

# Walk-through Checklist

Use this walk-through checklist to help collect information to determine the suitability of CHP at your facility. The results can then either be sent to your U.S. D.O.E. Regional Clean Energy Application Center for a technical and financial screening, or sent to another qualified consultant of your choice.

## General Questions

The Facility Manager should be able to get all these bills for you.

### Obtain 12 Months of Electric Bills

In some areas, electric bills can be downloaded from the utility website if the meter and account number are known. In some cases, the facility may be purchasing electricity "unbundled" where they are buying electricity wholesale and being charged "wires" fees for transmission and distribution.

NOTE: There may be more than one monthly bill for a facility if it has multiple meters on-site.

<i>Do bills contain monthly demand values?</i> Demand is shown in kW.	
<i>Do bills contain on-peak and off-peak consumption?</i> If so, it would be indicated as separate amounts on bill.	
<i>What rate schedule(s) are used?</i> The rate schedule should be indicated on the bill.	

### Obtain 12 Months of Gas Bills

Be sure to get and add transportation fees if gas is purchased from a wholesale supplier under a separate contract from the local gas distributor.

<i>Do bills contain energy usage?</i> Energy is shown on the bills as Therms, mcf, or MMBtu.	
<i>Is gas purchased under contract?</i>	
<i>Name of Rate Schedule(s) Used</i> The rate schedule should be indicated on the bill.	

### Obtain 12 Months of Fuel Oil Bills (If Used)

<i>Do bills contain amount used?</i>	
<i>What type of fuel oils are used?</i> For example, no. 2, no. 6, etc.	

### Industrial Loads

Collect information on typical operating schedules.

<i>Number of hours of operation on weekdays?</i>	hrs/day
<i>Number of hours of operation on weekends?</i>	hrs/day
<i>Schedule of major process heat loads?</i>	hrs/day
<i>Does the plant have a steam system?</i>	
<i>Operating pressure:</i>	psig

### Commercial Loads

Collect information on typical operating schedules.

<i>Hours facility is open for business or largely occupied?</i>	hrs/day
<i>Type of heating system(s)?</i> Indicate all types: central boiler, central hot water system, rooftop units, and/or area heaters.	
<i>Type of cooling system(s)?</i> Indicate all types: electric central chillers, absorption central chillers, engine driven central chillers, or rooftop units.	



## Electric Parameters

Certain issues with the current electric power service can impact CHP economics. These questions investigate power service issues.

<p><b><i>How many electric service drops are there to the facility?</i></b>                  This may be difficult to definitively ascertain without walking around the outside of the facility and looking for wire drops. To make sure that the connection is still "live" you will need to find a corresponding electrical distribution panel that is still active that can be associated with that service drop. Sometimes there are separate meters associated with each service drop.</p>	
<p><b><i>How many electric meters serve the facility?</i></b>                  The Facility Manager should be able to tell you this. If not, often multiple meters are billed on the same electric account and will be shown on the bill.                  Note: Sometimes separate bills will be issued for separate meters.</p>	
<p><b><i>Estimate the distance between the multiple meters in your facility</i></b></p>	feet
<p><b><i>Do all of your service drops originate at the same utility feeder?</i></b>                  This may be difficult to ascertain unless you are able to walk the feeder lines back to determine if they are fed off of different transformers.                  Be aware that sometimes feeder lines may be disconnected and cross tied away from a transformer, and may not be obvious without careful observation.</p>	

### Power Quality Issues

<p><b><i>Has the facility experienced problems with power quality such as:</i></b></p>	
<p><b><i>Low voltage?</i></b>                  Low voltage indication may include such things as motor failures, dimming lights, or equipment resets.</p>	<p>If yes, please describe:</p>
<p><b><i>Poor frequency quality?</i></b>                  Poor frequency indication may include such things as sluggish motor operation, flickering lights, or equipment resets.</p>	<p>If yes, please describe:</p>
<p><b><i>Does the facility have a need for UPS systems?</i></b>                  UPS systems may be beneficial if there is equipment that shuts down or resets during momentary electric perturbations, or sensitive electronic equipment such as computers or automated process equipment.</p>	<p>If yes, please describe:</p>

## Momentary and Complete Electric Power Outages

Momentary power drops are power fluctuations that cause computer equipment to reset after a full blackout.

<p><b>Estimated number of momentary electric power outages</b> Ask facility manager to estimate the number of momentary outages (&lt;1 second) the facility can expect to experience in a year.</p>	
<p><b>Estimated cost of a momentary power outage</b> This cost should be estimated based on the impact of each momentary interruption of electrical power such as equipment resetting, loss of production/business, or loss of product.</p>	
<p><b>Estimated number of non-momentary or complete electric power outages</b> Ask facility manager to estimate the number of non-momentary outages (&gt;1 minute) the facility can expect to experience in a year.</p>	
<p><b>Estimated cost of a non-momentary power outage</b> This cost should be estimated based on the impact of each non-momentary interruption of electrical power such as loss of production/business, or loss of product.</p>	per hour

## Back-up Power Generation

<p><b>Does the facility have back-up generation?</b></p>	
<p><i>If yes, what is the size of the back-up generators?</i></p>	kWe
<p><b>Are the back-up generators diesel fueled?</b> If back-up generator(s) are diesel fueled, they are not suited for CHP system use because they are not designed for continuous operation and they have high emissions.</p>	
<p><b>How old are the back-up generators?</b> If generator is &gt;20 years old consideration should be given to replacing it. Credit should be taken on a like-for-like basis in the financial assessment of the CHP project.</p>	years
<p><b>What is the facility's current power factor?</b> This question can generally be skipped for commercial buildings. Power Factor is usually only a concern where there are large inductive loads (such as synchronous motors) used in industrial applications. If power factor is an issue for a facility, generally the electric utility will notify the facility or a capacitor bank will have been installed near the service drop to the facility to offset the effect on utility distribution lines.</p>	



## Overall Location and Equipment Questions

It is important to find a location for the CHP system that allows it to be affordably connected to the electric and thermal loads.

