

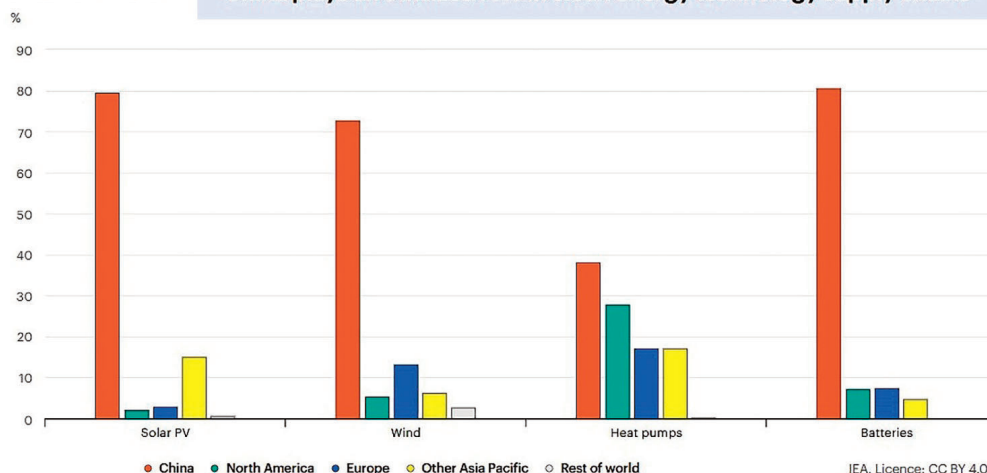


IEA warns of overreliance on China for clean energy technologies

China-made electric cars, batteries and renewable power equipment dominate global markets, making the world vulnerable to supply disruption. A one-month halt in Chinese battery export would reduce e-car factory output elsewhere by \$17 billion, while a similar disruption in Chinese solar panels would slash \$1 billion in monthly output from solar PV module factories, the International Energy Agency (IEA)

Shares in global production of clean energy technologies, 2024

China plays an outsized role in clean energy technology supply chains



In an 'N-1' report, the IEA assesses what would happen if the single largest supplier of a technology were removed from the market. In the event of a one-month halt in Chinese battery exports, nearly \$9 billion of the losses along the supply chain would occur in the EU, while a similar halt in Chinese solar panel exports would mostly affect factories in Southeast Asia and India.

"Many of the technologies central to the Age of Electricity are no longer niche markets, they are important and growing parts of the

global economy. The market for them may well double over the next decade," said IEA Executive Director Fatih Birol. He urged governments and industry to strengthen supply chain resilience and industrial competitiveness to reduce geographic concentration in the interest of energy and economic security.

The global market for key energy technologies may grow from nearly \$1.2 trillion today to around \$2 trillion by 2035 under governments' current policies, roughly equivalent to the size of the

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Biomass challenges gas power on fuel costs, offsets higher Capex

Emerson has been selected by Strategic Biofuels to automate a \$2 billion biomass power project in Louisiana, as wood-fired plants with CCS outcompete gas-fired generation on fuel costs and Capex trade-offs.

Wood chips or forestry residuals typically trade at \$1-2 cent per kilowatt-hour (ct/kWh), or \$20-40/ton equivalent – far below recent natural gas prices at around 5 ct/kWh or higher, as CO₂ taxes or carbon pricing add 20-50% to gas-burn's effective costs, a Verenum study finds.

Levelized cost of electricity (LCOE) studies show wood integrated gasification combined-cycle plants achieving 9 ct/kWh at scale with cheap wood feedstock, while co-firing wood



Render of Louisiana Green Fuels power plant in Caldwell Parish

gas in combined-cycle plants (CCGTs) can drop blended costs to about 8 ct/kWh, thanks to the latter's higher operational efficiency.

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global oil market last year. Under governments' stated policies, growth could be even stronger, with the market for the technologies potentially reaching almost \$3 trillion by 2035.

Manufacturing remains concentrated in China, which has been accounting for 60-85% of production capacity across multiple supply chain steps. Chinese gross exports of clean energy technologies exceeded \$165 billion in 2025, equivalent to about 15% of the country's overall trade surplus.

Improving industrial competitiveness is essential for strengthening supply chain security and that cost gaps vary across technologies, the IEA underlined.

