



Combined Heat and Power: Expanding CHP in Your State

December 4, 2013

Molly Lunn
U.S. DOE's State and
Local Technical
Assistance Program

DOE's State & Local Technical Assistance Program

Priority Areas

- Strategic Energy Planning
- **Program & Policy Design and Implementation**
- Financing Strategies
- Data Management and EM&V
- **EE & RE Technologies**

Resources

- General Education (e.g., fact sheets, 101s)
- Case Studies
- Tools for Decision-Making
- Protocols (e.g., how-to guides, model documents)

Peer Exchange & Trainings

- **Webinars**
- Conferences & in-person trainings
- Better Buildings Project Teams

One-on-One

- Level of effort will vary
- In-depth efforts will be focused on:
 - *High impact efforts*
 - *Opportunities for replicability*
 - *Filling gaps in the technical assistance marketplace*

Priority Area: EE & RE Technologies

- **Resources**

- Advanced Manufacturing Office's (AMO) Industrial Distributed Energy <http://www1.eere.energy.gov/manufacturing/distributedenergy/index.html>
- AMO's CHP Project Profiles www.eere.energy.gov/manufacturing/distributedenergy/chp_projects.html
- CHP program and policy resources also available through SEE Action Network's Industrial EE and CHP Working Group, including the ***Guide to Successful Implementation of State CHP Policies*** www.eere.energy.gov/seeaction/combined_heat_power.html
- State & Local Solution Center Technologies resource portal – Updated in early 2014

- **One-on-One Assistance**

- CHP Technical Assistance Partnership www.eere.energy.gov/manufacturing/distributedenergy/chptaps.html

How to Access These Offerings

- Visit the ***State & Local Solution Center***
www.eere.energy.gov/wip/solutioncenter/
- Join ***Upcoming Webinars***
 - **Tomorrow!** Show Me the Money: Raising Investment Funds for Clean Energy Programs & Working with Financial Institutions
 - 1/23 – Tapping New Markets: State EE Initiatives for ***Correctional Facilities***
 - 1/TBD – Tapping New Markets : State EE Initiatives for ***Multifamily Housing***
www.eere.energy.gov/wip/solutioncenter/wip_events.html
- Sign up for ***TAP Alerts***, the TAP mailing list, for updates on our latest and greatest
TechnicalAssistanceProgram@ee.doe.gov



The Role of CHP in Energy Strategic Planning

December 4, 2013

Claudia Tighe

CHP Deployment Program Manager

Executive Order 13624 “Accelerating Investments in Industrial Energy Efficiency”

- Executive Order to **accelerate investments in industrial energy efficiency (IEE), including Combined Heat and Power (CHP)** with the goal of bringing together all stakeholders to seize this opportunity and ensuring that Federal agencies are taking the maximal steps to support private sector investment in this space. (August 30, 2012)
- Often **barriers exist** that prevent otherwise economic investments in IEE and CHP from occurring.
- The Administration believes it is important to **accelerate investment in industrial energy efficiency** in a way that **benefits all stakeholders**.
- The Order **sets a national goal of 40 GW of new CHP** installation over the next decade.

National Goal of 40 GW of Combined Heat and Power by 2020

Achieving this goal would:

- Increase total CHP capacity in the U.S. by **50 percent** in less than a decade
- Save energy users **\$10 billion a year** compared to current energy use
- Save **one quadrillion Btus** (Quad) of energy — the equivalent of 1 percent of all energy use in the U.S.
- Reduce emissions by **150 million metric tons of CO2 annually** — equivalent to the emissions from over 25 million cars
- Result in **\$40-\$80 billion in new capital investment in manufacturing** and other U.S. facilities over the next decade

Source: DOE/EPA, CHP: A Clean Energy Solution, August, 2012, www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

Why Combined Heat and Power?

- **Benefits of CHP for U.S. businesses**
 - Reduces energy costs for the user
 - Reduces risk of electric grid disruptions and enhances energy reliability
 - Provides stability in the face of uncertain electricity prices
- **Benefits of CHP for the Nation**
 - Improves U.S. manufacturing competitiveness
 - Offers a low-cost approach to new electricity generation capacity
 - Provides an immediate path to lower GHG emissions through increased energy efficiency
 - Lessens the need for new transmission and distribution (T&D) infrastructure and enhances power grid security
 - Uses abundant clean domestic energy sources
 - Uses highly skilled American labor and American technology

Source: DOE/EPA, CHP: A Clean Energy Solution, August, 2012, www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

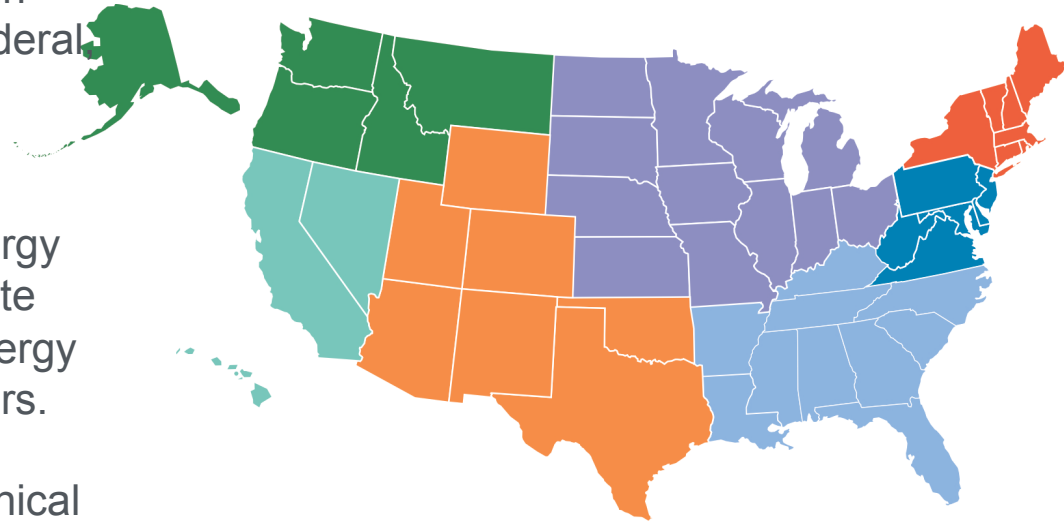
CHP Deployment Program Mission

AMO's CHP Deployment Program provides stakeholders with the **resources** necessary to **identify** CHP market opportunities and **support** implementation of cost-effective CHP systems in industrial, commercial, institutional, and other applications.

CHP Technical Assistance Partnerships

Key Activities:

- **Market Opportunity Analysis:** Supporting analyses of CHP market opportunities in diverse markets including industrial, federal institutional, and commercial sectors.
- **Education and Outreach:** Providing information on the energy and non-energy benefits and applications of CHP to state and local policy makers, regulators, energy end-users, trade associations and others.
- **Technical Assistance:** Providing technical assistance to end-users and stakeholders to help them consider CHP, waste heat to power, and/or district energy with CHP in their facility and to help them through the project development process from initial CHP screening to installation.



www1.eere.energy.gov/manufacturing/distributedenergy/chptaps.html//

DOE CHP Technical Assistance Partnerships (CHP TAPs)

NORTHWEST www.northwestCHPTAP.org

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DOE CHP Technical Assistance Partnerships (TAPs): Program Contacts

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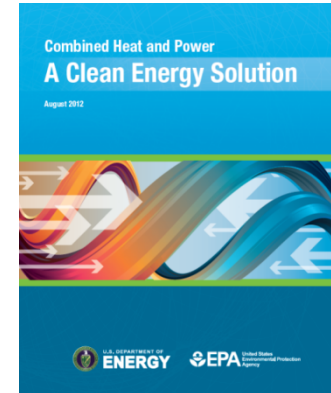
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Recent CHP Reports

CHP: A Clean Energy Solution, August, 2012

Provides a foundation for national discussions on effective ways to reach the 40 GW target, and includes an overview of the key issues currently impacting CHP deployment and the factors that need to be considered by stakeholders participating in the dialogue.



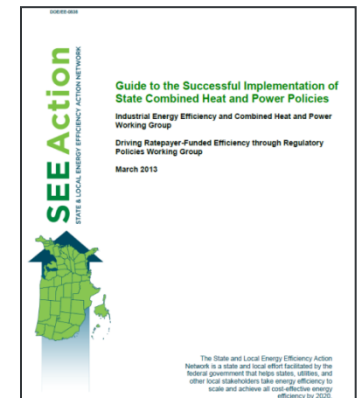
CHP: Enabling Resilient Energy Infrastructure for Critical Facilities, March 2013

This report summarizes how critical infrastructure facilities with CHP systems operated during Superstorm Sandy. Several examples from other storms and blackout events in other regions of the country are also included. The report provides information on the design and use of CHP for reliability purposes, as well as state and local policies designed to promote CHP in critical infrastructure applications.

Guide to the Successful Implementation of State CHP Policies, March 2013

Informs state utility regulators and other state policymakers with actionable information to assist them in implementing key state policies that impact CHP.

- Design of standby rates
- Interconnection standards for CHP with no electricity export
- Excess power sales
- Clean energy portfolio standards (CEPS)
- Emerging market opportunities—CHP in critical infrastructure and utility participation in CHP markets.



