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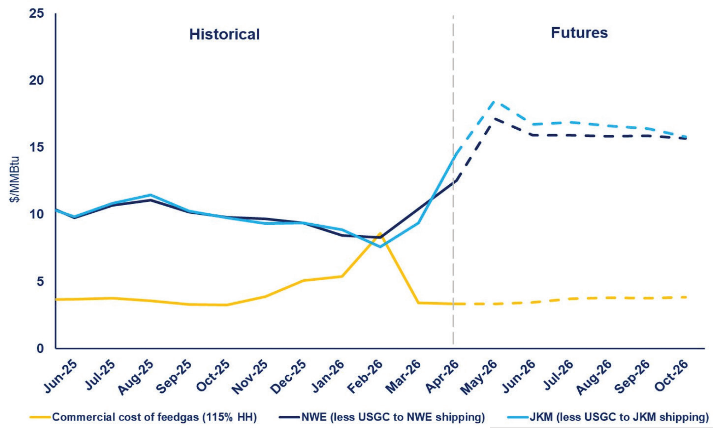
INTELLIGENCE THAT WORKS

Economic Horizons for LNG and Gas-Fired Generation

US LNG COMMERCIAL MARGINS



Insights

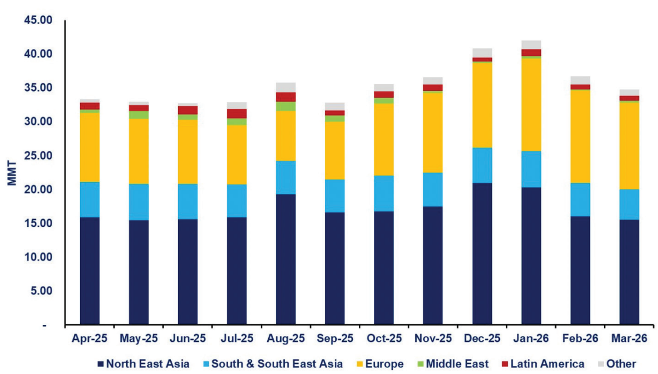
- LNG margins dropped below 0 at the end of February 2026 due to spiking Henry Hub prices because of Winter Storm Fern.
- Henry Hub prices quickly returned to higher levels. LNG prices for Europe and Asia spiked 44% and 68%, respectively, from February to April 2026 due to the conflict in Iran.
- Future curves indicate growing LNG trading margins with implied margins above $11/MMBtu, assuming a tolling and liquefaction fee of $2.75/MMBtu, margin levels not seen since around February 2023.

Notes
Commercial Cost of Feedgas: 115% HH (Source: S&P).

NWE (less USGC to NWE Shipping): Platts NWE minus BRG calculated shipping costs (Sabine Pass to Zeebrugge).

JKM (less USGC to JKM Shipping): Platts JKM minus BRG calculated shipping costs (Sabine Pass to Futtsu).

GLOBAL LNG IMPORTS



Insights

- Over the trailing twelve months:
  > Global monthly imports averaged 35.6 MMT.
  > Northeast Asia—predominantly Japan, Korea, and China — accounted for 48% of global imports, on average.

> Global imports of LNG are up 20.5 MMT compared to the preceding 12-months from 2024Q2 - 2025Q1, a 5.1% increase, even with the drop-off in LNG shipments in March 2026 due to the conflict in Iran.

Note
Regional data aggregated based on individual cargo deliveries (source: Kpler).

Plugging the Gap: How US Well Abandonment Could Become the Next Carbon Investment Frontier

The energy transition conversation often focuses on emerging technologies (e.g., hydrogen, carbon capture, next-generation renewables) while paying less attention to the legacy infrastructure from more than a century of hydrocarbon development. One of the most immediate emissions-reduction opportunities may lie not in building new systems but in addressing the millions of aging oil and gas wells already in the ground.

Across the United States, inactive, abandoned, and orphaned wells remain scattered across producing basins. Long treated primarily as environmental liabilities, these wells are now increasingly recognized as a diffuse but meaningful source of methane emissions—and, under emerging carbon-market frameworks, a potential source of investable methane-abatement projects.

