BCHP Baseline Analysis for the Illinois Market

Prepared by:
Midwest CHP for Buildings Application Center

Under
ORNL Contract #4000007633

University of Illinois at Chicago – Energy Resources Center
Gas Technology Institute

August 2001

Table of Contents:

Executive Summary

The following baseline analysis was conducted by the Midwest CHP for Buildings Application Center, which is a joint partnership between the University of Illinois at Chicago Energy Resources Center and the Gas Technology Institute. This work was performed as part of ORNL Contract #4000007633 dated February 22, 2001.

Combined Heat and Power for Buildings (BCHP) refers to technologies which generate electricity at the point of use, such as a building or building complexes, while simultaneously recovering the waste heat for heating, cooling or dehumidification purposes.

The intent of this analysis is to assess the current state of the BCHP sector in Illinois and identify current hurdles which prevent the widespread use of BCHP systems. This information will be used to identify target markets for BCHP systems as well as development of education and market transformation programs, which will foster BCHP applications.

In order to assess the current state of BCHP in Illinois, a comprehensive survey of key players involved with this technology was conducted. Key engineering firms, manufacturers, distributors, architectural firms, energy suppliers and federal, state and local agencies were identified. Furthermore a survey of existing and pending BCHP installations was conducted. Also electric generating installations which do not currently recover the waste heat were identified, since these installations are potential BCHP targets.

Technology and operating costs, as well as policy issues, are some of the major hurdles, which prevent BCHP technology from achieving its full potential. Therefore in this report current technology and operating cost of BCHP systems were evaluated. Natural gas constitutes the primary fuel of many BCHP applications. The recent gas price movements were evaluated in light of its potential impact on BCHP installations.

A status assessment of policy related issues pertaining to BCHP was conducted. The assessment was performed for five policy areas; access and interconnection rules, standby charges and exit fees, general progress with state electric deregulation, emerging legislation and potential partners/advocates of BCHP.

Expending the resources to foster BCHP is only worthwhile if there is a potential market for this technology. Therefore the market capacity potential for BCHP in Illinois was evaluated.

This report concludes with recommendations, which address the need to educate state regulators and private market participants on CHP benefits. The recommendations also identify the need to develop a screening tool to assist CHP interested parties with a feasibility evaluation.

1.1) Key Illinois Firms with BCHP project experience or capabilities

The following list provides information on architectural firms, property management firms, engineering firms, manufacturers and energy services companies, which are involved in Illinois with BCHP applications. In addition to that the list also provides information on firms which have the interest and capability to get involved with BCHP applications either because they promote energy efficiency, green building technologies or have other BCHP supporting missions. Detailed contact information for each firm is listed in Attachment A.

1.1.1) Architectural Firms

Sonoc Architects
Capabilities: Green Building, BCHP Capabilities

Farr Associates Architecture and Urban Design, Inc.
Capabilities: Green Building, BCHP Capabilities

O'Donnell Wicklund Pigozzi & Peterson Architects, Inc.
Capabilities: Green Building, BCHP Projects Developed

Prisco Serena Sturm Architects
Capabilities: Green Building, BCHP Projects Developed

Skidmore Owings & Merrill LLP
Capabilities: Green Building

1.1.2) Property Management Firms

CenterPoint Properties
Capabilities: Private Housing

Chicago Housing Authority
Capabilities: Public Housing

Equity Office Properties Trust
Capabilities: Property Management, Office Space

1.1.3) Engineering Firms

IBC Engineering
Capabilities: BCHP Turnkey Installations

La Salle Associates
Capabilities: BCHP Turnkey Installations

Ballard Engineering
Capabilities: BCHP Turnkey Installations

Stanley Consultants, Inc.
Capabilities: BCHP Turnkey Installations

Flash Power
Capabilities: BCHP Turnkey Installations

NICOR Solutions
Capabilities: BCHP Turnkey Installations

Montgomery Watson Harza
Capabilities: BCHP Turnkey Installations

OptimalPath
Capabilities: Data Centers

GKC-EME
Capabilities: BCHP Turnkey Installations

Americas Power Partners, Inc.
Capabilities: BCHP Turnkey Installations

Primera Engineering
Capabilities: HVAC Engineering, BCHP Potential

GLHN A&Es
Capabilities: HVAC Engineering, BCHP Potential

Cuh2a, Inc.
Capabilities: HVAC Engineering, BCHP Potential

Epstein and Sons International, Inc.
Capabilities: HVAC Engineering, BCHP Potential

Jacobs Facilities, Inc.
Capabilities: HVAC Engineering, BCHP Potential

General Energy Corp
Capabilities: HVAC Engineering, BCHP Potential

Globetrotters Engineering Corporation
Capabilities: HVAC Engineering, BCHP Potential

Patrick Engineering, Inc.
Capabilities: HVAC Engineering, BCHP Potential

Sebesta Blomberg & Associates, Inc.
Capabilities: HVAC Engineering, BCHP Potential

Unicom Distributed Energy
Capabilities: Onsite Electricity Generation

1.1.4) Manufacturers

Caterpillar
Capabilities: Electric Generation Equipment, Recip. Engines

Solar Turbines Incorporated
Capabilities: Electric Generation Equipment, Combustion Turbines

Cummins Onan Northern Illinois
Capabilities: Electric Generation Equipment Manufacturer

Eisenmann
Capabilities: Air Purification

ADA Systems
Capabilities: Evaporative Cooling Systems, Energy Recovery

Charles Equipment
Capabilities:

Trane
Capabilities: HVAC systems, Air Handling Products

Munters
Capabilities: Desiccant Dehumidification Products

GE Power Systems
Capabilities: Combustion Turbine Products

Ingersold Rand
Capabilities: Microturbines

International Fuel Cells, Inc.
Capabilities: Fuel Cells

Yazaki
Capabilities: Thermally Activated Chillers

Wartsilla
Capabilities: Recip. Engines

York
Capabilities: HVAC Systems

Waukeshaw
Capabilities: Recip. Engines

Honeywell
Illinois Distributor: Unicom Distributed Energy
Capabilities: Microturbines

Broad
Capabilities: Thermally Activated Chillers

1.1.5) Local Energy Suppliers

AES New Energy Inc
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Alliant Energy Corp.,

Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Ameren Corp.
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Blackhawk Energy Services
Capabilities: Electricity Marketing and Natural Gas Marketing

CILCO
Capabilities: Electricity, Onsite Generation and Natural Gas Marketing

CMS Marketing Services & Trading Co.
Capabilities: Natural Gas Marketing

Commonwealth Edison/Excelon Corp.
Capabilities: Electricity Marketing

Energon Inc.
Capabilities: Natural Gas Marketing

Energy Services Inc.
Capabilities: Natural Gas Marketing

Enron Energy Services Inc.
Capabilities: Electricity and Natural Gas Marketing

Enron North America
Capabilities: Onsite Electricity Generation
Exelon Services, Inc.
Capabilities: Onsite Electricity Generation

Gulf Pacific Energy
Capabilities: Electricity and Natural Gas Marketing

Illinois Natural Gas
Natural Gas Marketer

Lower Electric LLC
Capabilities: Electricity and Natural Gas Marketing

Midamerican Energy Co.
Capabilities: Natural Gas Marketing, Onsite Generation and Electricity Marketing

Multiut Corp.
Capabilities: Electricity and Natural Gas Marketing

Nicole Energy Marketing of Illinois Inc.,
Capabilities: Electricity and Natural Gas Marketing

NiCor, Inc.
Capabilities: Natural Gas Marketing

NiSource Inc.
Capabilities: Onsite Generation and Natural Gas Marketing
Onsite Generation through
Primary Energy Inc.

Peoples Energy Corp.
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Reliant Energy Inc.
Capabilities: Electricity and Natural Gas Marketing

Santanna Energy Services,
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

VMC Energy Management Inc
Capabilities: Natural Gas Marketing

WPS Energy Services Inc.
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing
Onsite Generation through:
WPS Power Development

1.2) Links to Associations and Organizations Concerned with BCHP

The following list provides information on state, federal and regional governmental entities which are concerned with BCHP as well as BCHP related non-profit organizations and associations. The web-addresses for each organization is listed in Attachment B.

1.2.1) Illinois/Regional Organizations

Energy Resources Center – University of Illinois at Chicago
Gas Technology Institute
Midwest CHP for Buildings Application Center
Midwest CHP Initiative
Delta Institute
Midwest Cogeneration Association
Environmental Law and Policy Center
Center for Neighborhood Technology
Interstate Renewable Energy Council (IREC)
Midwest Energy Efficiency Alliance (MEEA)
Manufacturing Extension Program (MEP)
American Institute of Architects
BOMA Chicago
BOMA Peoria
EPA Region 5
DOE Chicago Regional Office
Illinois Dep. Commerce and Community Affairs (State Energy Agency)
Illinois Environmental Protection Agency
Illinois Commerce Commission (Public Utilities Agency)

1.2.2) Federal Government

US Department of Energy (DOE)
DOE Energy Efficiency and Renewable Energy Network (EREN)
DOE Office of Energy Efficiency and Renewable Energy (EERE)
DOE Office of Industrial Technologies
DOE Industries of the Future (IOF)
DOE Inventions & Innovation Program (I&I)
DOE Office of Power Technologies (OPT)
DOE Combined Heat and Power (CHP) Initiative

DOE Distributed Energy Resources (DER) Taskforce
DOE Distributed Power (DP) Program
DOE Energy Information Administration
US Environmental Protection Agency (EPA)
EPA Office of Air Quality Planning and Standards
EPA Office of Air & Radiation
EPA Climate Protection Division (CPD)
EPA-DOE Energy Star Program
US Department of Housing & Urban Development (HUD)
Federal Energy Management Program (FEMP)
Federal Laboratory Consortium for Technology Transfer
Manufacturing Extension Partnership (MEP)

1.2.3) Others

Oak Ridge National Laboratory
National Renewable Energy Laboratory
Brookhaven National Laboratory
National Energy Technology Laboratory
National Association of State Energy Officials (NASEO)
National Association of Regulatory Utility Commissioners (NARUC)
Distributed Power Coalition of America (DPCA)
U.S. Combined Heat and Power Association (USCHPA)
International District Energy Association
Electric Power Research Institute (EPRI)
Electric Power Supply Association (EPSA)
Alliance to Save Energy
American Council for an Energy-Efficient Economy (ACEEE)
American Planning Organization (APA)
Consortium for Energy Efficiency (CEE)
Natural Resources Defense Council (NRDC)

2) Survey of BCHP Installations and BCHP Targets in Illinois

The survey of BCHP Installations and potential BCHP targets is primarily based on personal interviews and to a lesser extent on the use of existing data.

Existing data was used in the form of a report by the Illinois Commerce Commission (ICC) titled "Distributed Resources: Report and Review of Comments to the Illinois Commerce Commission Electric Policy Committee." As part of this report the ICC provided a compilation of non-utility power producers and the respective project capacity as of December 31, 1998.

