

JET FUEL INTELLIGENCE®

COPYRIGHT © 2022 ENERGY INTELLIGENCE GROUP. ALL RIGHTS RESERVED. UNAUTHORIZED ACCESS OR ELECTRONIC FORWARDING, EVEN FOR INTERNAL USE, IS PROHIBITED.

CONTENTS

- 2 UK SAF POLICIES
- 3 SPOT CARGO MARKETS: PRICE SLIDE
- 4 PLATTS LAUNCHES CARBON PRICE
- 4 COSMO SCALES UP JAPAN'S SAF
- 4 ITOCHU INKS NESTE DEAL
- 5 JFI DATA METHODOLOGY
- 6 JET FUEL MARKET DATA

ENERGY TRANSITION

ICAO Outlines Pathway for Aviation to Achieve Net Zero Emissions

Setting a goal for net zero carbon emissions is easy. Achieving that target within the prescribed timeframe is the difficult part. The UN's International Civil Aviation Organization (ICAO) hosted its own side event on Thursday alongside the COP27 conference in Egypt this week. Entitled ICAO: A new era of green aviation, a panel composed of officials from ICAO, airports, developing countries, and civil aviation outlined the sector's well-defined pathway for achieving for net zero emissions by 2050.

Cause for Celebration

Chaired by ICAO's deputy director for environment Jane Hupe, panelists celebrated ICAO's long term aspirational goal (LTAG) to reach net zero by 2050 agreed last month at its General Assembly in Montreal. They also discussed what needs to happen next in order to make the LTAG a reality. Hupe said 135 of ICAO's 193 member states that account for 98% of global traffic had already submitted state action plans.

ICAO already has Corsia [Carbon Offsetting and Reduction Scheme for International Aviation] that is seen as a bridge for short-term carbon abatement until sustainable aviation fuel (SAF) becomes widely available. That system includes a global standard for SAF, which is expected to do the heavy lifting for emissions reductions over the longer term. This summer ICAO also launched an assistance, capacity-building and training program for SAF (ACT-SAF) to help all member states maximize their SAF potential. That will soon be rebranded as ACT-LTAG to include other decarbonization measures. But the principle of collaboration remains the same.

Harnessing Africa's Sunshine

Christoph Wolff from German development agency GIZ spoke about Germany's involvement alongside the UK government in a SAF feasibility study in Kenya. That project hopes to harness Kenya's abundant solar power reserves to make low-cost power-to-liquids SAF using technology that could be replicated across Africa. Another feasibility study into Chile's green hydrogen potential using hydro power was also discussed.

Wolff said \$3.2 trillion of investment would be required to supply aviation with the more than 70% SAF proportion of total fuel it will need by 2050. He urged ICAO to help with financing, suggesting a SAF producer fund to help de-risk much needed investment in emerging markets. He also called for action on "book and claim" accounting so that emerging markets could export SAF and boost their economic potential.

Singapore is meanwhile due to publish its sustainable Air Hub blueprint next year. That will include interim targets for SAF usage at Changi airport and tangible pathways to reach net zero by 2050. Singapore's decarbonization efforts will make huge strides that reverberate around the world next year. Finnish Neste's 1 million tons/yr

>> *continued on page 2*

SAF plant is due to start production in 2023, providing SAF not only for Singapore but also for Asia, the US West Coast and Europe. Once that facility is fully commissioned, it will be the largest SAF plant in the world.

Along with other countries in Southeast Asia, Singapore is also studying the potential for a long-term SAF ecosystem in the region. Underscoring the inclusive nature of the aviation sector's strategy for decarbonization, the panelist from Singapore pointed out that, "No country should be left behind."

During the main sessions of the COP-27 meetings, US Climate Envoy John Kerry announced a public-private initiative called the Energy Transition Accelerator (ETA) that seeks to raise funds for projects in developing countries via sales of carbon offsets. He did not provide any indication of how much money could be made available under the initiative, which is backed by the US government, the Rockefeller Foundation and the Bezos Earth Fund. But a US government statement said it was expected to operate through 2030, with a possible extension to 2035.

