GE Power & Water
Distributed Power

Delivering gas-fired power where no gas has gone before

Small gas networks for distributed power whenever and wherever it's needed.

GE imagination at work

30-50% power producers have reported 30-50% savings in operating costs when using natural gas instead of diesel

27.5% burning natural gas instead of fuel oils can reduce CO_2 emissions by 27.5%

2025 gas could overtake oil and coal as number one in global energy market share by 2025

50% over half of the boom in natural gas consumption will take place in China, the Middle East, as well as Southeast and South Asia.

Distributed power and the Age of Gas

Power and gas industry dynamics are changing rapidly. Uncertainty around traditional power development models, combined with advancing technology, is creating new distributed power options. Traditionally, large centralized power plants were built to capture the economies of scale in power production. The costs of these plants were spread over many customers and paid off over many years. Multi-billion-dollar projects such as coal and nuclear power plants have long development timelines and can be difficult to build if institutional structures are weak and/or electric grids are immature. The speed of development, lower capital intensity, and increasing competitiveness are driving the emergence of new gas-based distributed power solutions.

With a focus on customer value, GE brings technology and innovation to enable distributed gas-to-power projects around the world. The rise of distributed gas is one aspect of a larger energy mega-trend GE has described as the "Age of Gas".[1]

1) For more on GE's global gas perspective, see the Age of Gas and the Power of Networks at www.ge.com/AgeOfGas

"Virtual" pipelines for distributed power generation

"Virtual" pipelines are a substitute to physical pipelines that distribute gas via land or sea transport. Virtual pipelines replicate the continuous flow of energy in a pipeline with the movement of gas via transportation logistics using trucks or ships.

Modular and Scalable

Virtual pipelines provide the ability to start from small systems and progressively scale up for a relatively modest trade off on cost per unit output. Scalability can lead to dramatically reduced investment and transaction risks along with shortened development timelines. The lower capital intensity allows a wider array of participants with smaller balance sheets and different risk appetites to invest in the opportunities.

Flexible

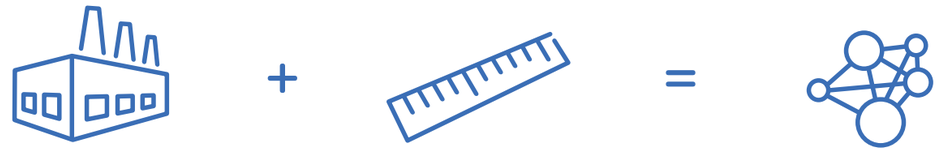
Physical pipelines are tied to the geographies they traverse. Virtual pipelines, in contrast, are flexible to serve shifting demand centers wherever rail, road or port infrastructure permit. These networks can cater to multiple transport options and end points of fuel delivery within an economically competitive radius from the gas source.

Resilient

In places with immature pipeline systems, a portion of the pipeline span can go down and interrupt the flow of gas for weeks while repairs take place. By their discrete nature, virtual pipelines are not subject to the same vulnerability to single point failures and can be built with redundancies at relatively low cost.

Convening technologies to create customer value

Distributed gas-to-power technologies bring together next-generation, smaller, modular gas systems with distributed power generation. Natural gas system development is often highly regional and project specific. Emerging small scale systems are no different, but have standardized elements. The three important aspects to consider when developing distributed gas to power networks are segments, scale, and solutions.



Segments

End-use or industry that defines fuel and power requirement influence economics

Ex.
- Peaking power or base load
- Grid connected or isolated
- Residential or industrial

Scale

Energy requirements along with gas cost and accessibility shape technology options

Ex.
- Power: 0.5 MW or 100 MW
- Gas: 1 MMSCFD or 30 MMSCFD

Solutions

Distributed gas to power system combining technology, network logistics and commercial structures that addresses risk and regulatory aspects

Successful projects will create customer value while monetizing gas resources profitably. In general, a one-size-fits all approach is more likely to underperform relative to a more flexible and diverse approach. The range of solutions for multiple segments and scales is one of the key strengths of GE's portfolio of distributed power products and distributed gas solutions.

GE offers a wide range of gas-to-power options

Distributed gas-to-power is made possible through a series of components integrated into a full gas delivery system.
GE plays in key parts of this series whether it is 0.5 to 50 MMSCFD of gas processing or 100 kW to 100 MW of power generation.