Table 2.1 below categorizes the installations based on the facility type in which the system is installed. The facility types are classified as Data Centers, Museums/Zoos, Hospitals, Schools/Universities/Research Centers, Stores, Warehouses/Restaurants, Water Treatment facilities and Conference Centers. The table lists the capacity size in kW followed by the primary purpose of the facility, where information was available. Facilities, which have electric generating equipment installed but do not use the waste heat are considered potential target applications for BCHP. Absence of a checkmark (√) signifies that data on the primary purpose was not available at the time of the survey.

The table also lists whether the facility is in operation or whether the installation is pending. The column headed "Config. Available" lists whether or not more detailed information was collected on the configuration of the respective installation. Where available the information on the individual configuration is provided in the section following the table. The detailed information is numbered and corresponds to the number listed in the "Config. Available" column for each facility.

This report focuses primarily on BCHP applications for buildings. However, for the purpose of providing a comprehensive overview, a similar summary table on industrial applications is attached to this report in Attachment C.

2.1) Survey Summary

Table 2.1:

Project Type and Name							
Data Centers:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
Transamerica, Schaumburg, IL	750			√		Y	1
G.E. Capital Auto Financial Services, Barrington, IL	3,000			√		Y	2
MCI/Worldcom, Riverdale, IL	4,000			√		Y	3
Power Net	60					Y	4
Van Buren Data Center	-	√				N	5

Hospitals:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
So. Suburban Hospital, Hazelcrest, IL	1,000	√	√			Y	6
Christ Hospital & Medical Center, Oak Lawn, IL	2,000	√			√	Y	7
Little Company of Mary Hospital	4,000	√				Y	37
Sherman Hospital, Elgin, IL	1,600					N	8
Sisters of Holy Family Saint Mary of Nazareth Hospital Center	2,400					Y	
St Francis Hospital, Evanston, IL	1,600	√				N	9
Saint James Hospital, Chicago Heights, IL	1,900			√	√	Y	10
Saint Anthony Hospital, Michigan City, IN	1,200			√	√	Y	11
Resurrection Hospital	1,450	√			√	N	12
Northwest Community Hospital, Evanston, IL	3,450	√			√		13
Alma Nelson Health Care Facility	195						14
Park Strathmoor Health Care Facility	115			√			15
Condell Memorial Hospital	500	√				N	16
Lake Forest Hospital, Lake Forest, IL	3200	√		√		Y	17
Gottlieb Memorial Hospital	1600	√		√		Y	18
Presbyterian Homes, Evanston, IL	3200	√				Y	19
Hinsdale Hospital, Hinsdale, IL				√		Y	
Museums/Zoos:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
Brookfield Zoo	3,800		√			Y	21
Art Institute of Chicago	1,450	√				N	20
Conference Centers:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
Trigen-Peoples District Energy Company	3,300	√			√	Y	22
Schools/Universities/Research Centers:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
University of Illinois at Chicago, Chicago, IL	13,000	√			√	Y	23
Mokena School, Mokena, IL	375	√	√			Y	24

Chicago State, Chicago, IL	3,500	√				Y	25
Amoco Research Center Cogeneration Facility	8,300					Y	
Board of Education, Evanston Township High School District 202	2,400	√		√		Y	26
Illinois Thornton Twnshp Schl Dist 205	1,100					Y	
Thornwood High School	1,500					Y	
Abbott Power Plant-Univ of IL/Urbana-Champaign	30,000					Y	
Center for Neighborhood Technology, Chicago, IL	28		√			Y	27
Illinois Institute of Technology	7,600	√				N	28
Northwestern University	800	√				N	29
Adlia E. Stevenson High School	2,100					Y	30
Lake Park High School, Roselle, IL	775					Y	
Stores:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
Walgreen's, Deerfield, IL	1,600			√	√	Y	31
White Hen Pantry, Bensenville IL	-			√		Y	32
Warehouses/Restaurants:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
Asta Health Care	60					Y	33
Goose Island Brewery, Chicago, IL	-	√				N	34
Fannie May Candy	90					N	35
Heinemann's Bakery	90					N	36
Water Treatment/Resource Recovery Facilities:	**Size (kW)**	**Waste Heat**	**Peak Shaving**	**Back-up Power**	**Cooling**	**In Oper**	**Config. Available**
DuPage Co Environmental Region 9 West Wastewater Treatment	1,500					Y	
Fox Metro Water Reclamation District	2,200					Y	
Metro Water Reclamation Lockport Powerhouse	13,500					Y	
MWRD: Stickney Water Reclamation Plant	3,000					Y	
Aurora Sanitary District, Oswego, IL	2,100	√				Y	

2.2 System Configurations

The detailed system configurations for each facility are provided below. The number listed next to the facility corresponds to the number in the "Config. Available" column of Table 2.1.

1) Transamerica, Schaumburg, IL
119,000 sf office build-out; 750kW back-up generator for Data Center, critical operations area and heating/cooling of these areas;

Dual utility electrical feed with Automatic Throw Over (ATO) switch;
225kVA UPS system for Data Center loads
Architect: OWP&P

2) G.E. Capital Auto Financial Services, Barrington, IL
265,000 sf complete office reconstruction/addition
Completed in 1998
2 - 1.5MW generators that back up entire building power and cooling
600kW generator for Data Center and life safety systems
225kVA UPS system for Data Center loads
Architect: OWP&P

3) MCI/Worldcom, Riverdale, IL
30,000 sf network information center
Complete in 2000
2 - 2000kW diesel fueled engine generators shall provide backup for all of the electrical and mechanical loads
Onsite fuel storage system capable of sustaining the generators for 72 hours before refueling.
2 - 225KVA UPS systems capable of a minimum of sixty minutes of backup at full load capacity.
Architect: OWP&P

4) Power Net
2-60 kW Capstone Microturbines

5) Van Buren Data Center
7 MW natural gas generating system
Cogeneration – electricity and absorption chilling
Owner: OptimalPath
Project Manager: Peoples Energy

6) So. Suburban Hospital, Hazelcrest, IL
Waukesha Engines
(1) natural gas engine at 1,050 KW
Cogeneration - Peak Shaving
Heat Recovery - Domestic Hot Water
Project Manager: Nicor Solutions

7) Christ Hospital & Medical Center, Oak Lawn, IL
Expansion of emergency power system
with two 1,000 kW engine generators,
Installation of 550 ton absorption chiller.
Project Design: GKC/EME

8) Sherman Hospital
1600 kW Cat natural gas cogeneration with
low pressure steam heat recovery

9) St. Francis Hospital
1600 kW Cat natural gas cogeneration with
low pressure steam heat recovery.

10) Saint James Hospital, Chicago Heights, IL
1200 tons of cooling
3300 ton-hours of ice storage
900 BHP high pressure steam boilers
1000 kW diesel generator

Architect: OWP&P

11) Saint Anthony Hospital, Michigan City, IN
800 tons of cooling
500 BHP high pressure steam boiler
New medium voltage distribution with two substations
2-600 kW diesel generators
Architect: OWP&P

12) Resurrection Hospital, Chicago, IL
2-725 kW naturally aspirated Waukeshaw engines.
Low pressure steam recovery for heating and for
550 ton carrier absorption chiller.
Installation pending

13) Northwest Community Hospital
3,450 kW Cogeneration system together with
three HP boilers, 3400 tons of air conditioning consisting of
two 1300 ton centrifugal and one 800 ton absorber,
Cogeneration system will also produce 6000 lbs of steam/hour, 150 psig.

14) Alma Nelson Health Care Facility
Power generation system consisting of 75 kW and 120 kW generators
with a building automation control system.

15) Park Strathmoor Health Care Facility
115 kW Power Generation System to provide 90% of the facility's
electric requirements.

16) Condell Memorial Hospital
500 kW Cat natural gas reciprocating power cogeneration with
low pressure steam heat recovery.

17) Lake Forest Hospital
3200 kW Cat natural gas cogeneration with
high pressure steam heat recovery.
Operates on peak 3,300 hours/year.

18) Gottlieb Memorial Hospital
2 naturally aspirated 7100 GU natural gas Waukesha engines
each rated at 800 kW.
Medium temperature jackewater with provision for heat recovery.
from exhaust steam and provision for standby and emergency operation.

19) Presbyterian Homes
2400 Cat natural gas cogeneration with low pressure steam heat recovery.
Operates on peak 3,300 hours/year.

20) Art Institute of Chicago
2-725 kW nat. asp. Waukesha engines.
Low Pressure steam used for climate control
Installation pending

21) Brookfield Zoo Waukesha Engines
(2) natural gas, (1) diesel totaling 3.8MW
Power Generation - Peak Shaving No Heat Recovery

Project Manager: Nicor Solutions

22) Trigen Peoples District Energy
3-1100 kW Makila Gas Turbines.
High pressure steam used for heating and cooling

23) University of Illinois at Chicago
2-6300 kW dual fuel Cooper Bessemer engines (East Campus - Operating), with heat recovery
2-4000 kW natural gas fired Wartsila engines (East Campus - Operating) with heat recovery and supplemental firing..
3-7000 kW Solar natural gas turbines (Operation pending - Fall 2001) with heat recovery and supplemental firing.
3-5000 kW natural gas fired Wartsila engines (Operation pending – Fall 2001) no heat recovery
High pressure and low pressure used for heating
Cooling of Campus.

24) Mokena School, Mokena, IL
Waukesha Engine
(1) natural gas engine at 375 KW
Cogeneration - Peak Shaving
Heat Recovery - Boiler Make Up
Project Manager: Nicor Solutions

25) Chicago State, Chicago, IL
Waukesha Engine
(2) natural gas engines at 825 KW each
Power Generatio - Peak Shaving
No Heat Recovery
Project Advisor : Nicor Solutions

26) Evanston Township Highschool
2400 kW Cat natural gas cogeneration with
high pressure steam heat recovery.
Operates on peak 3,300 hours/year.

27) Center for Neighborhood Technology, Chicago, IL
28 kVA natural gas fired micro turbine,
Design of switchgear to accommodate
future addition fuel cells
Thermal storage system for peak shaving
Project Design: GKC/EME

28) Illinois Institute of Technology
2-3.8 MW 501 KB gas turbines.
Steam used for Campus steam system
Installation pending

29) Northwestern University
800 kW Cat natural gas cogeneration with
low pressure heat recovery.