Chile and Nigeria are among the countries that have expressed an early interest in exploring the ETA's potential benefits. Bank of America, Microsoft, PepsiCo, and Standard Chartered Bank have also shown interest in helping to develop the ETA, and will decide later on whether they will formally participate. The statement said that one idea under consideration was to limit participation "to companies committed to achieving net zero no later than 2050" and also adopting "science-based interim targets." The International Capital Market Association (ICMA) launched a separate initiative on Wednesday that would enable countries struck by climate disasters to hit the pause button on their debt payments.

*Kerry Preston, London, Cristina Haus, New York,
Lauren Craft, Sharm el-Sheikh*

ALTERNATIVE FUELS

Aviation Leaders Pressure New UK Transport Minister on SAF

The UK aviation industry is calling for more urgent government support to help get the country's domestic sustainable aviation fuel (SAF) industry off the ground.

Lots needs to be done to meet the government's own targets for five SAF plants to be under construction by 2025 and a mandated 10% SAF use by 2030. UK aviation leaders are specifically calling

for "contracts for difference" (CFDs) price subsidies to help de-risk the huge amount of investment needed to meet an anticipated 1.5 billion liters per year of UK SAF demand by the end of the decade.

"We believe UK SAF production has the chance to become a domestic success story, but the government needs to act now to ensure manufacturers get the price certainty needed to unlock private investment into this sector," industry leaders wrote in a letter to the new UK transport secretary Mark Harper. Details of the letter were leaked to the *Financial Times* newspaper this week.

According to the FT, signatories to the letter included the heads of UK-based carriers British Airways and Virgin Atlantic, as well as the CEOs of Heathrow, Gatwick and Manchester Airport Group and potential UK SAF producers Velocys, Fulcrum and Alfanar.

"The only question is do we make our own SAF, creating jobs and growth for the UK, or do we import it from other countries?" they asked Harper. The letter warned that investors would go elsewhere if the UK government doesn't underwrite projects using CFDs, like it did for offshore wind. CFDs guarantee a fixed wholesale price for SAF, below which the government tops up the difference and above which producers would pay the government back.

UK Political Chaos

Bold UK ambitions for "guilt-free flying" by 2040 were rushed out in July before disgraced former prime minister Boris Johnson was forced out of office. A new £165 million (\$191 million) Advanced Fuel Fund was announced at the time, alongside promises for a SAF blending mandate from 2025 and other initiatives like CFDs designed to stimulate investment in SAF production.

Concrete plans were due to be published by the end of this year. But that deadline is likely to slip given the ongoing political chaos in the UK. Mark Harper became the UK's third transport secretary in the space of just seven weeks on Oct. 25. He was appointed by the current UK prime minister Rishi Sunak who was installed as leader by the ruling Conservative Party following Liz Truss' disastrous 50-day tenure as leader.

SAF Plant Progress

Even without proper government support, this month has still seen another UK SAF plant move a step closer to commercialization. Flag carrier British Airways (BA), US SAF producer LanzaJet and the UK's Nova Pangaea technologies signed an agreement Nov. 2 to accelerate their Project Speedbird plant to convert agricultural and wood waste into 102 million liters/yr of low-cost SAF. BA says it will offtake all SAF produced at the facility in the UK's northeast, which it says will be enough to power 26,000 flights.

Construction work on Speedbird could now start next year with first SAF production expected from 2026. The project has already received almost £500,000 of UK government funding under the Green Fuels, Green Skies competition. It has now applied for a Department for Transport’s Advanced Fuel Fund grant which the partners say “will be key to the project’s continued development.” BA’s parent company IAG has also said it will invest in the next phase of development work.

Six UK SAF plants are now at various stages of development, offering a potential 645 million liters/yr of SAF production capacity by 2027. But start-up dates are starting to slip.

BA is also working with Fischer-Tropsch (FT) specialist Velocys on a 50,000 tons per year (62.5 million liters/yr) AltAlto plant making SAF from municipal solid waste (MSW) at Immingham in the UK northeast. Its start-up date has already slipped from an initial 2024 to 2027 currently.

Two more FT MSW plants are expected around the same time. US Fulcrum Bioenergy is spending £600 million (\$687 million) on a 100 million liters/yr FT facility at Stanlow near Manchester airport in the UK northwest. Saudi Arabia Alfanar has committed 5 billion Riyal (\$1.33 billion) on a 180 million liters/yr SAF and naphtha Lighthouse plant in the UK northeast.