For batteries, manufacturing efficiency and automation explains over 40% of China's cost advantage over Europe. In wind blade production, energy and labour costs account for 75% of the production cost gap, and for 65% in solar PV wafer and polysilicon manufacturing.

Access to low-cost renewables could

enable hydrogen-based steelmaking to compete moving forward in countries like the US, China and India, analysts find. Investment in green hydrogen production rose by 80% year-on-year, albeit from low levels.

Deployment of carbon capture, utilisation and storage (CCUS) – dismissed by critics as a way to prolong the age of fossil fuels – is also advancing, although many announced projects have yet to reach final investment decisions (FIDs). ■

EU windfall tax on energy profits risks squeezing spark spreads

A push by five EU governments for a windfall tax on oil and gas profits could fund consumer relief and curb electricity-price inflation, impacting dispatch economics as well as dark and spark spreads.

Germany, Italy, Spain, Portugal and Austria have asked Brussels to skim off "surplus profits" of energy companies after a surge in fuel prices triggered by the Middle East conflict. Ministers argue that the measure could ease the burden on industry and households, and limit inflation without putting extra strain on

public finances.

The proposed tax is primarily designed as a fiscal transfer, not a direct power-market intervention. Unlike blunt price caps or broad subsidies, a windfall tax would leave wholesale prices more exposed to market fundamentals, which impacts spark spreads and the level of gas-burn.

If the tax gets enacted, the effect on wholesale electricity markets will hinge on whether higher taxes damp investment and supply expectations or whether the

money is recycled quickly into bill relief, keeping demand and power prices firmer.

The effect on spark spreads – profit margins for burning gas for power generations – will depend less on the tax itself than on how it feeds through to power prices, consumer relief and the relative profitability of gas versus coal as a fuel.

For gas-fired generators, the crucial benchmark is the spark spread, which measures electricity revenue against gas fuel costs after accounting for power plant efficiency. If gas prices keep climbing faster than power prices, spark spreads shrink and gas burn can be displaced by coal or lower-cost generation; if power prices rise with fuel costs, gas generation can still stay in the money. ■

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Though fuel cost economics are tilted in favour of wood chips, upfront capital costs for such plants are comparatively high and scalability is limited.

On capex, CCGTs have seen costs balloon to \$2,000-2,400/kW up from \$785/kW four years ago, due to supply-chain issues, pipeline upgrades and materials inflation. Biomass plants like the Louisiana Green Fuels run \$3,000-5,000/kW or higher when including CCS, pushing the full \$2 billion project envelope.

Louisiana Green Fuels to feature CCS

As for the Louisiana Green Fuels plant,

Strategic Biofuels said it will process about 1.3 million tons of biomass feedstock a year — material that would otherwise decompose or be burned. Emerson will equip the plant with its Delta automation platform, a suite of measurement, valve, flow and software tools that allow operators to finetune the plant's integrated power and CCS operations.

Situated in Caldwell Parish, the LGF plant will burn forestry residuals and capture related emissions, producing 100 MW of carbon-neutral, dispatchable electricity for the state grid while permanently storing 1.1 million metric tons of CO₂ annually in geologic formations. ■

Japan faces electricity crunch as Qatari LNG flows falter

Japan could face electricity shortages if Qatari LNG shipments remain disrupted. A prolonged Middle East conflict would also delay the start of additional LNG deliveries expected from 2028 new projects in Qatar and the UAE.

Though Japan just sources 4 million tons of LNG annually, or 6% of total imports, via the Strait of Hormuz – this volume is critical.

Qatari and UAE LNG deliveries provide about 3.5% of Japan's electricity. "As this affects what is known as the power reserve margin, a 3.5% drop is by no means small, as we head into summer months," Takafumi Yanagisawa, executive analyst at the Institute of Energy Economics, Japan (IEEJ) pointed out.

Australia is by far the largest supplier of LNG to Japan, though the country also buys cargoes from Malaysia, Russia and the US. Just under 60% of Japan's LNG total imports is used for electric power generation, the remainder is for city gas and industry.

Japanese utilities are striving to balance lost Qatari deliveries by buying additional volumes on the spot market and utilising the upper quantity tolerance (UQT) of existing contracts with sup-

pliers, such as Australia and the US. Under the UQT, supply can be increased by around 10% of the contracted volume, subject to mutual agreement.