30) Adlia E. Stevenson High School
Electric Only

2.1 MW Reciprocating Engines

31) Walgreen's, Deerfield, IL
100,000 sf new office building
Two new 800 kW generators were installed to provide back-up power for the entire building.
A new 400-kVA UPS system tied into existing 375 kVA UPS. UPS systems were paralleled such that either unit is capable of providing uninterruptible power to the entire campus
600 tons of cooling tied into existing 400 ton chiller
Entire campus can be run from two chillers
Architect: OWP&P

32) White Hen Pantry, Bensenville IL
Microturbine used to ensure power for 24/7 operation and refrigeration
Capstone Microturbine Installation

33) Asta Health Care
2-60 kW Capstone Microturbines

34) Goose Island Brewery, Chicago, IL
6 microturbines with waste heat recovery.
Technology: Capstone Microturbine

35) Fannie May Candy
3-30 kW Capstone Microturbines
Installation pending

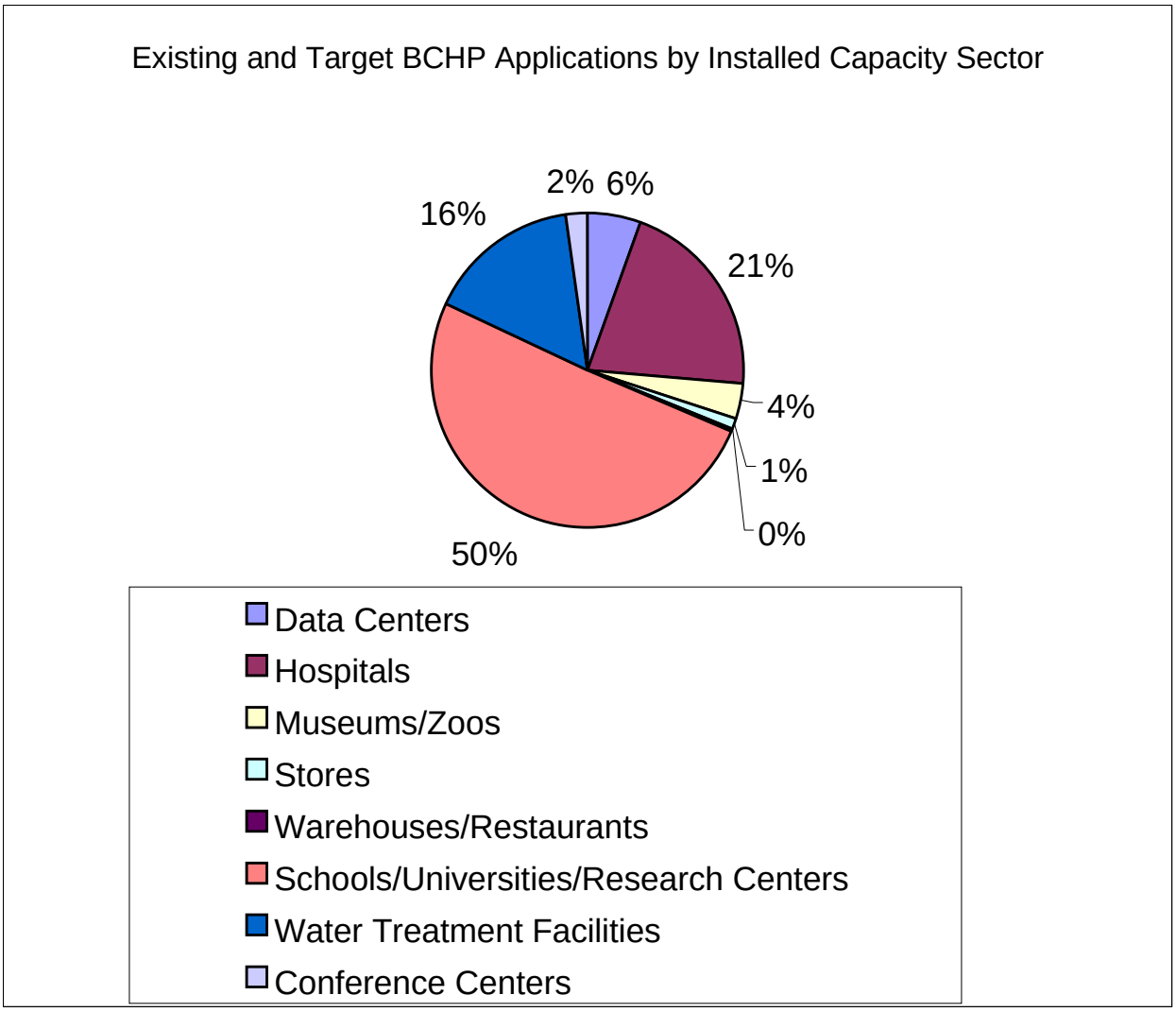
36) Heinemann's Bakery
3-30 kW Capstone Microturbines
Installation pending

37) Little Company of Mary Hospital
3,700 kW natural gas turbine cogeneration with
high pressure heat recovery
Operates 24 hrs/day.

2.3) Sector Analysis of the Survey Data

In the following the survey data form Section 2.1 is summarized by sector:

BCHP Sector:	Capacity (kW)	Percent of Installed Capacity
Data Centers	7,810	6%
Hospitals	29,410	21%
Museums/Zoos	5,250	4%
Stores	1,630	1%
Warehouses/Restaurants	240	0%
Schools/Universities/Research Centers	71,478	51%
Water Treatment Facilities	22,300	16%
Conference Centers	3,300	2%
Total:	141,418	100%



As can be seen Water Treatment Facilities and School/Universities constitute the biggest installed market segments in Illinois followed by Hospitals and Data Centers.

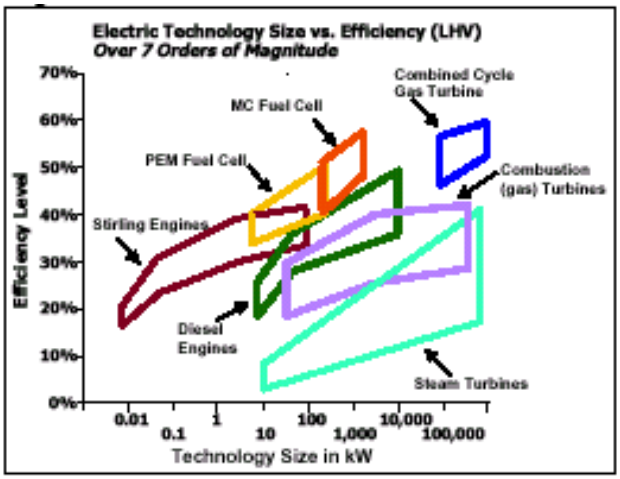
3) Current Pricing Issues

Capital cost as well as operating cost are generally viewed as some of the major hurdles to utilize BCHP technologies. This section will address these issues.

3.1) Technology Cost

The predominant technologies in BCHP applications are combustion turbines, microturbines and reciprocating engines. In the near future fuel cell technology is expected to become a prevalent BCHP technology as well.

Each technology operates at different efficiency and capacity size levels. The following graph from a Northeast Midwest study titled "Combined Heat and Power Education and Outreach Guide to State and Federal Government" illustrates the competitive advantage of each technology relative to the installation size.



The various Technology Sizes in the graph above correspond to different installed costs. The GRI Report 98/0028 titled "Distributed Generation for Municipal Utilities" lists the following installed capacity cost ranges:

	Installed Cost	Size
	$/kW	kW
Combustion Turbines	2,300	600
Combustion Turbines	2,000	1,500
Combustion Turbines	1,500	2,000
Combustion Turbines	1,100	3,000
Combustion Turbines	750	4,000

Combustion Turbines	600	14,000
Combustion Turbines	450	27,000
Recicprocating Engines	650- 800	1200 -4,000

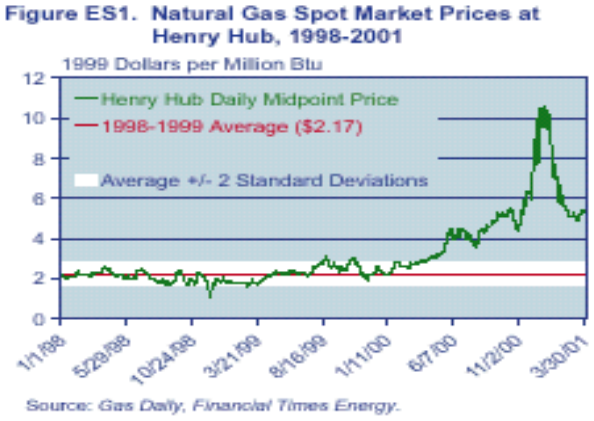
A report by the Northeast-Midwest Institute (dated March 2001) states: "As noted earlier, the optimum size of new power plants has dropped over the last decade from approximately 1,000 megawatts to 50-100 megawatts, and the downward trend continues."

Various manufacturers confirm that the downward trend in installed capacity cost continues. The current installed capacity cost for microturbines is between $1500/kW to $3000/kW. Manufacturers expected this number to drop to $1000/kW just over the next three years. This, however, is in the competitive range of larger combustion turbine facilities or reciprocating engines.

3.2 Operating Cost

Many BCHP systems such as reciprocating engines, combustion turbines and microturbines use natural gas as a primary fuel. For these systems fuel constitutes the majority of the variable/operating cost. The year 2000 however was characterized by high natural gas price spikes. High natural gas prices could have negative affects on the BCHP market development. Therefore it is important to understand reasons for the gas spikes and project the future trends.

The following graph from the Energy Information Administration report titled "U.S. Natural Gas Markets: Recent Trends and Prospects for the Future" illustrates the gas price movement in 2000:



In this report the EIA identifies several reasons for the gas price movement among which are significant demand increase following a period of low growth in gas consumption (from 1996 to 1999) and a relatively cold winter in 2000. However in its mid-term

outlook the EIA states: “Because natural gas resources are expected to be adequate to meet future demand through 2020 and technological progress for exploration and development is expected to be sustained, natural gas prices are projected to return to a lower price path around 2005 and gradually increase to about $3.05 per million Btu in 2020.”

These projections should also be applicable for the Chicago market since Chicago gas prices move relatively in sync with Henry Hub prices, which is one of the central gas trading points in the US. This is also illustrated in the following table form the EIA report:

Table ES2. Average Quarterly Spot Prices and Price Differentials for Selected Trading Centers
(Dollars per Million Btu)

Quarter and Year	Henry Hub, LA	Chicago Citygates	Florida Citygates	Katy, TX	New York Citygates	SoCal Citygate[a]
3rd quarter 2000	4.47	4.56	5.00	4.48	4.81	5.28
4th quarter 2000	6.41	6.82	6.73	6.38	8.07	13.59
1st quarter 2001	6.44	6.61	6.85	6.41	7.83	15.19
			Price Differentials from Henry Hub Spot Price			
3rd quarter 2000	—	0.09	0.53	0.01	0.34	0.81
4th quarter 2000	—	0.41	0.32	-0.03	1.66	7.18
1st quarter 2001	—	0.17	0.41	-0.03	1.39	8.75

[a]SoCal is a large Southern California utility and is used as an indicator for typical spot prices to that region.
Source: Energy Information Administration, Natural Gas Division, adapted from prices reported in *Gas Daily*, *Financial Times Energy* (various issues).

In conclusion it can be stated that the natural gas prices are expected to decrease further from the winter 2000 spike and that the mid-term outlook supports relatively low gas prices. Taking into account some lead time for new BCHP installations the winter 2000 gas spike should have little affect on the economics of future BCHP projects. However, the concern over price volatility may need to be addressed on an individual basis with prospective clients considering BCHP.

4) Summary and Status of CHP Policy Issues

The purpose of this section is to provide a summary and status of policy related issues pertaining to the advancement of Cooling Heating and Power (CHP) for Buildings in the State of Illinois. The following policy areas are summarized: Access and Interconnection Rules, Rates, Standby Charges and Exit Fees, General Progress with State Electric Deregulation, Emerging Legislation, and Potential Partners / Advocates of CHP.

