CALCULATING PRELIMINARY FEASIBILITY FOR INSTALLING COMBINED HEAT AND POWER IN AN APARTMENT BUILDING

The U.S. Department of Housing and Urban Development (HUD), the Department of Energy (DOE) Oak Ridge National Laboratory and the eight DOE Regional Application Centers have an initiative to promote the use of combined heat and power (CHP) in apartment buildings. The average efficiency of the fossil-fueled central power generating plants in the U.S. is around 33% and has remained virtually unchanged for 40 years. This means that two-thirds of the energy in the fuel is lost as heat. CHP systems generate electricity at the apartment building, recycle waste heat and convert it to useful energy. They can achieve overall efficiencies higher than 80% without transmission losses. The value of that heat is what drives the economics for using CHP.

CHP can significantly reduce a multi-family building's annual energy costs. Instead of buying all the building's electricity from a utility and separately purchasing fuel for its heating (mechanical) equipment, most—or even all—of the electricity and heat can be produced for less money by a small power plant in the building operating at a higher combined efficiency. CHP can help relieve grid congestion and can improve the environment by reducing emissions. The recent ICPP report recognized CHP as "one of the leading responses to climate change currently commercially available".

The type of CHP system commonly installed in multi-family housing uses a package that contains a gas-fired reciprocating engine (a refined version of that found in a car or truck), or a microturbine, that drives a generator to produce electricity. The heat (thermal energy) produced by this process is recovered and used to produce hot water or steam for space heating, to operate an absorption chiller or power a desiccant (drying) machine, instead of being exhausted. For the May 17 HUD webcast summary of HUD promotion of CHP, go to: http://www.hud.gov/webcasts/archives/envirhealth.cfm and bring up Part 2; CHP begins at after the 51 minute point and runs about 20 minutes. For more technical information see: "CHP Technologies"

http://www.eere.energy.gov/de/chp/chp_technologies/tech_status.html

For a list of DOE Regional Application Centers see:

http://www.eere.energy.gov/de/chp/chp_applications/chp_application_centers.html

The initiative has provided two guides to CHP in multifamily housing that are on the HUD website at: http://www.hud.gov/offices/cpd/library/energy/index.cfm

-CHP Guide #1: "Q&A on Combined Heat and Power for Multifamily Housing" explains the basics of CHP for apartment building owners.

-CHP Guide #2: "Feasibility Screening for Combined Heat and Power in Multifamily Housing" describes EPA's preliminary screening tool and the computer software prepared by the Oak Ridge National Laboratory for completing worksheets in the Guide. ORNL has expanded the scope of the software to consider cooling and space heating, in addition to the original analysis of the potential based on use of domestic hot water. Please use Version 2d of the expanded software (with different sample data from 2c); both are available at:

http://eber.ed.ornl.gov/HUD_CHP_guide_version_2c

The Help file in version 2b contains detailed explanations of who should use it, what it does, and how to use it. It also includes "screen shots" with sample data, and explains menu commands, e.g. "File." There also is detailed information about the types of equipment used, e.g. reciprocating engines and microturbines.

Utility Information:

	Electricity			Natural Gas		Fuel #2	
	kWh	kW	$	( )therms ( )CCF	$	(quantity) _gallons_	$
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Annual Total			$		$		$
Average Cost	xxxxxx	xxxxxx	$	xxxxxx	$	xxxxxx	$

Building Information:

Name of Contact _____Telephone # _____
Email address _____Name of development_____
Year constructed _____# floors _____ # dwelling units _____ # residents_____
Square footage to be heated _____and/or cooled _____

Electric Rate Schedule Data

a. name of electric utility _____
b. name of electric rate _____
c. energy charge _____ /kWh
d. demand charge_____ /kW per month
e. standby or supplemental demand charge _____/kW per month
f. fuel adjustment charge from most recent bill _____/kWh

Natural Gas Rate Schedule Data

a. name of gas utility _____
b. name of gas rate _____
c. gas cost per unit of consumption _____
d. units of consumption ( ) per million Btu (MMBtu)
( ) per therm
( ) per decatherm
( ) per hundred cubic feet (CCF)
( ) per thousand cubic feet (MCF)

We would like to run data from a variety of appropriate candidate buildings to demonstrate the software program. Buildings with 80 or more units with access to natural gas may be appropriate. If you would like to participate in this demonstration, please access the software, enter the data, save and print the Results. You can then fax the files to HUD at the number listed below. As an alternative, you can send email to robert.groberg@hud.gov with a request for the CHP Screening Word file with the table shown above. You can then fill in the building and utility information called for and send that file by email or fax to Robert Groberg at HUD.
We will run your data through the software program and, with help from the DOE Regional Application Centers, send you estimates that include: cogeneration system size, power consumption dollar savings, demand dollar savings, total electric and fuel cost savings, system operating costs, total cogeneration operating cost, net savings and simple payback in years. We will provide follow-up comments.
The analysis performed by this program is adequate for a coarse screening to let building operators know whether or not they should consider CHP more seriously. Encouraging results are only a prelude to a more rigorous analysis to be performed by engineering professionals using much more detailed information on building heating and electricity loads and CHP equipment. Please send comments and suggestions on the use of this material. Thank you for your interest.

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