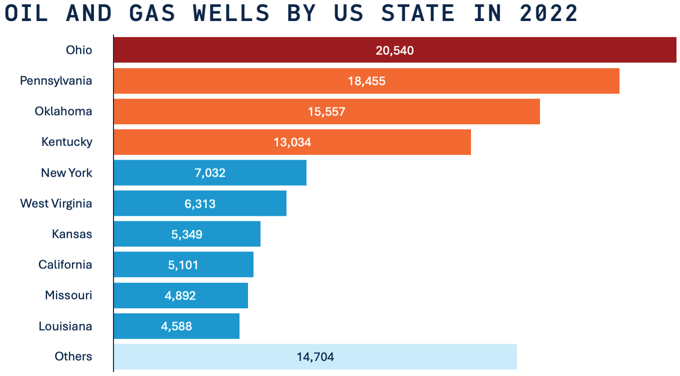
The Scale of the US Well Abandonment Challenge

More than a century of drilling has left the US with a vast inventory of aging wells. Estimates suggest roughly **3.5 million wells** fall into the abandoned category, including both plugged and unplugged wells. Within this universe, regulators have identified more than **120,000 orphan wells**—sites with no responsible operator—while researchers estimate hundreds of thousands more may remain undocumented.

Many of these wells leak methane through degraded casing, compromised cement barriers, or incomplete abandonment procedures. The emissions may appear small but across millions of wells represent a measurable source of greenhouse gases. Because methane has a global warming potential more than twenty-eight times greater than carbon dioxide (CO_2), even modest leak rates translate into significant climate impact.

Plugging wells is also expensive. Depending on depth, geology, and location, plugging and abandonment (P&A) can cost from the tens of thousands to more than $100,000 per well, leaving operators (those primarily responsible for terminating wells properly) and government (in the form of policy or fiscal incentives) with a multibillion-dollar remediation challenge.

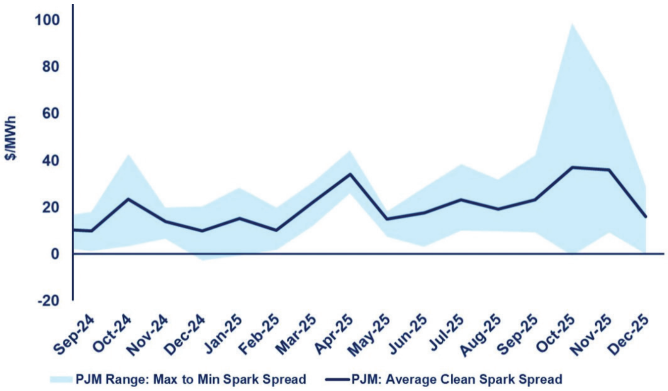
FIGURE 1: DOCUMENTED NUMBER OF ORPHANED OIL AND GAS WELLS BY US STATE IN 2022



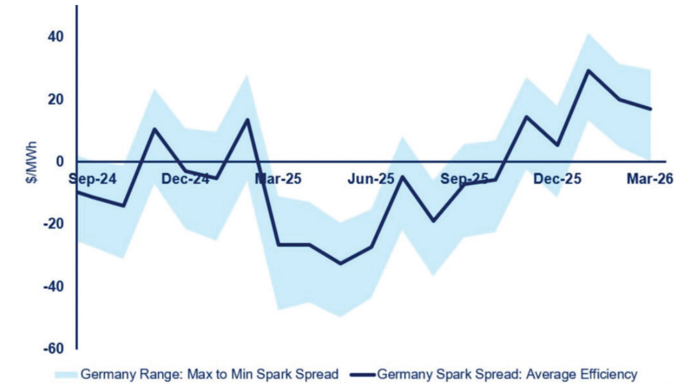
Source: US Geological Survey (USGS); visualizingenergy.org; BRG research and analysis.