"Even if the Strait is freed for navigation, reduced LNG exports from Qatar are likely to last for some time, and expansion projects could be delayed," Yanagisawa cautioned. Before the Middle East crisis, some industry players expected the global LNG market to face a supply surplus by 2030, but that view is becoming "increasingly difficult to sustain."



Man watches LNG tanker arriving at Japanese port

Panic LNG buying may trigger 'vicious feedback loop'

Southeast Asian countries with historically low gas storage levels have resorted to panic buying of spot LNG cargoes. Analysts warn a "vicious feedback loop" could weaken domestic purchasing power and further exacerbate energy price inflation.

"Not only do you have higher priced energy imports, you also have weaker local currencies. Which means that those imports become more expensive in local currency terms and importantly, those currency devaluations can outlast the high cost of energy imports," explained Sam Reynolds, research lead at the Institute for Energy Economics and Financial Analysis (IEEFA).

Asia's vulnerability to imported LNG and the lack of energy self-sufficiency has been exposed by US-Israeli air strikes against Iran and the subsequent closure of the Strait of Hormuz. China, India, Japan and South Korea account for 75 percent of oil and 59 percent of LNG flows through the nautical choke-point.

"Bangladesh has contracts to procure oil and LNG on the spot market from Australia, Malaysia, Saudi Arabia, Singapore and the US – but everybody is now looking at those options too," said Khondaker Golam Moazzem, research director at the Centre for Policy Dialogue, warning of spiralling prices.

In the short term, the loss of Middle Eastern supply can be partially substituted by new volume by Australia, the U.S. and Canada.

LNG has been promoted as a means to provide energy security through diversifying supply routes beyond fixed natural gas pipelines. "But we've seen that this has not been the case with all the cards held by a few LNG suppliers," Amy Kong, energy transition researcher from Zero Carbon Analytics (ZCA) said, pointing at the vulnerability of many Asian countries in the face of the consolidation of global oil and gas exporters.

Philippines suspend power spot market in 'energy emergency'

The Philippines has suspended trading on the Wholesale Electricity Spot Market until further notice, citing fuel supply risks and price volatility linked to the Middle East tensions.

The Energy Regulatory Commission (ERC) announced the temporary halt of spot electricity sales across all grids. The suspension was ordered under a presidential decree declaring a "state of national energy emergency," aimed at stabilising supply and shield consumers from sharp bill increases.

Acute fuel shortages of natural gas are necessitating a modified pricing scheme, the regulator warned. The Philippines remaining fuel stocks could last roughly 45 days.

For the time being, the power system is running under special guidelines designed to prioritize renewable generation and conserve critical fuel inventories.



LNG carrier discharges at AG&P's Philippines regas terminal

Coal fired plants will be paid at fixed rates, while gas-fired plants are compensated based on contracted prices in a bid to reduce operators' exposure to spot market fuel price spikes. With this market intervention, the Philippine government is seeking to prevent an anticipated 16% surge in household and industrial power bills.

Vietnam shifts from LNG-fuelled power to RES-plus-battery

Vietnam's Vingroup has proposed dropping plans for what would have been Vietnam's biggest LNG-fired power plant and replacing it with a renewable-plus-battery project. The 4.8 GW Hai Phong LNG-to-power project could be abandoned over high fuel costs.

ExxonMobil had been working with Japan's largest LNG importer JERA to develop the 4,800 MW plant as an integrated LNG-to-Power project in the port city of Hai Phong in northern Vietnam.

The regasification terminal was designed to have a capacity of 6 million tonnes of LNG per annual and a power plant will have an initial capacity of 2,250 MW that would be expanded to 4,500 MW by 2030. But now these plans may well be shelved, if not scrapped outright.

Landed LNG prices soar past \$18/MMBtu

The pivot comes as landed LNG prices in Asia have spiked dramatically, with JKM spot benchmarks trading above \$18/MMBtu — more than double last year's levels — driven by the sudden cut-off of Qatari volumes that typically account for 15-20% of regional imports.

Deliveries from Qatar's Ras Laffan terminal, a cornerstone supplier to Japan, South Korea

and now Vietnam, halted after Iranian missile strikes on shipping lanes near the Strait of Hormuz disrupted safe passage for at least 10-12 cargoes scheduled for March-April.