In addition to Speedbird with BA and Nova Pangea, LanzaJet is still planning two more 100,000 liters/yr alcohol-to-jet plants in the UK: Project Dragon with Virgin Atlantic in Wales making SAF from steel mill waste gases and another Project Atmos taking captured carbon dioxide from the atmosphere.

Kerry Preston, London

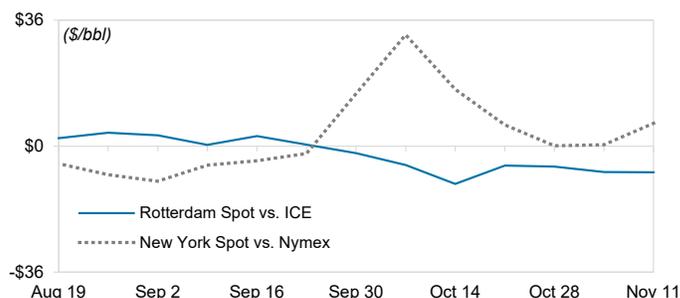
SPOT CARGO MARKETS

Prices Slide as China Heads Back into Lockdown

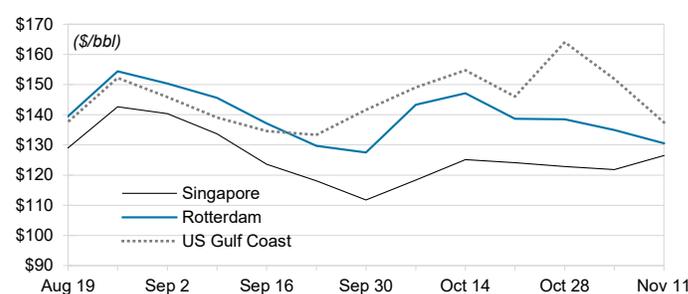
Oil prices slumped with the world’s biggest buyer China still missing from the market and rampant inflation beginning to squeeze fuel demand elsewhere. Beijing is still rejecting the “live with the virus” approach to Covid-19 taken by most other countries with surging infections in the capital and port city of Guangzhou triggering fresh lockdowns. Analysts at US bank Goldman Sachs don’t expect China to fully reopen until the second quarter of 2023.

Russia’s apparent withdrawal from the strategic Ukrainian city of Kherson also knocked prices. But no one expects a swift end to the war and traders are still nervous about the market impact of next month’s EU ban on Russian crude imports and G7 price cap. International benchmark Brent lost a dollar over the reporting

JET-GASOIL SPREADS



SPOT JET FUEL PRICES



EUROPEAN QUARTERLY JET FUEL SWAPS QUOTES

(Bid/Offer Range in \$/ton, c.i.f. NWE)

Q	Chg.	Nov 11	Nov 4
Q1'23	-43.75	1,016.75 - 1,017.75	1,060.50 - 1,061.50
Q2'23	-29.50	956.00 - 957.00	985.50 - 986.50
Q3'23	-24.00	923.00 - 924.00	947.00 - 948.00
Q4'23	-23.75	896.25 - 897.25	920.00 - 921.00

Prices are live for midday. Source: FCStone

week to close at \$93.67 per barrel Thursday. It has shed almost \$5/bbl since its mini-peak last Friday when it settled at a nearly 10-week peak of \$98.57/bbl. That price spike was triggered by supply-side concerns about Russia’s reaction to the cap and Opec-plus cuts. US domestic price-pin WTI lost \$1.70/bbl over the week to close at \$86.47/bbl Thursday, having topped out at \$92.61/bbl last Friday.

European jet fuel cargo differentials surged as ICE low-sulfur gasoil (LSGO) futures switched to the dramatically lower December front-month. There are also concerns the Fifa football World Cup taking place in Qatar this month will cut lifeblood jet fuel flows from Mideast Gulf. Jet cargoes were pegged at a whopping \$119.75 per metric ton premium to the new front-month December ICE LSGO futures on Nov. 10, their highest since Jun. 22, and up from an all-time low of minus \$135.75/ton on Oct. 10. Rollercoaster LSGO futures are making life difficult for traders with the upcoming EU ban on Russian fuel imports from Feb. 5 contributing to market backwardation. No Russian gasoil will be allowed in the Amsterdam-Rotterdam-Antwerp tanks used for ICE physical settlement after Nov. 30 to give traders time to adjust.