4.1 Access and Interconnection Rules

In Illinois there is no State standard for exit, interconnection or stand-by fees and no regulatory or legislative policy regarding distributed energy. Currently, it is left up to each individual electric utility to define the procedures that affect DE installations. Each utility's approved rate structure and its own guidelines must be followed when installing DE within that electric utility's service territory.

This "hodge-podge" of rules, standards, and fees makes it difficult for companies that want to install DE at numerous sites over several electric utility territories within the State. The economics for a DE installation in one service territory will likely be very different than in another.

Recently, however, the Illinois Commerce Commission Staff has begun working on a project to identify appropriate interconnection standards for distributed generation connected to utility distribution facilities. Economists in the ICC's Policy Department and engineers in their Engineering Department are reading available reference materials and working on criteria right now and hope to have chosen interconnection standards by the end of this year. This is currently an informal Staff activity without any associated Commission docket, and accordingly no information is on there web site. As of this time industry participation in this activity has not been solicited. Phillip Roy Buxton, Manager of Engineering, Energy Division, Illinois Commerce Commission is leading this effort for the ICC.

The largest electric utility in Illinois is ComEd. Their "Blue Book" or "Guidelines for Operation of Non-Utility Generation in Parallel with the ComEd System," provides detailed technical guidance on the requirements for interconnection. In addition to the standby costs addressed below, there is the cost of commissioning an interconnection study to ascertain the impact of the proposed DE installation on the electric grid. This study will determine the interconnection requirements for the installation. These studies can cost between $3000 and $250,000. The potential end user is required to pay ComEd for the study. Studies are required for all DE installations over 40 kilowatts.

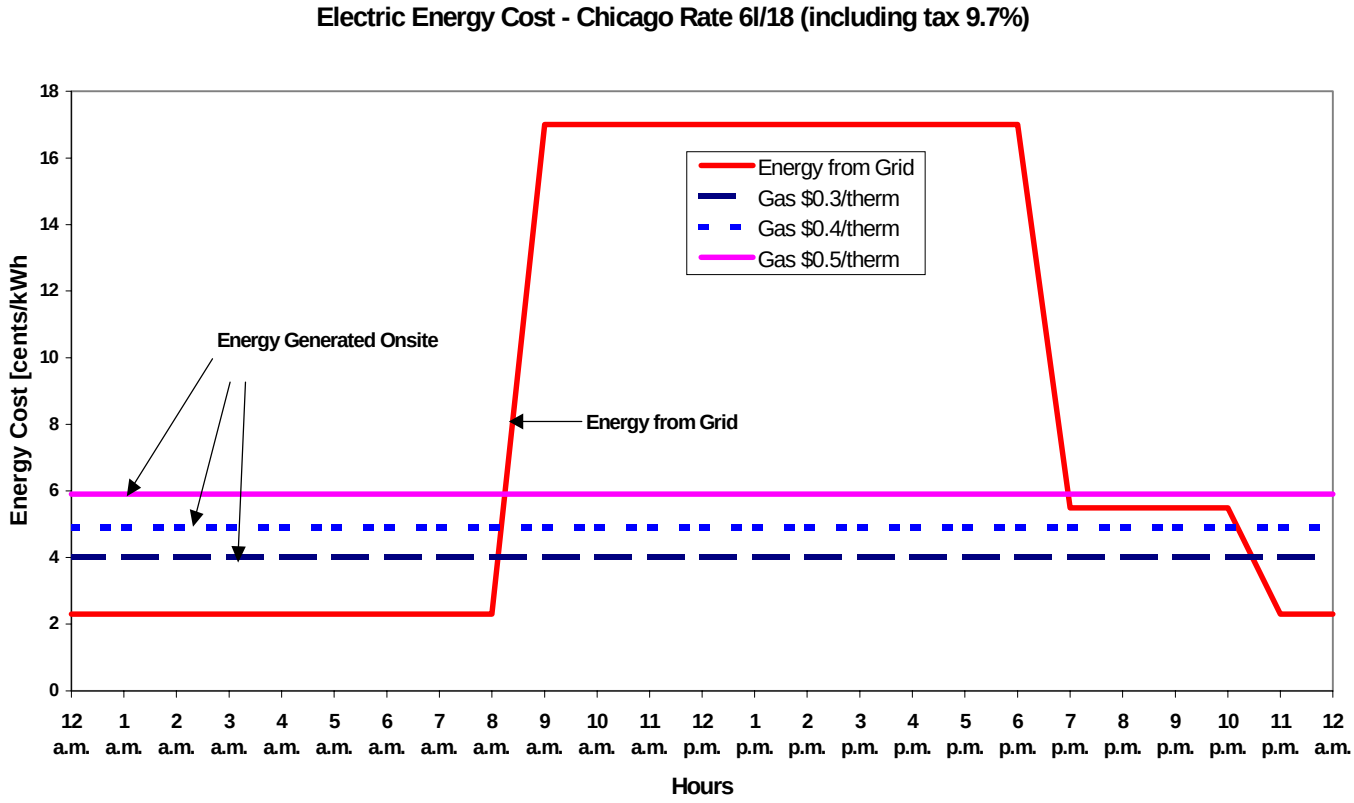
4.2 Rates

Commonwealth Edison's Rate 18 is the rate that most affects the installation and operation of DE generation, including detailed and complicated standby charges. These

standby charges have been known to be the sole stopper of some DE projects in ComEd's territory. A synopsis of Rate 18 (Attachment D) is attached to this document. The complexity of this rate underscores one of the major barriers in determining the actual economics of the installation and operation of DE.

Customers often pay outside consultants to decipher jargon, penalties, access, study-fees and many other rate related matters. This complexity can create uncertainty for customers who need hard answers about the economics of a DE installation, and underscores one of the major hurdles in determining the actual economics of the installation and operation of DE.

Below is a table outlining the effect of ComEd commercial rates on the economics of a 1000 kW BCHP installation at various configurations at $5/mmBTU gas costs. As shown in the Figure below ComEd commercial rates are designed to reflect the high cost of peak daytime electricity. This Figure and the Table below show that under this rate structure BCHP is economical during the day (9am to 10pm) with savings up to $200,000 a year for a 1000kw BCHP system. Conversely, BCHP is uneconomical at night when electricity prices approach 2 cents/kWh. Of particular note in the Figure below is that ComEd's energy charge is approximately 5.5 cents/ kWh from 9 am to 6 pm while the demand charge equates to 11.5 cents/ kWh for that period. The demand charge can be as high as approximately 90 cents/ kWh for peak demand loads that last only 1 hour.



		Baseline Com Ed Rate 6L	1000 kW DG Only 9am - 10pm	1000 kW 50% of Recoverable Heat Used BCHP 9am to 10pm	1000 kW 100% of Recoverable Heat Used BCHP 9am to 10pm	1000 kW DG Only 24 hours	1000 kW 50% of Recoverable Heat Used BCHP 24 hours
Energy Cost		1,180,143	1,045,524	1,011,237	976,950	1,155,361	1,097,102
Rate 18 Customer Charge			1,290	1,290	1,290	1,290	1,290
Energy Cost Savings			133,329	167,616	201,903	23,492	81,751
			Additional Cost Resulting from Generator Failure				
Rate 18 Facilities Charge			39,360	39,360	39,360	39,360	39,360
Generator Offline for 1 Day. Additional Energy and Demand Cost Affecting Energy Cost Savings Corrected for Generator Fuel and O&M Cost Reduction	A		223	370	516	51	305
Generator Offline for 5 Days. Additional Energy and Demand Cost Affecting Energy Cost SavingsCorrected for Generator Fuel and O&M Cost Reduction	B		1,116	1,849	2,581	256	1,526
Generator Offline for 31 Days. Additional Energy and Demand Cost Affecting Energy Cost Savings Corrected for Generator Fuel and O&M Cost Reduction	C		5,134	8,503	11,873	1,180	7,022

Additional costs of Rate 18 based on 1000 kW max. and 700 kW average extra power provided by the utility during generator failures. Assumes generator fails during the peak demand hours of month of August with Rate 18 supplemental service level of 1,786 kW and demand peak period load factor for supplemental service varying from 0.044 for 1 day failure to 0.217 for 5 day failure and 0.999 for full month failure.

Baseline application has total annual electric consumption of 12,000,(and max. demand of 2,840 kW. Cooling provided by one 500 RT abs chiller and two electric centrifugal machines providing total cooling ca 1,600 RT. Analyzed BCHP configuration assumes 1000 kW gas engi generator with heat recovery to heating/absorption equipment. Natur $0.5/therm

4.3 Standby Charges

The Table above estimates the economic impact of possible failure of the system. Most building owners request consideration of this cost as a contingency factor when considering BCHP system economics. The standby charges include an annual customer charge $1,290. In the event of a failure that exceeds 30 minutes the user is assessed a standby charge of approximately $40,000 per 1000kW of demand. This standby charge covers a 12 month period. The customer would also pay additional energy charges which are shown above as the costs paid to the utility above what was allocated to run the BCHP system.

As you can see from the above, the standby charge alone can significantly reduce the cost savings of a given configuration. In addition, dependent on the assumptions made in the financial analysis concerning failures, variable charges can almost double the fixed charge. It should also be noted that these rates do not have provisions to account for the benefit DG can provide to the grid.

4.4 Re-Negotiated Rates

Another circumstance that impacts the economic viability of DE in Illinois is the potential for re-negotiated rates, adopted by the Illinois Commerce Commission as outlined below: (Source: Illinois Commerce Commission's, Economic Development Handbook, Illinois Utility Options, 9th edition)

> *"The Commission has approved cogeneration and self-generation deferral and displacement rates when uneconomic bypass of the utility's system would be avoided. Ratepayers benefit from the utility's retention of the potential bypasser's load, since revenues received under the discounted rates help minimize potential deficiencies in revenue requirements. If the load were lost (for example, if the customer bypassed the utility and installed cogeneration facilities), at the time of the utility's next rate case, other ratepayers would have to make-up the lost revenue through higher rates. Discounted rates are set above the utility's incremental cost to serve the particular customer."*
>
> *"Customers who can cogenerate or self-generate more economically than purchasing electricity at the utility's offered discounted rate and who are willing to assume the associated risks, are not discouraged from doing so."*

The Commission's position creates the possibility of a re-negotiated rate for Illinois electric customers. This can occur when the customer has decided to investigate or move forward with a DE installation. A customer may have already paid a consulting firm to review the rate structure and likely savings and/or paid an engineering firm to develop a specification for the DE installation. The project can have a reasonable payback and

good economics, yet because the host electric utility does not want to lose the electric load, they offer a lower rate. This can effectively stop the installation. These set of circumstances are familiar to local industry and gas utility representatives and have resulted in the demise of many DE installations in Illinois.

