Doing More with Less: Praxair Energy Efficiency

Renewable Energy vs. Energy Efficiency:
Comparing the Energy ROI and Levelized Energy Cost

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Executive Summary:
Return on Investment (ROI): A comparative energy ROI study was conducted between Praxair's own investments in improving the energy efficiency of our plants and a range of alternatives for sourcing renewable energy. **Energy efficiency is the best investment we can make to reduce our global energy footprint and reduce natural resource consumption.** Praxair's energy efficiency program returns are 10 times those of typical solar projects and more than twice the energy ROI of wind alternatives. Based on Praxair energy efficiency rates, the company has committed to an ambitious Sustainable Development 2020 target: Conserve 8 Million MWh with energy savings by 2020 (cumulative 2009-2020), equivalent to more than 5 million MT CO2e.

Praxair's business model frequently provides environmental and energy savings to customers. Applications improve the energy efficiency of industrial processes from cement production to steelmaking, and are components of several clean and/or renewable energy solutions such as solar panels. Praxair is a major industrial gas supplier to the polysilicon market, and currently serves more than 50 photovoltaic manufacturing facilities worldwide. Industrial gases are crucial ingredients in second generation biofuels such as jet fuel produced from non-food animal fat. Praxair is an eager participant in innovating and building the marketplace in clean and renewable energy, which is an important business driver for Praxair.

As a large energy user, Praxair receives interest from investors and the sustainability community concerning our investment in renewable energy sources. Praxair sources renewable energy through its energy suppliers, and as a large customer frequently engages to help them achieve their renewable energy goals. In addition, Praxair directly sources renewable energy and has a target to source more than 500,000 MWh renewable energy by 2020: this is equivalent to replacing 190 MW nameplate renewable generation sources (or 114 MW nameplate coal generation), or the electricity supply for 31,500 homes for a year, and would result in a reduction of 323,500 MT CO2e.2

**Praxair Energy Efficiency vs. Renewable Energy alternatives**

Energy efficiency is the best investment Praxair can make to reduce our global energy footprint and reduce natural resource consumption. A comparative energy ROI study was conducted between Praxair's own investments in improving the energy efficiency of our plants and a range of alternatives for sourcing renewable energy.

- Many renewable energy solutions depend on the wind or sun and run at much less than full capacity. On the other hand, Praxair’s energy efficiency investments provide benefits almost 100% of the time. In terms of energy saved or produced, Praxair’s energy efficiency program is 10 times more effective than solar, when adjusted for capacity factors (three times more when unadjusted).
- For each $1,000 invested, Praxair's energy efficiency program reduced power demand by 0.46 kW. By contrast, each $1000 invested in solar PV provided 0.043 kW of power, when adjusted.
- Energy efficiency projects reduce greenhouse gas emissions while contributing little to other key environmental and resource impacts such as eco-toxicity, land occupation and consumption of iron, cement, copper and aluminum. Wind and solar energy have significant impacts in these areas.
- Energy efficiency is consistent with Praxair’s ongoing business model and value proposition.
- Looking at levelized cost, the effective cost of energy from Praxair's efficiency projects is well below that of energy from new generation; both renewable and non-renewable, and below average U.S. energy market prices as reported by the EIA for large industrials.

In addition, Praxair energy efficiency investments have proven benefits: Praxair has demonstrated the ability to manage costs and schedules to a very tight tolerance. Praxair engineering teams typically deliver major projects around the world within +/- one percent of predicted energy consumption and +/- four percent of predicted schedule and budget.

Sources:
1. This is the 3rd update to this White Paper. December 2016.
Praxair Efficiency Projects
Wind (on-shore)
Geothermal
Hydropower
Biopower
Wind (off-shore)
Fuel Cell
Solar PV
Nuclear

kW per $1,000 invested

0.0
0.20
0.40
0.60

kW/$1,000
adjusted for capacity factor
The ROI study shows that energy efficiency projects are a better investment in terms of power (kW) by freeing up generation capacity at a lower cost compared to new generation alternatives. Levelized cost enables a comparison of the cost of energy saved through efficiency projects against procuring energy from new generation projects. Levelized cost includes capital recovery as well as variable costs (or savings in the case of efficiency).³

Looking at levelized cost, we find that the effective cost of energy from Praxair’s efficiency projects is well below that of energy from new generation; both renewable and non-renewable. Additionally, the levelized cost of energy for efficiency projects is below average U.S. energy market prices as reported by the EIA for large industrials.

The average levelized cost of energy saved by Praxair’s efficiency projects is:

- 48% of the average cost of energy from new wind generation projects,
- 41% of the average cost of energy from new utility scale solar PV projects, and
- Less than one-third of the average cost of energy purchased by U.S. industrial customers.

Sources:
Praxair is one of the largest industrial gases companies in the world, and the largest in North and South America. We operate in more than 50 countries and serve one million customers in a wide variety of industries including: energy, manufacturing, chemicals, metal production, and healthcare. To learn more about Praxair’s gas supply expertise, call us at 1-800-PRAXAIR or visit our website at www.praxair.com.