contrast to NIO, whose swapping stations service NIO cars, the Chinese battery swapping station operator Aulton's stations support [30 models from 16 different vehicle companies](#).

Battery swapping could also be a particularly attractive option for LDV taxi fleets, whose operations are more sensitive to recharging times than personal cars. US start-up Ample currently operates [12 battery swapping stations](#) in the San Francisco Bay area, mainly serving Uber rideshare vehicles.

Batteries

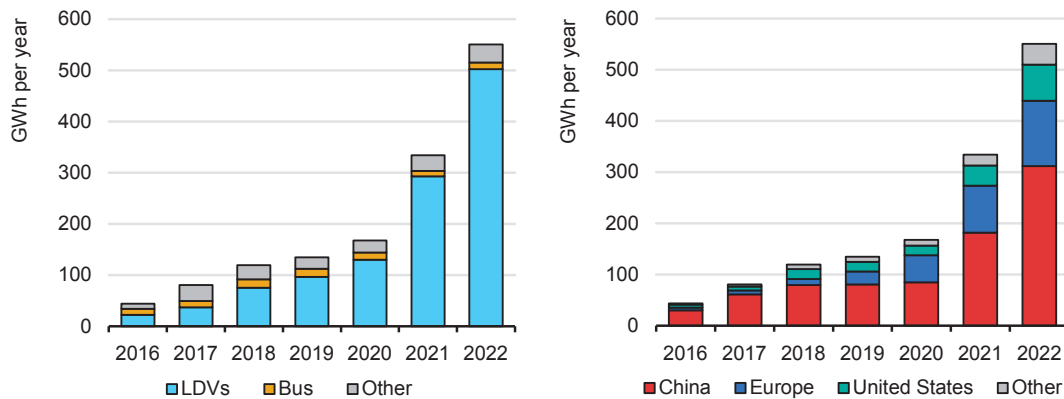
Battery demand for EVs continues to rise

Automotive lithium-ion (Li-ion) battery demand increased by about 65% to 550 GWh in 2022, from about 330 GWh in 2021, primarily as a result of growth in electric passenger car sales, with new registrations increasing by 55% in 2022 relative to 2021.

In China, battery demand for vehicles grew over 70%, while electric car sales increased by 80% in 2022 relative to 2021, with growth in battery demand slightly tempered by an increasing share of PHEVs. Battery demand for vehicles in the United States grew by around 80%, despite electric car sales only increasing by around 55% in 2022. While the average battery size for battery electric cars in the United States only grew by about 7% in 2022, the average battery electric car battery size remains about 40% higher than the global average, due in part to the higher share of SUVs in US electric car sales relative to other major markets,¹⁴ as well as manufacturers' strategies to offer longer all-electric driving ranges. Global sales of BEV and PHEV cars are outpacing sales of hybrid electric vehicles (HEVs), and as BEV and PHEV battery sizes are larger, battery demand further increases as a result.

¹⁴ For more information on the climate impact of SUVs, refer to the IEA's [27 February 2023 commentary](#) on the subject.

Figure 1.17 Battery demand by mode and region, 2016-2022



IEA. CC BY 4.0.

Notes: LDVs = light-duty vehicles, including cars and vans; In the left chart, “Other” includes medium- and heavy-duty trucks and two/three-wheelers. Battery demand refers to automotive lithium-ion batteries. This analysis does not include conventional hybrid vehicles.

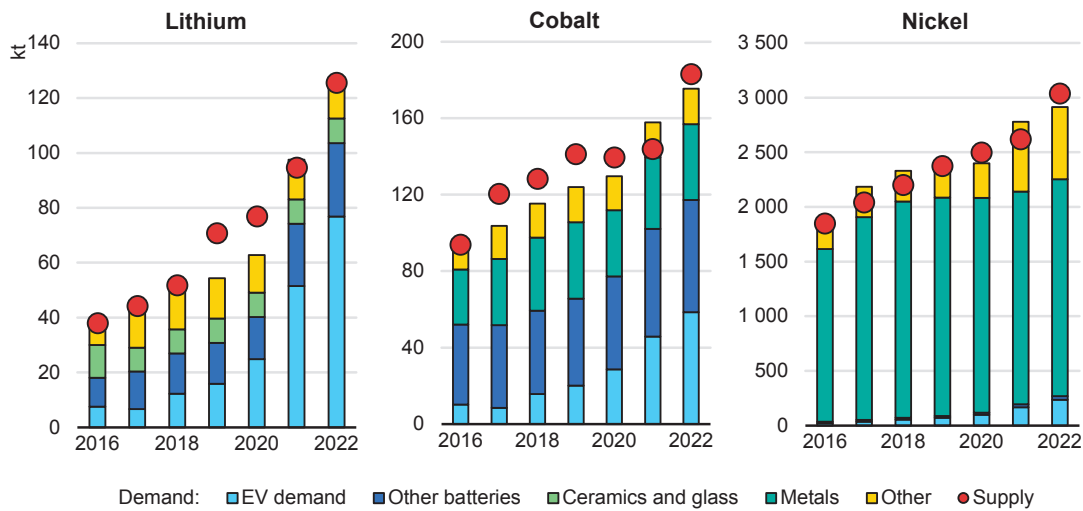
Source: IEA analysis based on EV Volumes.

Global battery demand increased by 65% in 2022, mainly as a result of electric car sales in China.

The increase in battery demand drives the demand for critical materials. In 2022, lithium demand exceeded supply (as in 2021) despite the 180% increase in production since 2017. In 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries. Just five years earlier, in 2017, these shares were around 15%, 10% and 2%, respectively. As has already been seen for lithium, mining and processing of these critical minerals will need to increase rapidly to support the energy transition, not only for EVs but more broadly to keep up with the pace of demand for clean energy technologies.¹⁵ Reducing the need for critical materials will also be important for supply chain sustainability, resilience and security. Accelerating innovation can help, such as through advanced battery technologies requiring smaller quantities of critical minerals, as well as measures to support uptake of vehicle models with optimised battery size and the development of battery recycling.

¹⁵ For more information on the future of supply and demand of critical minerals, refer to the [Energy Technology Perspective 2023](#) report.

Figure 1.18 Overall supply and demand of battery metals by sector, 2016-2022



IEA. CC BY 4.0.

Note: EV = electric vehicle. The metals category includes alloying applications. Supply refers to refinery output and not mining output.

Source: IEA analysis based on [Mineral Commodity Summary 2022](#) by USGS, lithium and cobalt global supply-demand balance (January 2023) and nickel global supply-demand balance (January 2023) from S&P Global and World Metal Statistics Yearbook by the World Bureau of Metal Statistics.

In 2022, supply of nickel and cobalt exceeded demand, while lithium demand outpaced supply by a small margin.

Battery chemistries are diversifying

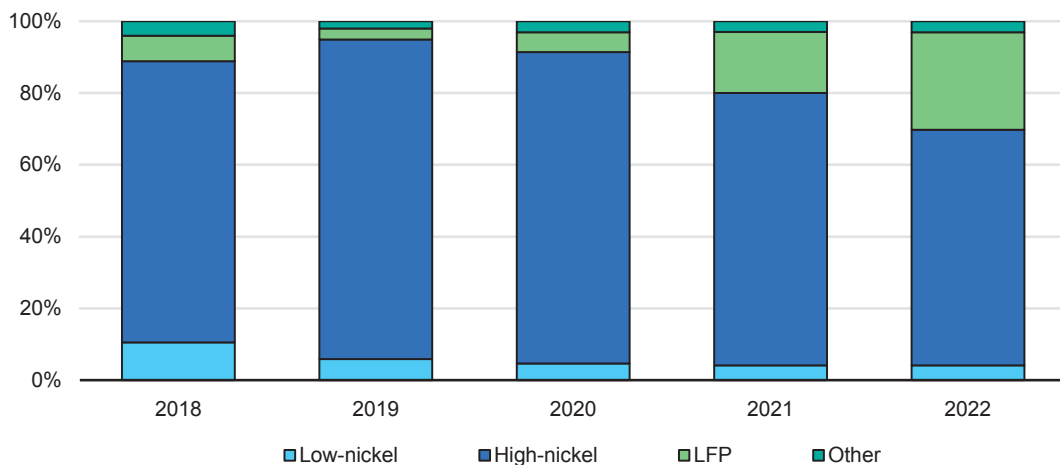
New alternatives to conventional lithium-ion are on the rise

In 2022, lithium nickel manganese cobalt oxide (NMC) remained the dominant battery chemistry with a market share of 60%, followed by lithium iron phosphate (LFP) with a share of just under 30%, and nickel cobalt aluminium oxide (NCA) with a share of about 8%.

Lithium iron phosphate (LFP) cathode chemistries have reached their highest share in the past decade (Figure 1.19). This trend is driven mainly by the preferences of Chinese OEMs. Around 95% of the LFP batteries for electric LDVs went into vehicles produced in China, and BYD alone represents 50% of demand. Tesla accounted for 15%, and the share of LFP batteries used by Tesla increased from 20% in 2021 to 30% in 2022. Around 85% of the cars with LFP batteries manufactured by Tesla were manufactured in China, with the remainder being manufactured in the United States with cells imported from China. In total, only around 3% of electric cars with LFP batteries were manufactured in the United States in 2022.

LFP batteries contrast with other chemistries in their use of iron and phosphorus rather than the nickel, manganese and cobalt found in NCA and NMC batteries. The downside of LFP is that the energy density tends to be lower than that of NMC. LFP batteries also contain phosphorus, which is used in food production. If all batteries today were LFP, they would account for nearly 1% of current agricultural phosphorus use by mass, suggesting that conflicting demands for phosphorus may arise in the future as battery demand increases.

Figure 1.19 Electric light-duty vehicle battery capacity by chemistry, 2018-2022



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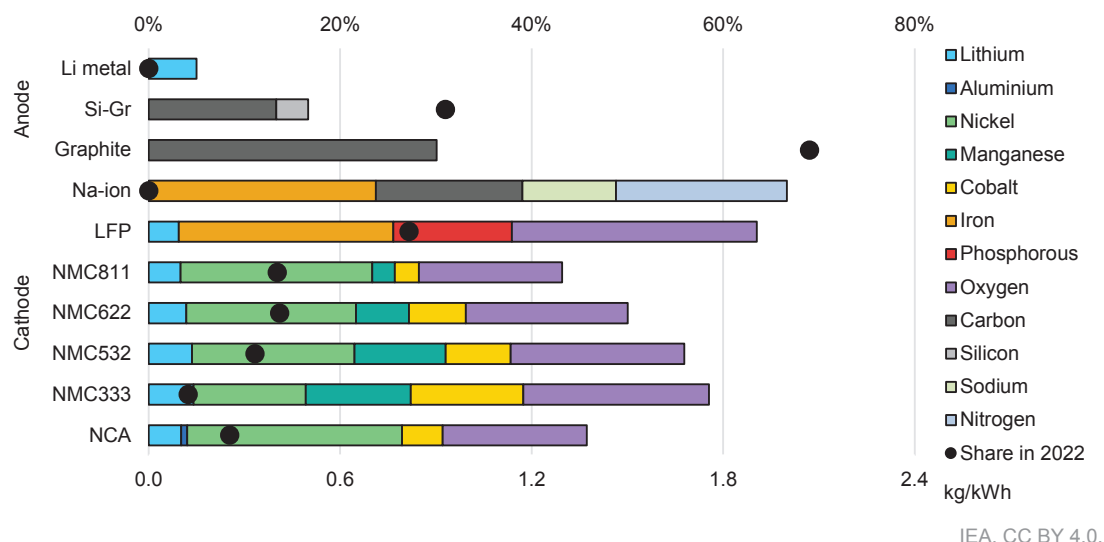
Notes: LFP = Lithium iron phosphate. Low-nickel includes: NMC333. High-nickel includes: NMC532, NMC622, NMC721, NMC811, NCA and NMCA. Cathode sales share is based on battery capacity.

Source: IEA analysis based on EV Volumes.

The share of lithium iron phosphate reached its highest ever point, accounting for almost 30% of new electric LDV battery capacity in 2022.

With regards to anodes, a number of chemistry changes have the potential to improve energy density (watt-hour per kilogram, or Wh/kg). For example, silicon can be used to replace all or some of the graphite in the anode in order to make it lighter and thus increase the energy density. Silicon-doped graphite already entered the market a few years ago, and now around 30% of anodes contain silicon. Another option is innovative lithium metal anodes, which could yield even greater energy density when they become commercially available (Figure 1.20).

Figure 1.20 Material content in different anode and cathodes



Notes: Li metal = Lithium metal anode; Si-Gr = Silicon-graphite anode; Graphite = Pure graphite anode; Na-ion = Sodium-ion; LFP = Lithium iron phosphate; NMC = Lithium nickel manganese cobalt oxide; NCA = Lithium nickel cobalt aluminium oxide. Materials composing the battery casing and the electrolyte are excluded. Chemistry shares are based on demand. The share of NCA battery includes every NCA type and Si-Gr includes every degree of silicon-graphite mix. Carbon covers the graphite composing anodes. The Na-ion cathode shown is the Prussian white.

Source: IEA analysis based on Lithium-Ion Batteries: State of the Industry 2022 by BNEF, [BatPaC v4](#) by Argonne Laboratory and [Sodium-ion batteries: disrupt and conquer?](#) by Wood Mackenzie.

Lithium iron phosphate cathodes do not rely on nickel, manganese or cobalt, which has contributed to their increased market share.