For More Information

- Executive Order
<http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency>
- SEE Action IEE and CHP Working Group
<http://www1.eere.energy.gov/seeaction/>
- AMO's Combined Heat & Power website
<http://www1.eere.energy.gov/manufacturing/distributedenergy/index.html>
- DOE/EPA, CHP: A Clean Energy Solution, August, 2012,
http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf

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Combined Heat and Power *Technologies*

Patricia Welesko Garland
CHP Program Manager
Oak Ridge National Laboratory



Attractive CHP Markets



Industrial

- Chemical manufacturing
- Ethanol
- Food processing
- Natural gas pipelines
- Petrochemicals
- Pharmaceuticals
- Pulp and paper
- Refining
- Rubber and plastics



Commercial

- Data centers
- Hotels and casinos
- Multi-family housing
- Laundries
- Apartments
- Office buildings
- Refrigerated warehouses
- Restaurants
- Supermarkets
- Green buildings



Institutional

- Hospitals
- Schools (K – 12)
- Universities & colleges
- Wastewater treatment
- Residential confinement



Agricultural

- Concentrated animal feeding operations
- Dairies
- Wood waste (biomass)

What Is Combined Heat and Power?

CHP is an *integrated energy system* that

- Is located at or near a facility
- Generates electrical and/or mechanical power
- Recovers waste heat for
 - Heating
 - Cooling
 - Dehumidification
- Can utilize a variety of technologies and fuels
- Is also referred to as cogeneration

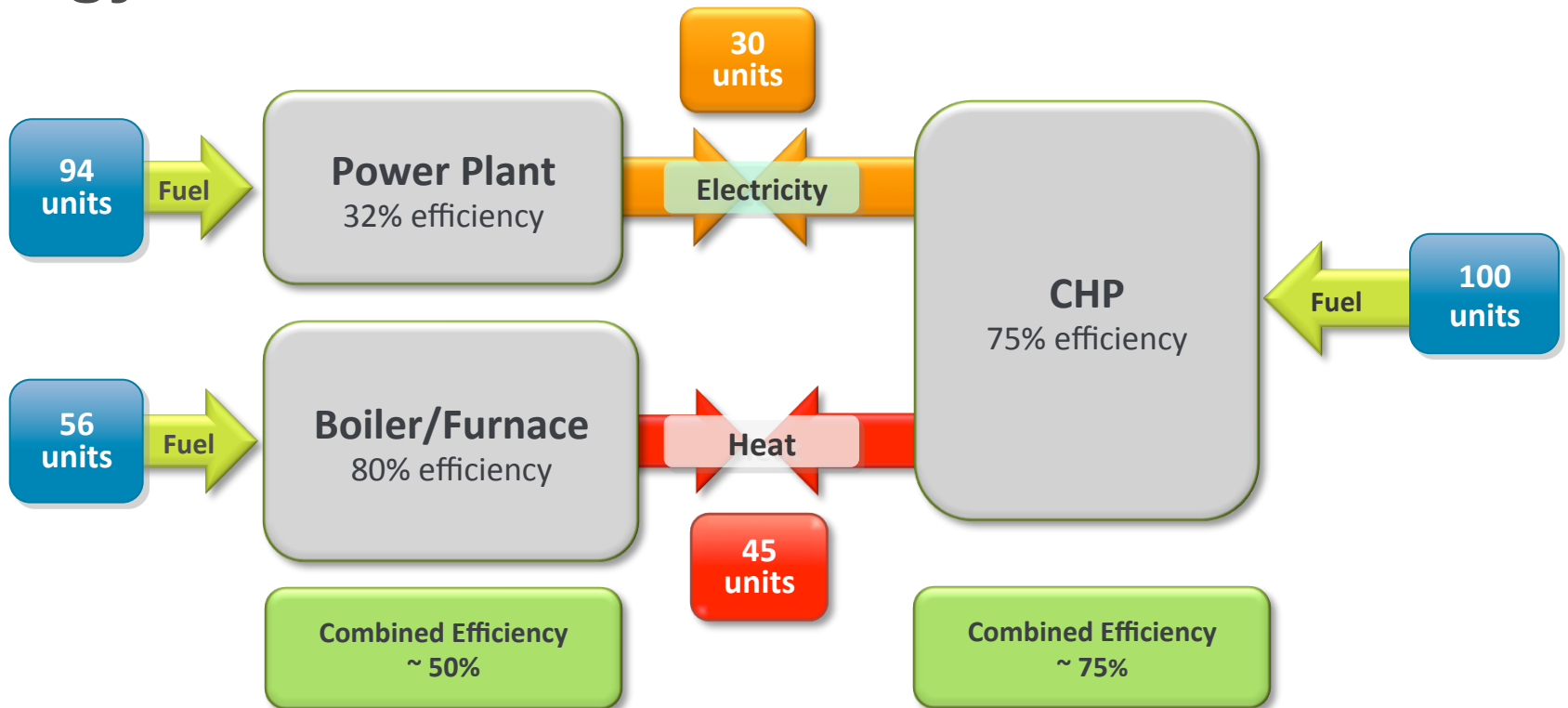


What Are the Benefits of CHP?

- CHP is more efficient than separate generation of electricity and heat
- Higher efficiency translates to lower operating cost, (but requires capital investment)
- Higher efficiency reduces emissions of all pollutants
- CHP can also increase energy reliability and enhance power quality
- On-site electric generation reduces grid congestion and avoids distribution costs

CHP Heat Recapture

CHP recaptures heat, increasing overall efficiency of energy services.

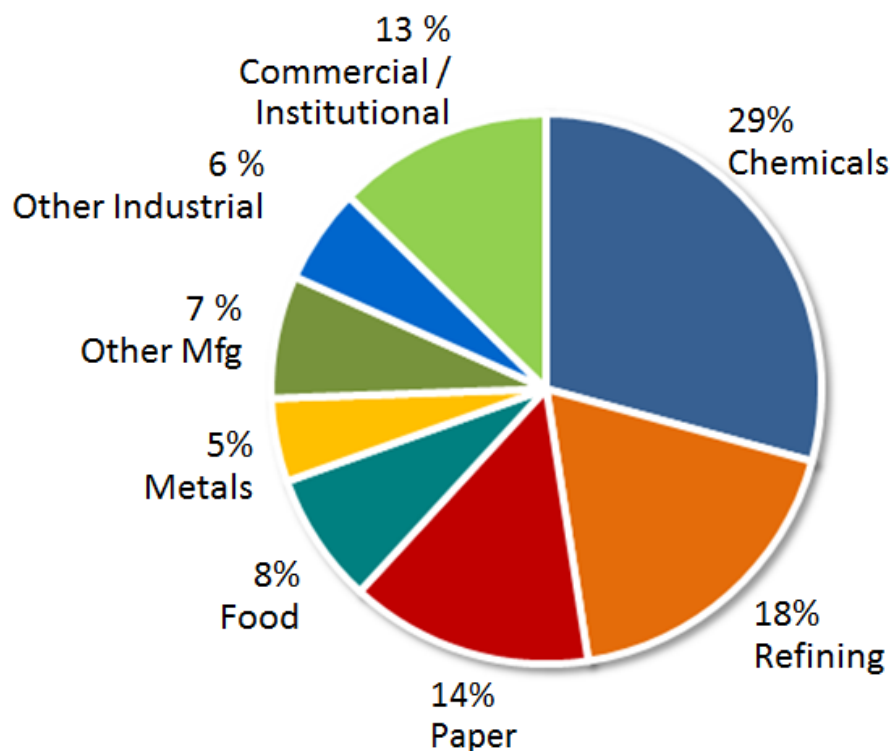


CHP's Higher Efficiency Results in Energy and Emissions Savings

Category	10 Megawatt CHP	10 Megawatt PV	10 Megawatt Wind	10 Megawatt Natural Gas Combined Cycle (NGCC)
Annual Capacity Factor	85%	22%	34%	70%
Annual Electricity	74,446 MWh	19,272 MWh	29,784 MWh	61,320 MWh
Annual Useful Heat Provided	103,417 MWh _t	None	None	None
Footprint Required	6,000 sq ft	1,740,000 sq ft	76,000 sq ft	N/A
Capital Cost	\$20 million	\$60.5 million	\$24.4 million	\$10 million
Annual Energy Savings, MMBtu	308,100	196,462	303,623	154,649
Annual CO ₂ Savings, Tons	42,751	17,887	27,644	28,172
Annual NO _x Savings	59.9	16.2	24.9	39.3

Source: *Combined Heat and Power A Clean Energy Solution: August 2012: DOE and EPA*