GAS GAS

1 Source

2 Pre-treatment

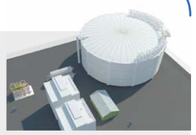
3 Compression/ Liquefaction

GE Oil & Gas

CNG In A Box™ system
0.5 to 4 MMSCFD
2 MW to 16 MW base load power equivalent

Fully-integrated and preconfigured module within a modified 8 foot by 20 foot shipping container for ease of transportation and rapid installation. The CNG In A Box system is suited for monetizing flare gas and supplying CNG for drill rig and onsite power generation, as well as on-road transportation fueling.

Small-scale LNG plants
25,000 to 600,000 LNG gal/day
10 MW to 250 MW base load power equivalent



GE's Small-scale LNG solution is a modular, plug-and-play natural gas liquefaction plant. From design to engineering and manufacturing, GE's skid-mounted solution provides a cleaner, abundant fuel source, ideal for supplying LNG for transportation and to power remote locations for industrial and residential use.

GAS POWER

4 Transport

5 Storage

6 Pressure reduction/ Regasification

7 Power generation

GE Power & Water

Waukesha gas engines
119 kW to 3,605 kW

Waukesha engines can run on direct field gas and provide 80 percent lower operation cost and 95 percent lower emissions compared to diesel.

Jenbacher gas engines
248 kW to 9,500 kW

Jenbacher engines offer cost advantages of natural gas through class-leading electrical efficiency – whether power is required in a remote mine or an island community or is needed for industrial applications.

Aeroderivative gas turbines
18 MW to 100 MW

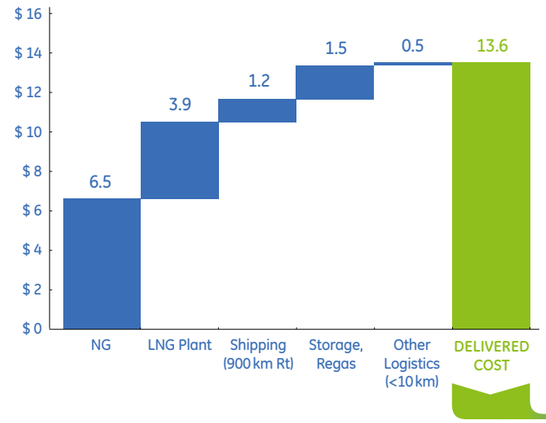
Aero gas turbines can provide power in peaking, cyclic and base load applications and are suitably fueled by floating storage and regasification units (FSRU). The speed and flexibility of developing virtual pipelines also work well with GE's mobile trailer-mounted units when critical power is needed fast.

Realizing distributed gas-to-power systems

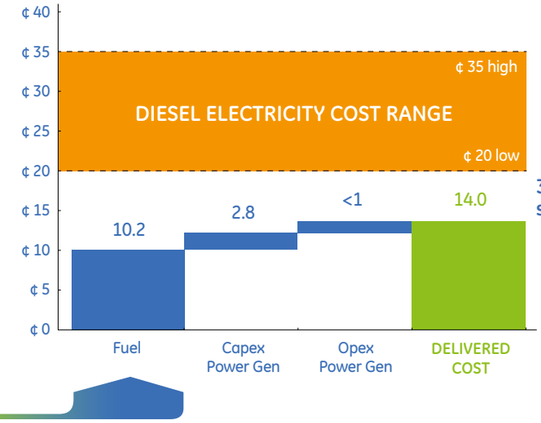
Base load Island power using LNG (90 MW)

A 90 MW base load plant supplied by a small-scale LNG plant, feeder vessels and storage tanks to create a "virtual pipeline" across the sea