In recent years, alternatives to Li-ion batteries have been emerging, notably sodium-ion (Na-ion). This battery chemistry has the dual advantage of relying on lower cost materials than Li-ion, leading to cheaper batteries, and of completely avoiding the need for critical minerals. It is currently the only viable chemistry that does not contain lithium. The Na-ion battery developed by China’s CATL is estimated to cost 30% [less](#) than an LFP battery. Conversely, Na-ion batteries do not have the same energy density as their Li-ion counterpart (respectively [75](#) to [160](#) Wh/kg compared to 120 to 260 Wh/kg). This could make Na-ion relevant for urban vehicles with lower range, or for stationary storage, but could be more challenging to deploy in locations where consumers prioritise maximum range autonomy, or where charging is less accessible. There are nearly 30 Na-ion battery manufacturing plants currently operating, planned or under construction, for a combined capacity of over [100 GWh](#), almost all in China. For comparison, the current manufacturing capacity of Li-ion batteries is around 1 500 GWh.

Multiple carmakers have already announced Na-ion electric cars, such as the [Seagull by BYD](#), which has an announced range of 300 km and is sold for USD 11 600 (with possible discounts bringing the price down to USD 9 500), and the Sehol EX10, produced by the VW-JAC joint venture, with a 250 km range.

While these first models are likely to be slightly more expensive than the cheapest small BEV models in China – such as the Wuling Mini BEV, [sold](#) for as little as USD 5 000 to 6 500 – they are still cheaper than equivalent options with similar driving range. To compare, the Wuling Mini BEV's range stands at 170 km, but BYD's Dolphin BEV, the second best-selling small BEV in China in 2022, with a similar range to the announced Na-ion cars, can [cost](#) more than USD 15 000. BYD plans to progressively integrate Na-ion batteries into all its models below USD 29 000 as battery production ramps up. These announcements suggest that electric vehicles powered by Na-ion will be available for sale and driven for the first time in 2023-2024, hence bringing the technology to a readiness level (TRL¹⁶) of 8-9, between first-of-a-kind commercial and commercial operation in the relevant environment. In 2022, it was [assessed](#) at TRL 6 (full prototype at scale) in the IEA [Clean Technology Guide](#), compared to only TRL 3-4 (small prototypes) in the assessment from 2021, highlighting quick technological progress.

Critical mineral prices can have an impact on chemistry choice

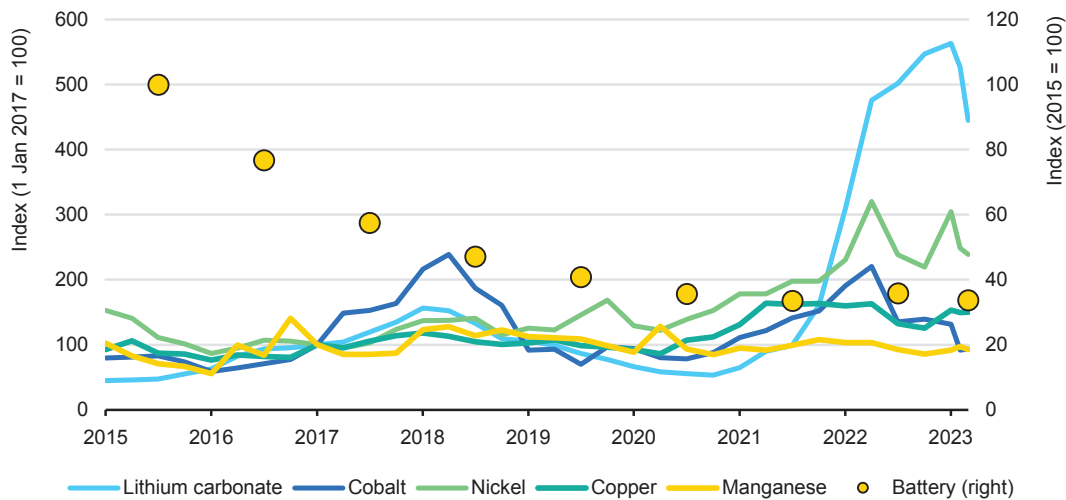
The variability in price and availability of critical minerals can also explain some of the developments in battery chemistry from the last few years (Figure 1.21). NMC chemistries using an equal ratio of nickel, manganese, and cobalt (NMC333 or NMC111) were popular until 2015. Since then, cobalt price increases and concerns affecting public acceptance of cobalt mining have contributed to a shift towards lower-cobalt ratios, such as NMC622, and then NMC811, which are nevertheless more difficult to manufacture. In 2022, the price of nickel increased, reaching a peak twice as high as the 2015-2020 average. This created incentives to use chemistries that are less reliant on nickel, such as LFP, despite their lower energy density.

Lithium carbonate prices have also been steadily increasing over the past two years. In 2021, prices multiplied four- to five-fold, and continued to rise throughout 2022, nearly doubling between 1 January 2022 and 1 January 2023. At the beginning of 2023, lithium prices stood six times above their average over the 2015-2020 period. In contrast to nickel and lithium, manganese prices have been relatively stable. One reason for the increase in prices for lithium, nickel and cobalt was the insufficient supply compared to demand in 2021 (Figure 1.18). Although nickel and cobalt supply surpassed demand in 2022, this was not the case for lithium, causing its price to rise more strongly over the year. Between January and March 2023, lithium prices dropped 20%, returning to their late 2022 level. The combination of an expected 40% [increase](#) in supply and slower growth in demand, especially for EVs in China, has contributed to this trend. This drop – if sustained – could translate into lower battery prices.

¹⁶ Technology Readiness Level (TRL) provides a snapshot of the maturity of a given technology. It has 11 steps ranging from initial idea at step 1 to proof of stability reached at step 11. For more information, refer to the [IEA Clean Technology Guide](#).

Beyond those materials, global commodity prices have surged in the last few years, as a [result](#) of supply disruptions in the wake of the Covid-19 pandemic, rising demand as the global economy started to recover, and Russia’s invasion of Ukraine in February 2022, among other factors.

Figure 1.21 Price of selected battery materials and lithium-ion batteries, 2015-2023



IEA. CC BY 4.0.

Notes: Data until March 2023. Lithium-ion battery prices (including the pack and cell) represent the global volume-weighted average across all sectors. Nickel prices are based on the London Metal Exchange, used here as a proxy for global pricing, although most nickel trade takes place through direct contracts between producers and consumers. The 2023 battery price value is based on cost estimates for NMC 622.

Source: IEA analysis based on material price data by S&P, 2022 Lithium-Ion Battery Price Survey by BNEF and Battery Costs Drop as Lithium Prices in China Fall by BNEF.

From 2021 to the end of 2022, the price of critical materials such as lithium, cobalt and nickel increased dramatically, putting pressure on historical Li-ion battery price decreases.

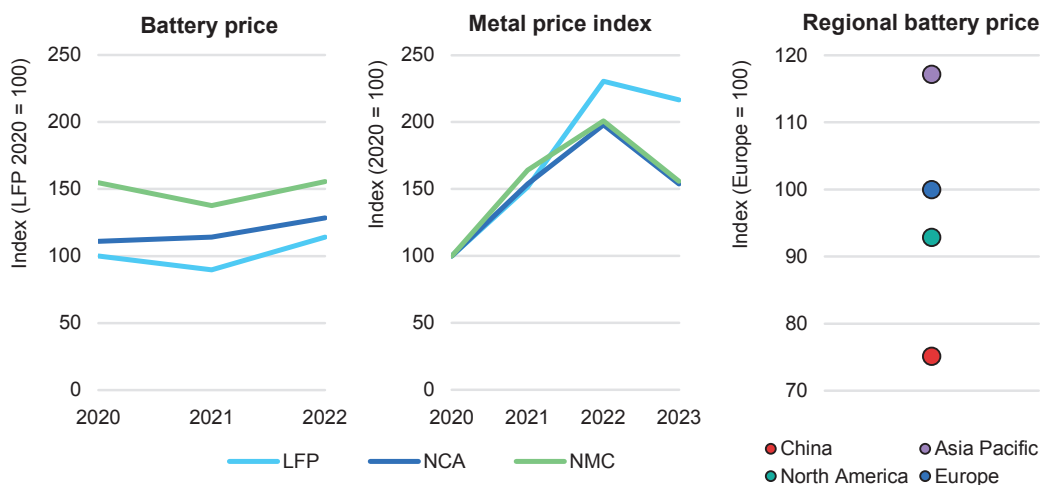
In 2022, the estimated average battery price [stood](#) at about USD 150 per kWh, with the cost of pack manufacturing accounting for about 20% of total battery cost, compared to more than 30% a decade earlier. Pack production costs have continued to decrease over time, down 5% in 2022 compared to the previous year. In contrast, cell production costs increased in 2022 relative to 2021, returning to 2019 levels. This can be explained in part by the increasing prices of materials, which account for a significant portion of cell price, and of electricity, which affects manufacturing costs, whereas efficiency gains in pack manufacturing help decrease costs. Bloomberg New Energy Finance (BNEF) sees pack manufacturing costs dropping further, by about 20% by 2025, whereas cell production costs decrease by only 10% relative to their historic low in 2021. This warrants further analysis based on future trends in material prices.

The effect of increased battery material prices differed across various battery chemistries in 2022, with the strongest increase being observed for LFP batteries

(over 25%), while NMC batteries experienced an increase of less than 15% (Figure 1.21). Since LFP batteries contain neither nickel nor cobalt, which are relatively expensive compared to iron and phosphorus, the price of lithium plays a relatively larger role in determining the final cost. Given that the price of lithium increased at a higher rate than the price of nickel and cobalt, the price of LFP batteries increased more than the price of NMC batteries. Nonetheless, LFP batteries remain less expensive than NCA and NMC per unit of energy capacity.

The price of batteries also varies across different regions, with China having the lowest prices on average, and the rest of the Asia Pacific region having the highest (Figure 1.21). This price discrepancy is influenced by the fact that around 65% of battery cells and almost 80% of cathodes are manufactured in China.

Figure 1.22 Price index for selected battery chemistries, regions and metal price, 2020-2023



IEA. CC BY 4.0.

Note: LFP = Lithium iron phosphate; NMC = Lithium nickel manganese cobalt oxide; NCA = Lithium nickel cobalt aluminium oxide. The metal price index is based on the price evolution of four commodities (lithium carbonate, cobalt, nickel and copper) weighted by their use in each battery chemistry. For this metal price index, NMC uses the NMC622 chemistry. The 2023 value of the metal price index covers only the first 3 months of the year. Asia Pacific excludes China. Regional battery (pack) price refers to 2022.

Source: IEA analysis based on material price data by S&P, 2022 Lithium-Ion Battery Price Survey by BNEF, [BatPaC v4](#) by Argonne Laboratory and Lithium-Ion Batteries: State of the Industry 2022 by BNEF.

Despite a higher relative increase in price compared to other battery chemistries, LFP batteries remain the lowest price per kWh.

Prospects for electric vehicle deployment

Several pathways to electrify road transport in the period to 2030 are explored in this section. First, deployment of electric vehicles (EVs) is projected by region and road segment for the Stated Policies and Announced Pledges scenarios, and globally by segment for the Net Zero Emissions by 2050 Scenario. These projections are then compared to announcements by original equipment manufacturers (OEMs). Then the corresponding battery demand is projected, followed by roll-out requirements for charging infrastructure. Finally, the impacts of EV deployment are assessed, including increased electricity demand, oil displacement, implications for tax revenues, and net well-to-wheels GHG emissions.

Outlook for electric mobility

Scenarios

A scenario-based approach is used to explore road transport electrification and its impact, based on the latest market data, policy drivers and technology perspectives. Two IEA scenarios – the Stated Policies and Announced Pledges scenarios – inform the outlooks, which are examined in relation to the Net Zero Emissions by 2050 Scenario at the global level.¹ These scenarios are based on announced policies, ambitions and market trends through the first quarter of 2023.

The purpose of the scenarios is to assess plausible futures for global EV markets and the implications they could have. The scenarios do not make predictions about the future. Rather, they aim to provide insights to inform decision-making by governments, companies and stakeholders about the future of EVs.

These scenario projections incorporate GDP and population assumptions from the [International Monetary Fund](#) (2022) and [United Nations](#) (2022), respectively.

Stated Policies Scenario

The [Stated Policies Scenario](#) (STEPS) reflects existing policies and measures, as well as firm policy ambitions and objectives that have been legislated by

¹ The projections in the Stated Policies and Announced Pledges scenarios are based on historical trends through the end of 2022 as well as stated policies and ambitions as of the end of March 2023. The Net Zero Emissions by 2050 Scenario is consistent with the [World Energy Outlook 2022](#) publication.

governments around the world. It includes current EV-related policies, regulations and investments, as well as market trends based on the expected impacts of technology developments, announced deployments and plans from industry stakeholders. The STEPS aims to hold up a mirror to the plans of policy makers and illustrate their consequences.

Announced Pledges Scenario

The [Announced Pledges Scenario](#) (APS) assumes that all announced ambitions and targets made by governments around the world are met in full and on time. With regards to electromobility, it includes all recent major announcements of electrification targets and longer-term net zero emissions and other pledges, regardless of whether these have been anchored in legislation or in updated Nationally Determined Contributions (NDCs). For example, the APS assumes that countries that have signed on to the Conference of the Parties (COP 26) declaration on accelerating the transition to [100% zero emissions cars and vans](#) will achieve this goal, even if there are not yet policies or regulations in place to support it. In countries that have not yet made a net zero emissions pledge or set electrification targets, the APS considers the same policy framework as the STEPS. Non-policy assumptions for the APS, including population and economic growth, are the same as in the STEPS.