Mideast refiners are sending far less jet to Europe as they work to satisfy booming local demand around the Fifa World Cup. Brokers flag a steady stream of jet tankers heading into Jebel Ali, the port that serves regional airport hub Dubai. Qatar Airways and Flydubai have between them added 42 extra flights per day from Dubai to Doha for the duration of the Nov. 20–Dec. 18 football tournament. Qatar has even reopened its mothballed Doha International airport (DIA) alongside Hamad (DOH) in order to handle the sharp rise in traffic. Mideast jet fuel flows to Europe were already down sharply last month at 541,000 tons in October compared to 877,000 tons in September. Just one jet cargo changed hands in Europe’s market-on-close pricing window. European major Shell sold 30,000 tons to rival heavyweight BP into Le Havre Nov. 17–21 at a \$22/ton premium to Platts c.i.f cargo mean assessment in Monday’s window. Shell continued to offer jet into Rotterdam on board the *STI Jermyn* coming from China. Europe is looking to longer haul suppliers in Asia-Pacific, particularly South Korea and China, to replace Mideast barrels. But north Asia’s kerosene winter heating season could scupper their plans.

Oil markets continued to slide in the US, where stocks swelled by 3.9 million barrels to 440.8 million bbl in the week ended Nov. 4, according to the US Energy Information Administration (EIA). But product stocks are still lean, and some market players said they think that low product tanks could eat into crude exports. “Domestic refiners may opt to ramp up runs in a bid to rebuild depleted product stocks,” said one analyst, who thinks that the US may have reached a high point for crude shipments. Refinery throughputs, meanwhile, rose 247,000 b/d to 16.1 million b/d as the downstream emerges from maintenance.

Nymex diesel futures plunged by 35¢ per gallon to reach \$3.57 on Thursday, pushing outright jet quotes into the \$3.17–\$3.89 range. Weaker jet spreads on the Gulf and West coasts accentuated the slide in jet markets. New York Harbor is the notable exception. The region is desperate for imported barrels, with NYH jet differentials soaring to 32¢/gallon over December diesel futures from a 5¢ discount last week. Volatile demand recovered from its five-week low, jumping by 239,000 b/d to 1.55 million b/d. Output climbed by 145,000 b/d to 1.6 million b/d — its highest level since late August. Stocks rose by 600,000 bbl to reach a two-month high of 37 million bbl and approach year-ago levels following a prolonged deficit.

Asian jet markets strengthened, with the benchmark Singapore spot price differential hitting its highest level in more than two months. Benchmark Singapore differentials jumped by 58¢/bbl to a premium of \$2.81/bbl on Nov.10, its highest level since Sep. 7. Airline capacity inched up in three of the four largest regional aviation markets East of Suez despite a decline in China, the world’s second largest national aviation market. Scheduled airline capacity for the week of Nov. 7 held steady in Northeast Asia, according to data analysis firm OAG.

Kerry Preston, London, Cristina Haus, New York, Freddie Yap, Singapore

IN BRIEF

Platts Launches Jet Fuel Carbon Price

Benchmark price provider S&P Platts will start publishing its long-promised daily carbon prices for jet fuel, diesel and gasoline alongside its regular transport fuel price assessments on Nov. 15. Platts has already launched price assessments for sustainable aviation fuel (SAF) as it works to maintain its stranglehold on contract pricing through the energy transition. Carbon prices will be based on a new monthly estimate of the carbon intensity of each fuel and Platts existing daily carbon removal credit offset price assessment. The carbon price of each fuel will be published daily in dollars per gallon on the US Gulf Coast, dollars per metric ton in northwest Europe and dollars per barrel in Singapore.

“As low carbon commodity trading continues to gain traction, aligning our carbon intensity assessments and price premiums directly with the regional gasoline, diesel and jet fuel price benchmarks will allow the market to judge individual asset and cargo performance against the standard we have outlined,” said Platts’ Global Head of Carbon Paula VanLaningham.

