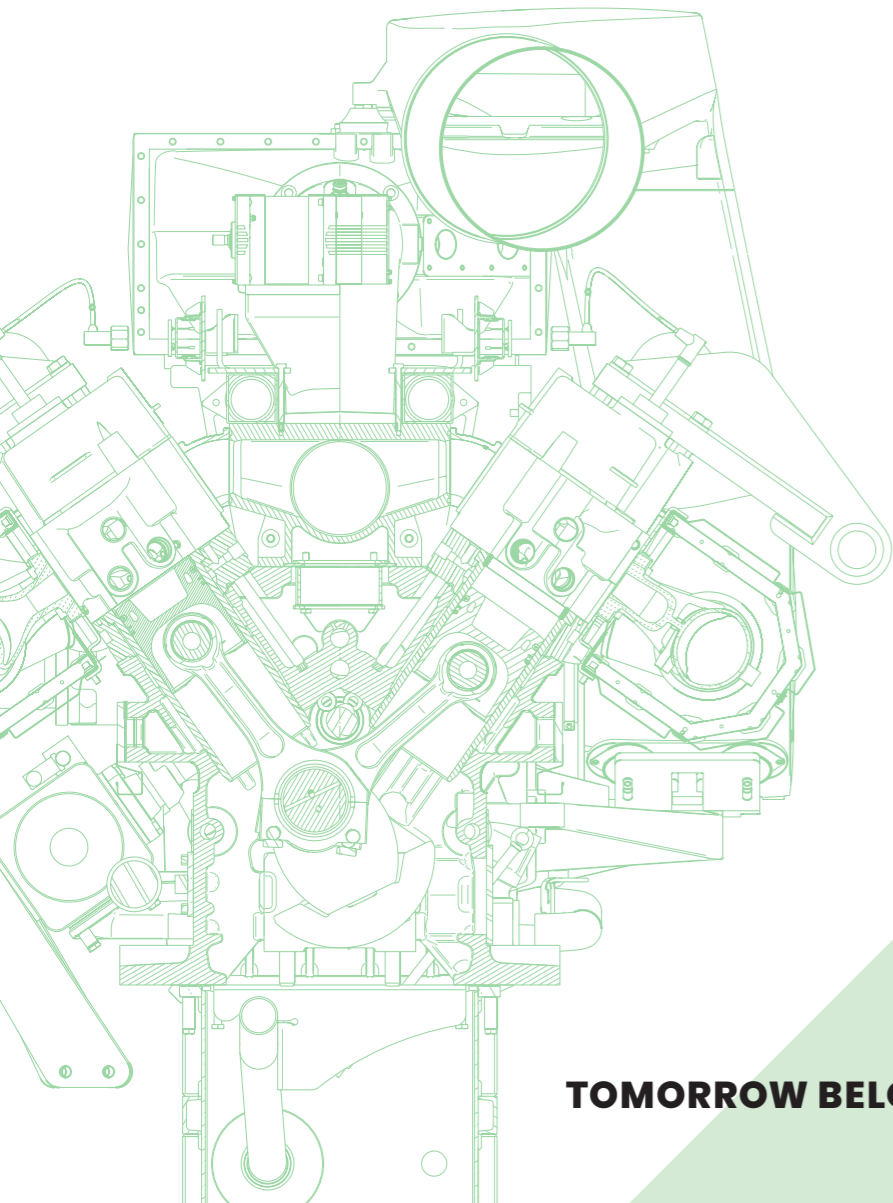


INNIO* is a leading solutions provider of gas engines, power equipment, a digital platform and related services for power generation and gas compression at or near the point of use. With our Jenbacher* and Waukesha* product brands, INNIO pushes beyond the possible and looks boldly toward tomorrow. Our diverse portfolio of reliable, economical and sustainable industrial gas engines generates 200 kW to 10 MW of power for numerous industries globally. We can provide life cycle support to the more than 50,000 delivered gas engines worldwide. And, backed by our service network in more than 100 countries, INNIO connects with you locally for rapid response to your service needs. Headquartered in Jenbach, Austria, the business also has primary operations in Welland, Ontario, Canada, and Waukesha, Wisconsin, US.