The difference between the APS and the STEPS represents the “implementation gap” that exists between the policy frameworks and measures required to achieve country ambitions and targets, and the policies and measures that have been legislated.

Net Zero Emissions by 2050 Scenario

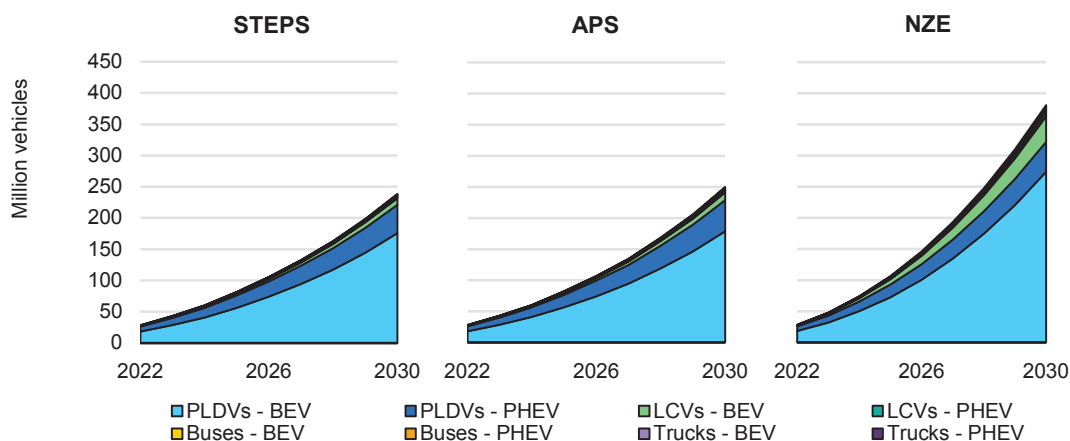
The [Net Zero Emissions by 2050 Scenario](#) (NZE Scenario) is a normative scenario that sets out a narrow but achievable pathway for the global energy sector to achieve net zero CO₂ emissions by 2050. The scenario is compatible with limiting the global temperature rise to 1.5°C with no or limited temperature overshoot, in line with reductions assessed by the Intergovernmental Panel on Climate Change in its [Special Report on Global Warming of 1.5°C](#). There are many possible paths to achieve net zero CO₂ emissions globally by 2050 and many uncertainties that could affect them. The NZE Scenario is therefore a path and not *the* path to net zero emissions.

The difference between the NZE Scenario and the APS highlights the “ambition gap” that needs to be closed to achieve the goals under the 2015 Paris Agreement.

Electric vehicle fleet to grow by a factor of eight or more by 2030

The total fleet of EVs (excluding two/three-wheelers) grows from almost 30 million in 2022 to about 240 million in 2030 in the Stated Policies Scenario (STEPS), achieving an average annual growth rate of about 30%. In this scenario, EVs account for over 10% of the road vehicle fleet by 2030. Total EV sales reach over 20 million in 2025 and over 40 million in 2030, representing over 20% and 30% of all vehicle sales, respectively.

Figure 3.1. Electric vehicle stock by mode and scenario, 2022-2030



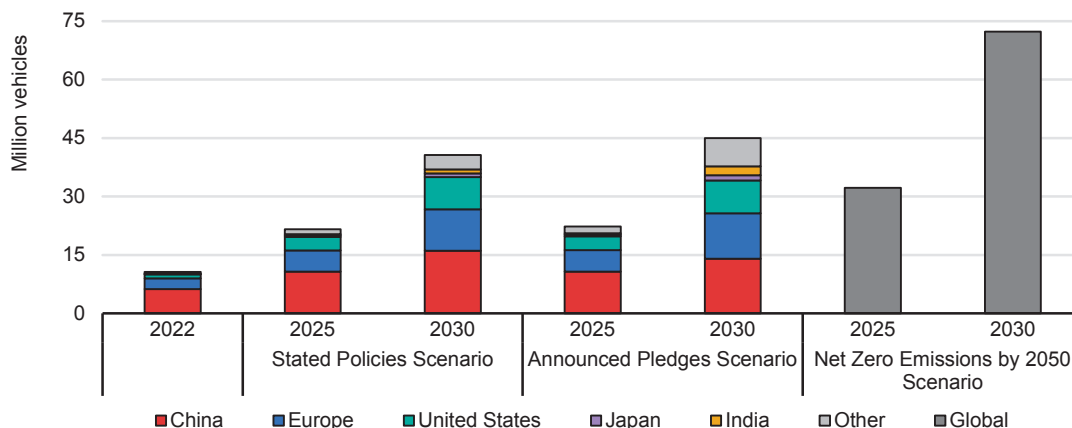
IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario; BEV = battery electric vehicle; PHEV = plug-in hybrid electric; PLDV = passenger light-duty vehicle; LCV = light commercial vehicle.

EV deployment commensurate with government pledges is only 5% above what stated policies would imply by 2030.

In the Announced Pledged Scenario (APS), based on announced government targets and pledges that go beyond existing policies, the global EV fleet reaches almost 250 million in 2030, around 5% higher than in the STEPS. The average annual growth rate in the APS is nearly 35%, with the result that one in seven vehicles on the road is an EV in 2030. Total EV sales reach 45 million in 2030, representing over 35% of all vehicle sales.

Figure 3.2. Electric vehicle sales by region, 2022-2030

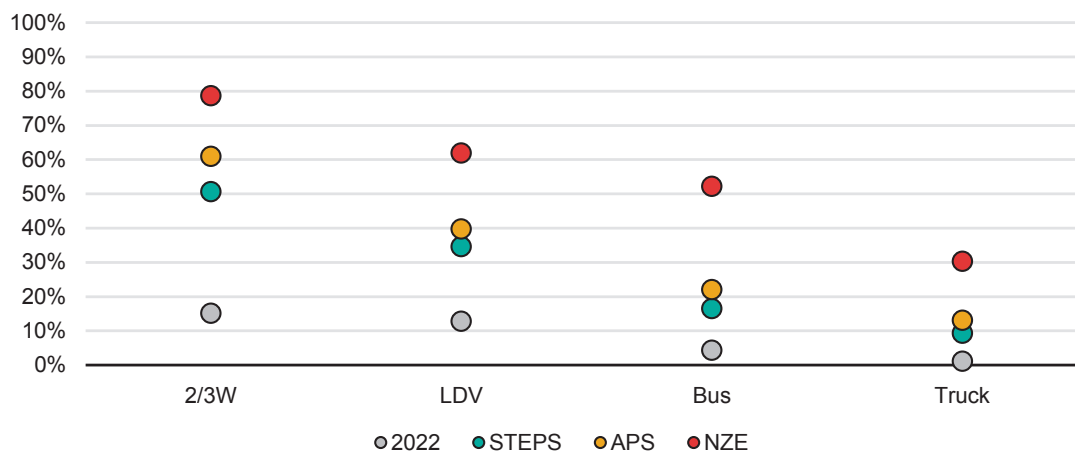


IEA. CC BY 4.0.

Global EV sales increase around fourfold from 2022 to 2030 under both stated policies and announced ambitions.

The global EV sales share in 2030 in the STEPS is about half that in the NZE Scenario, in which the fleet of EVs grows more rapidly, at an average annual rate of around 40%, reaching 380 million EVs on the road in 2030. Electric vehicle sales reach over 30 million in 2025 and over 70 million in 2030, a total of approximately 30% and 60% of all vehicle sales, respectively.

Figure 3.3. Electric vehicle sales shares by mode and scenario, 2030



IEA. CC BY 4.0.

Notes: 2/3W = two/three-wheeler; LDV = light-duty vehicle; STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario.

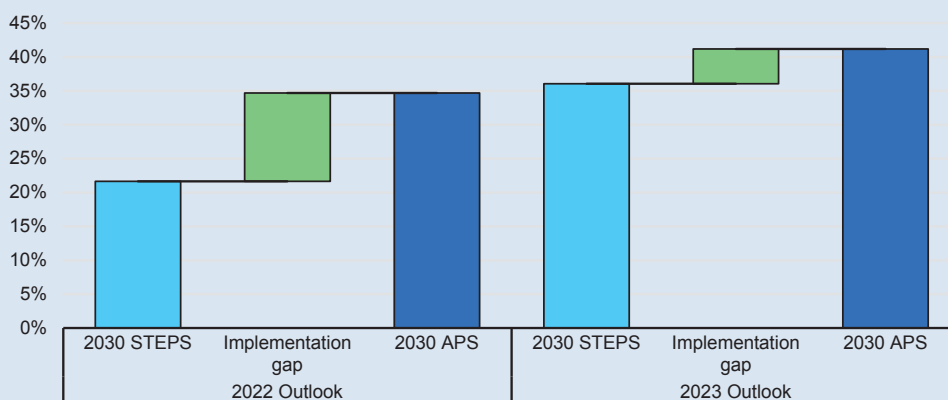
Existing policies are projected to yield market shares almost in line with country pledges across all modes of transport.

Box 3.1 Closing the implementation gap: how EV policy is catching up with targets

Targets and ambitions for clean energy technology deployment are generally more easily formulated than they are achieved, but in the case of EVs, the momentum is clearly on the side of achievement. Strong market uptake in 2022, combined with major policy announcements over the past year, have led to a significant upward revision of EV deployment to 2030 in the STEPS presented in this edition of the Global EV Outlook compared to the [2022 edition](#). The projected sales shares of EVs based on stated policies and market trends are now coming close to country stated ambitions for EVs, meaning that the policy implementation gap – the difference between country deployment ambitions and the policies currently in place – in the 2023 Outlook is much smaller than in the 2022 edition.

This is most notable for light-duty vehicles, where recent policies such as the US Inflation Reduction Act (IRA) and new EU CO₂ standards for cars and vans have resulted in a significantly higher EV sales share in 2030 in the STEPS. In this year’s Outlook, under announced ambitions, the electric car sales share exceeds 40% in 2030 compared to 35% under stated policies: this gap has more than halved in the past year. For trucks and buses, the EV sales share in 2030 in the STEPS also increased faster than ambition. As a result, the gap between ambition and legislated policies for HDVs is half of what it was in the 2022 Outlook.

Electric car sales share implementation gap, 2030



IEA. CC BY 4.0.

Realising the potential of EVs to support government climate (as well as energy security) ambitions is thus almost in reach under current policy frameworks. In particular, the gap between policy and ambition has closed in three of the largest EV markets: the European Union, the United States and China. At the global level, oil displacement by EVs reaches 1.8 million barrels per day in 2025 (over 5 mb/d in 2030) under stated policies. As a result, global demand for oil-based road transport fuels will peak by 2025.

The momentum seen over the past year in terms of increasing EV sales and new supportive policies being introduced, along with funding designated for the necessary infrastructure (for example, the USD 5 billion allocated in the US IIJA to support EV charger installation), have also led industry players to invest more in EV supply chains. Notably, planned EV battery manufacturing expansions are set to increase capacity more than fourfold, reaching 6.8 TWh/year of production capacity in 2030, 65% higher than is needed to enable the level of EV deployment in the APS. Taken together, this suggests that even higher EV deployment than is implied by the APS is achievable by 2030 if policy efforts are sustained and critical potential bottlenecks (such as around recharging infrastructure and mining) are addressed early on.

Light-duty vehicles

Light-duty vehicles (LDVs), including passenger light-duty vehicles (PLDVs) and light commercial vehicles (LCVs), continue to make up the majority of electric vehicles (excluding two/three-wheelers). This is a result of strong policy support, including light-duty vehicle fuel economy or CO₂ standards, the availability of EV models, and the size of the LDV market. In the STEPS, electric LDV sales are projected to reach over 20 million in 2025, doubling the number of sales in 2022, and to quadruple to 40 million in 2030. The sales share of electric LDVs thus increases from 13% in 2022 to over 20% in 2025 and around 35% in 2030. The stock of electric LDVs reaches about 230 million in 2030, meaning that about one in every seven LDVs on the road is electric.

In the APS, the fleet of electric LDVs reaches over 240 million in 2030, a 15% stock share. Of these, 230 million are electric PLDVs, with only 6% being LCVs. Sales of electric LDVs reach almost 45 million in 2030 in the APS, representing a sales share of 40%. These results reflect government electrification ambitions and net zero pledges, including the [2021 COP 26 declaration target](#) to achieve 100% zero-emission LDV sales by 2040, and by 2035 in leading markets, which 40 national governments have committed to.

In the NZE Scenario, the sales share of electric LDVs reaches 30% in 2025, four years earlier than in the STEPS. In 2030, the sales share is over 60%, about 80% higher than in the STEPS and 55% higher than in the APS.

Buses

Governments have made significant progress in electrifying public bus fleets. In 2022, there were more than 800 000 electric buses on the road, representing over 3% of all buses. As such, buses are the most electrified road segment, excluding two/three-wheelers. In the STEPS, the electric bus fleet reaches 1.4 million in 2025 and 2.7 million in 2030, at which point around one in ten buses will be electric. In the near term, electrification is expected to progress most rapidly within the publicly owned urban bus fleet, which is covered by government procurement

regulations and, in some cases, government funding. For example, Canada is aiming to put 5 000 electric public and school buses on the road by the end of 2025 via the CAD 2.75 billion [Zero Emission Transit Fund](#).