4.5 Exit Fees

Exit fees are determined by ComEd on a case by case basis and can vary significantly

4.6) General Status of Progress on Deregulation

The Illinois Electric Service Customer Choice and Rate Relief Law of 1997 restructured the state's electric utility industry to offer customers choices about who supplies their electric power, competitive prices for that power, and new services. Non-residential supplier choice was phased in from 1998 through 2000, and residential customers will be able to choose their supplier on May 1st, 2002. With regard to deregulation and DE, the ICC has taken the following actions:

- Sent out DE Questionnaire in Spring of 1999 (see below)
- Hearing on California energy situation in Spring of 2001
    - The ICC did hold a hearing on the California energy crisis; general consensus was that something similar would not happen in Illinois.
- Initial plans to establish an Interconnection working group have been put on hold, with activity here limited to the ICC's Engineering group (see above).
- Illinois appears to be taking a wait and see approach and is falling behind other States when developing statewide rules for DE

The Illinois Commerce Commission (ICC) began to address the issue of DE by sending out a detailed list of questions (Exhibit A) in the Spring of 1999 and receiving comments back from a variety of interested companies and organizations. Companies that answered the questionnaire and/or provided additional comments include:

- NICOR
- Ameren CIPS
- Caterpillar
- Corn Products
- Cummins ONAN Northern
- Edison Electric Institute
- Enron, Environmental Law and Policy Center
- Illinois Power Mid American
- New Energy
- Peoples Energy
- Unicom

A diversity of opinions and suggestions were offered by the entities responding to the questionnaire. In general, the electric utilities stated that the existing regulatory situation

works well for the market and little or no changes need to occur. Most of the others offered a variety of changes and suggestions.

As of this date, the ICC has not outlined any concrete initiatives or regulatory changes to reduce barriers for DE installations. While it has issued a report regarding the responses it received, no plan is being offered at this time. The ICC staff has informally begun to investigate the idea of an interconnection standard for the State but no hearings have yet been scheduled.

4.7) Emerging Legislation

HB 606 passed both the Illinois House and Senate and will likely be signed by the Governor. The bill creates the Energy Efficiency Revolving Loan fund that will provide low interest loans through a program administered by the Illinois Department of Commerce and Community Affairs (IDCCA). This program provides loans at no more that 2% interest for energy efficiency improvements. IDCCA shall assist in the loan applications and review process for proposed projects in governmental, commercial, and certain multi-family buildings.

A project involving reduction of electric demand to achieve an electric load shape that exhibits a ratio of no more than 1.3 to 1.0 peak to average load in an existing building with a peak demand of 50 kilowatts or more is eligible for the low interest loans. This type of project could utilize a combined heat and power (CHP) system.

The bill also states that priority should be given to projects that demonstrate innovative and efficient way to achieve demand reduction, may serve as a model for replication in other locations, or are proposed by governmental or nonprofit organizations to promote both energy efficiency and improved reliability of service.

HB 1599 passed both the Illinois House and Senate and is likely to be signed by the Governor. The bill is titled the Illinois Resource development and Energy Security Act. The main purpose of the act is to provide an attractive environment for companies wanting to build large electric producing power plants 400 megawatts or larger.

The legislation provides incentives, most of which are focused on companies willing to build power plants that would burn Illinois Coal. It also contains favorable wording regarding renewable energy with goals in line with the Repower the Midwest Report developed by the Environmental Law and Policy Center, however its does not appear there is an enforcement mechanism.

The purpose of the Act is as follows “to enhance the State’s energy security by ensuring that: (i) the State’s vast and underutilized coal resources are tapped as a fuel source for new electric plants; (ii) the electric transmission system within the State is upgraded to more efficiently distribute additional amounts of electricity; (iii) well-paying jobs are created as new electric plants are built in regions of the State with relatively high

unemployment; and (iv) pilot projects are undertaken to explore the capacity of new, often renewable sources of energy to contribute to the State's energy security.

4.8) Potential Political Partners or Advocates of CHP

When investigating possible partners or advocates within the State one must remember that there is an education process that needs to be developed. Most, but not all of the potential partners or advocates are not yet educated on the benefits of CHP. An initiative designed to improve the market environment for CHP could be educatory, regulatory or legislative, or a combination of all three.

Below are a list of groups that could assist with the development and/or deployment of a CHP initiative.

- Energy & Environment Committee members in both Illinois House and Senate
- Governor's Energy Cabinet Members
- Clean Energy Community Trust Fund Board Members
- Metropolitan Mayor's Caucus

Obviously, the Illinois Governor, the Mayor of Chicago or the leadership in the Illinois House or Senate could also help, however, they are likely to be more difficult to reach and/or influence. Members of their staff's may be better targets with any CHP initiative. The groups listed above are not to be viewed as all-inclusive, as there are other groups and or organizations to be targeted. Those listed above, however, should make for a good starting point.

In addition, the 13 companies and organizations that responded to ICC DER questionnaire with a positive favor for CHP can be considered advocates. Some of these companies include Caterpillar, Cummins, Nicor and Peoples Energy.

5) The Market Capacity Potential of BCHP in Illinois

The previous sections identified the key parties currently involved with BCHP technology and detailed the major hurdles preventing market transformation. However, market transformation in favor of CHP technologies is only viable if the market potential is large enough. Therefore in the following the market potential for each BCHP category, industrial, commercial and multi-unit residential is being discussed.

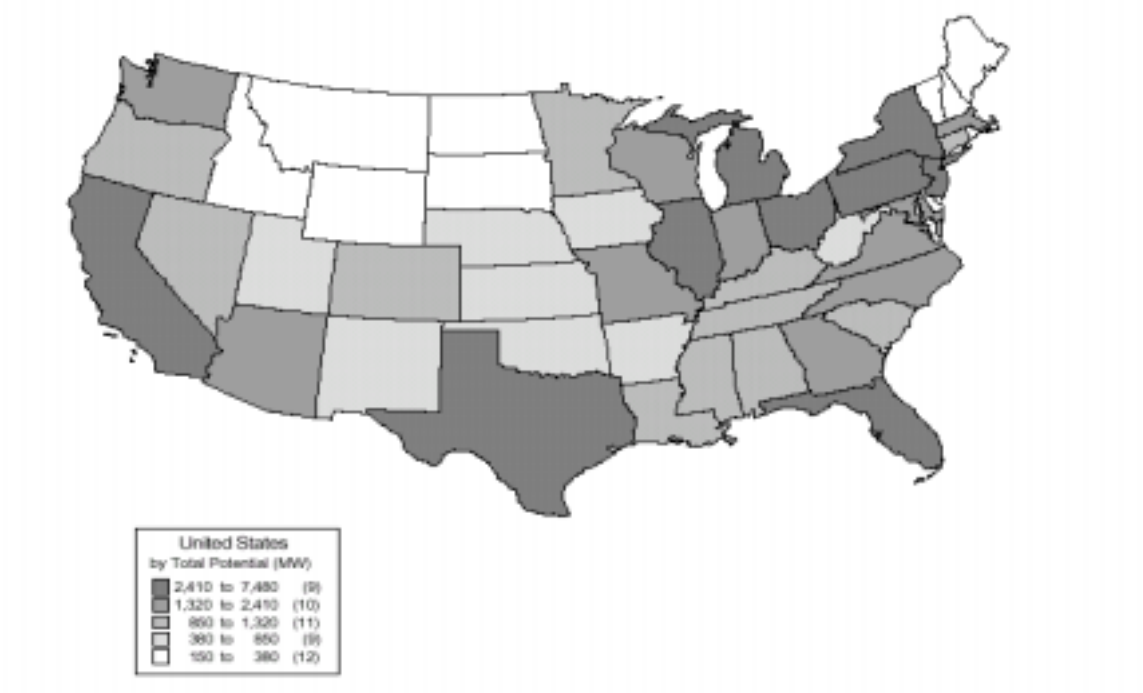
Estimates for the Industrial/Commercial Sector were derived from a previous study conducted by ONSITE-SYCOM Energy Corporation (ONSITE). Estimates for the Residential Sector are based on UIC/ERC research.

5.1) Industrial and Commercial Market

ONSITE Energy Corporation in January 2000 prepared a study for the Energy Information Administration titled "The Market and Technical Potential for Combined Heat and Power in the Commercial/Instutional Sector." This study identified potential CHP application sites using the iMarket, Inc. MarketPlace Database to select commercial/industrial building types based on SIC codes.

The potential buildings were: hotels/motels, nursing homes, hospitals, schools, colleges, commercial laundries, car washes, health clubs, golf clubs, museums, correctional facilities, water treatment plants, extended service restaurants, supermarkets and refrigerated warehouses. The buildings were divided into different groups based on their electric demand. The electric demand was estimated using data from Wharton Economic Forecasting. As a result ONSITE selected 1,431,805 buildings in the United States as suitable for CHP applications requiring a capacity of 77,281 MW.

On a state by state basis, ONSITE estimated the following potential:



As can be seen the total commercial/industrial market potential of CHP in Illinois is estimated to range between 2,410 to 7,480 MW.

5.2) Multi-Family Residential Market

Besides commercial and industrial applications CHP systems also have tremendous potential for multi-unit residences. Compared to conventional HVAC systems, the installation of CHP systems are particularly competitive when it comes to new construction or complete replacement of old HVAC systems. Since all new and replacement HVAC systems need to be permitted in Illinois, permitting data provides a good estimate of buildings where CHP systems may be a potential alternative. Therefore residential building permit data was obtained from the U.S. Census Bureau (Census).

The building permit data published by the Census includes all new privately owned residential structures in the U.S. This data is based on reports submitted by local building permit officials in response to a mail survey. The new building permit data was obtained for each year starting from 1980 to 2000 (see Table 5.2) by number of units permitted. According to the Census' New Construction Documentation the one unit structure category includes fully detached, semidetached, rowhouses, and townhouses. In the case of attached units, these units do not share heating/air conditioning systems or interstructural public utilities. Units build one on top of another and those built side-by-side, which do not have a ground-to-roof wall and/or have common facilities are classified by the number of units in the structure. Apartment buildings are defined as buildings containing five units or more. From this statistic, data for Illinois was extracted and summarized in the following table:

Table 5.2:

New Privately Owned Housing Units Authorized in Illinois						
Source: www.census.gov/const						
						Apartment
Year	Total	1 Unit	2 Unit	3 and 4	5 Units or	Structures with
				Units	More	5 Units or More
2000	51944	37817	1070	2040	11017	678
1999	53974	39228	1406	2065	11275	806
1998	47984	36177	1094	2263	8450	627
1997	46323	32801	1496	2365	9661	730
1996	49592	35912	1628	2796	9256	791
1995	47467	35392	1856	1990	8229	667
1994	49290	38532	1492	2028	7238	580
1993	44742	36232	1558	1631	5321	412
1992	40430	32695	1432	1290	5013	382
1991	32846	26045	1112	1173	4516	400
1990	38255	27401	1284	1239	8331	482
1989	42377	30205	1296	1544	9332	579
1988	49145	33936	1272	1853	12084	758
1987	50447	32972	1118	2218	14139	890
1986	51876	30635	1438	1992	17811	1135
1985	38719	20496	1212	1902	15109	974
1984	30160	19556	1198	1420	7986	672
1983	29836	17654	1136	1208	9838	566
1982	18960	7980	588	853	9539	430
1981	16356	8769	672	1069	5846	355
1980	25226	10627	1042	1765	11792	744
Sum Y2000+Y1980	77170	48444	2112	3805	22809	1422

As can be seen in the year 2000 a total of 14,127 privately owned multi-unit structures were permitted in Illinois. In 1980 a total of 14,599 privately owned mutli-unit buildings were permitted in Illinois. For residential applications, CHP systems are more suitable for multi-unit applications (two units or more) with higher energy requirements.