$/MMBtu Cost of Gas as LNG supply



¢/KWh Cost of Electricity

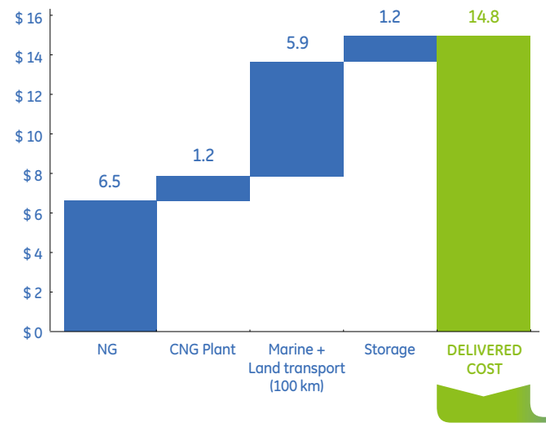


30 – 60% savings

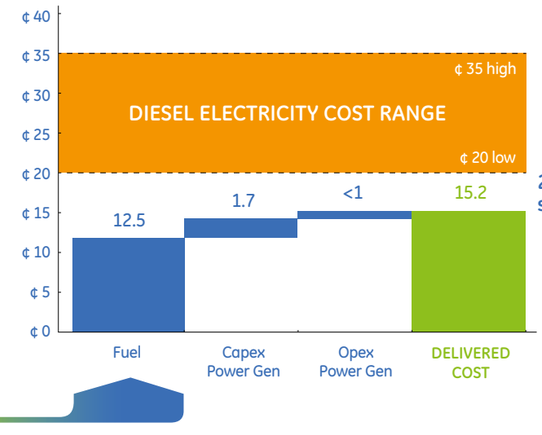
Remote mining power generation with CNG (5 MW)

A 5 MW mining power facility supplied by CNG based virtual pipelines using trucks and roll-on, roll-off ("ro-ro") barges

$/MMBtu Cost of Gas as CNG supply



¢/KWh Cost of Electricity



24 – 57% savings

Assumptions

Asset life 20 yr, Return @15%

Source: GE Oil and Gas, GE Power & Water. Note: Numbers based on indicative cost estimates. Project specific and actual cost structures may vary depending on multiple factors

Cases in point – Solving our customers' challenges

The number of distributed gas-to-power projects are growing rapidly. These summaries highlight a few of the recent places where GE has been part of the solution.

Affordable, reliable power in Nigeria's industrial sector

The challenge for a manufacturing plant in Nigeria was to achieve greater power reliability with no natural gas pipelines in sight.

Instead of a diesel solution priced around 85 cents per liter, the factory in Sagamu took advantage of available CNG through a 60 km virtual pipeline. The operation includes two CNG truck deliveries a day to two containerized Jenbacher Type 3 engines. After two years of flawless operations, annual fuel costs dropped by more than 45 percent.

LNG for power in the Australian outback

Western Australia's population of 2.5 million is situated almost entirely in its southwest corner making its energy infrastructure concentrated on this relatively small area. For the rest of the communities and industrial operations spread across an "outback" of nearly 1 million square miles, providing their power needs involve major logistics challenges.

At the coastal town of Karratha, GE's Small-scale LNG plant forms the backbone of a 120,000 gallon per day liquefaction facility distributing fuel to remote areas of the state. The plant supplies LNG using triple train LNG fueled trucks for transport, moving gas in this virtual pipeline to five remote communities and industrial sites as far as 1,200 miles away.

Monetizing flare gas in the North Dakota oil boom

North Dakota is in the midst of an oil boom, driven by the exploitation of the Bakken shale oil field. While the region is producing large amounts of oil, 30 percent of the associated gas is being flared.

In a joint venture with Ferus Natural Gas Fuels, GE created the Last Mile™ Fueling solution - a fully-integrated natural gas fueling solution for exploration and production companies that can potentially slash operators' annual operating costs by up to $6 million and dramatically cut gas flaring.[1] Working closely with the first customer, the Last Mile Fueling solution takes previously uneconomic natural gas directly from a flare stack, oilfield production site, or a remote pipeline, and removes high-value liquids so they can be sold. The remaining methane is compressed using GE's CNG In A Box system and loaded onto Ferus' specialized tube trailers to be delivered safely to fuel drilling rigs, hydraulic fracturing crews or other oilfield power applications.

Clean, cost effective alternative for island power in Indonesia

Indonesia consists of a seismically active archipelago with more than 17,000 islands making pipeline development full of challenges. For many areas in East Indonesia, the default solution is oil-fired power.

MAXpower recently opened the country's first marine CNG-fueled power plant. The project was developed on Bintan Island at a cost of $4 million and construction took only two months. CNG is shipped by truck and barge where it is used to generate power by two Type 6 Jenbacher engines. This represents close to 35 percent in fuel savings compared to diesel or an annual savings of $4.5 million U.S.