In the APS, the electric bus fleet exceeds 3 million in 2030, reaching a stock share of over 10%. In 2030, about a quarter of buses sold are electric, which is about 35% higher than the sales share in the STEPS. In part, this increase is due to the [proposed EU heavy-duty vehicle CO₂ standards](#), which would require 100% zero-emission city bus sales from 2030. In the NZE Scenario, the electrification of buses is even more rapid, with one in two buses sold in 2030 being electric.

Medium- and heavy-duty trucks

Medium- and heavy-duty trucks are more difficult to electrify than other road segments, due in part to the size, weight and cost of the batteries needed to fully electrify this segment. However, progress is being made: around 320 000 electric trucks were on the road in 2022. By 2030, the fleet of electric trucks reaches almost 3.5 million in the STEPS, over 3% of the total truck fleet.

In the APS, the stock of electric trucks exceeds 4 million in 2030, a stock share of 4%. Electric truck sales increase from a negligible share today to over 9% in the STEPS in 2030 and 13% in the APS. The increased sales in the APS are driven in particular by the [Global Memorandum of Understanding \(MoU\) on Zero-Emission Medium- and Heavy-Duty Vehicles](#), through which 27 countries have now pledged to reach 30% zero-emission medium- and heavy-duty vehicle² sales by 2030 and 100% by 2040. In addition, the European Union has proposed HDV CO₂ standards that would require a 45% reduction in emissions in 2030 compared to 2019 levels.

In the NZE Scenario, electric trucks reach 30% of sales in 2030, which is aligned with the Global MoU on Zero-Emission Medium- and Heavy-Duty vehicles. However, this sales share is still two-and-a-half times that in the APS, and over three times that in the STEPS.

Two/three-wheelers

Two/three-wheelers are currently the most electrified road transport segment. Given the vehicles' light weight and limited daily driving distance, battery electrification is relatively easy and makes economic sense on a total cost of ownership basis in many regions. In 2022, the electric two/three-wheeler fleet totalled over 50 million, reaching a stock share of around 7%.

In the STEPS, the fleet of electric two/three-wheelers reaches 220 million in 2030, or a quarter of the total two/three-wheeler fleet. In the APS, the stock grows to 280 million, and almost 30% of all two/three-wheelers are electric. The electric sales share in 2030 reaches 50% in the STEPS and 60% in the APS. In the NZE Scenario, the electric two/three-wheeler sales share reaches almost 80% in 2030.

²Includes buses.

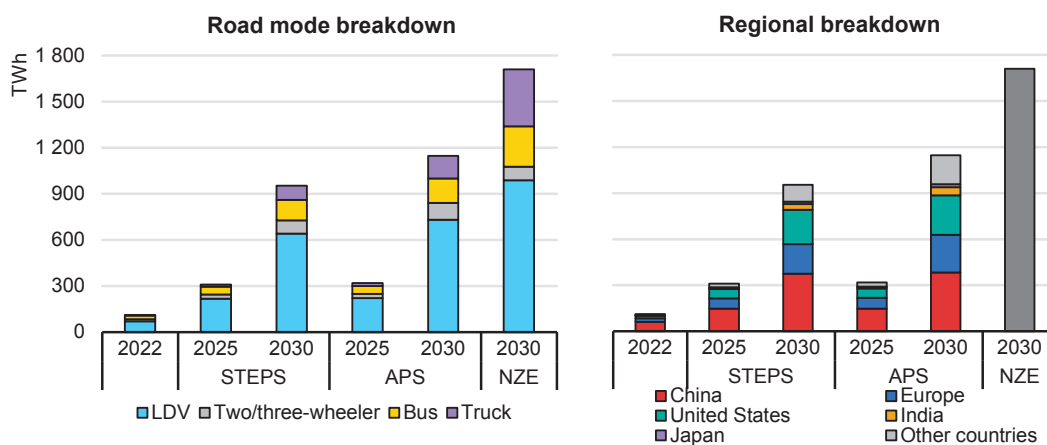
To power the growing stock of electric trucks, the number of depot chargers increases from around 300 000 today to 3.5 million in 2030 in the STEPS and 4.2 million in the APS. The installed capacity of truck depot chargers is about 310 GW in the STEPS and 380 GW in the APS in 2030. As with buses, the number of depot chargers needed in 2030 is far greater than the number of opportunity chargers. In the STEPS, the number of opportunity truck chargers is about 13 500 (6.5 GW installed capacity), increasing to 25 000 (13 GW installed capacity) in the APS in 2030.

Impact on energy demand and emissions

Electricity demand

The global EV fleet consumed about 110 TWh of electricity in 2022, which equates roughly to the current total electricity demand in the Netherlands. Almost a quarter of the total EV electricity consumption was for electric cars in China, and a fifth for electric buses in the same country. Electricity demand for EVs accounts for less than half a percent of current total final electricity consumption worldwide, and still less than one percent of China's final electricity consumption.

Figure 3.12. Electricity demand by mode and region, 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; RoW = rest of the world. The analysis is carried out for each region in the transport model within the IEA's Global Energy and Climate Model (GEC-Model) separately and then aggregated for global results. For the Net Zero Emissions by 2050 Scenario, only global values are reported. Regional data can be interactively explored via the [Global EV Data Explorer](#).

Electricity demand for EVs accounts for only a minor share of global electricity consumption in 2030 in the Announced Pledges Scenario.

Electricity demand for EVs is projected to reach over 950 TWh in the STEPS and about 1 150 TWh in the APS in 2030. Notably, electricity demand in the APS is

about 20% higher than in the STEPS, despite the stock of EVs only being about 15% higher. This is in part due to higher rates of electrification in many high-average vehicle mileage markets such as the United States, but also to greater electrification in the truck and bus segments, which contribute incrementally to vehicle stock, but have a high electricity demand per vehicle. In addition, it is assumed that in countries with net zero pledges, a larger share of energy consumption in PHEVs is provided by electricity (as opposed to gasoline or diesel). This is particularly relevant for cars and vans, which account for about two-thirds of demand in both scenarios.

By 2030, electricity demand for EVs accounts for less than 4% of global final electricity consumption in both scenarios. As shown in the [World Energy Outlook 2022](#), in 2030 the share of electricity for EVs is relatively small compared to demand for industrial applications, appliances or cooling and heating.

Table 3.1 Share of electricity consumption from electric vehicles relative to final electricity demand by region and scenario, 2022 and 2030

Country/region	2022	Stated Policies Scenario 2030	Announced Pledges Scenario 2030
China	0.8%	3.8%	4.0%
Europe	0.7%	4.7%	5.7%
United States	0.4%	5.4%	6.3%
Japan	0.1%	1.7%	2.2%
India	0.1%	1.7%	2.5%
Global	0.5%	3.2%	3.8%

Note: Non-road electricity consumption from the [World Energy Outlook 2022](#).

China remains the largest consumer of electricity for EVs in 2030, although its share of global EV electricity demand decreases significantly from about 55% in 2022 to less than 40% in the STEPS, and around 30% in the APS. This reflects wider adoption of electromobility across other countries in the period to 2030.

The size of the EV fleet becomes an important factor for power systems in both scenarios, with implications for peak power demand, transmission and distribution capacity. Careful planning of electricity infrastructure, peak load management, and smart charging will be critical. Reducing dependence on fast charging will allow for optimal planning and resiliency of power systems, mitigating peak power demand. More than 80% of the electricity demand for electric LDVs in 2030 in both scenarios is via slow chargers (private and public).

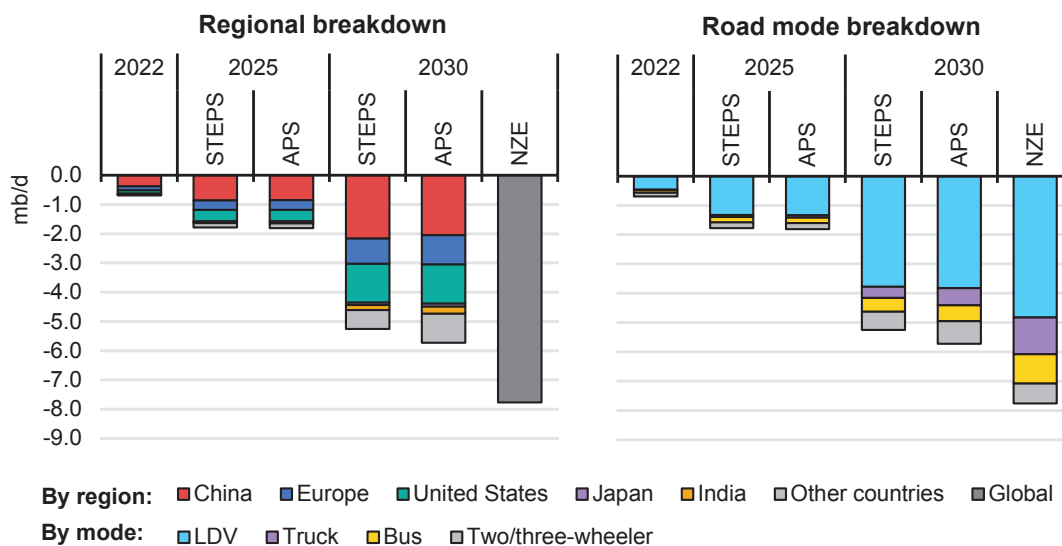
To help policy makers prioritise charging strategies according to the size of their EV fleet and their power system configuration, the IEA has developed a [guiding framework](#) and [online tool](#) for EV grid integration.

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.

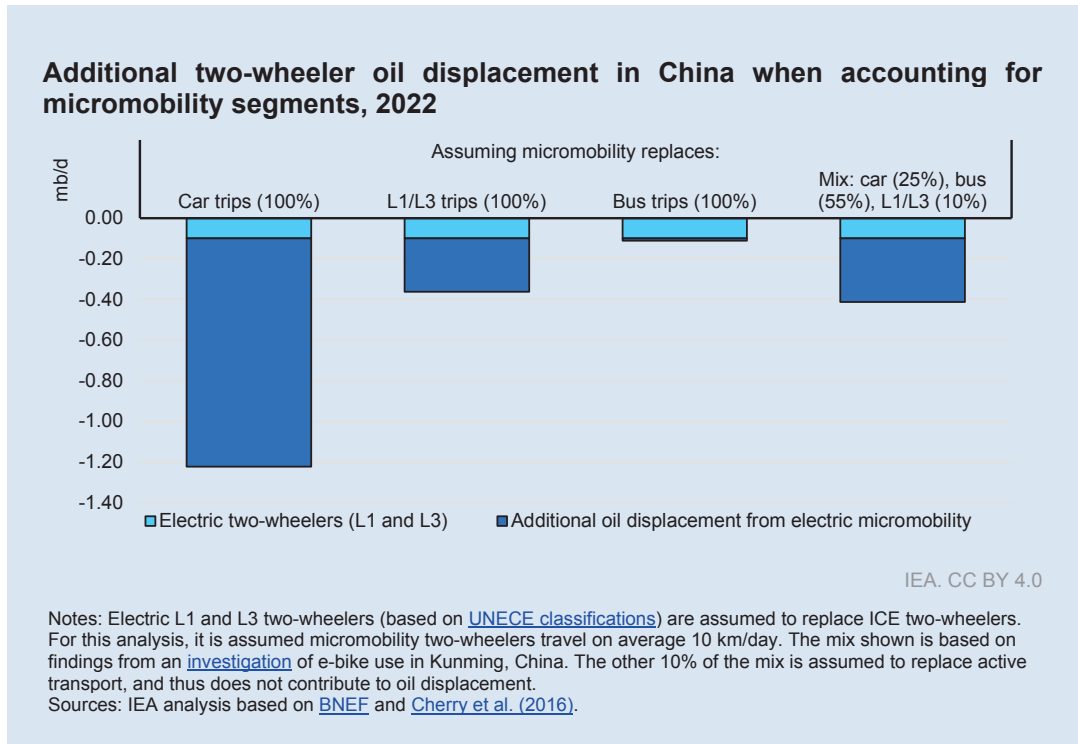
Box 3.2 How much oil really gets displaced by electric vehicles?

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.



Tax revenues

Taxes on petroleum-based road fuels can be a significant source of income for governments,⁷ and are often used to support investments in transport infrastructure, such as roads and bridges. Given the levels of oil displacement discussed above, the transition to EVs will reduce these tax revenues. Additional tax revenue from electricity will not be sufficient to fully compensate for this reduction, both because taxes on electricity tend to be lower on an energy basis and because EVs are more efficient and thus use less energy than ICE vehicles.

In 2022, the transition to electric vehicle stock displaced around USD 11 billion in gasoline and diesel tax revenues globally. At the same time, the use of EVs generated around USD 2 billion in electricity tax revenue, meaning there was a net loss of around USD 9 billion. Although China has the greatest stock of EVs, the greatest impact on tax revenues was seen in Europe, a trend which is expected to continue into the future. This is because Europe has some of the highest taxes on gasoline and diesel; for example, the gasoline tax rate in Germany is almost ten times the rate in China.

As the number of EVs increases globally, government fuel tax revenues are expected to decline, with global net tax losses increasing by around two-and-a-

⁷ While the share of total government revenue from fuel taxes may be small, for example it has recently been [less than 3%](#) in the United Kingdom, in many cases it represents a large share of the budget allocations for transportation infrastructure.

SAF GROUP

Dan Tsubouchi  @Energy_Tidbits · 2h

...

Also #Oil demand switching back to #NatGas

@vitolnews @michaelwmuller to @gulf_intel : when #OPEC cut took Brent to \$86/87, gas price didn't go with it. "#LNG is now competitive to low sulfur fuel into utilities", back into S/SE Asian economies after 1.5 yrs.

