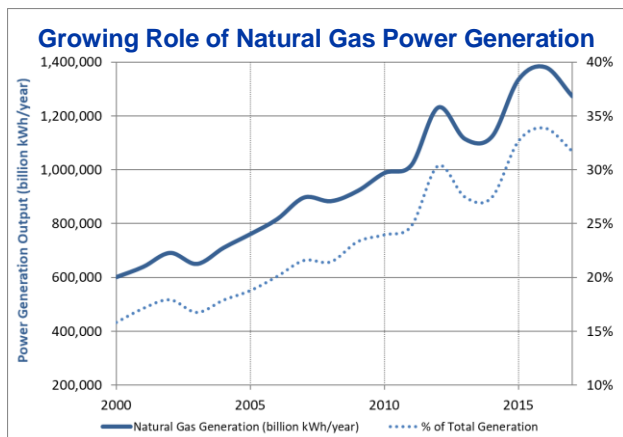


Assessment of Natural Gas and Electric Distribution Service Reliability

SUMMARY OF GTI TOPICAL REPORT AUGUST 2018

A recent GTI report assembles and compares North American electric and natural gas distribution reliability data. The results substantiate the high level of reliability of natural gas service, and support its use for standby and emergency generators.

Energy delivery system reliability and resilience is gaining attention. Data analysis within this report provides a summary of availability of natural gas and electric distribution services to homes and businesses, and the frequency or likelihood of outages per year. The quantified metrics illustrate that natural gas distribution systems operate at very high levels of service availability.



Underground natural gas pipelines are not very vulnerable to weather conditions such as high winds and ice storms, and have proven stable and dependable throughout many major emergency events. The inherent resilience of the natural gas infrastructure allows it to provide cost-effective, clean, and reliable power generation.

A growing number of homes and businesses are turning to onsite generators to provide emergency or standby power during grid outages. Historically, many of these generators, especially for commercial and industrial facilities, have been fueled by diesel.

Today, a number of factors are opening up greater market opportunity for onsite natural gas power systems to supplement grid electricity.

Customers benefit from not having to replenish onsite liquid fuel tanks, such as diesel or propane, when backup is needed to provide extended power. Following extreme weather events, delivery of over-the-road fuel supplies can be disrupted for days to weeks. In this context, the continued supply of pipeline natural gas

makes onsite emergency generation more predictable.

From an economic perspective, another advantage for end users is lower fuel costs. In addition, an onsite natural gas generator can open the possibility for customers to participate in an electric demand response program to capture additional savings.

Customers are also interested in the option of using natural gas in place of diesel engines. To respond to market needs, a total cost of ownership calculator was developed to assist in comparing the business case for natural gas and diesel for standby and emergency generator sets. GTI worked with Generac, a major generator set manufacturer, to create this tool which is available at www.generatorTCO.com.

Sales of natural gas engines and generator sets are increasing. According to data from Power Systems Research, the North American market for 5-20 kW natural gas and propane generator sets has grown by over a factor of four since 2000— totaling about 110,000 units in 2017.

Against this backdrop of growing end user interest in using onsite natural gas power generation, traditional practices and historical code and standards language have typically favored diesel-fueled engines for standby and emergency power.

Backup options that use fuel stored onsite are perceived as more reliable and therefore have been the preferred choice. Code officials even require onsite fuel for facilities such as hospitals and 911 call centers “where failure of the equipment to perform could result in loss of human life or serious injuries”.



Despite their widespread use, however, loss of power associated with major weather events has highlighted the vulnerability of diesel generators. In contrast, gas systems usually remain operational during extreme weather conditions; most downtime is due to planned maintenance.

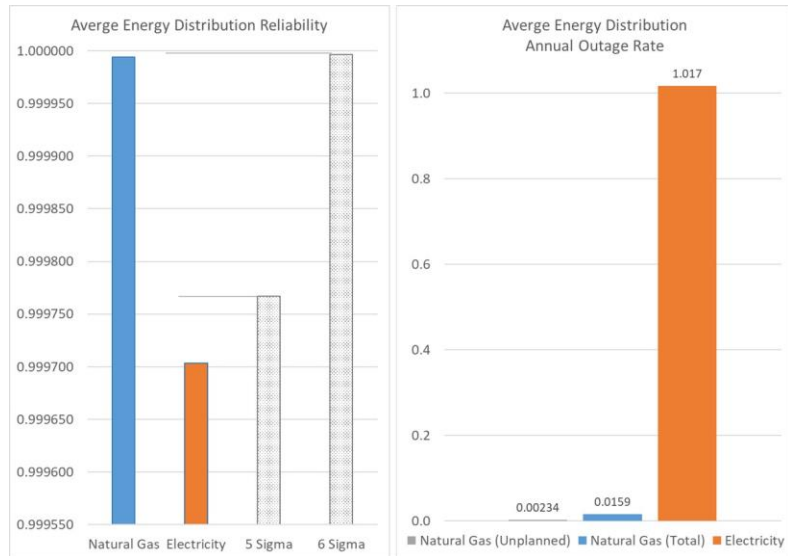
The growing number of emergency and standby generator sets that use the pipeline infrastructure underscores the value of natural gas. Natural gas is part of an integrated solution that helps ensure safe and reliable power during events that can disable electric distribution service—as well as onsite liquid fuel supply—for an extended time.

Quantitative Safety and Reliability Metrics

To gather data for the report, GTI conducted a survey of twelve North American natural gas distribution companies, who provided statistics on the number of planned and unplanned service outages and the number of service hours lost to outages. The survey data was combined with information from the U.S. Department of Transportation (USDOT) and the Common Ground Alliance (CGA) regarding safety incidents or unplanned outage events. Researchers applied the six sigma approach to quantify reliability of the natural gas distribution service.

For comparison, GTI assembled a representative set of distribution service reliability statistics from nine electric companies, culled from reporting data required by state public utility organizations.

Results from the comparison show that natural gas distribution service exhibits six-sigma-level availability performance, while electric distribution service has availability performance near the five-sigma level. Translated into nominal outage time per year, on average natural gas customers could expect to be without service for 3 minutes (and 1.2 minutes based on unplanned downtime) and electric customers could expect to be without service for 156 minutes.



Energy Distribution Reliability and Outage Rate Comparison

- All electric customers typically have **1** outage per year
- On average, only **1 in 112** gas customers are expected to experience an outage in any given year
- Most natural gas outages are for planned equipment replacement
- Unplanned outages affect about **1 in 800** natural gas customers per year

To review the full report, visit www.gastechnology.org/reliableNGservice

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