1) GE projected calculations based on assumption of average drilling rig and fracturing crew count in the Bakken.

We are at your service

With a full range of product offerings and a global network of service providers, Distributed Power from GE can help ensure your reciprocating engines or gas turbines run reliably – anywhere and anytime. As a user of GE's Distributed Power products, you can benefit from a comprehensive portfolio of service offerings that can reduce your maintenance costs and help ensure the availability of your equipment.

Higher asset availability with advanced technology

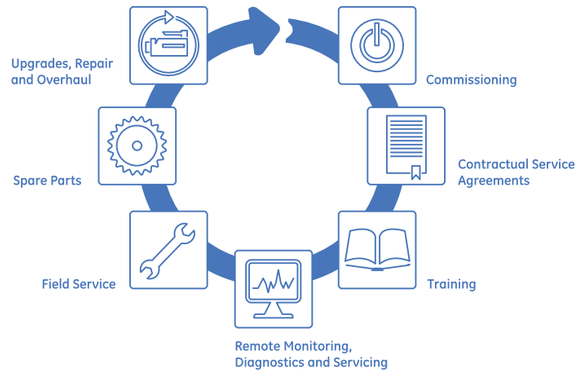
Our Conversion, Modification and Upgrade (CM&U) offerings provide several performance improvements in reliability, availability, maintainability, efficiency, performance, emissions reduction and safety. Additionally, GE Predictivity* solutions harness the power of Big Data to lift existing assets to new levels of performance and profitability. The collection of Predictivity assets provides real-time information to forecast service events, analyze issues, and take proactive steps to achieve your desired operating, compliance and safety outcomes.

Lower costs, less downtime, and 24/7 global service

You operate your equipment around the clock and around the world, and GE is right there at your service. Our Remote Monitoring & Diagnostic (RM&D) technology cuts costs and boosts equipment availability with immediate intervention whenever and wherever you need our help. Additionally, GE's services network is supported by our authorized service providers in more than 170 countries. And when your reciprocating engine or gas turbine reaches the end of its life cycle, we can replace it onsite with a new or overhauled engine or gas turbine, or repower your asset with an original GE unit.

Versatile service agreements fit maintenance to your needs

GE's contractual service agreements (CSAs) help distribute the costs of major maintenance events across the life of your equipment while reducing risk with customizable performance guarantees. Our CSAs cost-effectively integrate the latest OEM technical knowledge, a full range of remote monitoring and diagnostics solutions, field service, original spare parts and repairs. In addition, we can protect your investment by improving operational productivity through guaranteed availability and reduced costs.

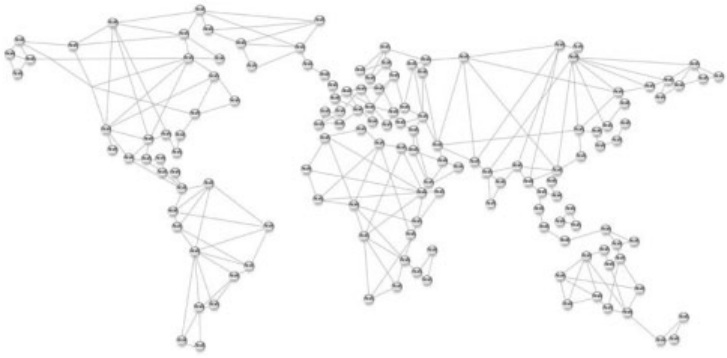


Full range of service offerings ... once it starts, we never stop.

*Trademark of General Electric Company

GE Power & Water
Distributed Power

GE Power & Water's Distributed Power is a leading provider of power equipment, engines and services, focused on power generation at or near the point of use. Distributed Power's product portfolio includes highly efficient industrial reciprocating engines and aeroderivative gas turbines that generate 100 kW to 100 MW of power for numerous industries globally. Headquartered in Cincinnati, Ohio, Distributed Power from GE employs about 5,000 people around the world.



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For more information on gas-to-power solutions:

Power generation solutions, visit **www.ge-distributedpower.com**
CNG and LNG solutions, visit **www.geoilandgas.com**

GE imagination at work

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