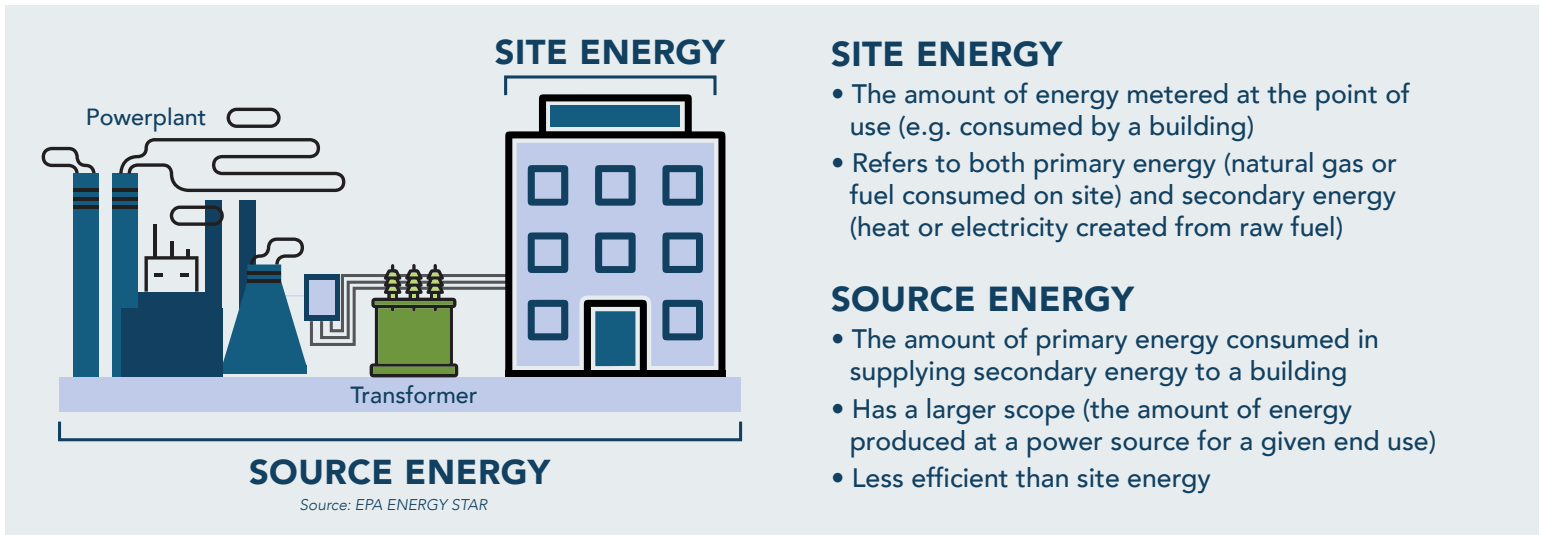


SOURCE VS. SITE ENERGY SOLUTIONS

When discussing energy efficiency, decarbonization, and greenhouse gas accounting, the terms source energy and site energy are often used. What is the difference between source and site energy?



SITE ENERGY

- The amount of energy metered at the point of use (e.g. consumed by a building)
- Refers to both primary energy (natural gas or fuel consumed on site) and secondary energy (heat or electricity created from raw fuel)

SOURCE ENERGY

- The amount of primary energy consumed in supplying secondary energy to a building
- Has a larger scope (the amount of energy produced at a power source for a given end use)
- Less efficient than site energy

NATURAL GAS AS AN ENERGY SOURCE

Natural Gas as a Primary Energy Source

- Natural gas is the most widely used fuel for primary energy in the U.S.
- Energy consumed for extraction, processing, transportation and distribution reduces the efficiency of direct natural gas usage by approximately 8%¹
- It's combusted and often connected to a furnace or boiler system to heat air, water or steam (with a typical efficiency of 82%)
- Direct use of natural gas is 75% energy efficient²

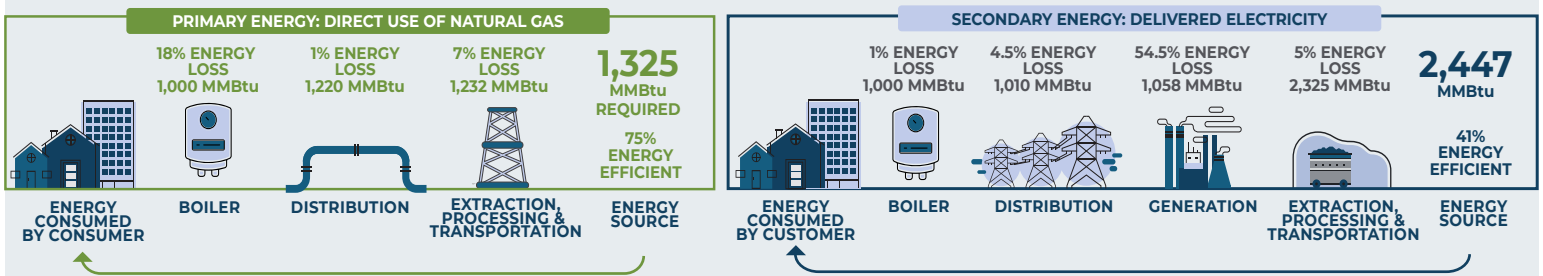
Natural Gas as a Secondary Energy Source

- Approximately 5% of the source energy used to produce electricity is lost in extraction, processing, and transportation of that source energy
- Natural gas is combusted and connected to turbines or engines which generate electricity that is transmitted via power lines
- More than half the remaining energy is lost as heat to the atmosphere during electric generation
- Additional losses occur during electric distribution and conversion to heat for use in a building
- Delivered electricity generated by natural gas is 41% energy efficient²

PRIMARY VS SECONDARY ENERGY WITH NATURAL GAS

In the figure below, both pathways are illustrated to highlight the difference in energy required for an onsite boiler fueled by natural gas for primary energy, versus electricity produced from natural gas for secondary energy, using average values for efficiencies and losses.

PRIMARY VS SECONDARY ENERGY WITH NATURAL GAS²



- Energy required for secondary energy (via electricity production) is nearly double that of primary energy.
- Losses from electricity generation and delivery tend to result in higher source energy emissions compared to direct use of natural gas.
- Consumers can install high-efficiency HVAC systems, electric heat pumps, gas heat pumps, or combined heat & power (CHP) systems to improve efficiency and reduce greenhouse gas emissions associated with both source and site energy.

1. American Gas Association
2. ICF