As stated above the installation of CHP systems are particularly competitive when it comes to new construction or complete replacement of old HVAC systems. Assuming that a HVAC systems needs to be replaced every 20 years a total of 14,127 (Year 2000 multi unit permits) +14,599 (Year 1980 multi unit permits) = 28,726 buildings in Illinois could be considered potential CHP application sites.

6) Conclusions and Recommendations

The intent of this study was to describe the baseline scenario for CHP technology in Illinois. This included a survey of key players, current installations, current technology and operating costs, current policy issues and finally an assessment of the market potential for these applications.

The survey of key Illinois firms indicated that more than 70 firms in Illinois are involved in CHP applications or have CHP capabilities. This shows a high interest from the private market towards these technologies. This interest is complemented by a multitude of local and regional organizations which have involvement with CHP applications. Excluding industrial applications there are about 50 combined heat and power installations in place in Illinois with a total installed capacity of about 141 MW.

Capital and operating costs as well as policy issues are generally sited as the major hurdles preventing CHP from achieving broad market penetration. However, this report discussed that capital costs should continue to decline due to technological improvements. Also, operating costs, especially when driven by natural gas fuel expenses, should exhibit reduced volatility and prices should return to lower levels.

On the policy side, a "hodge-podge" of interconnection standards and especially stand-by charges such as Commonwealth Edison's Rate 18 and re-negotiated rate provisions significantly impede market transformation towards CHP technology. Some emerging legislation on the other hand, such as the Energy Efficiency Revolving Loan Fund may provide some policy driven incentives in the future.

These incentives may be very welcomed by the large capacity market potential for CHP technologies identified in this report. This capacity potential consists of up to 7,500 MW in the industrial and commercial sector and an additional 28,000 installations in the multi-family residential sector. It should be noted that this potential can only be realized if the policy issues concerning BCHP are resolved in favor of promoting this technology.

Finally, in order to reduce the apparent hurdles for CHP technologies, to keep the private market interest active and to take advantage of a substantial CHP capacity potential in Illinois the following recommendations are being made:

Educate State Regulators on

- the benefits of CHP.
- the need to address interconnection standards, stand-by charges, exit fees and present rate structures.
- the need to consider appropriate incentives for BCHP such as tax incentives, subsidies and others.

Educate Architects, Engineers, Property Management Firms on

- the benefits of CHP.
- the permitting process.

- successful Case Studies.
- the technical and financial possibilities and risk structure.

Develop a simplified screening tool with the ability to provide an initial BCHP feasibility assessment to prospective BCHP users.

Review the permitting process and issue recommendations to streamline the process based on current BCHP user input.

Attachment A: Detailed Contact Information for Key Illinois Firms Involved with CHP Projects

Architectural Firms:

Sonoc Architects
735 W. Division Street
Chicago, IL 60610
Contact: Scott Sonoc
Capabilities: Green Building, CHP Capabilities

Farr Associates Architecture and Urban Design, Inc.
53 West Jackson #1661
Chicago, IL 60604-3798
Phone: (312) 408-1661
http://www.farrside.com
Contact: Patrick Thornton
Capabilities: Green Building, CHP Capabilities

O'Donnell Wicklund Pigozzi & Peterson Architects, Inc.
111 West Washington #2100
Chicago, IL 60602-2783
Phone: (312) 332-9600
Fax: (312) 332-9601
E-mail: prosenzweig@owpp.com
http://www.owpp.com
Contact: Michelle Halle Stern
Capabilities: Green Building, CHP Projects Developed

Prisco Serena Sturm Architects
3351 Commercial Ave.
Northbrook, IL 60062-1908
Phone: (847) 564-0370
Fax: (847) 205-5089
Contact: Pat Dolan (will send info) 847 564 0370 x24
Capabilities: Green Building, CHP Projects Developed

Skidmore Owings & Merrill LLP
224 South Michigan Ave. #1000
Chicago, IL 60604-2505
Phone: (312) 554-9090
Contact: Kelly Andereck
Capabilities: Green Building

Property Management Firms:

CenterPoint Properties
1808 Swift Drive
Oak Brook, IL 60523
Capabilities: Private Housing

Chicago Housing Authority
626 W. Jackson Street
Chicago, IL 60661

Capabilities: Public Housing

Equity Office Properties Trust
Two North Riverside Plaza
Chicago, IL 60606
Phone: (312) 466-3300

Engineering Firms:

IBC Engineering
Contact: Eric T. Truelove, P.E.
Branch Manager - Madison
IBC Engineering Services, Inc.
7402 Whitacre Road
Madison WI 53717
608-347-4738
Capabilities: CHP Turnkey Installations

La Salle Associates
3700 North Southport
Chicago, IL 60613
Capabilities: CHP Turnkey Installations

Stanley Consultants, Inc.
Chicago, Illinois
312-693-9624

Flash Power
1224 W. Van Buren
Chicago, IL 60607
Contact: Dennis Flaum (773) 325-1000
Capabilities: CHP Turnkey Installations

NICOR Solutions
Clyde K. Schafer, P.E.
Manager Technical Sales
1844 Ferry Road
Naperville, IL 60563-9600
630-983-8676, ext. 2806
Capabilities: CHP Turnkey Installations

Montgomery Watson Harza
175 West Jackson Blvd
Chicago, IL 60604-2814
Contact: Stephen J. Chippas, P.E.
(312) 831-3999
Capabilities: CHP Turnkey Installations

Ballard Engineering
3555 Electric Avenue
Rockford, IL 61109
(815) 229-1800
Capabilities: CHP Turnkey Systems

OptimalPath

1224 West Van Buren Street
Chicago, IL 60607
Contact: Donna Urbikas
(312) 563-6106
Capabilities: Data Centers

GKC-EME
205 W. Wacker Drive
Chicago, IL 60606
Capabilities: CHP Turnkey Installations

Americas Power Partners, Inc.
105 East First Street
Hinsdale, IL 60521
Contact: David Boyce
Capabilities: CHP Turnkey Installations

Excelon Services, Inc.
2315 Enterprise Drive
Westchester, IL 60154
708-236-8000

Manufacturers:

Caterpillar
Distributor: Patten Power Systems
615 West Lake Street
Elmhurst, IL 60126
(630) 530-4747
Capabilities: Electric Generation Equipment Manufacturer

Solar Turbines Incorporated
40 Shuman Blvd. Suite 350
Naperville, IL 60563
(630) 527-1700
Capabilities: Electric Generation Equipment Manufacturer

Cummins Onan Northern Illinois
8745 W. 82nd Place
Justice, IL 60458
(708) 563-7070
Capabilities: Electric Generation Equipment Manufacturer

Eisenmann
150 E. Dartmoor Dr.
Crystal Lake, IL 60014
Contact: Mark West
(815) 455-4100
Capabilities: Air Purification

ADA Systems
955 North Lively Boulevard
Wood Dale, IL 60191
Capabilities: Evaporative Cooling Systems, Energy Recovery

Trane
7100 Madison
Willowbrook, IL 60521
Phone: 630-734-3200
Fax: 630-323-9040

Local Energy Suppliers:

AES New Energy Inc
309 W. Washington St., Suite 1100
Chicago 60606
(312) 704-9200
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Alliant Energy Corp.,
222 W. Washington Ave.
Madison, Wis. 53703
(800) 521-1725
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Ameren Corp.
1901 Chouteau Ave
St. Louis 63103
(314) 554-2333
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

CILCO
300 Liberty St.,
Peoria, IL 61602
888-451-3911
Capabilities: Electricity, Onsite Generation and Natural Gas Marketing

Blackhawk Energy Services
100 N. Lincolnway, Suite B
North Aurora, IL 60542
630-264-6600
Capabilities: Electricity Marketing and Natural Gas Marketing

CMS Marketing Services & Trading Co.
1 Jackson Square, Suite 1060
Jackson, Mich. 49201
(517) 787-8582
Capabilities: Natural Gas Marketing

Energon Inc.
33 North LaSalle, Suite 2400
Chicago, IL 60602
312-443-5700
Capabilities: Natural Gas Marketing

Energy Services Inc.
6033 North Sheridan Road, Suite 42A
Chicago, IL 60660

773-334-3560
Capabilities: Natural Gas Marketing

Enron Energy Services Inc.
12 Salt Creek Lane, Suite 450
Hinsdale, IL 60521
(630) 654-5100
Capabilities: Electricity and Natural Gas Marketing

Enron North America
Capabilities: Onsite Electricity Generation
(312) 541-1717

Exelon Services, Inc.
2315 Enterprise Drive
Westchester, IL 60154
(708) 236-8000
Capabilities: Onsite Electricity Generation

Gulf Pacific Energy
51 Sherwood Terrace, Suite J
Lake Bluff, IL 60045
847 283 9700
Capabilities: Electricity and Natural Gas Marketing
Illinois Natural Gas
1731 Central Street
Evanston, IL 60201
847-491-9500
Natural Gas Marketer

Lower Electric LLC
1307 Shermer Road
Northbrook, IL 60062
847-272-0700
Capabilities: Electricity and Natural Gas Marketing

Midamerican Energy Co.
2811 Fifth Ave.
Rock Island, IL 61201
877-227-5632
Capabilities: Natural Gas Marketing, Onsite Generation and Electricity Marketing

Multiut Corp.
7514 N. Skokie Blvd.
Skokie, IL 60077
847-982-0030
Capabilities: Electricity and Natural Gas Marketing

Nicole Energy Marketing of Illinois Inc.,
18 W. 100 22nd St., Suite 114
Oakbrook Terrace 60181;
(630) 792-9928
Capabilities: Electricity and Natural Gas Marketing

Nicor, Inc.
1844 Ferry Road

Naperville, IL 60563
630-305-9500

NiSource Inc.
801 E. 86th Ave.
Merrillville, Ind. 46410
(877) 647-5990
Capabilities: Onsite Generation and Natural Gas Marketing
Onsite Generation through
Primary Energy Inc. 219 647 6071

Peoples Energy Corp.
130 E. Randolph Drive,
Chicago 60601
(312) 240-4000
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

Reliant Energy Inc.
477 E. Butterfield Road, Suite 400
Lombard 60148
(630) 241-1010
Capabilities: Electricity and Natural Gas Marketing

Santanna Energy Services,
120 E. Ogden Ave., Suite 236
Hinsdale 60521
(630) 789-6022
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing

VMC Energy Management Inc
P.O. Box 643
Cary 60013
(847) 639-9118
Capabilities: Natural Gas Marketing

WPS Energy Services Inc.
677 Baeten Road
Green Bay, Wis. 54304
(920) 496-9000
Capabilities: Electricity Marketing, Onsite Generation and Natural Gas Marketing
Onsite Generation through:
WPS Power Development 708 449 4100