Cosmo Aims to Scale Up Domestic SAF

Japanese refiner Cosmo Oil has joined forces with engineering company JGC and biodiesel producer Revo to produce sustainable aviation fuel (SAF) at scale domestically. On Nov. 1 the three partners set up joint venture firm Saffaire Sky Energy that aims to become Japan’s first large-scale SAF producer. The JV targets an annual output of 30,000 kiloliters (518 b/d) using 100% waste cooking oil as feedstock. Construction of the SAF production plant is scheduled to begin in the summer of 2023 at Cosmo’s Sakai refinery in Osaka. Completion is expected by end-2024 with operational start-up targeted by April, 2025. The project is supported by Japan’s R&D agency New Energy and Industrial Technology Development Organization. The plant would also produce biophtha and biodiesel.

Itochu Sells Neste-Made SAF in Japan

Japanese oil trader Itochu will start supplying Neste-made sustainable aviation fuel (SAF) to Japan Airlines (JAL) at Tokyo’s Haneda airport later this month. SAF deliveries are due to start Nov. 18 for JAL’s regular “sustainable charter flight” service from Haneda to Okinawa (Naha). The airline is in the process of negotiating a longer term SAF supply deal with Itochu ahead of the Japanese government’s plan for a 10% SAF mandate by 2030.

In the Nov. 7 statement announcing the deal with JAL, Itochu touted its SAF credentials. The trader has been instrumental in building an SAF supply chain based on Neste imports with stable deliveries currently to Japan’s Haneda and Narita airports. Itochu said SAF deliveries would be extended to Chubu Centrair airport by the end of this year and Kansai airport during the first half of 2023.

THE METHODOLOGY BEHIND JFI'S PRICE PAGE

The Jet Fuel Intelligence data track prices and trends in spot cargo and futures markets as well as key biofuel prices, providing a concise summary of weekly trends. Spot cargo and futures prices represent weekly averages, and last week quotes are subject to revisions since JFI goes to press before final Friday prices are available. Assessments for regional prices are based on the common cargo size for that particular area. Quotes reported for the New York Mercantile Exchange and the Intercontinental Exchange (ICE) contract reflect the weekly average for the front-month contracts. Cargo prices are provided by Thomson Reuters as well as OPIS.

In the Key Biofuel Prices table, prices are listed for some of the main ethanol and biodiesel markets in the US and Europe. In the US there are prices for two futures contracts, the front-month CME CBOT ethanol contract and the front-month Nymex RBOB contract, as the equivalent gasoline contract. There are also prompt-month prices for ethanol in three spot markets: the Midcontinent hub, New York Harbor and the US Gulf Coast.

In Europe we list benchmark gasoil futures prices on the ICE in addition to prompt barge prices on a dollar-per-metric-ton basis f.o.b. in the Amsterdam-Rotterdam-Antwerp (ARA) market for unleaded premium gasoline and ultra-low-sulfur diesel

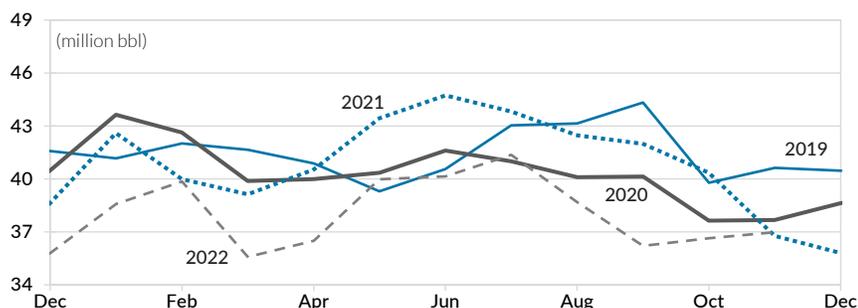
(ULSD) as fuel reference prices alongside a range of biodiesel prices, all provided by Thomson Reuters.

Biodiesel prices are all quoted on a dollar-per-ton basis. Fatty Acid Methyl Ester (FAME) matches European fuel standards for summer grade with a cold filter plugging point (CFPP) of 0°C, and winter grade with a CFPP of -10°C on an f.o.b. ARA basis. Prices are also quoted for the main forms of feedstock biodiesel used in blending in Europe: SME produced from imported soya oil has a CFPP of around 0°/-5°C and is quoted on a c.i.f. ARA basis; PME produced from imported palm oil has a CFPP of +11°/+15°C and is quoted on a c.i.f. ARA basis; while RME produced from rapeseed has a CFPP of -10°/-12°C and is quoted on an f.o.b. ARA basis by Reuters on the basis of prices published by brokerage Kingsman SA.