Traders report that replacement volumes from the US Gulf Coast and Australia have pushed freight rates up 40% to \$120,000/day for 174,000 cbm carriers, while competition from Europe — where TTF gas futures hit €120/MWh — has further squeezed supply.

Vietnam, still building out its LNG infrastructure, now faces regas tolls and take-or-pay risks that render the Hai Phong project uneconomic at current fuel costs. ■



Render of the 4.8 GW Hai Phong LNG-to-Power project

Siemens Energy revives Libya's Sarir plant with turbine swap

Siemens Energy's has repowered Libya's Sarir plant by replacing the old turbine units with new ones based on standardized designs. For a Brownfield Engine Exchange (BEX), the German manufacturer reuse existing infrastructure to cut costs and minimize downtime.

Faced with an electricity deficit that often exceeds 2 GWs during summer peaks, restoring the 855 MW Sarir gas power plant was deemed critical. The General Electricity Company of Libya (GECOL) partnered with Siemens Energy to carry out the rehabilitation.



New Siemens turbine arrives at Sarir power plant site

Situated 600 kilometers southeast of Benghazi, Sarir is one of Libya's largest gas-fired power plants and a key supplier to residential areas and the Sarir oil field, the country's largest crude production site.

However, the plant had suffered repeated outages since its commissioning in 2010 amid years of conflict and maintenance delays, sharply reducing its output.

Siemens Energy concept for rapidly replacing the tree 285 MW turbines, used existing foundations, generators, and auxiliary systems. The approach eliminates the need for full civil reconstruction and can cut total project timelines by 50–60% compared with new builds. ■

Gladstone gas-plus-storage project files for approval

Private Energy Partners has applied for environmental approval to build the 1,188 MW Gladstone SDA Energy Hub, a hybrid gas fired power generation and battery energy storage system (BESS) project in Queensland.

The project combines six open cycle gas turbines (198 MW each), based on Siemens Energy's SGT5 2000E technology, with a co located 780 MW lithium iron phosphate BESS — to be delivered in three phases.

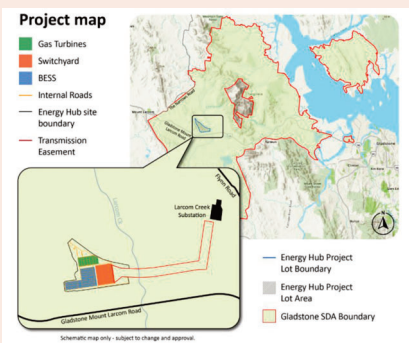
Electricity will be exported through a new dedicated 275 kV substation connecting to Powerlink Queensland's transmission network. Fuel supply will come via a 5.5 km buried pipeline linking the site to an underground gas storage facility.

First power gen by 2029

Early works could begin as soon as next year, positioning the first power generation units to come online by 2029, subject to approval and financing.

EPC procurement is planned for early 2027 following environmental clearance. According to the regulatory filing, the project is designed for 25 years of operation with life extension options.

Private Energy Partners has is pursuing the project through a special purpose vehicle backed by Australian and international infrastructure investors. The company is in discussions with local lenders and export credit agencies to secure project finance funding, expected to reach A\$2.8 billion (US\$1.8 billion). ■



Map of Gladstone SDA Energy Hub

Fracking intensifies to pre-empt service price spike

Caution among US shale gas producers gives way to ramping up activity before service prices escalate, with early actors bound to reap superior margins. For an average Permian Basin well, a 10% higher drilling and completion cost for a new well correlates to a 7.5% higher breakeven price and 40% lower internal rate of return (IRR) over the well's lifetime than the same well drilled prior to cost escalation.

Comparing the IRRs of the two wells, the cost escalation becomes more apparent: The lower cost well would have an IRR of 104% versus 63% for the higher cost well – a difference of 40%.

Rig additions on the cards

The forward curve is widely believed to not reflect the magnitude of the supply disruption. Some producers have hence begun to discuss rig additions and some operators have begun to announce upward guidance revisions.

"Even if the war ends and the Strait of Hormuz gradually reopens, geopolitical premiums, stockpiling demand and a new transit regime in the strait may keep prices higher for longer," analysts noted, suggesting this would incentivise additional shale fracking activities this year.

