DG UPDATE
NEWS & VIEWS ON DISTRIBUTED GENERATION

STEVE BLANKINSHIP,
ASSOCIATE EDITOR

Reprinted from
Power Engineering, November 2005
Copyright of Power Engineering,
Penn Well Publishing Company

Article focus
A major manufacturer is confident in the growing markets and applications for microturbines. Various cases with and without combined heat and power are presented.

MICROTURBINE EXEC OPTIMISTIC ABOUT GROWING MARKET ACCEPTANCE

Chip Bottone, president of Ingersoll-Rand's Energy Systems Division, thinks microturbine technology has turned the corner and that popularity of the compact, packaged energy systems – comprised of a gas turbine engine, a recuperator and a generator – will steadily increase over the next few years. His optimism comes on passage of the Energy Policy Act of 2005, which includes new tax credit incentives for the use of microturbine technologies and expands existing renewable electricity production tax credits.

The expansion of renewable tax incentives is especially relevant to microturbines, since they can be particularly beneficial for landfill and wastewater treatment-fueled applications. Designated for electricity produced from municipal solid waste and agricultural livestock waste, the energy act extends to January 1, 2008 the time frame in which onsite power generation systems – such as microturbines – must be placed into service to qualify for the renewable electricity production tax credits. In addition, the period in which this tax credit incentive is offered is expanded from five years to ten years.

At this California wastewater treatment plant, the installation of an Ingersoll-Rand MT250 microturbine lowered electric costs from about 11 cents/kWh to 4.3 cents/kWh, achieving an annual savings of $225,000. Photo courtesy of Ingersoll-Rand.

Bottone believes the increasing desirability for microturbines in the marketplace means that incentives beyond those now in effect won't be needed. "The reason microturbines, fuel cells and wind got those tax credits is because these are technologies that are still evolving and tax credits are a great way to get things over the hump," he says. "So far as microturbines are concerned, when the current incentives end, we will have been able to deliver benefits and values that the technology will be sustainable without the tax credits. The time is now for this technology and I think that's why we saw such a push from Congress and the industry for it."

Bottone sees lots of reasons why microturbine use will increase, citing several value and application drivers that can make them attractive based on specific circumstances. These drivers extend beyond traditional values such as efficiency and operating costs.

"The value drivers have increased in just the past three years and certainly are different than five years ago," he says. There are stronger environmental issues along with security and fuel volatility issues. He says microturbines are fully packaged, whereas reciprocating engines are more like erector sets. Microturbines generate less noise and create less vibration, so they can be sited closer to the user. Emissions and maintenance requirements are also lower than for reciprocating engines.

Bottone notes that as natural gas prices have increased, so will the cost of electricity. Therefore, customers needing combined heat and power (CHP) will seek greater thermal efficiencies. "With microturbines, you can get total heat and power efficiency up to 80 percent. That's a huge hedge against gas prices because you will need gas to produce heat. Also, our microturbines have high oxygen content in the discharge, which is something recips don't provide. That's important when you're going after CHP applications that do not use hot water. The oxygen-rich exhaust unique to a microturbine is a combustion enabler. If you can co-fire boilers or put heat into ovens or other thermal applications, you maximize the efficiency of the system."

Ingersoll-Rand makes microturbines in 70 kW and 250 kW sizes that can burn natural gas, gas taken from oil and gas field operations (in 500 Btu to 2400 Btu range), or lean gas from landfills and wastewater treatment that can be as low as 350 Btu in heat content.

The environmental advantages that microturbines provide can render CHP applications – often considered essential to the economic viability of microturbine applica-

CONTINUED ON PAGE 150

MICROTURBINE EXEC OPTIMISTIC ABOUT GROWING MARKET ACCEPTANCE ... *continued from page 148*

tions – either unnecessary or "icing on the cake."

"We have many customers that use stranded gas or gas generated by landfills that cost out fine without cogeneration," says Bottone. "Certainly, a cogeneration application makes it even better. But it's not needed." He adds, however, that at wastewater sites, customers generally want the heat because they can put it back into the anaerobic digester.

Ingersoll-Rand cites a portfolio of successful microturbine projects that reflect the combination of various value and application drivers that make them attractive.

A landfill gas facility in Burbank, California was wasting a renewable resource – methane – by having to flare it. Meanwhile, the city's renewable portfolio standard required that 20 percent of the power used by residents be derived from renewables. The solution – installation of one MT250 microturbine – reduced greenhouse gas emissions, produced power from waste, contributed to the city's renewable portfolio goals, took advantage of the California PUC's self-generation incentive, and created a revenue stream from negative value waste gas. The three value drivers in this instance were technology leadership, environmental compliance and emission reduction credits, while the application drivers that came into play were operating hours and fuel value.

In another instance – an industrial process application in Indiana – the customer was burdened with energy costs of 5.5 cents/kWh and $7/MMBtu gas. The installation of an Ingersoll-Rand MT70 microturbine lowered fuel consumption 21 percent, reduced greenhouse gas emissions an estimated 30 metric tons of carbon equivalent annually, offset higher cost utility power, achieved environmental compliance and provided a source of power and thermal energy that achieved an overall 75 percent system efficiency. In this case, the value drivers were power reliability, productivity and energy savings while the application drivers were thermal balance, operating hours and installation and site requirements.

At two gas production sites in Utah, the addition of four MT250s resulted in 1 cent/kWh power, delivering a one-month payback. Among the value drivers were health and safety, power reliability and productivity, while the application drivers included thermal balance, operating hours and fuel value.

"We know that in the past, some microturbine projects did not cost out well," says Bottone. "That's partially because microturbine technology was immature and, in many ways, ahead of its time. It's also because in some cases, people did not perform due diligence up front. So when they told a customer that something could be achieved, they never went back and did their post audit and said, 'here's what we delivered.'" PE