CLEAN SPARK SPREADS[1] FOR CCGT PLANTS

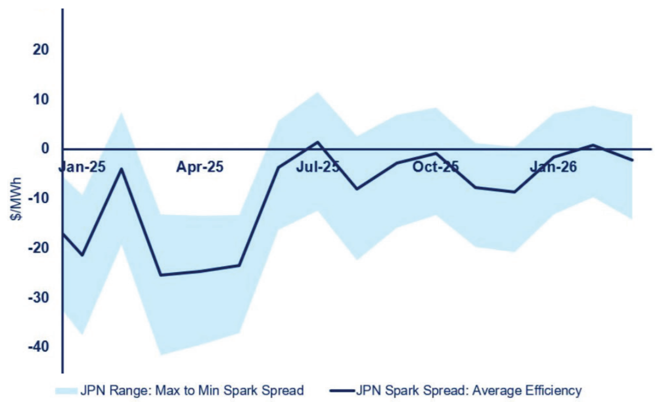
US: PJM



GERMANY



JAPAN



Insights

- Over the trailing twelve months, clean spark spreads:
  - > remained positive in the US PJM region
  - > in Germany turned and remained negative for most of 2025 before returning to positive at the end of 2025 and remaining positive through the start of 2026
  - > in Japan remained negative through the first half of 2025 before hovering around 0 for the second half of 2025 and into the start of 2026
- Over the last 6 months, clean spark spreads remained relatively static with a slight upward trend in the US; trended toward positive through the end of 2025 before dropping at the start of 2026 in Germany; and remained relatively static in Japan.
- EU ETS prices have decreased 22% from a peak in January 2026 to March 2026.
- Looking ahead: There is a one-month lag in outputs, such that the impacts of the Iran conflict will appear in the next quarterly update.

Notes

1 Clean spark spreads = electricity prices – natural gas costs – traded carbon prices.

Ranges in clean spark spread prices are based on variation in market prices and plant efficiencies.

Market data from S&P and Platts.

Emissions prices from a specified carbon tax (Japan), RGGI (PJM), and ICAP or Trading Economics (Germany).

From Environmental Liability to Carbon Opportunity

Historically, well plugging has been treated solely as a compliance cost—an unavoidable expense tied to the end of a well's productive life. Emerging methane-focused carbon markets are changing that perspective.

A properly plugged well prevents methane emissions that might otherwise continue for years or decades. When those avoided emissions are measured and verified, they can potentially be converted into carbon credits representing permanent methane abatement.

This reframes P&A from a regulatory burden into a potential carbon-reduction investment opportunity.

Methane reductions from well plugging possess several attributes aligned with carbon-market requirements:

- **Permanence:** once a well is properly sealed and monitored, the emissions source is effectively eliminated.
- **Additionality:** since many orphan wells would remain unplugged for years without new funding mechanisms.
- **Measurability:** advances in methane detection—from ground sensors to aerial and satellite monitoring—are improving the ability to quantify baseline emissions and verify reductions.

Under emerging methodologies, developers can measure methane emissions from candidate wells, plug them in accordance to regulatory standards in all relevant states, and quantify avoided emissions over time. Verified reductions can then be issued as carbon credits and sold to corporate buyers seeking credible emissions offsets.

At scale, the economics could become meaningful. Depending on carbon prices and participation levels, the market for credits associated with US well plugging could reach **billions of dollars over the coming decade**.

Policy Tailwinds and Evolving Carbon-Credit Framework

Public policy has begun addressing the orphan-well challenge. The **Infrastructure Investment and Jobs Act** allocated approximately **$4.7 billion** for well-plugging programs across the country. The **One Big Beautiful Bill Act** followed by reorienting this federal clean-energy incentive to focus mostly on orphan wells but kept the total fund intact.

Administered largely through the US Department of the Interior, these funds support identification, plugging, and remediation while creating employment in historically energy-producing regions.

