# COMBINED HEAT & POWER TECHNOLOGY

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## Reliable power island technology for emissions reduction

Combined heat and power (CHP) technology is a reliable, cost-effective source for generating reduced-emissions power for the world's energy infrastructure. By converting waste heat to energy, Audubon's CHP technology maximizes every drop of fuel to deliver power that improves sustainability and boosts operations.

Our gas-turbine generator is specially designed to meet the needs of energy producers at lower than grid unit cost. The system runs as a power island—independent from the power grid—and utilizes waste heat for central gathering, while remaining thermal energy is used to co-generate additional power via an organic Rankine cycle—without steam, additional fuel, combustion, or emissions. The CHP system's modular design enables seamless integration into most energy applications.

## Benefits of CHP technology

- Power island operations independent from the power grid
- 45% reduction in CO2 emissions
- 70% reduction in NOx emissions
- Decreased energy costs & operating expenses
- Improved energy resiliency
- Enhanced economic competitiveness
- Eliminated dependence on volatile electricity prices

## Sustainable power generation

From enhanced reliability to reduced carbon emissions, CHP provides significant economic, environmental, and operational benefits. With electrical and thermal energy coming from the same fuel source, Audubon's CHP technology minimizes the primary fuel needs of processing infrastructure (Figure 1).

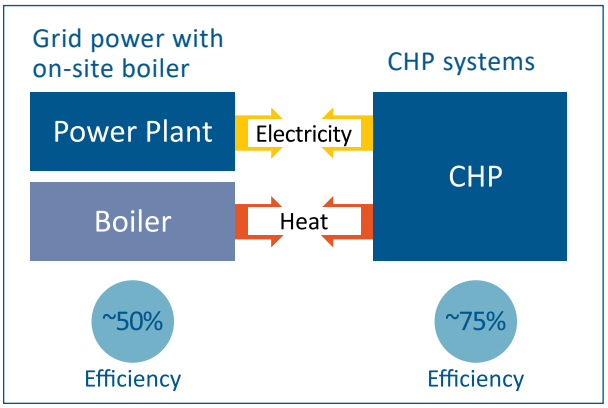
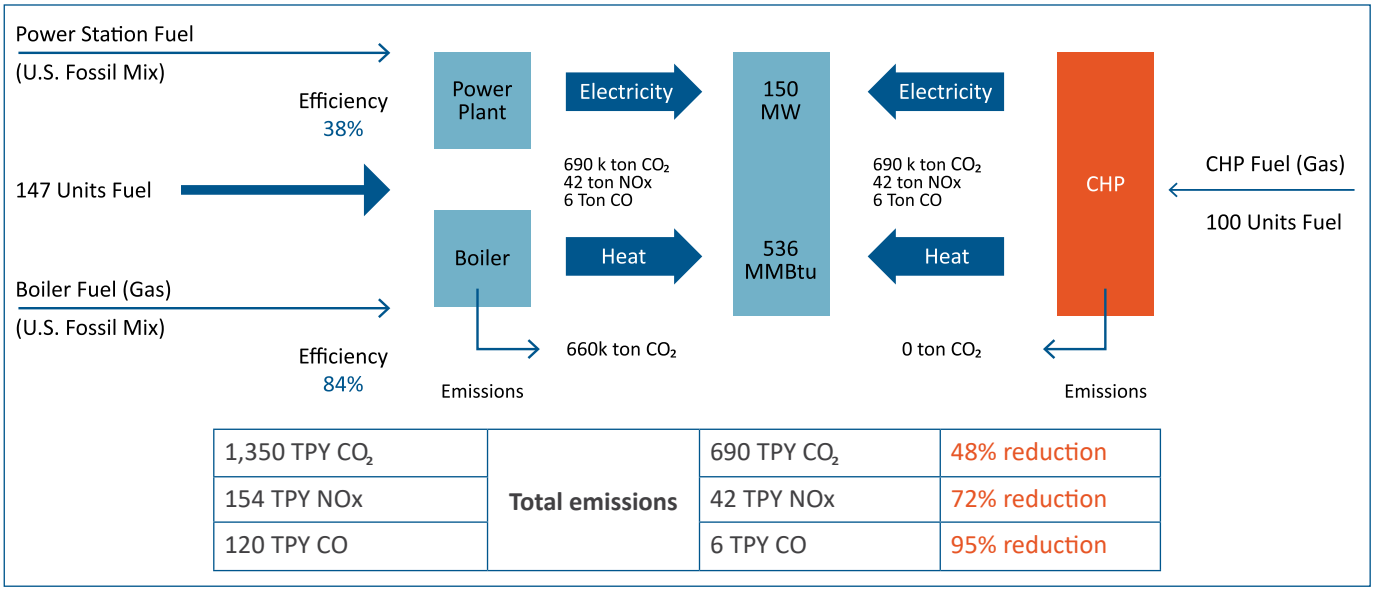



Figure 1. Efficiency benefits from CHP application.

## Reduced CO2 emissions

The CHP system forgoes fired heaters to deliver the same amount of energy—translating to reduced CO2 emissions (Figure 2). Operators can expedite air quality permitting, and some projects can even avoid Title V permitting.

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|---|---|---|---|
| 1,350 TPY $CO_2$ | **Total emissions** | 690 TPY $CO_2$ | 48% reduction |
| 154 TPY NOx | | 42 TPY NOx | 72% reduction |
| 120 TPY CO | | 6 TPY CO | 95% reduction |

Figure 2. Reduced emissions from CHP application.

## Lower costs & enhanced fuel efficiency

CHP technology is designed to balance energy efficiency and cost—a must in the energy transition. The table below summarizes optimal CHP configurations based on various processing capacities. Depending on your capacity level, Audubon's CHP system combined with a waste heat recovery unit (WHRU) can save up to $500 million over 15 years in electricity and fuel costs.

| | CHP + WHRU | CHP + WHRU | CHP + WHRU | Grid power + hot oil gas + fired heater |
|---|---|---|---|---|
| Total facility processing capacity | 400 MMSCFD | 800 MMSCFD | 1200 MMSCFD | |
| Total facility electrical demand | 50 MW | 100 MW | 150 MW | |
| Total facility thermal demand | 179 MMBTU/hr | 375 MMBTU/hr | 536 MMBTU/hr | $2.00/MMBTU |
| Number of turbines required | 1 | 2 | 3 | |
| Total power cost (fuel/OPEX included) | 3.1 c/kWh | 3.0 c/kWh | 2.9 c/kWh | 5.0 c/kWh |
| Annual electricity savings | $8.5 MM | $17.7 MM | $27.4 MM | |
| Annual fuel savings (fired heater) | $3.7 MM | $7.4 MM | $11 MM | |
| CAPEX payback period | 3.8 yrs | 3.5 yrs | 3.2 yrs | |

Work cited: US Department of Energy. (2017). Combined Heat and Power Technology Fact Sheet Series. https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/CHP%20Overview-120817_compliant_0.pdf

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Founded in 1997, Audubon is a leading provider of integrated engineering, procurement, construction (EPC), fabrication, consulting, and technical services. Serving the energy, power, utility, industrial, and infrastructure sectors, our end-to-end life-cycle solutions help solve our clients' toughest challenges. Leveraging technology, ingenuity, and experience, we deliver outstanding project outcomes for a more sustainable tomorrow.

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