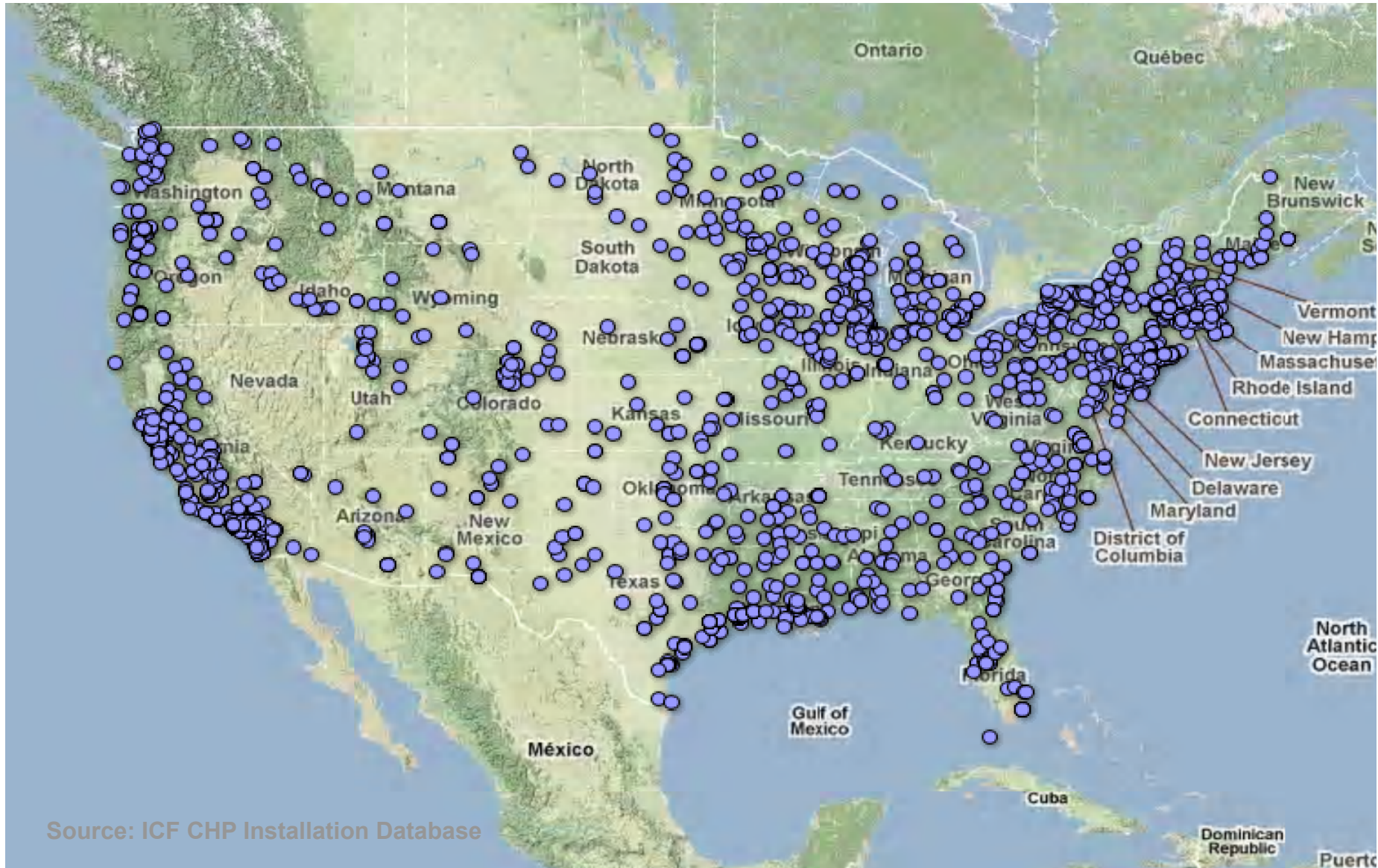
CHP is an important natural resource!



- **82.4 GW** of installed CHP over 4,200 industrial and commercial facilities (2012)
- 87% of capacity in industrial applications
- 71% of capacity is natural gas fired
- **Avoids more than 1.8 quadrillion BTUs of fuel consumption annually**
- **Avoids 241 million metric tons of CO₂ compared to separate production**

Source: ICF CHP Installation Database, 2012 Data

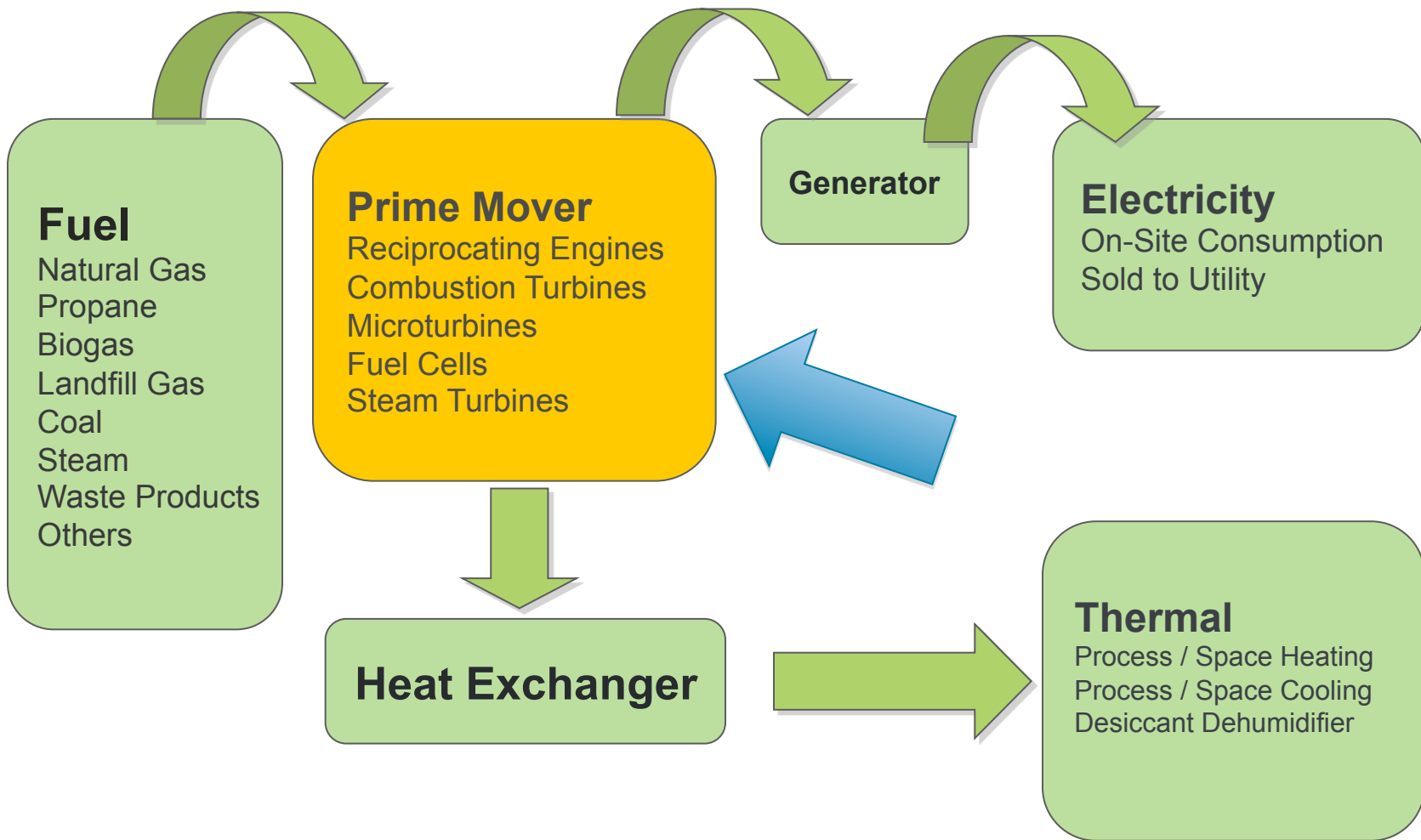
CHP is widely used



Source: ICF CHP Installation Database

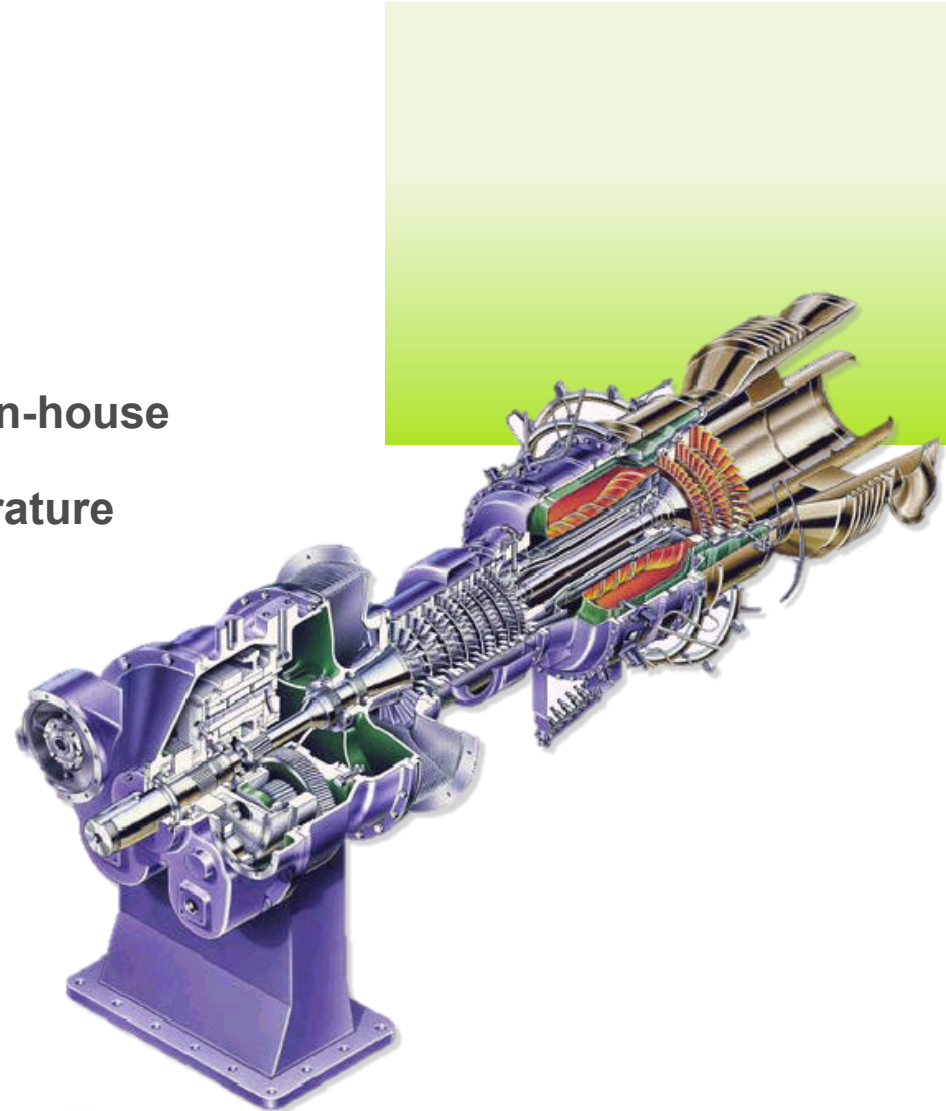
CHP is based on proven technologies and practices





