

The Turbine Industry

Introduction

In order to have a successful new technology it is essential to not only have an innovative product, it is also necessary to understand the industry for which the product will serve. This line of thought will be a key component of Team Cogeneration's research, allowing the team to not only understand what is feasible in today's industry, but also what could be successfully produced to fit current market needs.

Current Market Conditions

Most recently the gas turbine market was valued at \$67 billion dollars and was expected to grow by 7% annually. Within the industry there is a very high barrier to entry for new companies, caused by the high levels of initial capital investment required to start business. As a result there are a few key manufacturers that lead the market. American gas turbine manufacturers, such as General Electric, Siemens, and Caterpillar are all large international corporations with multiple departments dedicated to various forms of power generation, one of which is gas fired turbines.

The main competitors for the United States are located in Japan and Western Europe and as a result they have made it very difficult for these American companies to enter into these developed geographic markets. Reacting to this, in the most recent years, the most targeted consumers by the American manufacturers have been developing nations, particularly within the Middle East, South America, and parts of Asia. Demand in these areas has more than doubled in recent years and is expected to continue to increase.

Beyond foreign demand, there is still substantial demand within the U.S. Particularly to note are the caliber of turbines that are currently used on university campuses, found within the range of 30 – 180 megawatts. According to Diesel and Gas Turbines Worldwide, 76% of all turbines produced between this range are installed within the United States.

Current Innovations

Currently there are great amounts of research and development inroads being made within the turbine field to meet the rising demand for more energy efficient and "green" technologies. Some of the most notable on gas turbines are being done on those with low power levels which are prime candidates to be used on university campuses. Particularly innovations are being made in regards to biomass and novel usages of cogeneration for onsite production. Recently, GE has successfully demonstrated the viability of using biomass as the primary fuel source to power a turbine. Thus far the demonstrations have only proved this fuel source as a viable form of energy production for turbines with output ranges between 15 and 50 megawatts.

The innovation for low output turbines makes this a beneficial technology for use within a campus setting, especially within a campus that has a strong focus on environmentalism.

The main issue with such a form of fuel, however, is that a campus facility must have the capability to import a high quantity of biomass at a relatively low cost. The second innovation that is driving demand higher for low output level turbines is new, novel uses of the waste heat within a CHP system. Production facilities, such as paper mills, dog food manufacturers, and oil refineries have begun to use the waste heat produced by the turbine directly within their production process. This decision to use the waste heat produced by the turbine has created a market demand for on-site electricity production and since most sites require a relatively low amount of energy, the demand for smaller turbines has begun to rise.

The gas turbine market is a growing market with new avenues for use and electricity production. The rising innovations with regards to small turbines will hopefully result in a higher number of low power turbine consumers, which will result in better, more effective technologies for university consumers.