For more information, visit: innio.com

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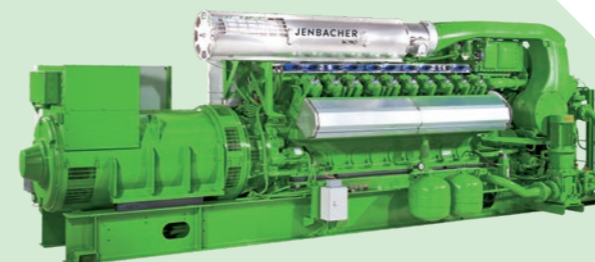
TOMORROW BELONGS TO THE BOLD. 

JENBACHER

GOODBYE FLARE GAS. HELLO USEFUL AND CLEANER ENERGY.



Jenbacher J420



Jenbacher associated petroleum gas solutions from INNIO – your gas engine expert



FLARE GAS IS NO MORE ASSOCIATED PETROLEUM GAS IS ECONOMICAL AND ENVIRONMENTALLY SOUND.

For a long time, oil producers have simply flared associated petroleum gas (so called “flare gas”), considered an unwanted oil by-product. But with increased energy demand coinciding with an escalation in environmental consciousness—flaring now often is avoided, and sometimes even prohibited.

INNIO* Jenbacher* gas engines can turn associated petroleum gas into power for onsite electricity and heat. That means you can eliminate the cost of diesel deliveries to remote areas. And, with associated petroleum gas, you'll reduce the carbon dioxide emissions that otherwise might result from diesel fuel consumption.

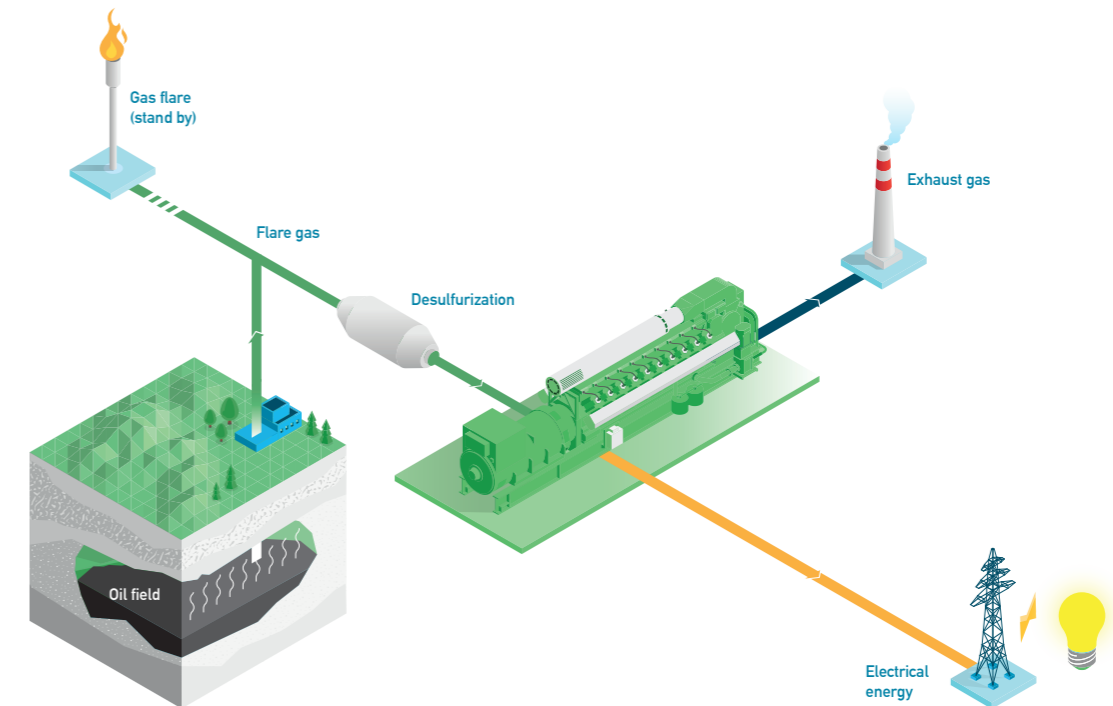
JUST WHAT IS ASSOCIATED PETROLEUM GAS?