Prime Mover: Combustion Gas Turbine

- **Size Range: 500 kW to 250 MW**
- **Advantages**
 - High reliability
 - Low emissions
 - High grade heat available
 - No cooling required
- **Disadvantages**
 - Poor efficiency at low loading
 - Require high pressure gas or in-house gas compressor
 - Output falls as ambient temperature rises
- **Typical Applications**
 - Hospitals
 - Universities
 - Chemical plants
 - Refineries
 - Food processing
 - Paper
 - Military bases



Prime Mover: Reciprocating Engines

- **Size Range: < 5MW in DG applications**
- **Advantages**
 - Fast start-up
 - Relatively low investment cost
 - Operate on low-pressure gas
 - Can be overhauled on site
 - High power efficiency with part-load operation flexibility
- **Disadvantages**
 - High maintenance costs
 - Limited to lower temperature cogeneration applications
 - Relatively high emissions
 - High levels of low frequency noise
- **Typical Applications**
 - Food processing
 - Office buildings
 - Multifamily housing
 - Nursing homes
 - Hospitals
 - Schools & Universities



Prime Mover: Microturbines

- **Size Range: 30 kW to 500 kW**
- **Advantages**
 - Small number of moving parts
 - Compact size and light weight
- **Disadvantages**
 - High costs
 - Relatively low mechanical efficiency
 - Limited to lower temperature cogeneration applications
- **Applications**
 - Multifamily housing
 - Nursing homes
 - Waste water treatment
 - Gas & oil production



Prime Mover: Fuel Cells

- **Size Range: 5 kW to 2 MW**
- **Advantages**
 - Low emissions
 - Low noise
 - High efficiency over load range
 - Modular design
- **Disadvantages**
 - High costs
 - Low durability
 - Fuels requiring processing unless pure hydrogen is used
- **Typical Applications**
 - Data centers
 - Hotels
 - Office buildings
 - Waste water treatment



Attractive CHP Markets



Industrial

- Chemical manufacturing
- Ethanol
- Food processing
- Natural gas pipelines
- Petrochemicals
- Pharmaceuticals
- Pulp and paper
- Refining
- Rubber and plastics



Commercial

- Data centers
- Hotels and casinos
- Multi-family housing
- Laundries
- Apartments
- Office buildings
- Refrigerated warehouses
- Restaurants
- Supermarkets
- Green buildings



Institutional

- Hospitals
- Schools (K – 12)
- Universities & colleges
- Wastewater treatment
- Residential confinement



Agricultural

- Concentrated animal feeding operations
- Dairies
- Wood waste (biomass)

USDOE / NREL Webinar: NYSERDA's CHP Program Logic and Format



Dr. Dana Levy is the Program Manager for On-site Power Applications in the R&D Group at NYSERDA where he leads a twelve-member team administering a budget of \$100 million per year. The group's programs support market development, especially via the installation of equipment at "early adopter" sites to increase awareness and acceptance among potential customers, proficiency among installers, and understanding and comfort among regulatory authorities having jurisdiction (such as building inspectors, utility personnel, and zoning officials).

In particular, the CHP Acceleration Program (and its predecessor the CHP Demonstration Program) have been structured to support projects that break down barriers and serve as role model examples while simultaneously creating important new learning opportunities (this strategic approach has been used to demonstrate trailblazing equipment, economically-important applications, and novel business models that can benefit a variety of users – and won an ACEEE 2010 States Stepping Forward Award).

Prior to joining NYSERDA in 1999, he held positions in private industry and the federal government performing academic laboratory research, engineering consulting, and factory operation and management. He earned his Doctorate and M.S. in Environmental Engineering from Rensselaer Polytechnic Institute, a B.S. in Chemical Engineering from the University of Massachusetts at Amherst, and is a licensed Professional Engineer. Dana is a recipient of the USCHPA CHP Champion Award. He has been a regular participant in NECHPI since its inception, and is a founding member of its Executive Committee.

December 4, 2013

NYSERDA's Decade of CHP Experience

- Strategy: Portfolio of diverse examples
 - **Size:** 1.2 kW to 40 MW
 - **Sectors:** 56 at Apartment Buildings, 26 at Healthcare, 26 at Farms, 17 at Schools, 6 at Office Buildings
 - **Fuels:** Natural Gas, Biogas, Wood
 - **Machinery:** Engines, Microturbines, Fuel Cells, ORC, Combustion Gas Turbines, Steam Turbines
- Impacts
 - **181 projects to yield 200 MW**
 - Of these, 140 projects are operational = 170 MW installed
 - Funding: NYSERDA ... \$125 Million
 - + Others \$675 Million
 - = **Total \$800 Million**

Program Administration Formats

- **Competitions** (facilitates strategic acquisitions for pilot activities)
- **Standard Offers** (facilitates scaled-up mass market activities):
 - List of pre-qualified measures and their associated specific rebates
 - Pseudo-performance (award computed based on analysis and forecast of site-specific performance)
 - Performance payments based on Measured & Verified performance

Increasing Complexity of Project



Increasing Magnitude of Incentive

Market Observation #1

CHP Vendors are Clustered by “Market Size”

Small-to-Medium (50 – 1,300 kW):

- Aegis
- Capstone
- Intelligen
- Tecogen
- Others

Medium-to-Large (greater than 1.3 MW):

- Caterpillar
- GE Jenbacher
- Siemens Turbines
- Solar Turbines
- Others

Market Observation #2

Modular CHP is becoming Prominent

- Widely-available “modular kits” of CHP size 1.3 MW or smaller
- Foundational efforts of USDOE for “component matching” into pre-engineered packages
- Potential to improve comfort of building inspectors & utility personnel via replicable equipment
- Standardized products will help accelerate sales to customers
- Facilitates single-point responsibility:
 - Removes one variable from the equation (harmony among components)
 - Still need to choose proper size module based on the needs of building
 - Still need to properly install the module
 - Still need to properly maintain the module

In Their Own Words

The marketplace is touting “packaged” CHP

DRESSER-RAND.

CHP 250

250kWe Combined Heat and Power System

Dresser-Rand CHP Solutions (a Dresser-Rand strategic business unit) provides a complete range of fully packaged and tested combined heat and power (CHP) systems to commercial, industrial and municipal energy users worldwide. CHP (or cogeneration) systems reduce on-site energy costs and carbon dioxide emissions through the highly efficient delivery of power and heating. Combined cooling, heat and power (CCHP or Trigeneration) systems, provide the high efficiency of CHP, with the added benefit of chilled water output.

CHP systems offer an environmentally-friendly option for the provision of electricity and heat by recovering thermal energy that would typically be wasted in conventional power plants. With standard modular CHP and trigen systems ranging from 250kWe to 2.4MWe, a Dresser-Rand packaged CHP solution increases energy productivity, efficiency and reliability, while substantially lowering clients' greenhouse gas (GHG) emissions.

CHP System Performance

Operating Load		100%	75%	50%
Electrical output [1]	kW	250	188	125
Hot water output [2]	BTU/hr x 1000	1,351	1,073	815
Chilled water output	USRT	76	60	45
Fuel input (LHV) [3]	BTU/hr x 1000	2,451	1,943	1,512
Generating efficiency	%	34.8	32.9	28.2
Heating efficiency [2][3]	%	55.1	55.2	53.9
Plant efficiency (LHV)	%	89.9	88.2	82.1

250kWe of Continuous, On-site Electrical Power

Energy consumers demand high efficiency and reliability in order to minimize operating costs and maximize uptime. Our CHP systems are supplied as a comprehensive factory tested package that can be easily integrated into existing site operations. Items such as synchronizing switchgear, heat recovery equipment, emissions treatment, attenuation, and lube oil systems are included “within the box” dramatically reducing the risk of cost overruns and performance issues associated with traditional “site built” systems.



■ A CHP TR250 trigeneration unit.