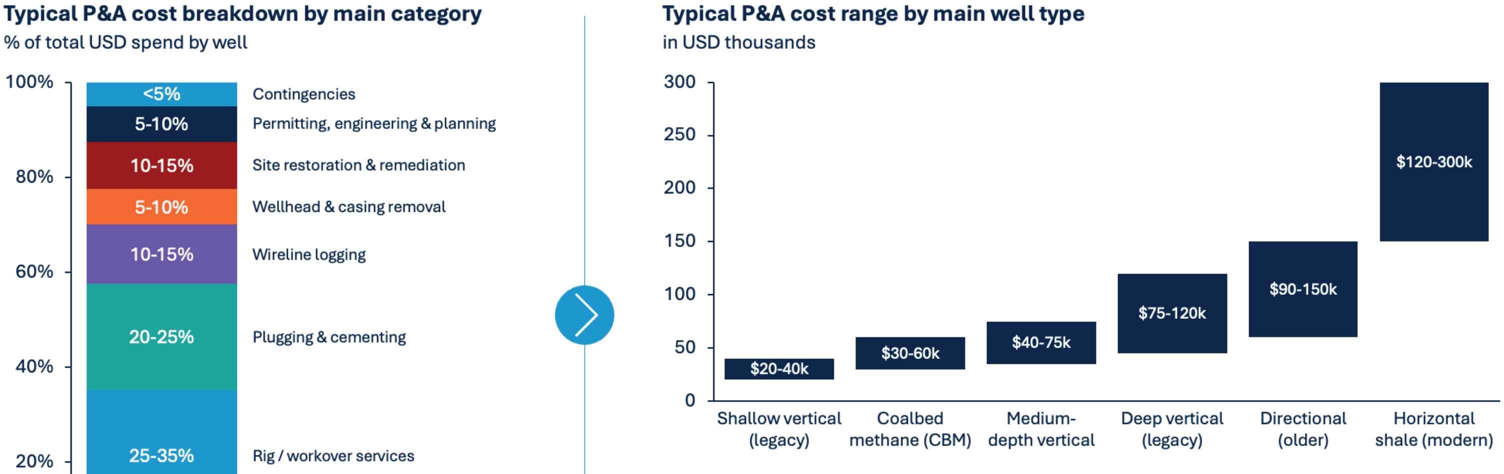
While significant, public funding addresses only a portion of the remediation challenge. Estimates suggest the full cost to address the national inventory of orphan wells could reach **tens of billions of dollars**, creating a natural role for private capital and carbon finance

FIGURE 2: MAIN CARBON CREDIT FRAMEWORKS FOR ABANDONED WELLS

Framework	Description	Pros	Cons	Best For	Who Uses It Today?
ACR at WINROCK INTERNATIONAL	• Registry methodology for orphan wells	• Established brand, clear rules	• Over-crediting risk	• Large professional projects	• Rebellion Energy Solutions (Oklahoma Heartland) • Zefiro Methane
BCarbon	• Protocols for orphan and marginal wells	• Flexible, decline-curve logic	• Less brand recognition	• Mixed portfolios	• Emerging developers
CARBONPATH	• Measurement-based, post-plug issuance	• Conservative, strong additionality	• Lower volume/well	• High-integrity buyers	• Developer-led projects
VERRA	• Emerging methodology (TBD)	• Scale and global demand	• Still developing	• Future large programs	• None yet (development stage)
Well Done Foundation	• NGO/developer bespoke	• Fast, flexible	• Quality varies	• Pilots and CSR	• Well Done Foundation

Source: Rebellion Energy; ACR; Zefiro; Payne Institute; Verra; BRG research and analysis.

FIGURE 3: TYPICAL COST RANGE OF A P&A JOB



	Shallow vertical (legacy)	Coalbed methane (CBM)	Medium-depth vertical	Deep vertical (legacy)	Directional (older)	Horizontal shale (modern)
Typical depth (ft)	<3,000	1,000-4,000	3,000-6,000	6,000-10,000	6,000-10,000	8,000-15,000
Key regions	•Appalachia •Texas •Mid-Con	•Powder River •San Juan	•Permian •Mid-Con	•Gulf Coast •Anadarko	•Permian •DJ Basin •Eagle Ford	•Permian •Eagle Ford •Bakken

Source: DOE/National Energy Technology Laboratory (NETL); Interstate Oil and Gas Compact Commission (IOGCC); BRG research and analysis.

Business Models and Unit Economics

For P&A-for-carbon to scale, projects must combine operational execution with viable financial structures. Emerging models include operators integrating carbon monetization into their own decommissioning programs, specialized developers aggregating portfolios of orphan wells, and investment platforms backed by private equity or infrastructure capital that finance large-scale remediation campaigns.

