



# NJ Clean Energy Conference

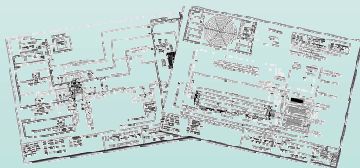
NJ Board of Public Utilities

Oct '09 Atlantic City, NJ

## Examining Proven Solutions

### Applications for DG & CHP

**Gearoid Foley**  
**Integrated CHP Systems Corp.**  
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**[www.ichps.com](http://www.ichps.com)**





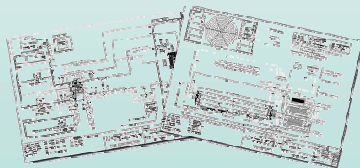
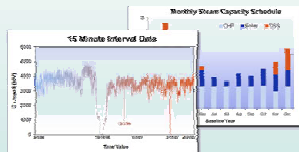
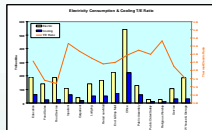
# Agenda

**Definition**

**Benefits/Goals**

**Applications in NJ**

**The Bottom Line**





# DG & CHP

## **DG – Distributed Generation**

Renewable – On-Site Solar and Wind

Biopower – Landfill Gas, Digester Gas, Bio Fuel

Process Waste Heat Recovery

Demand Response/Peak Shaving/Grid Support

Combined Heat & Power/Cogeneration

## **CHP – Combined Heat & Power**

On-site generation of Power and Thermal Energy  
from a single fuel source – Natural Gas, Bio Fuel

**High Efficiency = Lower Fuel Usage = Cost Savings & Reduced Emissions**



# Benefits/Goals

## Cost Savings

Renewable, Biopower & Waste Heat Recovery –  
Low/No Cost Fuel

Demand Response/Peak Shaving – Reduced Power  
Supply and Infrastructure Cost

CHP – Lower Energy Generation & Supply Costs

## Emissions Reductions

Renewable & Waste Heat Recovery – No Emissions

Biopower – Convert harmful Methane to power

CHP – “In comparing facilities with CHP plants against those using onsite boilers and chillers, CHP reduced emissions between 28% and 82%” ....NJ BPU



# Benefits/Goals

## Reliability

Provides local grid support and improves power quality

Can often be configured to provide emergency power back-up

Natural Gas grid can be more reliable for long term outages

## National Security

Reduced fossil fuel usage extends US resources and reduces dependence on foreign energy imports

Multiple points of power generation are less subject to catastrophic failure or attack



# CHP in New Jersey

Facility Name	U. S. Gypsum Company	YMCA	Harvey Cedars Bible Co	Clinton Hill Community C	Geon Company / BF Goodrich	Chemicals	1992	117,000
Homestop Company	Givaudan Corporation	Hudson Manor	Complex	Runyon	Sandy Mac Food Company	Food Processing	1988	1,000
Industrial Facility	Country Club Towers	Dutch Inn	Seaview Condominium	Clinton Hill Community C	Chadwick	Nursing Homes	1987	75
Allendale Nursing Home	Holiday Inn	Glassboro State College	Page & Schuyler Ave	Clinton Hill Community C	Union Carbide Bound Brook Project	Chemicals	1990	5,400
The Clinton Site Conge	Cranford Health	Palisade Nursing Home	Fairleigh Dickinson Univ	Clinton Hill Community C	Pitman Manor	Nursing Homes	1988	75
Ashbury Tower	Cranford Health & Ex Facility	Blair House Association	Madison	Clinton Hill Community C	Plainfield YMCA	Amusement/Recreation	1987	37
Phillips Seaview Tower	International Flavors & Facility	Bergen County Correct Nursing Home	Drew University	Shalom Clemente Towers	Robert Wood Johnson Jr. Health Care Ctr	Nursing Homes	1988	30
Kingsley Arms Facility		Ramapo College	International Crossroads	Belair Tower Apartments	Betty Bacharach Rehabilitation Hospital	Hospitals/Healthcare	1990	150
AT&T							2004	200
Int'L Matex Tanks/Exco							2006	385
YMCA							1988	15
Ocuca Central Plant							1996	14,600
Belmar Wastewater Treat							1977	11,800
Vitamins And Fine Chem							1994	44,000
Boiler Plant Project							1988	75
Apartments							2001	200
Fiber Mark Technical Sp							2007	1,500
Ocuca Northern Plant							1997	75
Hoechst-Celanese Plant							1987	60
National Starch & Chem							1987	60
Bridgeway Convalescen							2003	8,400
Rutgers University Busc Facility							1991	300,000
Borough of Caldwell Co							1999	16,000
South Camden Industrial							1997	150
Camden Paperboard Corp							2001	200
Rutgees Univ	College of New Jersey	Princeton University Pr	Johnson & Johnson New	Jewish Community Housi	School			
YMCA Of Camden Coun	55 Passaic Av. Project	Luftman Tower Apartm	Woodcrest Center	Apts	Green House Project	Agriculture	1994	200
Branch	Automatic Switch Cot	Essex County Waste-To	Essex County Waste-To	YMCA Of Northern Pass	Somerville Senior Citizen Housing	Multi-Family Building	1995	72
Rudox Engine & Equipm	Boiler House/Fort Dix	Lincroft Senior Citizen	Newark Boxboard Comp	Wood Street Project	Village Supermarkets, Inc.	Food Stores	1989	150
E.I. Du Pont Chambers W	Fort Lee George Wash	Tosco Bayway Petroch	Witco & Darling Delawa	Jackson Slater Apartments	Kimberly-Clark Corporation	Pulp and Paper	1985	3,000
Cedar Grove Manor	Hilton	General Motors Linden	University Of Medicine &	St. Joseph's Cogen Projec	Ciba-Geigy - Pharmaceutical Division	Chemicals	1986	2,800
Cherry Hill Sheraton	Ashbury Park Press F	Bergen County Utilities	Zion Towers	Mobil Oil Refinery	Ciba Geigy Pharmaceuticals	Chemicals	1989	4,020
	Cogeneration	Monsanto Plant	Carmel Towers	Beneficial Management C	Teaneck Nursing Home	Nursing Homes	1989	22