In Their Own Words

The marketplace is touting “packaged” CHP

INTELLIGEN
POWER SYSTEMS LLC
Intelligent Cogeneration

Saving Money Through Efficiency
Is an Efficient way to Save the Globe



[On Site Power](#) | [Capabilities](#) | [Sample Projects](#) | [Product Specifications](#) | [Contacts](#)

- Why Choose Intelligen Power?
- The Intelligen Platform
- Intelligen Product Benefits
- Intelligen Product Line and Specifications
- Custom Equipment Packages
- Operation and Maintenance Services
- Consulting



The Intelligen Platform

Standardized Approach

Intelligen Power Systems has developed a standardized cogeneration platform that can be refined and customized to meet the needs of a particular site. The standardized platform greatly simplifies the design process and leads to significant cost savings. It also improves reliability and the maintenance function.

Pre-Packaged

In order to simplify the installation, Intelligen Power Systems seeks to pre-package as much equipment as possible in its factory which leads to a quick and cost effective installation process.

Fully Automated Control System

The Intelligen Power Systems control system has been specially designed to provide fully automated operation of the cogeneration system as well as integration with the host facility. The onboard controls package provides full monitoring of system functions to allow for reliable unattended operation.

Remote Monitoring

The Intelligen Power Systems control package provides full remote monitoring functionality which is part of the active ongoing maintenance program that is designed for maximum run-time availability. Intelligen service technicians monitor system performance 24 hours per day and 7 days per week and respond quickly when needed in order to minimize downtime.

Highest Quality Components

Intelligen Power Systems obtains its high levels of availability by incorporating the highest quality components into its equipment. The prime mover is a heavy duty industrial reciprocating engine that is designed for highly reliable continuous operation.

Simplified Utility Connection

Intelligen provides standardized utility interface packages which can simplify the process of obtaining approval for interconnecting with your electrical utility. Intelligen has extensive experience of interfacing with many utilities in a variety of configurations.

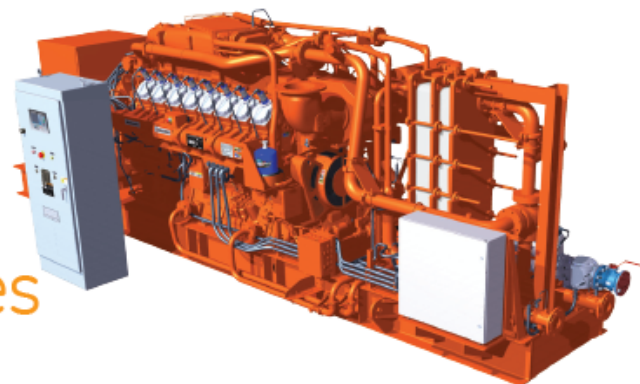
In Their Own Words

The marketplace is touting “packaged” CHP

GE Energy

Waukesha* gas engines APG1000

APG* Gas Enginator* Generating System
1000 kWe @ 50 Hz/1100 kWe @ 60 Hz



CHP

The APG1000 Combined Heat and Power (CHP) package allows for optimized efficiency by maximizing heat recovery. This minimizes packaging cost and time by including CHP components factory mounted. Achieve up to 89.4% total efficiency with the APG1000 CHP package.

With a reputation for rugged durability and ongoing design advancements, Waukesha engines are the sound investment you can depend on in mission-critical applications. Now a part of GE Energy, Waukesha provides enhanced support in the form of parts, service and a network of distributors to make us an even stronger partner for today's global energy industry.

In Their Own Words

The marketplace is touting “packaged” CHP

AEGEN THERMO POWER™ TP-75

The AEGEN THERMO POWER 75 is a compact, modular combined heat and power (CHP) system producing 75 kW of power and 5.23 therms of heat per hour. A three-way non-selective catalyst reduction (NSCR) emissions control package includes a catalytic converter and temperature and oxygen controls designed to reduce emissions of nitrogen oxide, carbon monoxide, and hydrocarbons. The CHP module has a natural gas-fired reciprocating engine, an induction generator, heat recovery system, a sound attenuating enclosure, electrical switchgear, and solid-state controls for automatic and unattended operation. High efficiency heat recovery components consist of oil cooler, engine jacket for heat transfer, marine type exhaust gas manifolds and exhaust gas heat exchangers. The AEGEN THERMO POWER 75 operates in parallel with existing mechanical and electrical systems in the facility. The module includes an advanced utility-grade relay (U.L., C.S.A., and C.E. listed or certified) for electrical protection and redundancy as standard equipment.

Features

- ✦ Reliable, proven technology
- ✦ Highly efficient
- ✦ Environmentally sound with low emissions
- ✦ Quiet operation
- ✦ Modular – scaleable into larger systems
- ✦ Compact – easily fits in most buildings
- ✦ Indoor or outdoor installation
- ✦ Ease of installation – no business disruption
- ✦ U. L. listed
- ✦ Remote monitoring and control
- ✦ Digital display and user-friendly interface
- ✦ Infinite system life with maintenance program
- ✦ Electric and thermal load following
- ✦ Modbus compatible for networking with building automation systems



AEGENCO
AEGIS GENERATOR COMPANY 55 Jackson Street, Holyoke, MA 01040 • (413) 536-1156 • (413) 536-1104 (fax)
Website: www.AegisEnergyServices.com • Email: Aegis@AegisEnergyServices.com

In Their Own Words

The marketplace is touting “packaged” CHP



**C1000 Megawatt Power Package
High-pressure Natural Gas**



1MW of reliable electrical power in one small, ultra-low emission, and highly efficient package.

- High electrical efficiency over a very wide operating range
- Low-maintenance air bearings require no lube oil or coolant
- Ultra-low emissions
- High availability – part load redundancy
- Proven technology with tens of millions of operating hours
- Integrated utility synchronization and protection with a modular design
- 5 and 9 year Factory Protection Plans available
- Remote monitoring and diagnostic capabilities
- Internal fuel gas compressor available for low fuel pressure natural gas applications



C1000 Power Package

In Their Own Words

The marketplace is touting “packaged” CHP



InVerdē Ultra 100

Ultra-Low Emissions Inverter-Based Cogeneration

Key Features & Benefits

- 100 kW Continuous / 125 kW Peaking
- Delivers ultra-low emissions levels compliant with strict “CARB 2007” Standards
- Standardized Interconnection
- Black-Start Grid-Independent Operation
- Microgrid compatible with licensed CERTS¹ power balancing control software
- Premium Quality Wave Form, Voltage and Power Factor for Special Applications
- Power Boost for Demand-Side Response
- Enhanced Efficiency from Variable Speed Operation
- Simplified Inter-Unit Controls for either Mode of Operation (parallel or standby)
- ETL Listed - Labeled for compliance with UL 1741 - Utility Interactive; Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
- Renewable Energy Compatible, a Clean Energy Solution for Today and Tomorrow

¹CERTS - Consortium for Electric Reliability Technology Solutions




- Over 25 years experience in packaged co-generation, chillers and refrigeration systems
- More than 1,400 operating units in the field
- Extensive service network with factory-trained technicians exclusively servicing Tecogen products

Tecogen Inc. • 45 First Avenue, Waltham, MA 02451 • 781-466-6400 • 781-466-6466 (fax) • www.tecogen.com

In Their Own Words

The marketplace is touting “packaged” CHP



KRAFT ENERGY SYSTEMS
COMBINED HEAT AND POWER

Home | Products | Installations | Technical Info | Service & Support | Contact Us

Specialists in Combined *HEAT & POWER*

Kraft Energy Systems LLC is dedicated to providing reliable onsite combined heat & power (CHP) systems. We have over 40 years experience in the power generation field, combining a sales force that possesses outstanding engineering knowledge and a service team that is expertly trained in the power generation field. We are responsive to your needs, providing customers with highly dependable power systems suitable to a wide variety of industry needs.




Our products supply power ranging from 50kW - 3 Mw. We offer prepackaged plug-and-play modular systems and customizable power components, meeting the needs of your unique power requirements.

Kraft Energy System stands apart from the rest in terms of providing clean efficient energy for good reason:

- The performance of our high quality products
- The value of purchasing environmentally sound CHP systems
- The expertise our service technicians bring, keeping your equipment running for decades to come

With CHP you can rest assured that you are getting the most cost-efficient power system, achieving several industry needs from one well engineered system that either meets or exceeds environmental standards.

Call one of our expert sales people today to learn how Kraft Energy Systems can provide you with a power producing system geared towards peak performance. **TEL: 800-969-6121**



In Their Own Words

The marketplace is touting “packaged” CHP



**NATURAL GAS CHP COGENERATION MODULE
PRODUCT LINE DATA SHEET**

Natural Gas Cogeneration CHP Modules
34kVA / 27ekW up to 3750kVA / 3000ekW* – 60Hz – U.S. 
*(*Larger Plants are available. Please contact us for more information.)*

- Especially designed for NG CHP
- Proven Technology
- Professionally Engineered
- Factory Tested
- Lean Burn with optimum AFR
- Compact Standardized Design
- Extended Life Cycle
- Higher Reliability
- All-In-One (Plug & Play)
- Decreased Operating Expenses
- Optimized Combustion Geometry
- More than 1500 Units in Operation
- Production Line Manufactured
- Reliable & Fuel Efficient
- Economical Rich Burn Options
- Low Service & Maintenance Cost
- Fully Automated User Friendly
- Connection Ready
- Best In Class Technology
- Increased ROI

No other CHP Systems are manufactured more thoroughly. 2G® delivers the ultimate Solution in High Efficiency, Performance and Design. Unmatched Quality and Reliability like nothing Else.

