Guidelines to follow when considering CHP:

- ***Year Round Heating/Cooling Load***: the facility that you are considering to install CHP in should have a year round need for the waste heat. For example, if a grocery store is using an absorption chiller to keep their products cold, they may want to consider installing a CHP system to satisfy the cooling load. If there is not a year round load, then the waste heat would not be used and the system would be just generating electricity. Therefore, the efficiency of the CHP system would be very low.

- ***Size System to Heat Needs:*** When sizing a CHP system, designers should size the unit based on the heat needs of the facility. It should be optimized such that 100% of the waste heat is being used – always! This corresponds to a 100% utilization factor. To do this, try breaking down the heat load to a per month basis. Pick a CHP unit based on the heat needed for the month with the lowest heat need. This will ensure that the utilization factor is 100%. Any excess heat need can be satisfied through conventional means. In rare cases, when a facility has an electric load that is much greater than the thermal load, then a CHP designer would want to size the project to meet electric needs.

- ***Uses for Recovered Heat:*** Few uses for the recovered heat include water heating, space heating, process heating and absorption chilling.

- ***60% Thermal Efficiency:*** Design the CHP system such that it has a thermal efficiency of **at least** 60%. Thermal efficiency, in this case, is defined as being the ratio of recovered heat plus electricity generated over the fuel input. Systems that operate below 60% are generally poorly designed and not worth considering. A more efficient system (80+%) will not produces as much electricity, but will satisfy a larger heat load.

- ***Escalation Rates:*** When calculating the financial considerations, take into account escalation rates for gas and electric prices. Gas and electric prices will not stay the same in years to come. Using realistic escalation rates will obviously lead to a more realistic financial per forma. Gas and electric rates do not necessarily increase at the same rate. If the electricity in your power plant is generated using natural gas (as is often the case in California), then escalation rates could be the same. However, in states like New Jersey, electricity is generated via coal. Therefore, gas and electricity escalation rates will not be the same.

- ***Use Old Energy Bills:*** Use old energy bills to not only determine the size of the CHP system, but to also determine the financial pro forma. Using old energy bills will give a realistic description of a facilities energy usages. Using multiple year's worth of energy bills will guarantee that a more accurate average usage is reached. Try to avoid using energy bills from periods of uncharacteristic energy usage. Also, if the facilities energy needs vary significantly hourly, then an hourly profile over an entire year is much more desirable than a monthly profile.

- ***Stand-by Charge:*** A facility installing CHP will be charged a stand-by charge by the electric utility. This charge is agreed upon by the electric utility and the facility and exists because the utility has to maintain the hardware to supply a CHP facility with electricity in case the CHP system is shutdown. These charges can be expensive and should not be ignored when calculating a financial pro forma.

- ***Avoid Demand Charges:*** Run the CHP system during peak hours. One of the most attractive aspects of CHP is its ability to offset demand charges. Demand charges are charges that the electric company applies during peak periods (periods when electricity usage is at its highest). The charge is based on the peak amount of energy that a facility uses during a certain time period. The electric company will measure a user's peak usages every few minutes (10 – 15 minutes) and the highest of these peaks will be its demand. The reasoning behind this charge is that the electric company has to be prepared to supply a facility the peak amount at any time. Demand charge is essentially paying the electric company to have the capacity and be prepared to meet a user's maximum needs. Higher peaks lead to higher demand charges. Therefore, by ensuring that a CHP system is running during peak periods, a facility can lower its demand charge significantly because the facility is producing electricity and thus lowering its peak demand.

- ***Maximize Load Factor:*** Load factor is calculated as being the ratio of actual energy being produced to maximum rating of prime mover. This value is related to efficiency. As the load on a prime mover decreases, the efficiency of the prime mover also decreases. When designing a CHP system, one should maximize the load factor such that the efficiency of the prime mover is maximized. Picking a prime mover whose efficiency varies with load factor in such a way that it fits the user's needs can maximize efficiency. For example, a gas turbine should be used in applications where the user has a constant electric load. Gas turbine's efficiencies drop drastically with lower loads. Therefore, it is wise to operate the turbine at a high load constantly. Users that have varying electric loads may want to opt for a reciprocating engine. These prime movers do not exhibit drastic drops in efficiencies with lower loads. Additionally, a high load factor will reduce the projects turnkey cost. This makes the project more financially viable.

- ***Minimum 5000 Operating Hours:*** As a general rule of thumb, a CHP prime mover should operate for 5000 hours per year in order to guarantee financial feasibility.