*If CHP is installed, where can it be located?*

Ideally this location will be within or adjacent to a central heating and cooling facility. If this is not possible, the generating system may need to be remotely located, with heat recovery piping to the heating and cooling plant. However, the cost for this piping over very long distances can make the CHP system unattractive.

Enough space will be needed to site the generation equipment, heat exchanger, switchgear, optional absorption chillers and/or desiccant systems), and connecting lines and duct work. Space also must be allocated to allow for maintenance work on the equipment. Finally, engine generators are not recommended for installation on upper floors due to weight load and vibration.

If a new structure needs to be built to house the CHP equipment it can substantially add to the cost of the project of a small system (<1 MWe).

<p><b><i>How close are the existing electric feeders to this location?</i></b> Running electrical feeds across a distance will add cost to a project and may make a small (&lt;250 kWe) project financially unattractive.</p>	feet
<p><b><i>Does a single electric distribution system exist that can be used?</i></b> This question is important for multi-building campuses. Combining feeds can add substantially to the cost of a project. Generally 2 feeds can be combined with reasonable costs. It may be less expensive to split the facility and install CHP on only one of the feeders. In rare cases, it also may not be possible for the utility to supply the back-up demand load to the facility off of one feeder. This can further add to the cost of the project.</p>	
<p><b><i>Does a hot water or steam piping system exist that could be used?</i></b> Central heating facilities or heating distribution systems make it more cost effective when installing CHP.</p>	
<p><b><i>How close is the existing heating plant?</i></b> It is impractical due to heat losses to run heat recovery ducting very far. It also adds to the CHP project cost.</p>	feet

## Existing Heating Equipment

A CHP system will need to tie into existing heating and cooling systems. The current state of these systems will affect the savings and the first cost.

If the current heating system has low efficiency or is >20 years old, give consideration to replacing it as part of the CHP project. Credit may be taken on a like-for-like basis in the financial assessment of the CHP project, depending on the planned operating schedule of the generator.

If a higher efficiency heating system is to be installed, the savings from increased efficiency should be included in the payback analysis.

<i>What is the approximate efficiency of the existing heating system?</i>	%
<i>How old is the current heating system?</i>	years
<i>How is heat distributed to the building?</i> Steam, hot water, or hot air?	
<i>If steam, what is the operating pressure?</i>	
<i>If water, at what delivery temperature?</i>	

## Sizes of the Existing Heating Equipment

Enter one of the following for Type: GSB = Gas Fired Steam Boiler, GHW = Gas Hot Water Boiler, OSB = Oil Fired Steam Boiler, OHW = Oil Hot Water Boiler, ESB = Electric Steam Boiler, EHW = Electric Hot Water Boiler, OHW = Oil Hot Water Boiler, ERT = Rooftop Units-Electric Heat, GRT = Rooftop Units-Gas Heat, or O = Other (Please Describe).

	Type	Capacity	Units
No. 1			
No. 2			
No. 3			
No. 4			
No. 5			

## Existing Chillers

<b>Estimated maximum cooling load</b>	tons
<b>Does the facility have a chilled water distribution system?</b> Central chilled water facilities or cooling distribution systems make it more cost effective to install CHP.	
<b>How long is the distance to the existing chiller room?</b> Running chilling lines adds to the cost of a CHP project and should be added to the estimate if only average numbers are used.	feet
<b>How old are the existing chillers?</b> If the current chillers are >20 years old, give consideration to replacing them as part of the CHP project. Credit should be taken on a like-for-like basis in the financial assessment of the CHP project. If a higher COP chilling system is to be installed, the savings from increased efficiency should be included in the payback analysis.	years

## Sizes of the Existing Chillers

Enter one of the following for Type: E = Electric Chillers, AS = Absorption (Steam Fired), AH = Absorption (Hot Water Fired), AD = Absorption (Direct Fired), ED = Engine Driven, SD = Steam Turbine Driven, or O = Other (Please Describe).

	Type	Capacity
No. 1		tons
No. 2		tons
No. 3		tons
No. 4		tons
No. 5		tons

## Selected System Location

<b>Are there concerns about noise at the selected system location?</b> CHP systems produce noise which can be silenced to as great a level as needed, within limits. However, there may be some added costs for such applications.	
<b>Are there concerns about vibration at the selected system location?</b> Engine generators tend to produce far more vibration than turbine systems. Therefore, vibration requirements can occasionally effect system selection.	

## Other Questions

These are additional questions to consider that Facility Operators may be able to help with.

<i>Would the facility be able to obtain gas at a lower rate if the gas consumption of the facility were larger?</i>	
<i>What are the electric utility stand-by charges in this area?</i> This can generally be found in the utility rate book.	\$/kW/mo
<i>Is the facility eligible for any state/federal/utility rebates?</i> You might find out through your U.S. D.O.E. Regional Clean Energy Application Center, through the DSIRE database, or from your State Energy Office.	
<i>Is the facility owned by a for-profit company?</i>	
<i>If yes, what is their marginal corporate tax rate?</i>	
<i>Would the facility be interested in leasing a CHP plant?</i>	
<i>Would the facility be interested in having a third party own the CHP plant and sell it power/heating/cooling?</i>	
<i>Are there any other special considerations or circumstances that should be addressed or noted?</i>	