In Their Own Words

The marketplace is touting “packaged” CHP


Elite Energy Systems, LLC
20 Industrial Parkway
Carson City, Nevada 89706
Tel (775) 246-8111 Fax (775) 246-8116

ELITE ENERGY

Combined Heat and Power

Cut energy expenses and reduce emissions with a packaged combined heat and power (CHP) EnviroGen® Energy Module powered by a Caterpillar natural gas or diesel engine.

- Standard Natural Gas CHP Modules:
 - 100 kW
 - 157 kW
 - 250 kW
 - 375 kW
- Standard Diesel CHP Modules:
 - 250 kW
 - 400 kW
- Digester Gas CHP Modules
- Custom CHP Systems

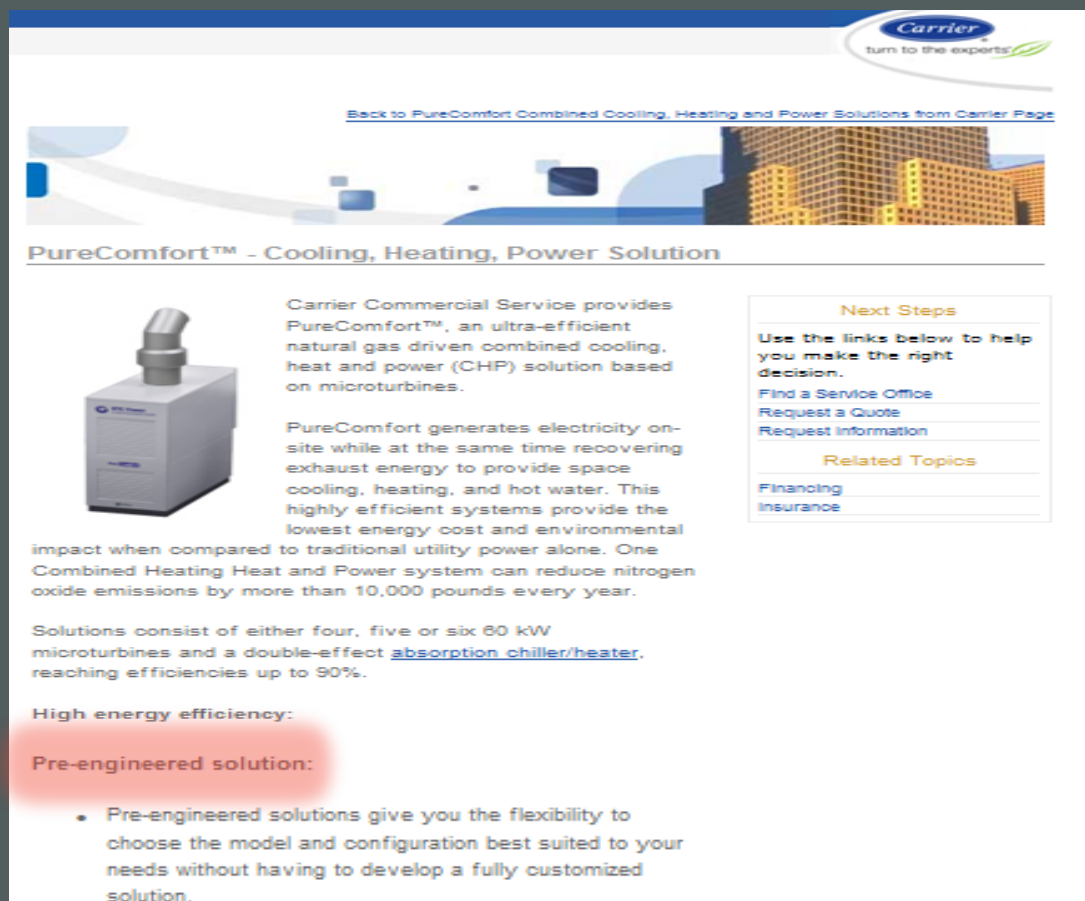


Integrated Control System

Manage your CHP system anytime and from anywhere with our advanced GenView™ Control System.

In Their Own Words

The marketplace is touting “packaged” CHP



The screenshot shows a Carrier website page for the PureComfort™ solution. At the top right is the Carrier logo with the tagline "turn to the experts". Below it is a navigation link: "Back to PureComfort Combined Cooling, Heating and Power Solutions from Carrier Page". The main heading is "PureComfort™ - Cooling, Heating, Power Solution". On the left is an image of the PureComfort unit. The text describes it as an ultra-efficient natural gas driven combined cooling, heat and power (CHP) solution based on microturbines. It highlights that the system generates electricity on-site while recovering exhaust energy for space cooling, heating, and hot water. A sidebar on the right contains "Next Steps" (Find a Service Office, Request a Quote, Request Information) and "Related Topics" (Financing, Insurance). A red highlight is placed over the "Pre-engineered solution:" section, which includes a bullet point stating that pre-engineered solutions offer flexibility in model and configuration.

Carrier Commercial Service provides PureComfort™, an ultra-efficient natural gas driven combined cooling, heat and power (CHP) solution based on microturbines.

PureComfort generates electricity on-site while at the same time recovering exhaust energy to provide space cooling, heating, and hot water. This highly efficient systems provide the lowest energy cost and environmental impact when compared to traditional utility power alone. One Combined Heating Heat and Power system can reduce nitrogen oxide emissions by more than 10,000 pounds every year.

Solutions consist of either four, five or six 80 kW microturbines and a double-effect [absorption chiller/heater](#), reaching efficiencies up to 90%.

High energy efficiency:

Pre-engineered solution:

- Pre-engineered solutions give you the flexibility to choose the model and configuration best suited to your needs without having to develop a fully customized solution.

Next Steps

Use the links below to help you make the right decision.

[Find a Service Office](#)

[Request a Quote](#)

[Request Information](#)

Related Topics

[Financing](#)

[Insurance](#)

CHP Acceleration “Catalog” Program

Program Mechanism:

- Created a catalog of “pre-qualified” systems (systems in the catalog have been evaluated for reasonable component sizing and are comprised of reputable components; this protects use of public funds)
- Assigned a specific “rebate” to each system
- Inviting customers to shop from catalog
 - Streamlined approach to system sizing*
 - Customized approach to system sizing

Use of Best Professional Judgment, in absence of availability of Industry Standard Certification Process

Size kW*	Downstate Incentive**	Rate \$/kW
100	\$180,000	\$1,800
300	\$510,000	\$1,700
600	\$930,000	\$1,550
900	\$1,260,000	\$1,400
1,200	\$1,500,000	\$1,250

* Chillers are credited at their equivalent kW displacement

** 10% Bonus for Critical Facility

* Via Rules-of-Thumb (for example):

- a hotel with 300 guest rooms should buy 60 kW system
- a nursing home with 300 beds should buy 75 kW system
- an apartment building with 300 housing units should buy 100 kW system
- a hospital with 300 beds should buy 600 kW system

Right-size is Key to Success

Example: Two Seemingly Similar Hotels

300 Guest Rooms

- No Grand Ballroom
- No Health Club
- No Linens Laundry

Rule-of Thumb

recommends 60 kW,
probably right size

300 Guest Rooms

- Yes Grand Ballroom
- Yes Health Club
- Yes Linens Laundry

Rule-of Thumb

recommends 60 kW,
probably could go bigger

CHP Acceleration “Catalog” Program

Catalog Items:

- **Pre-qualified (i.e., fully-qualified):**
 - Has demonstrated actual performance based on testing of the fully-integrated system, therefore, NYSERDA will allow an unlimited number of sales to be eligible for incentives
- **Conditionally-qualified:**
 - Each component and subsystem has been individually performance tested, and
 - The integration of the complete system has been designed and performance rated using accepted engineering methods

Conditionally-qualified systems can eventually be upgraded to pre-qualified status, until then, at NYSERDA’s discretion, each conditionally-qualified system may be required to undergo high-scrutiny factory testing prior to ship and may garner incentive funds only for a limited roll-out

CHP Acceleration “Catalog” Program

Catalog Items:

- Clean and Efficient CHP
- Integrated Controls Package
- Built-in Data Monitoring Features
- Bumper-to-Bumper Warrantee
- 5-year Service Plan
- Capable of “stand-alone” operability

Attention CHP Vendors: Instructions at RFI 2568 for how to get your products added to the Catalog

CHP Acceleration “Catalog” Program

CHP System Catalog

CHP Acceleration Program

(PON 2568 Attachment C)

Release date: December 2012
Updated August 2013

CHP Acceleration Program
Program Opportunity Notice (PON) 2568

~~\$20M Available~~

\$60 million Available

Applications accepted
through 5:00 PM Eastern Time* on December 30, 2016

CHP Acceleration “Catalog” Program

Eligible CHP Vendors and Systems

Vendor	Model	kW	50 to 100	101 to 300	301 to 500	501 to 700	701 to 900	901 to 1300
Aegis Energy Services	Agen Power Sync 75	75						
	Agen Power Verter 75	75						
	Agen Power Sync 150	150						
	Agen Power Verter 150	150						
GEM Energy	IPS-65-CHP	65						
	IPS-130-CHP	130						
	IPS-195-CHP	195						
	IPS-260-CHP	260						
	IPS-390-CHP	390						
	IPS-1000-CHP	1,000						
	MCPS-260-CHP	260						
	MCPS-390-CHP	390						
IntelliGen Power Systems	IntelliGen 150	150						
	IntelliGen 150 Inverter	150						
	IntelliGen 250	250						
	IntelliGen 250 Inverter	250						
Kraft Power Corporation	KMGR-55-4SH	55						
	KMGR-80-4SH	80						
	KMGR-150-4SH	150						
	KMGR-250-4SH	250						
RSP Systems	C65-DM-iCHP	65						
	C200-DM	200						
	C400-DM	400						
	C600-DM	600						
	C800-DM	800						
	C1000-DM	1,000						
Tecogen, Inc	InVerde INV-100	100						
	InVerde Ultra INV-100	100						
Unison Energy	UE-600-H	600						
Veolia Energy	CGC-080MA-080-NG-60-3WY	80						
	CGC-0160MA-080-NG-60-3WY	160						
	CGC-0260MA-080-NG-60-3WY	260						
	CGC-0310GU-080-NG-60-OXY	310						
	CGC-0400GU-080-NG-60-OXY	400						
	CGC-0620GU-080-NG-60-OXY	620						
	CGC-1300CU-078-NG-60-OXY	1,300						

All of these systems are capable of running during a grid outage.