Prime Mover Type	Sites	Capacity (kW)	Average kW/Site	% Sites
Total	210	3,440,829	16,385	100%
Boiler/Steam Turbine	14	718,100	51,293	7%
Combined Cycle	18	2,425,203	134,734	8%
Combustion Turbine	26	213,612	8,216	12.5%
Fuel Cell	5	1,150	230	2.5%
Microturbine	9	1,820	202	4%
Reciprocating Engine	136	79,794	587	65%
Other	2	1,150	575	1%



# The College of NJ, Ewing

The College of New Jersey owns and operates a 5.2 MW natural gas fired combustion turbine based system.

The College currently generates most of its electric consumption, with the remainder supplied by PSE&G.



<b>Combustion Turbine w/ Steam</b>	
<b>Years in Operation</b>	<b>6</b>
<b>Savings per Year</b>	<b>\$3,500.00</b>



# Essex Co Correctional Facility

**A new facility completed in 2003 incorporates two 3.1 MW Natural Gas fired Reciprocating Engines with Hot Water heat recovery into the central utility plant.**

**The CHP system provides facility power in parallel with PSE&G.**



<b>Recip Engine CHP w/ Hot Water</b>	
<b>Years in Operation</b>	<b>5</b>
<b>Savings per Year (2008)</b>	<b>\$ 1,532,185</b>



# Monmouth County Landfill

**A new 1 MW generator powered with Municipal Landfill Gas was installed and started in December 2007.**

**LFG Power converts harmful methane to useful energy, 24/7 Operation**

Recip Engine	
Years in Operation	2
Estimated Savings per Year	>\$1,000,000



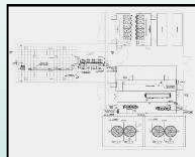


# Data Center Design

## Modular Design CHP w/ Chilled Water

**CHP is first call, then liquid fuel stand-by, then the utility. Meets Uptime Institute Tier III & IV reliability requirements**

## Natural Gas or Bio Fueled



Recip Engine w/ Chiller	
Estimated <sup>1</sup> Savings per MW-Yr	\$365,000
5-MW Savings per Year	\$1,825,000

Note 1: Nat Gas = \$8/MMBH, Electricity = 13¢/kWh, Maintenance = 2.5¢/kWh





# Benefits/Goals

## **Owner/Host Site Benefits**

Cost Savings

Environmental Stewardship/Good PR

Power Quality/Availability

## **Societal Benefits**

Lower Energy & Infrastructure Costs

Emissions Reductions/Health Benefits

Increased Grid Reliability

Resource Extension/National Security



# NJ & DG – Perfect Together

The economic, reliability, and environmental consequences of the “business as usual” scenario are unacceptable. Actions must be implemented to ensure that New Jersey’s future energy environment provides energy that is competitively priced, reliable and consistent with greenhouse gas targets.....NJ BPU EMP

Maximize energy conservation and energy efficiency. } **1st Call**  
Reduce peak electricity demand.

Meet 22.5% of the State’s electricity needs from renewable **DG** sources.

Develop new low carbon emitting, efficient power plants to help close the gap between the supply and demand of electricity. **CHP**

Invest in innovative clean energy technologies and businesses to stimulate the industry’s growth in New Jersey.



# NJ & DG – Perfect Together

**High energy costs favor clean DG and CHP making the economic benefits highly attractive in today's market.**

**High cost of implementation, long development schedules and high life cycle economic value lends itself to the “ESCO” model.**

**Self performance must look at long term and indirect benefits of implementation.**

**New Jersey through the Board of Public Utilities has developed multiple programs to assist in the development of clean DG and CHP applications towards meeting the goals of the EMP.**