#OOTT



SAF Group created transcript of comments by Mike Muller (Vitol) on Gulf Intelligence Daily Energy Markets podcast on May 7, 2023. https://twitter.com/gulf_intel/status/1655097866434785280

Items in "italics" are SAF Group created transcript

At 2:50 min mark, Muller "... to sum up, my view of things is there is a slightly more disappointing view of demand and a more adequate view of supply that has given people more reassurance that there is adequate supply. This has especially manifested itself in diesel markets where you can see the official data on speculative length. It is not speculative length, it is speculative shorts. People are positioning negative towards that diesel demand. All that against the backdrop of a year where we still think we are going to be growing in excess of 1.5, 1.6 million barrels a day, of which a good 2/3 is jet demand. And yet, there is a view fundamentally that there is an adequate amount of oil in the market despite the fact that oil has gone missing in places like Kurdistan, Nigeria in force majeure, and various other concerns as well. I think a couple of areas that have lent themselves to the demand position, sorry supply position that are maybe a bit surprising. There seems to be more oil from the northern, the large northern gulf states on the market backed up by statements from Iran themselves. I think Iraq seems to have compensated for reduced or cancelled Kurdish exports to the north by exporting more from the south. And all and all, there is a view there is more to come from US oil exports."

At 10:45 min mark "... the final thing that is weighing down on oil is gas. Because if you pull up gas price, you see the US Henry Hub at just above \$2/nmbtu. That's obviously been weak all along. But the international price of LNG has also come down and really moved in a very different way. So after the OPEC announcement that took Brent to \$86/\$87/b, gas didn't really go with oil at that point. And gas has been weak to a point where LNG is now competitive to low sulphur fuel into utilities. And we have to remind ourselves that a large amount of oil demand has been boosted by oil displacing LNG in power generation. And LNG now has a chance of featuring in those south and southeast Asian economies where it has been shunned for the best part of the last year and a half".

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

SAF GROUP

Dan Tsubouchi  @Energy_Tidbits · 2h

...

#Oil supply surprise.

There is no visibility to return of .400 kbd of Kurdish/Iraq exports via Turkey, BUT @michaelwmuller to @gulf_intel "I think Iraq seems to have compensated for reduced or cancelled Kurdish exports to the north by exporting more from the south".

#OOTT





Dan Tsubouchi @Energy_Tidbits · 3h

Are rich people fleeing Russia via UAE? What's going between the two?

@eurocontrol: Russia/UAE "average daily flights" Apr 26-May 2 were 41, +107% YoY, +1681% vs 2019.

Only slightly less than traditional busy UK/UAE flights.

China/Asia are missing from long haul!

#OOTT



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Dan Tsubouchi @Energy_Tidbits · 3h

What's missing from global air travel? and #JetFuel consumption

China and spillover onto Asia.

@eurocontrol top 25 global air departures only includes 1 Asian airport - Tokyo at #22.

Vs Top 10 world's busiest airports pre-Covid 2019 - Beijing #2, Tokyo #5, Shanghai #8.

#OOTT



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Dan Tsubouchi @Energy_Tidbits · 4h

Xi sees #1 short term priority - get industry going.

Must maintain "real economy" as mainstay, upgrade traditional industries, not eliminate them as "low end industries"

Implies (i) policy to support industry (ii) won't make them uncompetitive with going green.

#OOTT

Xi stresses building of modern industrial system and high-quality development

Xi Jinping, President of the Communist Party of China (CPC) Central Committee, Chairman of the Central Military Commission and Director of the Central Commission for National and Historical Affairs (CCNHA), presided over the first meeting of the commission under the 20th CPC Central Committee on Friday afternoon. He stressed that the work of the commission should be well planned and well implemented, and that, on the basis of the existing modern industrial system and advanced Chinese manufacturing with support from high-quality development of the real economy, to fully implement the strategy of high-quality development of the real economy. He stressed that the commission should fully implement the strategy of high-quality development of the real economy, strengthen and improve the industrial system, and fully implement the strategy of high-quality development of the real economy. He stressed that the commission should fully implement the strategy of high-quality development of the real economy, strengthen and improve the industrial system, and fully implement the strategy of high-quality development of the real economy.

Li Qiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, Chinese Premier and deputy director of the CCNHA, CCNHA, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, a member of the CPC Central Committee, Director and a member of the CCNHA, and Tang Yanyang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, Chinese vice premier and a member of the CCNHA, attended the meeting.

At the meeting, reports on organizing the building of a modern industrial system were made from the National Development and Reform Commission, the Ministry of Science and Technology, the Ministry of Industry and Information Technology, the Ministry of Agriculture and Rural Affairs, the Ministry of Education and the Ministry of Education.

Xi stressed that the modern industrial system is the Party's work focus. To strengthen the Party's leadership over economic work is an integral part of strengthening the overall leadership of the Party. The CCNHA must fully implement and shape its responsibilities in an important position of management of the CPC Central Committee to lead economic work. To do a good job, the CCNHA under the 20th CPC Central Committee must fully and fully implement the new development philosophy in all fields, accelerate the construction of a new development system and high-quality development. It is imperative to strengthen strategic planning, system building, general coordinated implementation, and actively investigate and research to fully and fully implement the new development philosophy in a coordinated manner. The meeting researched and approved the Regulations for the Central Commission for National and Historical Affairs and the Regulations for the Office of the Central Commission for National and Historical Affairs.

It was stressed at the meeting that industrial parks should be fully implemented with the full economy as the pillar, and that China can take the strategic initiative when it comes to its future development and global competition. The most grand opportunity of the new scientific and technological revolution and domestic cycle integration strategy, should be fully implemented by national industry, scientific and technological innovation and integration of a complete industrial system and supply chain, and the integration of scientific, technical, and financial resources, and build a more complete, advanced, safe and modernized industrial system. The most important is to fully implement the strategy of high-quality development of the real economy, and to fully implement the strategy of high-quality development of the real economy.

Members of the CCNHA were present. Leading officials of relevant central Party and government departments attended the meeting. ■

Dan Tsubouchi @Energy_Tidbits · 21h

China needs increasing birth rate ASAP.

Babies born in 2024 don't become contributing work force members until >2040.

...

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Dan Tsubouchi @Energy_Tidbits · 4h



China services vs manufacturing

More support for services sectors. Chinese made 274 mm domestic trips during May Day holiday, +71% YoY, +19% vs 2019.

But manufacturing sector keeps declinling. See 📉 05/03 Caixin PMI: Feb 51.6, Mar 50.0, back to contraction in Apr 49.5

#OOTT

<https://english.news.cn/2023/05/06/e431bd18a68840d4602475668891d8e1c.html>
May Day holiday queues reveal China's economic strength
 Source: Xinhua Editor: huada
 2023-05-06 15:34:15

TAIYUAN, May 6 (Xinhua) -- At the entrance of the **Taishan** scenic area in Taiyuan, the capital of north China's Shanxi Province, visitors formed a long queue that stretched for dozens of meters. Staff members generously provided them with free bottled water and ice pops.

"What they've done was very sweet and filled our spirits," said a tourist surnamed LI, coming from more than 100 km away.

Almost every major tourist destination was flooded with a sea of faces during the five-day May Day holiday, which concluded on Wednesday. The sweet burden of the influx of tourists is a fraction of the booming Chinese economy on the fast track to recovery.

Chinese people made 274 million domestic trips during the holiday break, upling 2023 (initial data) to same holiday of last year and up about 10 percent from 2019 before the COVID-19 outbreak, the Ministry of Culture and Tourism said.

Tourism revenue reached 148.06 billion yuan (about 21.4 billion U.S. dollars), surging 128.9 percent from last year.

The strong growth can be partly attributed to pent-up travel demand after the pandemic. Many netizens have called the experience of lining up for restaurants, **jackets** and popular tourist attractions "familiar."

Authorities and business practitioners across China are yearning for tourists to **return and** have launched a variety of promotions to woo them and further boost local economic growth.

The **Huanggangshan** scenic area in Changsha, a popular tourist city in central China's Hunan Province, welcomed more than 20,000 visitors daily on average during the holiday.

Pingyao, one of the best-preserved ancient walled cities in China and a UNESCO World Heritage site in Shanxi Province, saw over 230,000 tourist arrivals during the holiday.

The heat wave of the holiday economy has even spread from offline to online. Baidu Maps has introduced the function of a "real-time queuing radar," which allows users to check the traffic flow and parking spaces in real time.

"The app can automatically guide us to a parking lot with more spots available," said Chen **Erting**, a tourist to Pingyao.

Official data shows a total of 12,800 A-level tourist attractions were opened during the May Day holiday, accounting for 86 percent of the total. A total of 31,100 commercial performances were held nationwide, with box office revenue exceeding 1.5 billion yuan during the period.

"It's a much-needed booster for the tourism industry," said **Geng Yeqiang**, a professor at Shanxi University's school of economics and management.

While many prefer trendy cities to visit during the holiday, rural tourism also registered a sharp surge, propelled by China's rural revitalization campaign.

According to data from online travel agency Trip.com Group, the overall order for rural tours on the platform during the May Day holiday more than doubled that in the same period of 2019, and many opted for a longer stay in the countryside.

"The countryside is becoming more and more beautiful. It's wonderful to chill out or camp with several friends in the rural area," said a tourist surnamed Yang from Shanghai. 🌿



Dan Tsubouchi @Energy_Tidbits · 21h
China needs increasing birth rate ASAP.



Babies born in 2024 don't become contributing work force members until >2040.

Shrinking population may be a growing post 2030 problem but increasing birth rate is an immediate challenge.

Demographics are predictable!

#OOT #Oil

SAF — Dan Tsubouchi @Energy_Tidbits · 21h

Population development is of vital importance to the rejuvenation of the Chinese nation" says Xi. Also recognizes "relationship between population and economy and society"

Demographic trends are very tough to change so a growing post 2030 China economic problem.

#OOT #Oil twitter.com/Energy_Tidbits...



1 2 4,030



Dan Tsubouchi @Energy_Tidbits · 21h

Population development is of vital importance to the rejuvenation of the Chinese nation" says Xi. Also recognizes "relationship between population and economy and society"

Demographic trends are very tough to change so a growing post 2030 China economic problem.

#OOTT #Oil

<https://xinhuanet.com/english/2022/01/16/c11312879.htm>

Xi stresses building of modern industrial system and high-quality development

Xi Jinping, General Secretary of the Communist Party of China (CPC) Central Committee, Chairman of the Central Military Commission and Director of the Joint Secretariat for the Central Executive and Political Bureau of the CPC Central Committee, presided over the first meeting of the 19th meeting of the Standing Committee of the Politburo of the CPC Central Committee on Jan 16.

Xi stressed that the modern industrial system and high-quality development are the two wings of the modernization drive. He stressed that the modern industrial system and high-quality development are the two wings of the modernization drive. He stressed that the modern industrial system and high-quality development are the two wings of the modernization drive. He stressed that the modern industrial system and high-quality development are the two wings of the modernization drive.

Li Qiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, Chinese Premier and Vice Premier of the State Council, presided over the first meeting of the 19th meeting of the Standing Committee of the Politburo of the CPC Central Committee. Li Qiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee, Chinese Premier and Vice Premier of the State Council, presided over the first meeting of the 19th meeting of the Standing Committee of the Politburo of the CPC Central Committee.

At the meeting, reports on executing the Party's 19th National Congress and the 19th National Congress of the Communist Party of China (CPC) Central Committee, the National People's Congress, the National Committee of the Chinese People's Political Consultative Conference, the National Education Commission, the National Health Commission, the Ministry of Education, and the Ministry of Health.

Xi stressed at the meeting that economic development is the Party's central task. To strengthen the Party's leadership over economic work is an integral part of strengthening the overall leadership of the Party. The CPC Central Committee must take the lead in economic work, and the government must take the lead in economic work. Xi stressed at the meeting that economic development is the Party's central task. To strengthen the Party's leadership over economic work is an integral part of strengthening the overall leadership of the Party.

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Xi stressed at the meeting that economic development is the Party's central task. To strengthen the Party's leadership over economic work is an integral part of strengthening the overall leadership of the Party. The CPC Central Committee must take the lead in economic work, and the government must take the lead in economic work.

Members of the Politburo were present. Leading officials of relevant Party and government departments attended the meeting.

Dan Tsubouchi @Energy_Tidbits · Jan 16

China population shrinks by 850,000 to 1.4118 b, 1st decline in 60 yrs.

Seems Covid impact with deaths and also lower birth rates.

But reminds of long-term challenge for China - an aging population i...