Attachment B: Links to Associations and Organizations Promoting CHP

Illinois/Regional Organizations

Energy Resources Center – University of Illinois at Chicago http://www.erc.uic.edu
Gas Technology Institute http://www.gastechnology.org
Midwest CHP for Buildings Application Center, contact through Gas Technology Institute or Energy Resources Center
Midwest CHP Initiative, contact through Gas Technology Institute or Energy Resources Center
Delta Institute http://www.delta-institute.org
Midwest Cogeneration Association http://www.cogeneration.org
Environmental Law and Policy Center http://www.elpc.org
Center for Neighborhood Technology http://www.cnt.org
Interstate Renewable Energy Council (IREC) http://www.eren.doe.gov/cro
Midwest Energy Efficiency Alliance (MEEA) ttp://www.elpc.org/energy/index.htm
Manufacturing Extension Program (MEP)http://www.mep.nist.gov/index3.html
American Institute of Architects http://www.aia.org
BOMA Building Owners and Managers Association http://www.boma.org
DOE Chicago Regional Office http://www.eren.doe.gov/cro
Illinois Dep. Commerce and Community Affairs (State Energy Agency)
http://www.commerce.state.il.us/resource_efficiency/Energy/energy.htm
Illinois Environmental Protection Agency http://www.epa.state.il.us/
Illinois Commerce Commission (Public Utilities Agency) http://www.icc.state.il.us

Federal Government

US Department of Energy (DOE) http://www.energy.gov
DOE Energy Efficiency and Renewable Energy Network (EREN)
http://www.eren.doe.gov/
DOE Office of Energy Efficiency and Renewable Energy (EERE) http://www.eren.doe.gov/ee.html
DOE Office of Industrial Technologies http://www.oit.doe.gov/
DOE Industries of the Future (IOF) http://www.oit.doe.gov/industries.shtml
DOE Inventions & Innovation Program (I&I) http://www.oit.doe.gov/inventions/
DOE Office of Power Technologies (OPT) http://www.eren.doe.gov/power/
DOE Combined Heat and Power (CHP) Initiative http://www.eren.doe.gov/der/chp/
DOE Distributed Energy Resources (DER) Taskforce http://www.eren.doe.gov/der/
DOE Distributed Power (DP) Program http://www.eren.doe.gov/distributedpower/ DOE Energy Information Administration http://www.eia.doe.gov/
US Environmental Protection Agency (EPA) http://www.epa.gov
EPA Office of Air Quality Planning and Standards http://www.epa.gov/oar/oaqps/
EPA Office of Air & Radiation http://www.epa.gov/oar/
EPA Climate Protection Division (CPD) http://www.epa.gov/cpd.html
EPA-DOE Energy Star Program http://www.energystar.gov
US Department of Housing & Urban Development (HUD) http://www.hud.gov/
Federal Energy Management Program (FEMP) http://www.eren.doe.gov/femp/
Federal Laboratory Consortium for Technology Transfer http://www.fedlabs.org
Manufacturing Extension Partnership (MEP) http://www.mep.nist.gov/

Others

Oak Ridge National Laboratory http://www.ornl.gov
National Renewable Energy Laboratory http://www.nrel.gov
Brookhaven National Laboratory http://www.bnl.gov
National Energy Technology Laboratory http://www.netl.doe.gov
National Association of State Energy Officials (NASEO) http://www.naseo.org
National Association of Regulatory Utility Commissioners (NARUC) http://www.naruc.org
Distributed Power Coalition of America (DPCA) http://www.dpc.org
U.S. Combined Heat and Power Association (USCHPA) http://www.nemw.org/uschpa/
International District Energy Association http://www.districtenergy.org/
Electric Power Research Institute (EPRI) http://www.epri.com

Electric Power Supply Association (EPSA) http://www.epsa.org
Alliance to Save Energy http://www.ase.org
American Council for an Energy-Efficient Economy (ACEEE) http://aceee.org
American Planning Association http://www.apa.org
Consortium for Energy Efficiency (CEE) http://www.ceeformt.org/
Natural Resources Defense Council (NRDC) http://www.nrdc.org

Attachment C: Distributed Generation - Industrial Facilities in Illinois

Project Name	Size (kW)	Waste	Peak	Backup	Cooling	Oper.	Type
Interstate Brands Co Chicago Baking Co	1,050	√				Y	I
Candy Company	1,380	√				Y	I
Kincaid Generation L. L. C.						Y	I
A E Staley Manufacturing Co Decatur Plant Cogen	62,000					Y	I
Alpharma Incorporated	3,300					Y	I
Archer Daniels Midland Co (ADM)	-					Y	I
ADM Chicago	2,600					Y	I
ADM Clinton	31,400					Y	I
ADM Decatur	261,000					Y	I
ADM Galesburg	3,000					Y	I
ADM Peoria	64,000					Y	I
ADM Steger	1,000					Y	I
ADM Taylorville	4,600					Y	I
Armour Pharmaceutical Company Centeon L L C	4,300					Y	I
Bio Energy Partners Greene Valley Gas Recovery (BEP)	6,000					Y	I
BEP CID Gas Recovery	9,000					Y	I
BEP Kankaee County Landfill Gas Recovery	1,600					Y	I
BEP Lake Gas Recovery	12,000					Y	I
BEP Milam Gas Recovery	2,400					Y	I
BEP Settler"s Hill Gas Recovery	3,900					Y	I
Tazewell Gas Recovery	1,600					Y	I
Woodland Landfill Gas Recovery	1,600					Y	I
Browning Ferris - Mallard Lake Generating Facility	20,400					Y	I
Browning Ferris - Modern L/F Generating Facility	2,900					Y	I
Browning Ferris - Rockford Generating Facility	2,000					Y	I
Browning Ferris - Waukegan Generating Facility	3,000					Y	I
Bunge Foods	3,800					Y	I
City of Kankakee Hydroelectric Facility	1,200					Y	I
Corn Products International -Illinois	59,500					Y	I
Cyprus Rod Chicago, Inc.	2,300					Y	I
CGE Ford Heights, LLC CGE Waste Tires to Energy Project	23,500					Y	I
Dixon Marquette	14,100					Y	I
Duraco Products, Incorporated	1,600					Y	I
FSC Paper Co/Wisconsin Tissue Alsip Paper Condominium Association	8,600					Y	I
General Mills, Inc. - West Chicago	6,600					Y	I
Hoffer Plastics	7,200					Y	I
Tim Huey Corporation(DBA) - Huey Forest Products	3,000					Y	I
Hydro-Op One Associates Dayton Hydro	3,600					Y	I
Ingersol Milling Machine Company	4,900					Y	I
IMC Nitrogen Co. Imc Nitrogen Co	3,500					Y	I

IVEX Corporation IVEX Corporation	3,800					Y	I
Jacobs Energy Corporation	5,700					Y	I
Jefferson Smurfit Corporation (U.S.)	12,500					Y	I
John Deere Harvester Works	10,000					Y	I
Klein Tools Incorporated - Chicago	1,600					Y	I
Koppers Industries Inc Chicago Plant	7,500					Y	I
KMS Bakery Power Partners L P Entenmann's Co-Generation Facility	1,600					Y	I
Lauhoff Grain Company	20,000					Y	I
LTV Steel-So. Chicago Works	9,500					Y	I
M&M/Mars Inc.- Chicago	3,500					Y	I
Illinois Marathon Oil Co Illinois Refining Division	12,000					Y	I
Marcap Corporation IIT Cogeneration Facility	8,000					Y	I
Mobil Oil Corp Joliet Refinery	39,600					Y	I
Moose International Power House	2,000					Y	I
Nalco Chemical Company	4,700					Y	I
Northern Illinois Gas Company	2,600					Y	I
Panduit Corporation - Tinley Park	1,500					Y	I
Pekin Paperboard Company L/P	1,500					Y	I
PPG Industries, Incorporated - Works 14	4,800					Y	I
Research Technology Corp. - Biodyne Congress	4,300					Y	I
Research Technology Corp. - Biodyne - Pontiac	1,800					Y	I
Research Technology Corp. - Biodyne-Lansing	2,200					Y	I
Research Technology Corp. - Biodyne-Lyons	4,500					Y	I
Research Technology Corp. -Biodyne-Peoria	4,300					Y	I
Research Technology Corp. -Biodyne-Springfield	3,300					Y	I
Shell Wood River Refining Company	20,000					Y	I
Solutia INC. W. G. Krummrich Plant	6,400					Y	I
Star-Kist Foods Inc Gaines Pet Foods Corp	3,200					Y	I
STS HydroPower Ltd Dixon Hydroelectric Dam	3,000					Y	I
Viskase Corp Chicago East Plant	4,900					Y	I
Warner-Lambert Company - Rockford	4,800					Y	I
Wells Manufacturing Company-Dura-Bar Division	6,300					Y	I
Elgin Molded Plastics, Elgin, IL	825		√			Y	I
Chicago Paperboard	1,400					Y	I
Lawrence's Fisheries	60					Y	I
C&F Packing	-	√				N	I
Molex	2,200		√			N	I
USX	60,000					N	I
Finkl Steel	60					N	I

Attachment D: Synopsis of Commonwealth Edison Rate 18

Standby Service

APPLICABILITY.
This rate is applicable to any customer who (1) has installed his own electric generating facilities or is entitled to the output of electric generating facilities installed for his benefit but owned by a third party solely for financing or tax purposes (Customer's Own Electric Generating Facilities) used exclusively to produce all or a portion of the customer's electrical load requirements on a regular basis, and/or (2) uses another form of energy in the operation of his equipment, and wishes to use the Company's electric service as a standby, auxiliary or reserve service. Such Standby Service provided for temporary backup and maintenance power when Customer's Own Electric Generating Facilities are inoperative on an unplanned or planned basis shall not exceed the Total Capability of Customer's Own Electric Generating Facilities. The customer must state the extent to which such service shall be utilized for load that would have been supplied by the Company under an otherwise applicable rate(s). Each customer served hereunder shall be required to enter into a written contract with the Company incorporating the provisions of this rate.

Monthly Customer Charge:
For customers requiring only Standby Service the Monthly Customer Charge shall be
For a Standby Capacity of:

greater than 10,000 kilowatts	$524.61
1,000 kilowatts to 10,000 kilowatts	$344.39
500 kilowatts to less than 1,000 kilowatts	$137.93
less than 500 kilowatts	$106.83

For customers requiring both Supplemental and Standby Service

Monthly Customer Charge	$98.00

Required Facilities Charge.
The customer shall be billed a monthly Required Facilities Charge as follows:

Charge per kilowatt for kilowatts of Standby Capacity	$ 2.99

Demand Charge.
Charge per kilowatt for kilowatts of Maximum Demand for Standby Service for the monthly billing period:

For Standby Service for firm load that would otherwise be supplied by the Company under the otherwise applicable rate:
Summer Months:

For the first 10,000 kilowatts	$15.16
For all over 10,000 kilowatts	$ 6.29

All Other Months:

For the first 10,000 kilowatts	$13.41
For all over 10,000 kilowatts	$ 6.03

For Standby Service for interruptible load that would otherwise be supplied by the Company under Rider 26:

Summer Months:

For the first 10,000 kilowatts	$0.70
For all over 10,000 kilowatts	$0.14

All Other Months:

For the first 10,000 kilowatts	$0.79
For all over 10,000 kilowatts	$0.16

Demand Charge (Continued)

The monthly demand charges stated above shall be multiplied by a Load Factor Adjustment equal to customer's Demand Peak Period Load Factor for Standby Service for the billing period divided by .71 during the Summer Months or .75 during all other months. The customer's Demand Peak Period Load Factor shall be equal to the customer's Demand Peak Period kilowatt-hours of Standby Service for the billing period divided by the product of the customer's Maximum Demand for Standby Service for the billing period and the number of Demand Peak Period hours in the billing period.