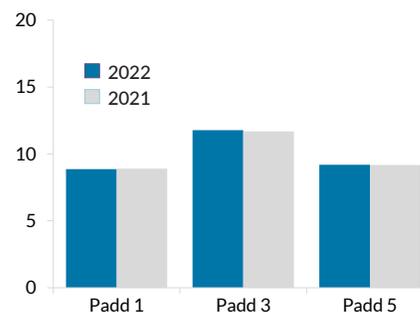
The JFI data table also charts mid-distillate crack spreads for Nymex heating oil versus ICE gasoil on a weekly and monthly basis, as well as global carbon and carbon futures prices from the ICE. EUAs are the credits used in the EU Emissions Trading System. Each is equivalent to one metric ton of carbon dioxide (CO2) and are used by power generators and large industrial plants to cover their emissions. EUAs can be bought in the market, are auctioned by government, with some given away free.

US SUPPLY, DEMAND AND STOCK TRENDS AT A GLANCE

US JET KEROSENE STOCKS



REGIONAL STOCK LEVELS, NOV 4



JET KEROSENE STOCKS

(million bbl)	2022					2021		Latest Levels vs.	
	Nov 4	Oct 28	Oct 21	Oct P	Sep P	Nov 5	Oct	Oct 28 '22	Nov 5 '21
East Coast (Padd 1)	8.9	8.5	8.8	8.7	8.5	8.9	10.3	+4.2%	-0.4%
West Coast (Padd 5)	9.2	8.3	8.6	8.7	8.5	9.2	9.8	+10.2	+0.2
Central (Padd 2-4)	18.9	19.5	18.6	19.3	19.2	19.8	20.2	-3.2	-4.5
Total Stocks	37.0	36.4	36.1	36.6	36.2	37.9	40.4	+1.6%	-2.4%

('000 b/d)	2022				2021		Latest Wkly. Change	Oct '22 vs. Oct '21	Sep '22 vs. Sep '21
	Nov 4	4 Wk. Avg.	Oct P	Sep P	Oct	Sep			
Jet Refinery Output	1,640	1,524	1,519	1,564	1,321	1,356	+9.7%	+15.0%	+15.3%
% Jet Yield	9.9	9.4	9.4	9.5	7.5	7.6	+7.8	+25.9	+24.9
% Utilization	92.1	90.3	90.0	91.7	86.1	87.2	+1.7	+4.5	+5.2
Imports	116	156	143	75	218	222	+56.8	-34.3	-66.3
Sales	1,547	1,487	1,488	1,520	1,467	1,485	+18.3%	+1.4%	+2.3%

p=Preliminary. Source: US Department of Energy. Data has not been updated due to delays at the Dept. of Energy.

JET FUEL INTELLIGENCE DATA

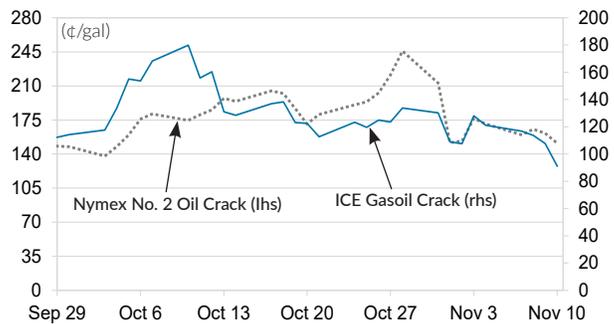
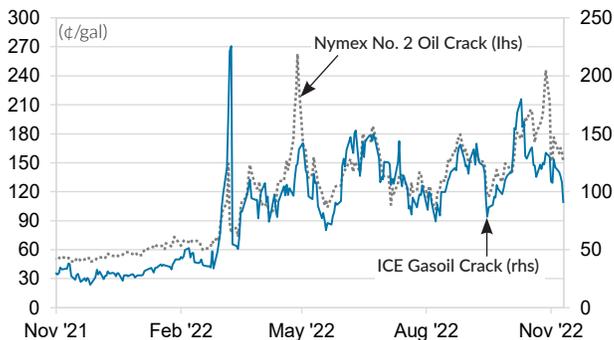
PRICES IN SPOT CARGO AND FUTURES MARKETS

