Economic Benefits of CHP:
Why Cogenerating Makes Sense

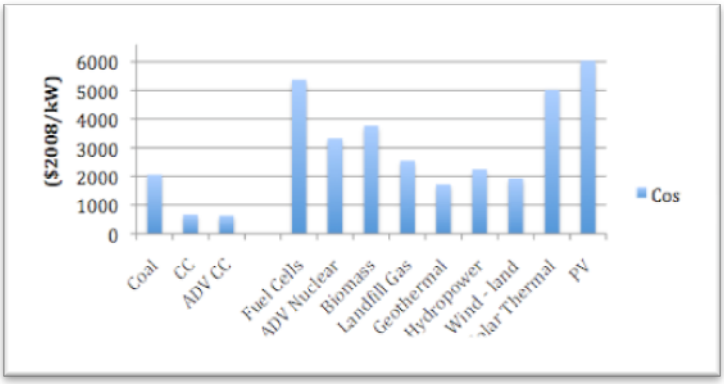
Who Should Cogenerate?

The implementation of any planned waste heat recovery system hinges largely on the ability to justify and recuperate immense initial costs. While CHP may not be the right energy solution for all types and sizes of user, for many applications it is a reliable, cost efficient method of power generation. Given the cogenerating nature of a CHP system, generating both steam and electricity, most cost efficient applications have many or all of the following characteristics:

- Constant, 24-hour, non-seasonal, steam and electricity load
- High electricity prices compared to gas prices
- Existing district heating system or central plant facility
- Participation in a local or regional cap and trade system
- Deregulation of the energy market
- General interest in reducing impact on the environment

Capital Investment

Although many other environmentally friendly power generation systems exist (wind, solar, nuclear, etc.), many of these options are not reliable for 24-hour, yearly, use and require substantially larger initial investments compared to CHP. The graph at right, using data from the Energy Information Association (EIA) "Assumptions to the Annual Energy Outlook 2009" report, shows the significant difference in initial costs between non-renewable, natural gas fueled, combined cycle (ADV CC), and many renewable options. Given that other expenses, such as engineering, permitting, and other facilities costs, should be constant across all projects, the capital investment in a cogeneration system is much smaller than any other type of power generation.



Total Overnight Cost
http://www.eia.doe.gov/oiaf/aeo/assumption/electricity.html

Continuing Investment

Many variables come into play when considering the ongoing costs of a CHP system. Factors like gas prices, electricity prices, labor costs, repairs, equipment depreciation, operating hours, support services, and environmental compliance costs all must be taken into consideration when figuring total annual savings. These savings can be extrapolated to find an estimation of the return on investment. This number is very important when deciding whether to implement a cogeneration system. Given a certain capital investment in CHP

technology, dependent on the power consumption at a site, the total return on investment time is how many institutions judge the worth of a project.

Chapter 1 Versus Chapter 2

Chapter two, the section of research specific to the University of Maryland, deals mostly with the aforementioned analysis of the practicality of a system cased of its return on investment time. Chapter one, on the other hand, deals less with the practicality of a specific system to a specific institution, and more with defining a market segment.

Market Segmentation

One of the many problems, identified through our research so far, with the current system of cogenerating power is the disparate level of research put into different scales of gas turbines. Large scale gas turbines, those often used industrially to generate power, are heavily researched and highly developed. Smaller gas turbines, like those used in many independent power generation sites, are not as profitable to large companies, so they are not as well researched or developed. In fact, many of the technologies implemented in smaller gas turbines simply “trickle down” from those implemented in larger systems years earlier. To combat this, we aim to identify a market segment, composed of universities and large campus-style institutions, interested in buying a cogeneration system that is both ecologically friendly and economically feasible. A market segment on the order of 100 large institutions willing to invest in energy efficiency and reliability would provide a larger motive for energy engineers to design a marketable, small turbine containing the technological advances already in use for larger systems.