Natural gas that comes from oil wells typically is called “associated gas.” It can exist separately from oil in its formation (free gas) or can be dissolved in crude oil. Once separated from crude oil, it commonly exists in mixtures with other hydrocarbons (HCs) such as ethane, propane, butane, and pentanes.

Raw natural gas also contains water vapor, hydrogen sulfide carbon dioxide, nitrogen and other compounds. Associated gas that contains such impurities cannot be transported easily or used without treatment.

TECHNICALLY, A NUMBER OF OPTIONS EXIST FOR HANDLING ASSOCIATED GAS:

- Preparing it as fuel in various forms, such as dried pipeline gas or liquefied petroleum gas (LPG), and exporting it via pipeline
- Reinjecting it for later recovery
- Generating electricity for transmission or onsite needs
- Processing it as liquefied natural gas (LNG) or LPG and exporting it via tankers
- Converting it to petrochemical industry feedstock
- Processing it as gas-to-liquids and gas-to-solids
- Converting it to other forms of energy for uses such as thermal for district heating



THE JENBACHER CONCEPT

In most cases, power generation installations where associated gas is present are in remote areas. If it exists at all, the power supply in such areas is often poor. In the past, a common solution to fulfill those power needs was to use diesel gensets. However, with oil and diesel fuel prices rising rapidly, this solution has become increasingly uneconomical. Add to that the necessary storage diesel fuel entails.

Although the composition of associated petroleum gas frequently is well suited for gas engine combustion, dehumidification and removal of condensable HCs generally are needed. Because HC content is often relatively high, a derating of the nominal natural gas output may be required. Gas desulfurization also may be needed if hydrogen sulfide concentration is high.

With these treatments, this gas becomes a valuable fuel for independent power supply using gas engines. The engines usually are installed in containerized units with all peripheral systems (ventilation, silencers, cooling, and control room) installed inside or on the roof. Depending on local demands, the waste heat from the engines also can be used for onsite heating purposes.

ADVANTAGES

- Replaces diesel fuel with the waste by-product of the crude oil production process, harnessing a problem gas as an energy source

- Avoids costs of diesel fuel transportation over long distances and its storage
- Delivers an independent, onsite power supply
- Offers high profitability with overall efficiencies of up to 90% with combined heat and power and up to 43% with power generation alone
- Provides smooth operation despite fluctuations in gas composition and impurities (within given limits)
- Avoids the deliverance of methane to the atmosphere with high global warming potential
- Provides excellent availability and reliability even at ambient temperatures as low as -50° C
- Requires a small installation footprint due to its compact design (making it a good fit for off-shore applications)
- Installs quickly

OUR COMPETENCE

The first Jenbacher systems using flare gas were installed in Italy in 1998. In total we have shipped about 640 units running on associated petroleum gas worldwide with a total electric output of 940 MW. These plants have the potential to generate about 7.5 million MW-hours of electricity a year—enough to supply more than 2 million European homes¹. Generating this amount of electrical power with associated petroleum gas allows for savings of approximately 1.6 billion liters of diesel fuel a year², what equals to about 10 million oil barrels³.

¹ World Energy Council, 2014 data for average electricity consumption of EU households

² Assuming 1 MW hour of APG fuel input = ~ 89,56 liters of diesel fuel

³ Assuming 1 barrel = ~160 liters of oil