	ICE Prompt Futures (\$/ton)	European Spot Jet Fuel (\$/ton)*			Asian Spot Jet Fuel Markets (\$/bbl)†		
	Gasoil 0.1% Sulfur	NW Europe	Mediterranean	Mideast	Singapore	Japan c.i.f.	
Weekly Trend	-29.66	-45.49	+60.70	+5.00	+3.62	+3.60	
This Week	1055.19	1,031.06	1,086.46	126.19	126.52	131.15	
Previous Week †	1084.85	1,076.55	1,025.76	121.20	122.90	127.54	
Oct 24-Oct 28	1100.75	1,099.65	1,018.12	121.74	123.75	126.56	
Oct 17-Oct 21	1083.25	1,089.30	1,052.57	122.89	123.96	128.66	

	Nymex Prompt Futures (\$/gal)	US Spot Jet Fuel Markets (¢/gal)			
	NY Harbor ULSD	New York†	US Gulf†	Chicago*	Los Angeles†
Weekly Trend	-0.16	+8.82	-33.79	+21.93	-7.43
This Week	3.69	385.11	327.30	456.85	321.55
Previous Week †	3.85	376.28	361.08	434.92	328.98
Oct 24-Oct 28	4.18	419.64	399.54	361.66	331.11
Oct 17-Oct 21	3.91	402.83	345.58	367.00	313.33

r=Revised. Source: *OPIS Worldwide Jet Fuel Report, †Refinitiv.

DISTILLATE CRACK SPREADS - ICE vs Nymex



KEY BIOFUEL PRICES

US (\$/gallon)	Nov 4	Oct 28	Chg.
Futures			
CBOT Ethanol	2.64	2.46	+0.17
RBOB Gasoline	2.71	2.89	-0.19
Spot market			
Ethanol Midcont.	2.79	2.48	+0.31
Ethanol NY Harbor	2.80	2.58	+0.22
Ethanol US Gulf	2.86	2.55	+0.31

Europe (\$/ton)	Nov 4	Oct 28	Chg.
Futures			
ICE Gasoil	1,084.85	1,100.75	-15.90
Spot market			
Gasoline	992.50	939.36	+53.14
Diesel	1,099.55	1,220.95	-121.40

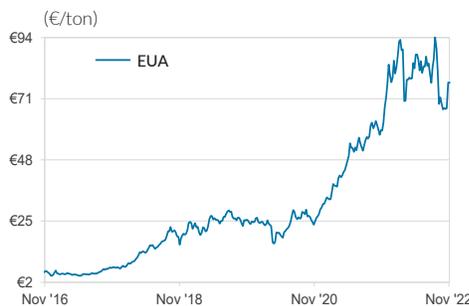
Source: Refinitiv, Exchanges

GLOBAL CARBON PRICES

(€/ton)	Nov 8	Nov 1	Chg.
EUA Dec '22	76.06	76.72	-0.66
US (\$/ton)			
CCA (Calif) Dec '22	28.20	29.38	-1.18
RGGI (NE) Dec '22*	13.38	13.56	-0.18
New Zealand (NZ\$/ton)			
NZU (spot)	88.20	84.50	+3.70
Asia (\$/ton)			
	Nov 4	Oct 28	Chg.
China (National)	8.08	8.00	0.07
South Korea	14.25	15.09	-0.84

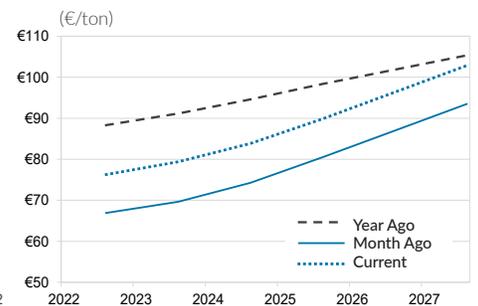
Benchmark months. *Short tons; all others metric tons. Based on given week's exchange rates. Source: ICE, OMF

EU CARBON FUTURES PRICES



ECX front-month futures. Source: ICE

EU CARBON FORWARD CURVE



ECX EUA forward curve. Source: ICE