2 7 3,852



Dan Tsubouchi @Energy_Tidbits · 23h

#Vortexa crude #Oil floating storage at May 5 est 72.54 mmb, -20.96 mmb WoW vs revised Apr 28 of 93.50 mmb. See table, -44.50 mmb MoM, is this Iran selling floating storage, RUS oil being rerouted after being transferred? Thx @Vortexa @business. #OOT



Posted May 6, 9am MT			Apr 29, 9am MT			Apr 22, 9am MT		
U	Q	W	U	Q	W	U	Q	W
01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023
U	Q	W	U	Q	W	U	Q	W
01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023	01/03/2023
Fr	05/05/2023	72541	Fr	04/28/2023	93500	Fr	04/21/2023	93460
Fr	04/28/2023	93501	Fr	04/21/2023	96206	Fr	04/14/2023	101875
Fr	04/21/2023	96627	Fr	04/14/2023	94494	Fr	04/07/2023	120394
Fr	04/14/2023	95425	Fr	04/07/2023	116508	Fr	03/31/2023	107355
Fr	04/07/2023	117039	Fr	03/24/2023	102441	Fr	03/24/2023	101204
Fr	03/31/2023	100406	Fr	03/24/2023	97299	Fr	03/17/2023	91352
Fr	03/24/2023	96842	Fr	03/17/2023	87600	Fr	03/10/2023	80234
Fr	03/17/2023	86070	Fr	03/10/2023	80955	Fr	03/03/2023	80891
Fr	03/10/2023	80467	Fr	03/03/2023	84003	Fr	02/24/2023	82811
Fr	03/03/2023	83210	Fr	02/24/2023	29006	Fr	02/17/2023	78854
Fr	02/24/2023	80599	Fr	02/17/2023	72852	Fr	02/10/2023	77442

Source: Bloomberg, Vortexa

Region	Vortexa Crude Oil Floating Storage by Region (mmb)			Original Posted		
	Apr 5/23	Apr 28/23	WoW	Apr 7/23	Apr 7/23	May 5 vs Apr 7
Asia	40.70	48.12	-7.42	40.29	42.96	-20.86
Europe	6.97	13.26	-6.29	11.70	25.23	-18.26
Middle East	3.71	7.06	-3.35	10.39	9.39	-1.48
West Africa	4.94	4.81	0.13	4.51	6.02	-1.28
US Gulf Coast	0.23	0.00	0.23	0.00	2.80	-2.60
Other	15.99	20.75	-4.76	20.53	38.01	-45.03
Global Total	72.54	93.30	-20.96	87.30	117.04	-44.50

Source: Vortexa, Bloomberg

12 8 39 19.3K



Dan Tsubouchi @Energy_Tidbits · May 6

Saudi imported new record 330 kbd from Russia incl record 198 kbd of #Gasoline #Diesel in Apr.

Then rerouted to effectively get more RUS #Oil & products to export markets ie. markets like Europe.

Thx @Jamie_Ingram @Kpler. #OOT

mees.com

Russia-Saudi Oil Products Trade Hits 330,000 b/d

Saudi Arabia imported a new record 330,000 b/d of oil from Russia in April according to data ...

1 3 5 1,278



Dan Tsubouchi @Energy_Tidbits · May 5

UAE lays out vision for #COP28.

"in a pragmatic, just & well-managed energy transition" "must be laser focused on phasing out fossil fuel EMISSIONS" "scaling up viable, AFFORDABLE zero carbon alternatives". And more!

Interesting debate & negotiations ahead for delegates.

#OOTT

Excerpt from COP28 President Designate Dr. Sultan Al Jaber's speech on May 2



SAF Created transcript of COP28 President Designate, Dr. Sultan Al Jaber (UAE's Special Envoy for Climate Change and also Managing Director and Group CEO of the Abu Dhabi National Oil Company (ADNOC Group) excerpt of his speech at St. Petersburg Climate Dialogue 2023 on May 2, 2023. Video at https://twitter.com/COP28_UAE/status/1653383061428469761

Items in "Italics" are SAF Group created transcript.

Al Jaber *"Trust is also essential in the negotiations process. In fact, trust is a critical success factor. And as COP28 UAE President-Designate, I will ensure a fair, inclusive and transparent presidency that provides space for all parties to reach consensus across the whole agenda. And here, let me assure you that, under this Presidency's leadership, the negotiations will give space for all parties to discuss, debate and agree on the role of all sources of energy. And on that point, let me say this and let me be perfectly clear. In a pragmatic, just and well-managed energy transition, we must be laser focused on phasing out fossil fuel emissions while phasing up and scaling up viable, affordable, zero carbon alternatives. This is the approach we have been taking in the UAE for more than 20 years, where we have embraced, in practice, the energy transition. We know that the energies used today will continue to be part of the global energy mix for the foreseeable future. And, as such, we will continue to work with the world to decarbonize the current energy system while we build the new energy system that is capable of transitioning even the most heavy emitting industries."*

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

2 2 1,862



Dan Tsubouchi @Energy_Tidbits · May 5

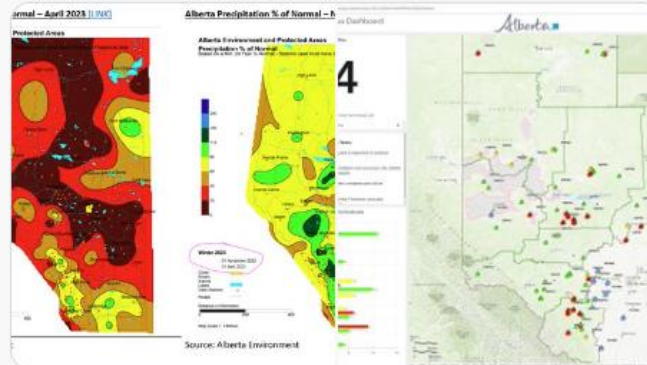
Here's why Alberta is getting hit by wildfires - Very low precipitation Nov thru Mar 31 and then April was brutal for lack of rain.

Link to Alberta live wildfire map: arcgjs.com/apps/dashboard...

Hope & pray we don't see Fort McMurray 2016 replay.

Stay safe everyone!

#OOTT



3 9 2,784

SAF Dan Tsubouchi  @Energy_Tidbits · May 5
patio lunch at Iron Goat. best view patio in #Canmore. can the see the famous Three Sisters Mountains on the left.



   19  1,369 



Dan Tsubouchi @Energy_Tidbits · May 5

More Russia #oil available for export as seasonal refinery maintenance reduced domestic demand for oil by ~280,000 b/d vs March.

Less refinery consumption = more oil available for export.

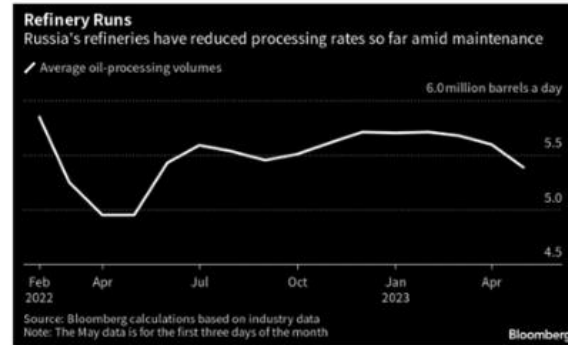
Thx @ja_herron.

#OTT

early May due to seasonal maintenance, reducing domestic demand for crude as Moscow said it was cutting production.

The nation's facilities refined an average of 5.39 million barrels a day of crude from May 1-3, according to a person familiar with the matter. That's 216,000 barrels a day, or 3.9% lower than the average for most of April, which itself was down 1.4% from March.

Moscow classified its oil-output statistics last year due to their "sensitive" nature as the country was target by Western sanctions over the invasion of Ukraine. In absence of official production data, the amount of Russian crude being processed domestically has been closely followed by analysts as a potential indicator.



Russia pledged to cut its crude output by 500,000 barrels a day in March, compared with February, and keep it at that level all year. Deputy Prime Minister Alexander Novak has said that the cutback were implemented, but the country's seaborne exports have been robust, prompting questions about whether the cuts are really happening.
See also: Russia Pipeline Data Offer Scant Evidence of Oil Output Cuts

To contact Bloomberg News staff for this story:
James Herron in London at jherron9@bloomberg.net

3

3

11

3,033





Dan Tsubouchi [@Energy_Tidbits](#) · May 5
Stalling Asian economy recovery.

AAPA is trade association for international airlines based in Asia Pacific.

Air travel rapidly recovering but still 59% of 2019.

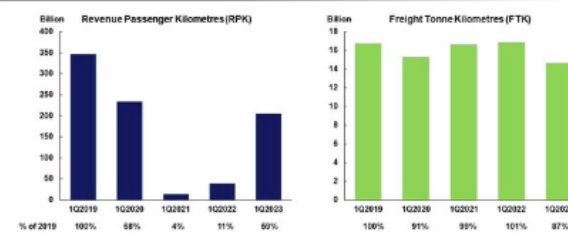
Air freight is pulling back, Q1/23 was down 13.1% YoY and back below 2019.

#OOTT

[AAPA](#) [@AAPAirlines](#) · May 2

During the first quarter of 2023, international passenger demand increased by 576.3% year-on-year. On the other hand, international air cargo demand fell by 13.1% year-on-year.

Asia Pacific Airlines International Passenger & Cargo Demand





Dan Tsubouchi @Energy_Tidbits · May 5

"Iran, during the last 3 mths, decided to sell most of its [floating] #Oil with remarkable discounts" "And there is almost no gas condensate floating right now" Tehran-based @DanialRahmat12 to @FrankKaneDubai on @gulf_intel.

Torque to oil price when demand returns.

#OOTT



SAF Group created transcript of comments by Danial Rahmat (Tehran-based, Senior Energy Security Consultant) with moderator Frank Kane (Editor-at-Large, Arabian Gulf Business Insights) on Gulf Intelligence PODCAST Daily Energy Markets – May 5th. [\[LINK\]](#)

Items in "italics>" are SAF Group created transcript.

Kane asked Ramat on Iran saying they are increasing more oil of late and one of the reasons "we have seen the price weakness of late?" Rahmat "... Please consider, remember last year at this time, we were speaking about Iran's floating reserves in Asia, which was about 100 million barrels. Right *now* there is almost nothing left of that. So you see that Iran has delivered a very huge amount of oil to the markets this last year. Basically, within the last six months."

Kane: "Dan, let me clarify one point, you said that the 100 million barrels of floating oil has now gone?" Rahmat "Mostly, Iran, because of the high level of uncertainty in the market. And actually, backwardation in the market where future contracts are cheaper than the spot prices. Iran, during the last 3 months, decided to sell most of its oil with remarkable discounts. Because it was not making sense to keep that oil floating because the prices were getting better and better so you were there to sell your oil with a discount instead of keeping that floating accepting the risk, and also spending the money for keeping that floating. So sold most of *its* oil. And there is almost no gas condensate floating right now."

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

6 16 52 10.9K

Dan Tsubouchi @Energy_Tidbits · May 4

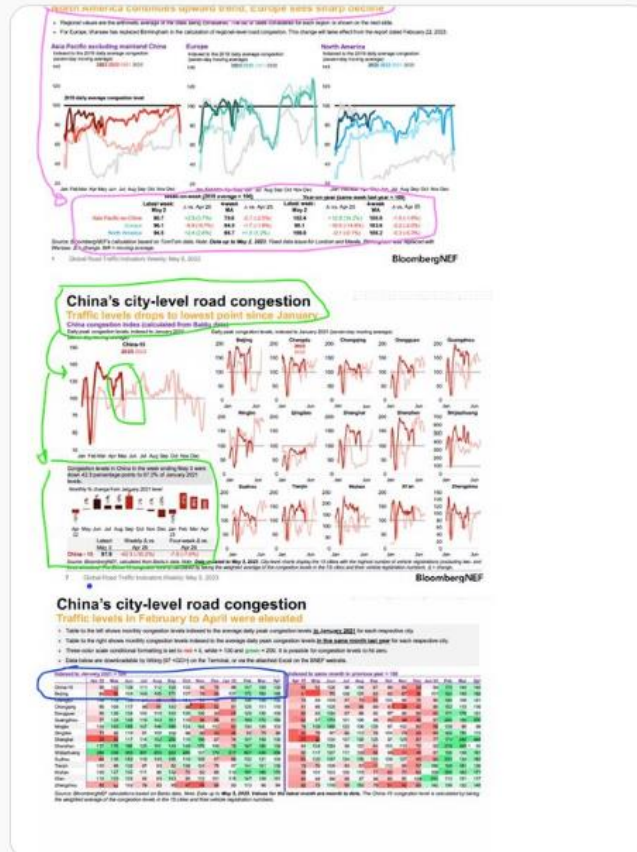
China's [road] congestion nosedives as Labor Day celebrated. It was a holiday BUT traffic -30.2% WoW to lowest point since Jan.

Asia Pacific Ex China +3.7% WoW, still well <2019

EU -6.7% WoW, back <2019

NA +2.6% WoW, close to 2019

@BloombergNEF Global Road Traffic Indicators... Show more





Dan Tsubouchi @Energy_Tidbits · May 4

#Shell Q1 Q&A still on

CEO Sawan "continue to be incredibly excited about the prospect of that project [#LNGCanada] coming onstream around the middle of this decade. It's making good progress"

Sounds like minor delay vs Sawan 02/21/22 "by the middle of this decade"

#LNG #OOTT

HOME



Shell plc Q1 Results - Analysts Webcast

Welcome to the Shell Q1 Results analyst webcast, hosted by Wael Sawan (CEO) and Sinead Quinlan (CFO). You can participate in the Q&A session by dialing in using one of the following numbers shortly before the start of the call:

SAF Group created transcript of Shell CEO Wael Sawan on Shell Q1 call on May 4, 2023, 7:30am

Items in "italics" are SAF Group created [transcript](#)

Sawan is asked about LNG Canada and at 7:41am MT, replies "... LNG Canada first. We continue **to be incredibly excited about the prospect of that project coming onstream around the middle of this decade.** It's making good progress. The last update I got we are already **past** the 70% mark in terms of construction on site. Coastal GasLink, the developer of the pipeline, is also making good progress. And this is despite what has been of course a difficult period when you consider the Covid disruptions [???] supply chain challenges around the world. So no new guidance other than to **say**, we continue to anticipate startup there **around the middle of the decade.** I look forward to seeing where that goes.

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

SAF Group created transcript of Shell Integrated Business Deep Dive Feb 23, 2022, Wael Sawan.