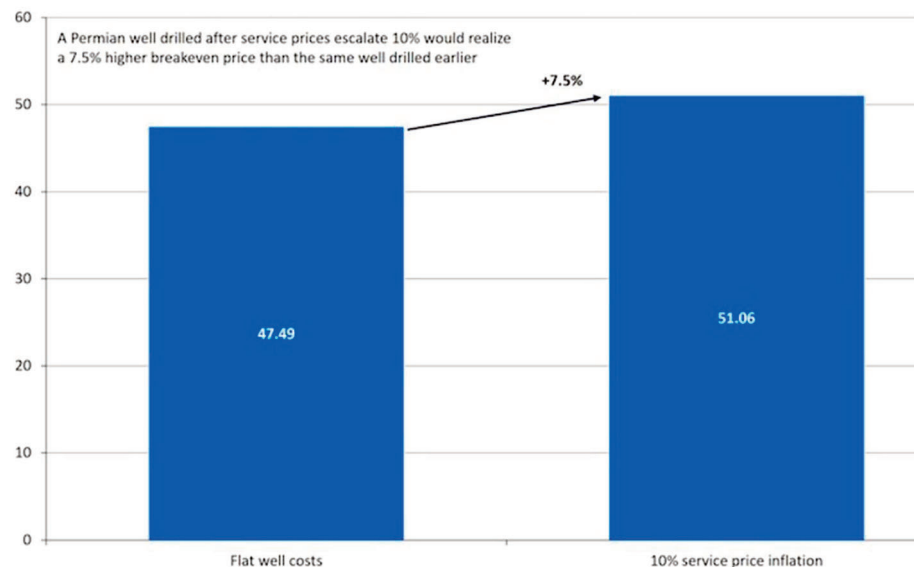
Yet, steep backwardation – where the spot price is higher than the forward price – in the futures curve disincentivizes adding rigs, while depleted drilled-but-uncompleted (DUC) wells and cash on hand prohibits any immediate production spikes to realize \$100 per barrel of WTI crude.

Service price escalation

Inflation in the oil and gas field service sector echoes 2021, when discussions cantered

Figure 1: Permian type well breakeven price* scenarios

USD per barrel



*Average Permian type curve, includes transportation costs, SG&A and corporate taxes; assumes 10% discount rate
Source: Rystad Energy ShaleWellCube; Rystad Energy research and analysis

on super-spec drilling rig availability and E-Fleet term commitments. According to Rystad projections, the current strip pricing encourages the addition of about 30 to 40 rigs and between eight and 12 frac fleets by the end of this year.

Soaring service prices may well go hand in hand with around 6% drilling and completion inflation in aggregate. Analysts an-

ticipate the back-end of the futures curve will raise 2027 and 2028 oil prices as Middle Eastern supply disruption drags on.

In a sustained \$85 to \$90-per-barrel of WTI world, the same basket of drilling and completion categories will see inflation of between 18% and 20%. According to Rystad findings, the most acute categories are land rigs, which could see inflation in the order of 18% to 20%, oil-country tubular goods at 20%, frac services at 18% to 25%, and fuel at 20% to 25%.

As more rigs are added, day-rates will rise to facilitate these additions. The first 15 to 25 rigs will likely require almost no capital, with the final 25 rigs requiring upgrade capital in the millions.

The frac service market is also tighter from a horsepower perspective, with demand in the order of 13 million to 14 million horsepower and supply between 16 million and 17 million horsepower. Incremental fleet additions will draw from around 3 million warm-stacked horsepower (40 to 60 fleets) that will likely require pumpers to overhaul equipment versus retire it permanently, driving pumping hourly rates higher for operators.

COST PRESSURE OUTLOOK

Acute inflation categories

Estimated service cost inflation by segment

LAND RIGS

18-20%

estimated inflation

OCTG

20%

estimated inflation

FRAC SERVICES

18-25%

estimated inflation

FUEL

20-25%

estimated inflation

WELL ECONOMICS IMPACT

Breakeven & IRR erosion

Combined effect of cost inflation on a typical well

Breakeven price

↑ 7%

higher breakeven required

Internal rate of return

↓ 40%

compression to IRR

OCTG = oil-country tubular goods. Inflation ranges represent estimated mid-cycle exposure.

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