To receive an incentive, the system must be installed and commissioned showing it runs during a grid outage, and systems must be sited “high and dry” at buildings located in flood prone areas.

Annual conferences for vendors and consultants, periodic Expos for potential customers.

Configurations: (N) or (N+1) or (Nx2)

Example: Sizing Recommends 600 kW

(N)

- Package has a single 600 kW generator, or -----> Gets \$930,000
- Package has a pair of 300 kW generators -----> Gets \$930,000

(N+1)

- Package has a pair of 600 kW generators, or -----> Gets \$1,500,000
- Package has three 300 kW generators -----> Gets \$1,260,000
- Thus, one extra prime mover (alternate whichever one sits idle)

(Nx2)

- Two fully-redundant packages where each package has a single 600 kW generator, or -----> Gets \$1,395,000
- Two fully-redundant packages where each package has a pair of 300 kW generators -----> Gets \$1,395,000
- Thus, two fully redundant packages (alternate whichever one sits idle)
- First package gets full incentive, second gets 50% incentive
- Sum of both packages capped at 1.3 MW
- Total incentive capped at \$1.5 million

CHP Acceleration “Catalog” Program



Aegis Energy Services, Inc. Aegen PowerSync 150 150 kW

Description

Type of prime mover	Number of prime mover units	Synchronous or Inverter	Chiller	Eligible for N+1 installation	Qualification Status
RICE	2	Synchronous	No	Yes	Conditionally qualified

NYSERDA Incentives

ISO Zones I and J	ISO Zones A through H
\$266,250	\$221,250

Performance at Full Load

Ambient	Fuel in MBTU/hr	Net kW	Hot Water to Building @ 120°F		Hot Water to Building @ 180°F		NOx lbs/MWhr	Chilled Water to Building		
			MBTU/hr	Return °F	MBTU/hr	Return °F		MBTU/hr	Supply °F	Return °F
0°F	1897.2	150	1046	170°F	1046	170°F	0.177			
50°F	1897.2	150	1046	170°F	1046	170°F	0.177			
95°F	1897.2	150	1046	170°F	1046	170°F	0.177	N/A	N/A	N/A

Footprint

	Width ft	Length ft	Height ft	Weight lbs
Core system based on minimum area*	16FT	13FT	4FT	6,100
Core system based on minimum width*	8FT	26FT	4FT	
Heat Rejection subsystem*	4.5FT	9FT	5FT	1,400
Largest part for delivery	2.67FT	2.67FT	2.5FT	850
Heaviest part for delivery	2.67FT	2.67FT	2.5FT	850

*Includes maintenance clearances.

Vendor Statement

The Leader in Combined Heat & Power since 1985

Made in the USA

Reducing Energy Costs with Onsite Combined Heat and Power

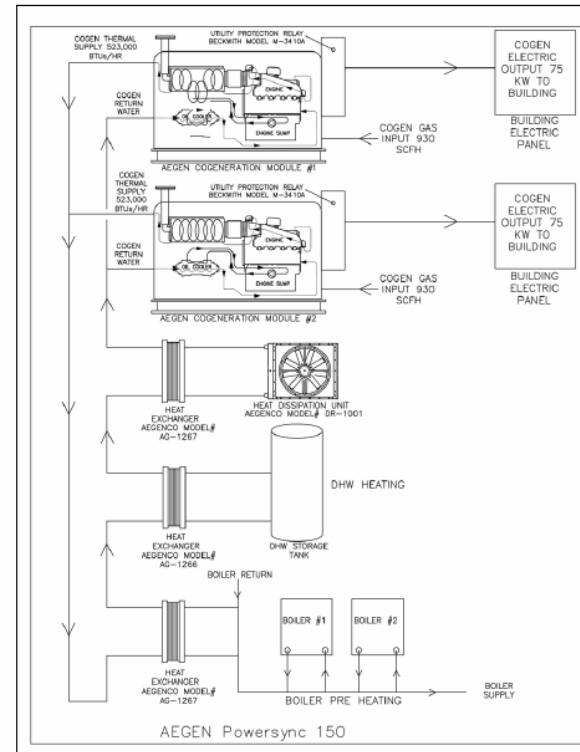
Vendor Information

Aegis Energy Services, Inc.
 50 Jackson St.
 Holyoke, MA 01040
 (413) 536-1150
 LeeV@aegisenergyservices.com
 www.aegisenergyservices.com

NYSERDA CHP Acceleration Program PON 2568
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 For the most recent version go to
<http://www.nyscrda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2568-CHP-Acceleration-Program.aspx>



Aegis Energy Services, Inc. Aegen PowerSync 150 150 kW



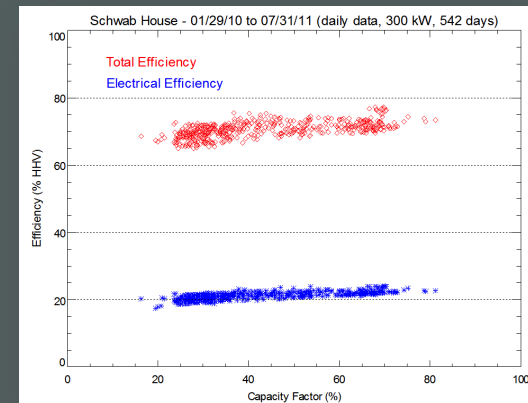
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Case Study - Aegis

Schwab House at 11 Riverside Drive NYC

- Apartment Building with 654 housing units
- CHP System: 300 kW consisting of four (4) engines at 75 kW each
 - Installed September 2009
 - Thermal output serves DHW, hydronic Space Heating, and chilled water Air Conditioning via Absorption Chiller



CHP Acceleration “Catalog” Program



RSP Systems C400-DM 400 kW

Description

Type of prime mover	Number of prime mover units	Synchronous or Inverter	Chiller	Eligible for N+1 installation	Qualification Status
Microturbine	2	Inverter	No	Yes	Conditionally qualified

NYSERDA Incentives

ISO Zones I and J	ISO Zones A through H
\$660,000	\$540,000

Performance at Full Load

Ambient	Fuel in MBTU/hr HHV	Net kW	Hot Water to Building @ 120°F		Hot Water to Building @ 130°F		NO _x lbs/MMWhr	Chilled Water to Building		
			MBTU/hr	Return °F	MBTU/hr	Return °F		MBTU/hr	Supply °F	Return °F
0°F	4380	400	1334	8.5	1060	7	0.40			
59°F	4573	400	1733	11	1498	10	0.40			
99°F	4280	350	1857	12	1631	10.5	0.40	N/A	N/A	N/A

Footprint

	Width ft	Length ft	Height ft	Weight lbs
Core system based on minimum area*	28'-5"	20'-10"	8'-10"	19,520
Core system based on minimum width*	28'-5"	20'-10"	8'-10"	
Heat Rejection subsystem	N/A	N/A	N/A	
Largest part for delivery	5'-6"	12'	8'-3"	8,000
Heaviest part for delivery	5'-6"	12'	8'-3"	8,000

*Includes maintenance clearances.

Vendor Statement

- Achieve ultra-low emissions and reliable electrical/thermal generation from natural gas.
- One moving part minimal maintenance and downtime.
- Patented air bearing requires no lubricating oil or coolant in our design.
- 9 year bumper factory protection plan with remote monitoring and data mining dashboard.
- Integrated utility synchronization and protection: inverted based.
- The unit is small with a modular design allowing for easy installation.
- Reliable, with tens of millions of run hours and counting.
- The boiler that makes electricity and provides back up power.