For customers taking both Supplemental and Standby Service, the Supplemental Service will be billed based on the Maximum Demand for such service at the otherwise applicable rate except as provided herein. Maximum Demand for Standby Service will be billed in accordance with the above rate steps, beginning at a demand level equal to the Maximum Demand for Supplemental Service. For the purposes hereof, the Summer Months shall be the customer's first monthly billing period with an ending meter reading date on or after June 15 and the three succeeding monthly billing periods.

Energy Charge.

The following charges per kilowatt-hour shall apply to all kilowatt-hours of Standby Service supplied by the Company in the month:

For all kilowatt-hours supplied

During Energy Peak Periods	5.022¢
During Energy Off-Peak	2.123¢

MAINTENANCE POWER.

Maintenance power is temporary service to meet the customer's needs during periods of scheduled equipment downtime for maintenance of the Customer's Own Electric Generating Facilities, however, the total number of days containing Peak Periods for which maintenance power will be allowed for each generating unit comprising the Customer's Own Electric Generating Facilities shall not exceed 42 each year. Maintenance power will be provided for levels not to exceed the level of Standby Capacity. Annually, prior to December 31, the customer shall provide the Company in writing his preliminary schedule of maintenance power during the succeeding year. If maintenance is scheduled for the fall or spring months, the customer may adjust his maintenance schedule by giving written notice 45 days in advance of date preliminarily scheduled. If such service is provided during the spring (March, April and May) or fall

(October and November) periods, the customer shall receive a 50% reduction in demand charges for Standby Service applicable to maintenance power. Scheduled periods of maintenance power may be changed upon mutual agreement by the customer and the Company in advance of the schedule. The customer shall be billed maintenance power in accordance with the agreed upon schedule. The charges for energy consumed in conjunction with maintenance power shall be as set forth above.

Total Capability of Customer's Own Electric Generating Facilities.
The Total Capability of Customer's Own Electric Generating Facilities shall be equal to the average of the three highest maximum 30-minute metered outputs as measured by the Generator Meter for the last twelve consecutive billing periods including the current billing period, not more than one such maximum selected from each billing period, or such other capability which represents typical maximum operation of the unit as mutually agreed to between the customer and the Company. If the Company is providing Standby Service for another form of energy used by the customer, the customer shall provide ratings and usage information necessary to determine the electrical load of backup equipment.

Total Load.
For each 30-minute period, the customer's Total Load shall be the sum of the 30-minute load on the Main Meter and the 30-minute load on the Generator Meter for such period.

Supplemental Service Level.
The Supplemental Service Level for a billing period shall equal the highest Total Load established during the Demand Peak Periods for the billing period minus the Total Capability of Customer's Own Electric Generating Facilities.

BILLING QUANTITIES.

Supplemental Service.
For each 30-minute period, the demand for Supplemental Service shall be the lesser of the demand measured on the Main Meter for such period and the Supplemental Service Level established during the current billing period.

Standby Service.
For each 30-minute period, the demand for Standby Service shall equal the demand measured on the Main Meter minus the demand for Supplemental Service for such period.

MAXIMUM DEMAND FOR SUPPLEMENTAL AND STANDBY SERVICES.
For customers with 30-minute total demands (Standby Service plus Supplemental Service) exceeding 1000 kW in three of the 12-months preceding the billing period, the Maximum Demand for Standby Service shall be the average of the three highest 30-minute demands established during the Demand Peak Periods for such service in such billing period provided that not more than one such demand to be selected from any one

day. In addition, the following definition for Maximum Demand for Supplemental Service shall be used in lieu of the definition for Maximum Demand set forth in the applicable rate for such service. Maximum Demand for Supplemental Service shall be the average of the three highest 30-minute demands established during the Demand Peak Periods for such service in such billing period provided that not more than one such demand to be selected from any one day. For all other customers, the single highest 30-minute demand established during the Demand Peak Periods of the billing period for both Standby and Supplemental Service will be substituted for the foregoing average demands.

STANDBY CAPACITY.
The customer shall elect a level of Standby Capacity which shall not exceed the sum of the Total Capability of the Customer's Own Electric Generating Facilities. The Standby Capacity shall be no less than the highest Maximum Demand for Standby Service for the last twelve consecutive billing periods including the current billing period.
Whenever the Maximum Demand for Standby Service exceeds such previously established highest Maximum Demand for Standby Service, the Standby Capacity shall be immediately changed, without notice or other action, to the new level of such highest Maximum Demand. Such increased Standby Capacity shall not exceed the Total Capability of the Customer's Own Electric Generating Facilities and shall be used for the entire billing period during which the Standby Capacity is increased.

SERVICE AND METERING FACILITIES.
A customer served hereunder shall reimburse the Company in accordance with Riders 6 and 7 for the cost of metering facilities and any other facilities the Company must install to connect the customer to the Company's system, to the extent the cost of such facilities exceeds the cost of facilities the Company would provide as standard under its otherwise applicable tariff provisions in order to serve the customer's Supplemental and Standby loads combined.

PARALLEL OPERATION.
The customer shall not operate his own power production equipment in parallel with the Company's service, except upon the written consent of the Company. However, if the Customer's Own Electric Generating Facilities are allowed to operate in parallel with the Company's facilities, the Company will install, at the customer's sole expense, appropriate metering to measure the flow of energy, if any, from the customer's facilities into the Company's system under the provisions of Rider 4, Parallel Operation of Customer's Generating Facilities.

LIABILITY.
A customer taking service hereunder shall indemnify the Company and its other customers against any liability for personal injury or property damage arising from or created by the interconnection or operation of the customer's electrical generating equipment, and against any and all loss resulting from demand established by the customer in excess of the capacity of the Company's facilities installed hereunder.

GENERAL.
Energy Peak periods, for purposes hereof, shall be the hours of 9:00 a.m. to 10:00 p.m. on Monday through Friday, except on days on which the following holidays are generally observed: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day and, if one of the foregoing holidays occurs on a Tuesday or Thursday, the immediately preceding Monday or immediately following Friday, respectively. Energy Off-Peak Periods shall be all other hours.

Demand Peak Periods for purposes hereof, shall be the hours of 9:00 a.m. to 6:00 p.m. on Monday through Friday, except on the holidays designated above. Demand Off-Peak Periods shall be all other hours.

The Schedule of which this rate is a part includes certain general Terms and Conditions and Riders. Service hereunder is subject to these Terms and Conditions and the Riders applicable to this rate.

Exhibit A: Illinois Commerce Commission - Distributed Resources Questionnaire (Spring 1999)

suppliers and by the early part of the next decade all customers will have the opportunity to choose alternative sources of supply in Illinois. Competition in the electric industry promises to provide new products and services. The Commission's role in this process is to promote the opening of these new markets so a varied array of products and services can be provided in an efficient manner. The Commission has unbundled delivery services from generation services and is currently in the process of unbundling delivery services (ICC Docket No. 99-0013).

While some customers have chosen alternative suppliers, other customers have shown an interest in distributed resources (e.g., small scale generation). As this past summer reminds us, for electric supply to be reliable, the transmission and distribution grid must also be reliable. Distributed resources can be used in a number of ways to provide value-added services in addition to power and energy as well as playing a role in maintaining the reliably of supply. It is therefore important to understand the issues surrounding distributed resources not only because they provide customers with additional choices, but also because they may represent a potential reliability enhancing measure.

The following question are designed to provide the Electric Policy Committee with the necessary background to begin the discussion of distributed resources and their role in the electricity market in Illinois. After the comments are filed, the Committee will put together a series of meetings related to this issue. As a practical matter, not all parities wishing to address the Committee on these important issues will have the opportunity to do so. The responses to these questions will provide one forum for those parties to have their opinion heard. Parties need not address all questions and are welcome to provide the Committee with additional relevant comments. Please send all comments via e-mail to Carl Peterson (cpeterso@icc.state.il.us). The deadline for comments is December 15, 1999.

1. Please provide an <u>exact</u> definition of a distributed resource (DR). For example, is a distributed resource only small scale generation? If so, of what size? Should DSM services also be included in the definition?
    - How can DR be used either in conjunction with traditional utility service or as a stand-alone service to meet customers' demands?
    - Can DR be effective in providing loading relief for transmission and distribution systems?
    - Should DR be considered when planning for and expanding the T&D system?
    - What new technologies can be used in conjunction with DR to lower costs and improve service?
    - Are there any other benefits from DR (e.g., environmental)?

- What are the drawbacks of DR (e.g., utility operations, public health and safety, etc.)?

Please include examples of currently deployed distributed resources either in Illinois or other jurisdictions and explain exactly what services (or value) these resources provide. (If providing examples of DR outside of Illinois, please indicate any unique features of the regulatory or legal environments of that jurisdiction that differentiate it from Illinois as it pertains to DR.)

1. What is the market penetration for DR in Illinois (include self-generation and co-gen if not included in your definition provided in question 1)?
2. What should the Commission's role, if any, be in promoting this market? If the Commission should have a role, please provide an outline of actions the Commission can take along with a timetable.
    - How does the manner in which the Commission has unbundled delivery services from generation services impact the cost-effective application of distributed resources?
    - What aspects of current delivery service rate design should be altered to facilitate the cost-effective deployment of DR?
    - Should delivery service rates be geographically differentiated to provide the appropriate price signals to locate DR in areas that need distribution upgrades?
    - Should the Commission develop a common set of interconnection rules/tariffs for the state?
    - What other changes in legislation, rules, tariffs, unbundling polices and interconnection practices are needed to facilitate the deployment of cost-effective distributed resources?
3. What are the requirements in terms of metering, metering standards, data control and management, communications and utility operations for the central dispatch of distributed resources? (Please provide a summary of the assumptions made concerning the distributed resource technology, the structure of the electricity market and the nature of the distribution system used to formulate your answer.)
4. What aspects of past distribution planning and deployment hinder the development of the DR market? Are there specific areas on any utility's system that are particularly problematic for DR? What actions can the Commission take to alleviate any perceived problems?
5. Do the incentives currently inherent in the regulation of the incumbent electric utilities hinder or facilitate the cost-effective application of distribute resources by alternative suppliers? Please explain. If the current structure hinders efficient deployment, what changes are needed?
6. Does the incumbent utility have any market power associated with planning, leasing or dispatching DR? Is this any different from central station generation? Can that market power be mitigated? How?
7. What other issues or problems arise from the incumbent utility owning, operating and deploying DR?
8. How is the natural gas industry impacted by DR? Is there a need for changes in the rules, practices, tariffs or market structure to facilitate the cost-effective application of DR?

9. How does the deployment of DR impact competition for the delivery of power and energy?
10. Please provide any additional comments (you may include procedures for the Commission to address any issues that are of concern.).