Favorable Site Selection Criteria

The following outlines site selection guidelines for the VOCGEN CHP solution. The guidelines are posted to assist our business partners and customers in the identification of favorable technical and economic site selection criteria to screen candidate facilities for a VOCGEN gas turbine oxidizer (GTO) project. A level one feasibility study comparing the capital equipment costs and operating costs of an existing or traditional equipment with VOCGEN CHP is the next step in the process of determining whether the a small scale co-generation VOC system, or a scaled up system with flexible operating capabilities can benefit the end user.

1. A candidate facility operates an existing VOC thermal oxidizer or other VOC air emissions abatement system where the capital investment is considered to be a “sunk cost” with little or no return on investment

2. A prospective customer has a need or the interest in capturing and utilizing “opportunity” fuels such as waste VOC emissions and/or emissions from fuels including gasoline, natural gas, hydrogen, methane (biogas), carbon monoxide and biodiesel.

3. A prospective customer is familiar with air pollution controls such as thermal oxidizers and with cogeneration applications

4. A prospective customer can use the electric power and heat generated on site

5. A prospective customer facility is located where electrical and natural gas energy prices are favorable to cogeneration

6. Two equipment installation strategies include 1) replacing existing VOC abatement equipment with a VOCGEN system, or 2) installing the VOCGEN CHP system in parallel as a redundant VOC abatement system to accommodate demonstration, performance testing and first system training before replacing the legacy equipment entirely

7. The candidate facility is located in a State where funding resources (rebates) and CHP investment tax credits or U.S. Treasury grants are available; backup rates and exit fees; public benefit funds; refunds and energy efficiency portfolio standards can be applied to the project

8. The candidate facility is located in a State where legislative incentives are available including output-based emissions regulations that have been adopted by the State; interconnection standards apply; energy efficiency portfolio standards are applied to the project

9. The prospective customer or end-user has considered the “value of energy reliability,” critical to plant operations

Volatile Organic Compounds

1. Generally, any volatile organic compound that can be incinerated in a thermal oxidizer can be combusted and oxidized in the gas turbine VOC combustion chamber with some exceptions where either process emissions preconditioning or neutralization is required. While the gas turbine residence times are similar to or less than the requirement of thermal oxidizers or regenerative thermal oxidizers where ceramic media is used, the gas turbine maintains consistently high temperatures and pressure at nine (9) atmospheres to compensate and enhance oxidation and destruction efficiencies; utilizing the heat content of VOC as a secondary fuel to operate the engine and off setting primary natural gas fuel requirements. VOC CHP technology can abate the following classes of organic compounds: Ketones, aldehydes, alcohols, alkanes, aromatics and glycol ethers. Chlorinated compounds and other corrosives, particulates, sulfur and salts will be reviewed on a case-by-case basis for pretreatment designs.

The following are classes of organic compounds can be utilized as fuel in a VOCGEN CHP system:

- Alkanes, single bonds, i.e., methane, ethane propane, pentane, etc.
- Alkenes, double bonded with functional groups i.e., ethylene and propene
- Alkynes, triple bonded functional groups, i.e., acetylene and propyne
- Aromatic compounds with three double bonds, i.e., benzene and methylbenzene (toluene)
- Haloalkanes, polar carbon-halogen bond functional groups, i.e. dichloromethane
- Alcohols, i.e., methanol, ethanol and Isopropanol, benzyl alcohol
- Ethers, i.e., dimethyl ether
- Aldehydes, i.e., formaldehyde
- Ketones, i.e., methyl ethyl ketone, methyl isobutyl ketone, acetone and cyclohexanone
- Carboxylic Acids, i.e., formic acid
- Oils of ink
- Fuels, i.e., jet A
- Odorous compounds, i.e., a butanol, 2-methyl, butanol, 3-methyl, hexanol, and acetaldehyde

Reference: EPA Combined Heat & Power Partnership