Items in "italics" are SAF Group created [transcript](#)

5:06. 8:36am MT. Sawan "That brings me to the future. Our current integrated gas business is doing what we said we would do and is on the right trajectory. But we are not yet where we want to be. We have opportunities that we are pursuing to do even better, with our existing assets, but also to position our growth portfolio to one with even stronger returns with lower carbon emissions. Let me expand on that a bit more. For our capital spend, we need to be even more focused with a continued emphasis on value over volume. We have a capital budget of \$4 to \$5 billion a year in the short to medium term. We are making good progress on our two LNG capacity expansion projects under construction. In Canada, Canada LNG surpassed recently the 50% completion mark last October, after three years of construction. The project remains dedicated to have **the first cargo by the middle of this decade.**" He then speaks of Nigeria and that construction there is now firmly underway, and then says "both these projects are competitively positioned for LNG growth markets in Asia. The same goes for most of our **long term** project funnel. We have several attractive **expansion and backlog** projects. A limited number of greenfield LNG projects and several promising low carbon new gaseous projects in early stages of development. For the pre-FID projects, we have an expected average internal rate of return of between 14% and 18%, and a unit technical cost below \$5/**mmbtu**. With most of these projects clearly having lower costs than the average in the industry. These are good numbers, but you will understand that we strive to push the IRR to the higher end and to push the unit costs down even further. But the **long term** role of gas depends on efforts to abate emissions and develop cleaner pathways for gas. This is why we continually try to reduce the carbon intensity of our new projects. Take LNG Canada currently under construction. It will run on hydropower and is set to deliver the lowest carbon intensity in the entire industry."

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

1 7 11 8,806



Dan Tsubouchi @Energy_Tidbits · May 4
Americans feeling or worried about economic pinch

#DineBrands CEO with @MelissaLeeCNBC @JoeSquawk

#Applebee's "now have a higher % of household guests over \$100,000 income vs pre-Covid"

"average check remains the same despite prices increasing", +10% vs pre-Covid
#OOTT



1 comment 2 retweets 3 likes 1,770 views



Dan Tsubouchi @Energy_Tidbits · May 4
Real time visits to US gas stations "...suggest a weaker than consensus outlook for the upcoming summer driving season, #Gasoline demand wise"

Vs pre-Covid, seeing impact of #EVs & work from home.

Usual great insights from @michael__tran.
#OOTT

RBC Elements
Spring insights through data
Report is located at <https://www.rbc.com/elements> | LinkedIn publication of the report posted

Digital Intelligence Strategy: RBC Connected Vehicle x Gas Station Visits Tracker
Quantifying Societal Behavior at the Pump

May 4, 2022
RBC Capital Markets, LLC
Michael Van Coten, and Global Intelligence Research (2022) 04-002 | <https://www.rbc.com/elements>

Our Thesis: We are adding to our suite of real-time mobility indicators by leveraging a proprietary intelligence and analytics tool that tracks daily visits across US gas stations (GST). Our monitoring platform provides real-time insights for the oil market, as well as for CPG companies in the "to-serve" segment. [View full report at https://www.rbc.com/elements](#) | [View full report at https://www.rbc.com/elements](#) | [View full report at https://www.rbc.com/elements](#)

- Tracking real-time visits to US gas stations helps us measure oil demand, as well as providing regional breakdowns for CPG companies in the "to-serve" segment. In partnership with RBC Elements™, we will use this data to provide a forecast for the oil market, as well as provide a forecast for the CPG market. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market.
- Real-time, a strong correlation exists between real-time visits and weekly reported demand for gasoline sold in the U.S. This should continue to hold true for the foreseeable future.
- Monitoring the behavioral patterns of real-time intelligence strategy, provides insight for, as well as, the real-time use of data in the oil market. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market.
- The data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market.
- Customers are sharing a variety of real-time data on their visits to gas stations, which has enabled us to provide a forecast for the oil market. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market.
- This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market.
- Most importantly, we expect to be a leader in the real-time intelligence space. This data is used to provide a forecast for the oil market, as well as provide a forecast for the CPG market.

1 comment 5 retweets 9 likes 3,917 views



Dan Tsubouchi @Energy_Tidbits · May 3



Stalling China recovery doesn't help #Oil.

Back in contraction, miss in China Caixin PMI for Apr 49.5 vs Est 50.3. Mar 50.0, Feb 51.6, Jan 49.2, Dec 49.0. "in a nutshell, manufacturing activity weakened in April" "domestic demand became a main drag".

Thx @SPGlobalPMI.
#OOTT



2 5 9 5,536



Dan Tsubouchi @Energy_Tidbits · May 3



first rafters of the season on the Elbow River enjoying the 26C temp in #Calgary.



1 6 1,190



Dan Tsubouchi @Energy_Tidbits · May 3

Can't see "The Man" Saudi Energy Minister Abdulaziz having an in-person OPEC meeting June 4 in Vienna to say no change.

His track record is clear: great read of supply/demand, surprises are to support Oil.

Especially given the below #IMF breakeven prices ie. KSA \$80.90. #OOTT

Dan Tsubouchi @Energy_Tidbits · May 3

#IMF fiscal Breakeven #Oil price.

Saudi declining \$85.80 in 22, \$80.90 in 23, \$75.10 in 24 with push on non-oil sectors.

Iran \$351.70 in 23!

Many other great tables in Appendix ie. current account balance.

#OOTT

The image shows two tables from the IMF. The left table, 'Table A. Breakeven Oil Prices', lists breakeven prices for various countries in 2022, 2023, and 2024. The right table, 'Table B. Current Account Balances', shows current account balances for various countries in 2022, 2023, and 2024.

Country	2022	2023	2024
Algeria	80.1	80.1	81.7
Argentina	21.4	22.0	22.4
Australia	85.8	85.8	85.8
Bahrain	85.8	85.8	85.8
Canada	85.8	85.8	85.8
China	85.8	85.8	85.8
France	85.8	85.8	85.8
Germany	85.8	85.8	85.8
India	85.8	85.8	85.8
Indonesia	85.8	85.8	85.8
Iran	351.7	351.7	351.7
Italy	85.8	85.8	85.8
Japan	85.8	85.8	85.8
Korea	85.8	85.8	85.8
Russia	85.8	85.8	85.8
Saudi Arabia	85.8	80.9	75.1
South Korea	85.8	85.8	85.8
Taiwan	85.8	85.8	85.8
U.S.	85.8	85.8	85.8
U.K.	85.8	85.8	85.8
Uzbekistan	85.8	85.8	85.8
World	85.8	85.8	85.8

Country	2022	2023	2024
Algeria	1.2	1.2	1.2
Argentina	-1.2	-1.2	-1.2
Australia	1.2	1.2	1.2
Bahrain	1.2	1.2	1.2
Canada	1.2	1.2	1.2
China	1.2	1.2	1.2
France	1.2	1.2	1.2
Germany	1.2	1.2	1.2
India	1.2	1.2	1.2
Indonesia	1.2	1.2	1.2
Iran	1.2	1.2	1.2
Italy	1.2	1.2	1.2
Japan	1.2	1.2	1.2
Korea	1.2	1.2	1.2
Russia	1.2	1.2	1.2
Saudi Arabia	1.2	1.2	1.2
South Korea	1.2	1.2	1.2
Taiwan	1.2	1.2	1.2
U.S.	1.2	1.2	1.2
U.K.	1.2	1.2	1.2
Uzbekistan	1.2	1.2	1.2
World	1.2	1.2	1.2

1 6 16 4,843

SAF Dan Tsubouchi @Energy_Tidbits · May 3
Here is 1st part of Putin response to drone attack on Kremlin.


Russia's Medvedev "After today's terrorist attack, there are no options left but the physical elimination of Zelensky and his clique."

Taking geopolitical risk to #Oil & other #Commodities up a notch.

#OOTT

<https://tass.ru/politika/17671037>
May 3, 10:33, Updated May 3, 11:01 a.m.

Medvedev: after the attack on the Kremlin, there are no options left for the Russian Federation except to eliminate Zelensky



Deputy Chairman of the Security Council of the Russian Federation Dmitry Medvedev
© Alexei Mizutsev/POOL/TASS

According to the deputy chairman of the Security Council of the Russian Federation, the Ukrainian president "is not needed even to sign an act of unconditional surrender." MOSCOW, May 3. /TASS/. The attack by Kyiv drones on the Kremlin left Russia with no options other than the physical elimination of Ukrainian President Volodymyr Zelensky "and his clique." This opinion was expressed on Wednesday in his Telegram channel by Deputy Chairman of the Security Council of the Russian Federation Dmitry Medvedev.

Commenting on the attack by Ukrainian drones, the politician wrote: "After today's terrorist attack, there are no options left but the physical elimination of Zelensky and his clique."

Zelensky, according to Medvedev, "is not needed even to sign an act of unconditional surrender." "Hitler, as you know, did not sign it either. There will always be some kind of replacement, such as zits-president Admiral Doenitz," the deputy chairman of the Security Council of the Russian Federation added.

After Hitler's suicide, Admiral Doenitz became his successor as Reich President. Winston Churchill, who served as Prime Minister of Great Britain, mentioned Doenitz's signature under the act of surrender of Germany. However, according to historians, this mention was a reservation: Doenitz was not at the ceremony in Reims, his representative von Friedeburg was there.

Tags:
[Medvedev, Dmitry Anatolievich](#), [Ukraine](#), [Russia/Zelensky](#), [Vladimir Alexandrovich/Military operation in Ukraine](#)

SAF Dan Tsubouchi @Energy_Tidbits · May 3
What will Putin do? Surely, this involves escalation?

two drones, incl this one, attack on Kremlin in Moscow.

#TASS, Kremlin ""Russia reserves the right to take retaliatory ...

2 2 3 2,049

SAF Dan Tsubouchi @Energy_Tidbits · May 3
For those who aren't near their laptop, @EIAgov just released its #Oil #Gasoline #Distillates inventory as of April 28. Table below compares EIA data vs @business expectations and vs @APIenergy yesterday. Prior to release, WTI was \$69.14. #OOTT

Oil/Products Inventory Apr 28: EIA, Bloomberg Survey Expectations, API			
(million barrels)	EIA	Expectations	API
Oil	-1.28	-0.50	-3.94
Gasoline	1.74	-1.50	0.40
Distillates	-1.19	-0.80	-1.00
	-0.73	-2.80	-4.54

Note: Oil is commercial so builds in a draw oif 2.0 mmb in SPR for the Apr 28 week
Note: Included in the oil data, Cushing had a 0.54 mmb build for Apr 28 week
Source EIA, Bloomberg
Prepared by SAF Group <https://safgroup.ca/news-insights/>

1 7 1,296

SAF **Dan Tsubouchi** @Energy_Tidbits · May 3 ...
What will Putin do? Surely, this involves escalation?

two drones, incl this one, attack on Kremlin in Moscow.

#TASS, Kremlin ""Russia reserves the right to take retaliatory measures whenever and wherever it sees fit"

#OTT

Francis Scarr @francis_scarr · May 3
Astonishing footage of last night's drone attack on the Kremlin



2 4 4,237

SAF **Dan Tsubouchi** @Energy_Tidbits · May 3 ...

At least for now or until US forces more tankers with Iran #Oil to US or other escalation, it feels like more of Iran's tit-for-tat for recent US DOJ force of tanker carrying Iranian oil to China to change to US.

#OTT

U.S. Naval Forces Central Command/U.S. 5... @US5th... · May 3

On May 3 at approximately 6:20 a.m. local time, Panama-flagged oil tanker Niovi was seized by Iran's Islamic Revolutionary Guard Corps Navy (IRGCN) while transiting the Strait of Hormuz.

See video & link to statement below dvidshub.net/news/443885/se...



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SAF **Dan Tsubouchi** @Energy_Tidbits · May 3
#IMF fiscal Breakeven #Oil price.

Saudi declining \$85.80 in 22, \$80.90 in 23, \$75.10 in 24 with push on non-oil sectors.

Iran \$351.70 in 23!

Many other great tables in Appendix ie. current account balance.

#OTT

The image shows two tables from the IMF. The left table is titled 'Table 4. Saudi Arabia: Fiscal Breakeven' and shows data for 2022, 2023, and 2024. The right table is titled 'Table 5. Saudi Arabia: Current Account Balance' and shows data for 2022, 2023, and 2024. Both tables include sub-rows for 'Oil' and 'Non-oil' sectors.

2 8 13 6,683

SAF **Dan Tsubouchi** @Energy_Tidbits · May 2
#Houthis/Saudi.

"was supposed to be an announcement of a ceasefire around Eid or before Eid, that didn't happen. But we understand the talks are going well and we might hear some good news soon" says @Amena_Bakr, who has good insights into #OPEC thinking.

#OTT@gulf_intel

The image is a screenshot of a podcast transcript. At the top, it says 'Daily Energy Markets PODCAST' and 'TUESDAY @ 11:00AM (GMT)'. Below that are photos and names of the hosts: Amena Bakr (Deputy Bureau Chief, Energy Intelligence), Max Tames (Managing Director, Gulf Energy), and Katie Douglas (PII). The transcript text discusses the situation in Yemen and the impact of the Houthi-Saudi talks on oil exports.

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SAF

Dan Tsubouchi @Energy_Tidbits · May 2
also @gulf_intel

...

SAF Dan Tsubouchi @Energy_Tidbits · May 2
#COP28 should be interesting.

@Amena_Bakr always has good insight into #OPEC thinking.