Project economics depend on three variables: **plugging cost, baseline methane emissions**, and **carbon prices**. P&A costs typically range from **$30,000 to $150,000 per well**, with emissions varying widely depending on well condition and geology. Since emissions are highly skewed—some wells leak far more than others—identifying high-emitting wells can significantly improve project economics.

Carbon prices ultimately determine revenue potential. At moderate prices, credits may offset only part of remediation costs. At higher prices—particularly when combined with public funding—plugging programs can generate positive returns while delivering permanent methane abatement.

A **sustained period of higher oil and gas prices** driven by geopolitical disruptions—including the ongoing conflict involving Iran—could further strengthen project economics by increasing both operator cash flows and corporate demand for high-integrity methane-abatement credits.

Strategic Implications for Key Stakeholders

- **Exploration and production (E&P) companies**: For E&P operators, P&A-for-carbon primarily represents a liability-management opportunity. Integrating carbon-credit generation into decommissioning programs could partially offset asset-retirement costs, demonstrate proactive methane management, and generate credits that can be used internally or sold.
- **Oilfield service providers**: Service companies are essential execution partners. Carbon-linked P&A campaigns create opportunities to develop standardized plugging and monitoring packages aligned with carbon methodologies while integrating methane measurement and verification services. Providers that combine operational expertise with measurement, reporting, and verification (MRV)-compatible workflows may position themselves as specialized decarbonization service providers.
- **Private equity and infrastructure investors**: For private capital, well-plugging portfolios offer exposure to infrastructure-style methane-abatement assets. Aggregating large well inventories allows investors to spread operational costs while generating diversified streams of carbon credits. Blended structures combining public funds, private capital, and carbon revenues could unlock scalable investment platforms.
- **Industrial buyers and end users**: Demand from corporate buyers will ultimately determine market scale. Hard-to-abate sectors (e.g., refining, chemicals, steel, cement) are increasingly seeking high-integrity credits to complement internal decarbonization strategies.
- **Methane-abatement credits**: Credits tied to well plugging may prove attractive because they deliver permanent emissions reductions through physical infrastructure remediation

The next phase of the energy transition may depend on both building new energy systems and addressing the infrastructure left behind by a century of development. Plugging abandoned wells reduces methane emissions, restores land, and eliminates long-term environmental risks.

If supported by robust MRV systems, P&A-for-carbon could transform one of the oil and gas sector's most persistent environmental liabilities into a new category of pragmatic decarbonization infrastructure.

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About BRG

BRG combines world-leading academic credentials with world-tested business expertise and purpose-built emerging technologies. Our culture centers on agility and connectivity that set us apart and get you ahead.

Our professionals include specialist consultants, industry experts, renowned academics, and leading-edge data scientists. Together, they bring a diversity of real-world experience, data, and human and artificial intelligence to economics, disputes, and investigations; corporate finance; and performance improvement services that address the most complex challenges facing organizations across the globe

Our unique structure nurtures the interdisciplinary relationships that give us the edge, laying the groundwork for more informed insights and more original, incisive thinking. When paired with our global reach and resources, our diverse perspectives and technical capabilities make us uniquely capable to address our clients' challenges. We achieve results because we know how to apply our thinking to your world

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BRG's Energy & Climate experts provide integrated business advisory, finance and investment, and dispute resolution services to help energy companies, investors, buyers, and sellers navigate today's policy, economic, market, pricing, and competitive imperatives.

The BRG Energy & Climate team is focused on business, regulatory, and dispute resolution challenges associated with rapid decarbonization and the transformation of energy use across the energy, industrial, and transportation sectors. Our energy business advisory offerings and dispute resolution work are synergistic and mutually reinforcing. Our extensive experience with energy disputes makes us realistic, grounded analysts of long-term opportunity, risk, pricing, and value. Similarly, our cross-disciplinary experience throughout the energy sector, as accomplished advisors, former executives, and financiers, makes us highly credible, effective experts for dispute resolution matters.

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For a deeper conversation and to learn more about how BRG can help you, call or email to arrange a private client briefing.

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