"what EU is facing today in terms of energy security should really be a warning sign that hydrocarbons are still relevant. They're here to stay for some time. Sure we need to invest in the... [Show more](#)



SAF Group created transcript of comments by Amena Bakr (Deputy Bureau Chief, Energy Intelligence) with on Gulf Intelligence PODCAST: Daily Energy Markets – May 2nd hosted by [Dyala Sabbagh](#) (Partner Gulf Intelligence) [LINK](#)

Items in "italics" are SAF Group created [transcript](#)

Bakr "... at a time where we are seeing very, very limited spare capacity. And the OPEC members continue to warn that spare capacity is thin, there is a need for more investment. We don't want to face a supply crunch. What we're facing today and what Europe is facing today in terms of energy security should be really a warning sign that hydrocarbons are still relevant. They're here to stay for some time. Sure we need to invest in the transition but it can happen in parallel. And I think this message is going to be conveyed later in the year by the UAE when we have COP 28."

Prepared by SAF Group https://safgroup.ca/news_insights/

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SAF

Dan Tsubouchi @Energy_Tidbits · May 2
#COP28 should be interesting.

...

@Amena_Bakr always has good insight into #OPEC thinking.

"what EU is facing today in terms of energy security should really be a warning sign that hydrocarbons are still relevant. They're here to stay for some time. Sure we need to invest in the... [Show more](#)



SAF Group created transcript of comments by Amena Bakr (Deputy Bureau Chief, Energy Intelligence) with on Gulf Intelligence PODCAST: Daily Energy Markets – May 2nd hosted by [Dyala Sabbagh](#) (Partner Gulf Intelligence) [LINK](#)

Items in "italics" are SAF Group created [transcript](#)

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Prepared by SAF Group https://safgroup.ca/news_insights/

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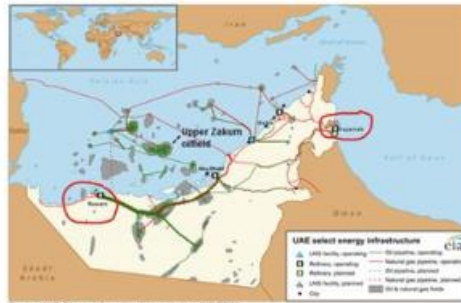
Dan Tsubouchi @Energy_Tidbits · May 2

...

Does UAE expect a future of getting along with Iran & less geopolitical risk to #1 #Oil #LNG chokepoint - the Strait of Hormuz?

@A_DiPaola17: UAE initially planned LNG export expansion at Fujairah, free of Strait of Hormuz. But is switching to Ruwais in Persian Gulf.

#OTT



Instead of Fujairah

UAE Opts to Build New LNG Plant at Ruwais Instead of Fujairah
2023-05-02 07:55:11.341 GMT

By Anthony Di Paola

(Bloomberg) — The United Arab Emirates has decided to build its new natural gas export facility at the Persian Gulf port of Ruwais instead of at Fujairah on the Gulf of Oman coast, state-controlled Abu Dhabi National Oil Co. initially planned to construct the plant — which will more than double the UAE's liquefied natural gas production capacity — at Fujairah, a major trading hub for oil products in the Middle East. The company said it had evaluated all options for locations and decided that Ruwais benefited from being closer to some of Adnoc's major facilities, which include gas fields and petrochemical plants.

Adnoc hasn't disclosed the cost of the plant, but they typically require billions of dollars of investment.

France's TotalEnergies to Buy LNG from UAE Under \$1 Billion Deal

Fujairah sits outside the Strait of Hormuz, the chokepoint at the entrance to the Persian Gulf, through which about a fifth of global oil exports pass.

The UAE is ramping up gas production to feed local power plants and a growing chemicals industry, as well meet rising demand for LNG in Europe and Asia.

On Monday, Adnoc announced a three-year deal worth roughly \$1.2 billion at today's prices to supply LNG to TotalEnergies SE.

To contact the reporter on this story: Anthony Di Paola in Dubai at adipaola@bloomberg.net
To contact the editors responsible for this story:

3 2 7 2,190

SAF **Dan Tsubouchi**  @Energy_Tidbits · May 2 ...
"I could easily see 30% of that [IBM's jobs] getting replaced by AI and automation over a five-year period" #IBM CEO @ArvindKrishna.

#AI is going to hit every industry jobs to some degree and soon.

Thx @BrodyFord_
#OTT



bloomberg.com
IBM to Pause Hiring for Jobs That AI Could Do
International Business Machines Corp. Chief Executive Officer Arvind Krishna said the company expects to pause hiring for roles it thinks ...

  4  4  1,543 

SAF Dan Tsubouchi @Energy_Tidbits · May 2
China stalling recovery.

China scheduled domestic flights +0.04% WoW for Apr 25-May 1 to 94,471. Fcast to climb to 100,045 for next 4-weeks.

BUT that is 20.7% below 119,180 for Apr per Mar 28 schedule.

Thx@BloombergNEF Claudio Lubis
#OOTT



SAF Dan Tsubouchi @Energy_Tidbits · May 1
Big relief for #FloridaPanthers as should avoid having a sea of blue #TorontoMapleLeafs jerseys in the crowd.

Huge happiness for scalpers flipping tickets to the many Canadians who will be paying up big time to watch the #Leafs in Florida.

Game 1 is tomorrow night in Toronto.... [Show more](#)

4 8 2,577



Dan Tsubouchi @EnergyTidbits · May 1
May 29 Alberta provincial election.

Elections are unpredictable but @338Canada projection shows UCP in lead to start the 4-week sprint.

Day 1 headlines: UCP to cut personal income taxes for everyone. NCP won't raise personal income taxes.

#OOTT

Welcome to 338Canada Alberta!

The 338 Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race. The 338 Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race. The 338 Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race.

338Canada Projection | Alberta

Category	UCP	NCP
UCP support	28%	26%
NCP support	26%	28%
Other parties	4%	4%

UCP Income Tax

UCP will cut personal income taxes for everyone by 10% from \$130 to \$117. The UCP will also eliminate the 10% surtax on income over \$100,000. The UCP will also eliminate the 10% surtax on income over \$100,000.

338Canada Projection | Alberta

The 338 Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race. The 338 Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race. The 338 Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race.

UCP vs NCP: The 338Canada projection shows that the 338 Canada projection of the 2025 Alberta provincial election is a close race.



Dan Tsubouchi @Energy_Tidbits · May 1
Increasing Venezuela #Oil into PADD 3 Gulf Coast



Here is the @business @lkassai tanker tracker numbers referenced in the earlier tweet.

More Venezuela oil into Gulf Coast is negative for WCS less WTI differentials.

#OTT

VENEZUELA TRACKER: Oil Exports Soar After US Sanctions Respite
2023-05-01 13:18:06.581 GMT

By Lucia Kassai (Bloomberg) -- Venezuelan oil exports hit a 16-month high in April after Chevron Corp. resumed production and shipments from the sanctions-hit country, according to loading schedules and ship movements tracked by Bloomberg.

- * Vessels loaded ~561.4k b/d in April, the highest since Dec. 2021; volumes were 18% higher from the previous month and 13% higher compared with a year earlier
- * To US, +24% m/m to 143k b/d as Chevron continues to ramp up drilling
- ** NOTE: Production could rise to ~150k b/d this year from 100k b/d currently, CEO said
- * To China, +2.3% m/m to 330k b/d
- * Chevron loaded 163k b/d in April and put ~600k bbl in Bahamas storage, a sign it's lifting more oil than it can process or resell
- * Click here for PDF of loadings, destinations

Destination	MoM Change	April	March	February	January
(Thousand barrels per day)					
China	7	330	323	284	348
US	28	143	115	89	76
All destinations	86	561	475	404	450

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To view this story in Bloomberg click here:
<https://blinks.bloomberg.com/news/stories/RTQRL5DWX2PS>

*** **Dan Tsubouchi** @Energy_Tidbits · May 1

Blame it on #Chevron.

Seasonal narrowing for WCS-WTI differentials, but not as much as might be expected.

...

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SAF

Dan Tsubouchi @Energy_Tidbits · May 1

Blame it on #Chevron.

Seasonal narrowing for WCS-WTI differentials, but not as much as might be expected.

Increasing PADD 3 Gulf Coast imports of VEN #Oil.

Feb: 89 kbd

Mar: 115 kbd

Apr: 143 kbd

Thx @business Tanker Tracker, @lkassai

#OTT

— Dan Tsubouchi @Energy_Tidbits · Apr 29

#Chevron' start of Venezuela #Oil imports (40 kbd in Jan, 58 kbd in Feb) into Gulf Coast looks to be impacting Cdn oil into Gulf Coast & WCS-WTI differentials.

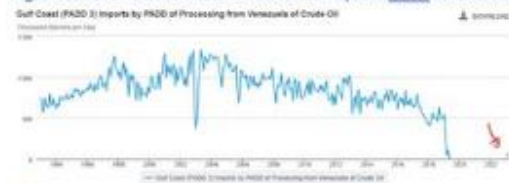
May is normal trough for diffs. Have narrowed seasonally to \$14.65 on Fri, but down YoY vs \$12.80 on 04/28/22.

#OTT



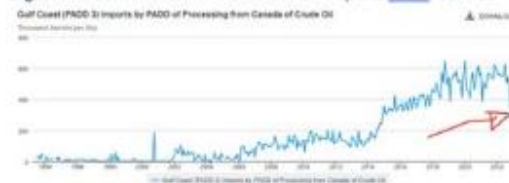
Source: Bloomberg

Figure xx: Gulf Coast PADD 3 Crude Oil Imports From Venezuela



Source: EIA

Figure xx: Gulf Coast PADD 3 Crude Oil Imports From Canada



Source: EIA

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

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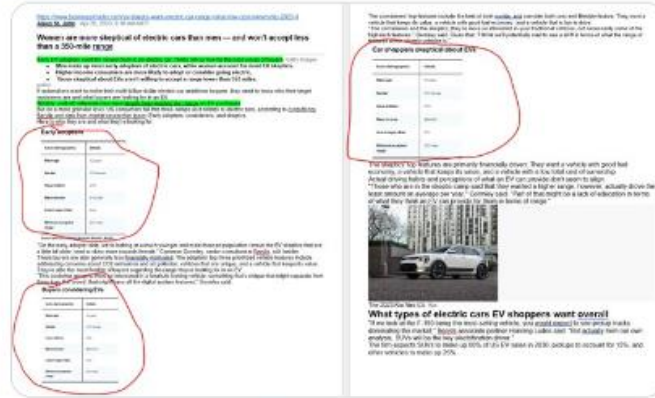
Dan Tsubouchi @Energy_Tidbits · May 1



2/2. Here's why #EVs early adopters are not a good indicator for broader market penetration.

@alexa_stjohn: "notably, well-off millennial men have largely been leading the charge on EV purchases", Early Adopters "mean income \$112,690".

#OOTT



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Dan Tsubouchi @Energy_Tidbits · May 1



1/2. #EVs buying is accelerating BUT shouldn't extrapolate early adopter pace with broader penetration

@Lebeaucarnews "the early adopters, those willing to pay up to buy an EV are becoming a smaller & smaller part of the market". #1 hurdle is price

@andrewsorkin

#OOTT



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SAF Dan Tsubouchi @Energy_Tidbits · Apr 30
SAF Group Apr 30, 2023 Energy Tidbits memo is posted on SAF Group website. this 72-pg energy research memo expands upon & covers more items than tweeted this week. Available at news/insights section of SAF website #Oil #OOTT #LNG #NatGas #EnergyTransition safgroup.ca/news-insights/

SAF GROUP

Energy Tidbits

April 30, 2023

Produced by: Dan Tsubouchi

NOV Q1 Call: "Growing Confidence that US Unconventional Growth is Slowing Significantly"

Welcome to new Energy Tidbits memo readers. We are continuing to add new readers to our Energy Tidbits memo, energy blogs and tweets. The focus and concept for the memo was set in 1999 with input from PMs, who were looking for research (both positive and negative items) that helped them shape their investment thesis to the energy space, and not just focusing on daily trading. Our priority was and still is to not just report on events, but also try to interpret and point out implications therefrom. The best example is our review of investor days, conferences and earnings calls focusing on sector developments that are relevant to the sector. Our target is to write on 48 to 50 weekends per year and to post by noon MT on Sunday. The Sunday noon timing was because PMs said they didn't have research to read on Sundays and Sundays are a day when they start to think about the investing week ahead.

This week's memo highlights:

- NOV mgmt. "in all likelihood in North American activity is at best flat for awhile" and "growing confidence that US unconventional [oil] growth is slowing significantly" ([Click Here](#)).
- Can WCS less WTI differentials are seasonally narrowing but being impacted by increasing Venezuela oil hitting PADD 3 Gulf Coast refineries ([Click Here](#)).
- Exxon CEO warns "This is a depletion business... basically, on a treadmill, every barrel is another barrel you have to replace" ([Click Here](#)).
- Definitely worth checking key assumption in IEA's new forecast that EVs will displace nearly 6 mmbbl of oil demand by 2030 ([Click Here](#)).
- Bloomberg: Germany is facing a shortfall of about \$13.2 billion in its special climate-protection fund, suggesting the government in Berlin has significantly underestimated the cost of greening Europe's biggest economy ([Click Here](#)).
- Please follow us on Twitter at [@Energy_Tidbits](#) for breaking news that ultimately ends up in the weekly Energy Tidbits memo that doesn't get posted until Sunday noon MT.
- For new readers to our Energy Tidbits and our blogs, you will need to sign up at our blog sign up to receive future Energy Tidbits memos. The sign up is available at [LINK](#).

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