Vendor Information

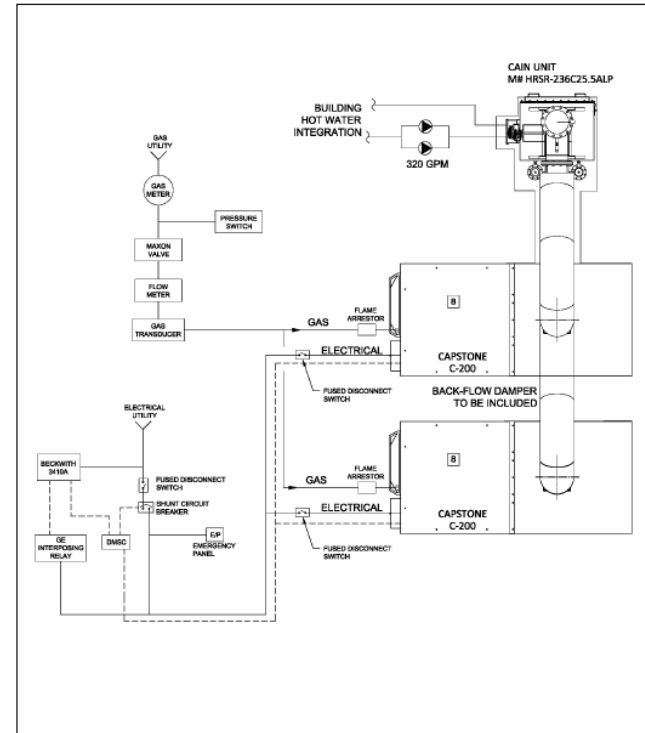
RSP Systems
528 Craven Street, Ground Floor
Bronx, NY 10474-6604
Phone: 718-991-6999
Email: sales@coagenyc.com
www.rsp-systems.com

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RSP Systems C400-DM 400 kW



NYSERDA CHP Acceleration Program PON 2568
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For the most recent version go to
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Case Study – Capstone Microturbine

Marriott Downtown Financial Center

- Hotel with 1,950 guest rooms
- CHP System: 715 kW consisting of eleven (11) microturbines at 65 kW each, with two (2) heater/chillers, arranged in a pair of arrays
 - Installed October 2008
 - Thermal output serves DHW, hydronic Space Heating, and chilled water Air Conditioning via Absorption Chiller



CHP Acceleration "Catalog" Program



Tecogen, Inc

InVerde Ultra (INV-100)

100 kW

Description

Type of prime mover	Number of prime mover units	Synchronous or Inverter	Chiller	Eligible for N+1 Installation	Qualification Status
RICE	1	Inverter	No	No	Conditionally qualified

NYSERDA Incentives

ISO Zones I and J	ISO Zones A through H
\$180,000	\$150,000

Performance at Full Load

Ambient	Fuel in MBTU/hr	Net kW	Hot Water to Building @ 120°F		Hot Water to Building @ 180°F		NOx lbs/MWhr	Chilled Water to Building	
			MBTU/hr	Return °F	MBTU/hr	Return °F		MBTU/hr	Supply °F
0°F	1263	100	607,000	97 °F	670,000	135 °F	0.07		
50°F	1263	100	607,000	97 °F	670,000	135 °F	0.07		
95°F	1263	100	607,000	97 °F	670,000	135 °F	0.07	N/A	N/A

Heat exchangers provided in schematic below are sized to deliver 100 °F water to the building. However, alternative heat exchangers can be selected to supply 120°F or 180°F as required.

Footprint

	Width ft	Length ft	Height ft	Weight lbs
Core system based on minimum area*	10'	14' 4"	5' 9"	3850
Core system based on minimum width*	10'	14' 4"	5' 9"	3850
Heat Rejection sub-system*	4'	22' 4"	4' 3"	2730
Largest part for delivery	4'	22' 4"	4' 3"	2730
Heaviest part for delivery	4'	7' 4"	5' 9"	3850

*Includes maintenance clearances.

Vendor Statement

The InVerde Ultra (INV-100) is an inverter-based natural gas engine driven CHP system providing 100 kW of premium quality power, with up to 607,000 Btu/hr of hot water. The CHP benefits of energy savings and reduced GHG emissions are further enhanced with inverter technology as a result of improved part load performance from variable speed operation. The INV-100 is NYSIR listed for certified grid interconnection and has no reactive power draw and a low fault current contribution. It is configured with black start capability for convenience power during an outage and since it is fueled with pipeline gas, power is available indefinitely for the duration of the outage, unlike typical standby generators. The InVerde is equipped with unique licensed CERTS software for microgrid operation that allows a cluster of units to effortlessly and seamlessly align themselves to share the load (both real and reactive power) and control frequency without complex controls and switchgear. When equipped with the Ultra emissions option, the INV-100 can meet extremely low levels of regulated pollutants, comparable to a fuel cell.

Vendor Information

Tecogen, Inc.
45 First Avenue
Waltham, MA 02451
(781) 468-0400

Jeffrey.glick@tecogen.com
www.tecogen.com

NYSERDA CHP Acceleration Program PON 2568

Version 1.0 Revised 12/20/2012

For the most recent version go to

<http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2568-CHP-Acceleration-Program.aspx>

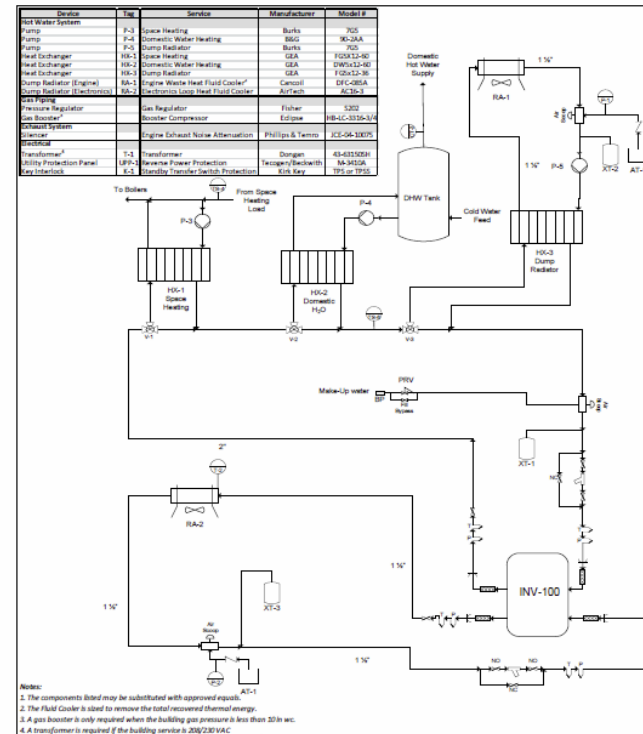
58



Tecogen, Inc

InVerde Ultra (INV-100)

100 kW



Notes:

- The components listed may be substituted with approved equals.
- The Fluid Cooler is used to remove the total recovered thermal energy.
- A gas booster is only required when the building gas pressure is less than 20 in. w.c.
- A transformer is required if the building service is 208/230 VAC.

NYSERDA CHP Acceleration Program PON 2568

Version 1.0 Revised 12/20/2012

For the most recent version go to

<http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2568-CHP-Acceleration-Program.aspx>

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Case Study - Tecogen

Madison-Oneida Board of Cooperative Educational Services (BOCES)

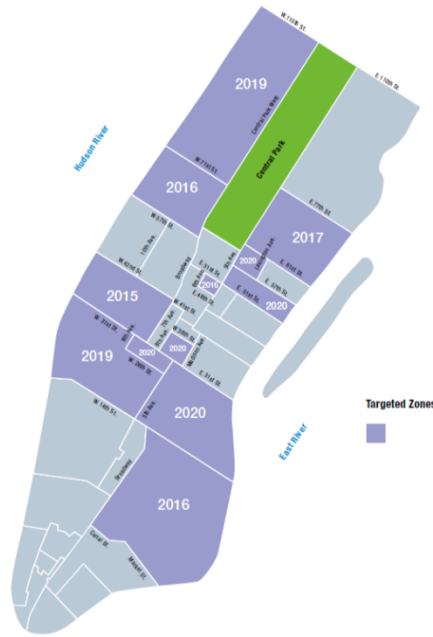
- Vocational Tech School with 250,000 ft² of occupied buildings
- CHP System: 600 kW consisting of six (6) engines at 100 kW each
 - Installed July 2008, replaces a decade-old 300 kW system, adds stand-alone capability (site is now a Red Cross Facility of Refuge)
 - Thermal output serves DHW, hydronic Space Heating, and chilled water Air Conditioning via Absorption Chiller



CHP Acceleration “Catalog” Program

CHP Targeted Zones: Manhattan

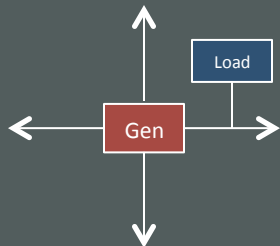
For more information on NYSEERDA's CHP incentive programs, please visit <http://www.nyserda.ny.gov/en/Funding-Opportunities/Current-Funding-Opportunities.aspx> or contact Edward Kear at EBK@nyserda.ny.gov or (618) 862-1090 x3269



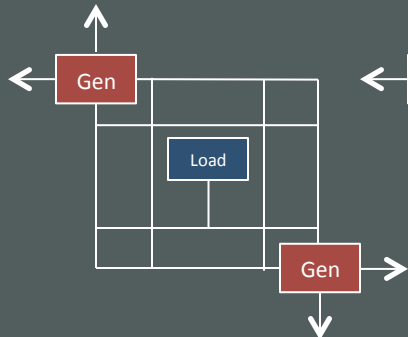
Incentives (Maximum \$1.5 Million):

- Incentive for Upstate
- 20 ~ 30% Higher Incentive for Downstate
- 10% Bonus for Critical Infrastructure such as Facility of Refuge
- 10% Bonus for ConEdison Targeted Zone

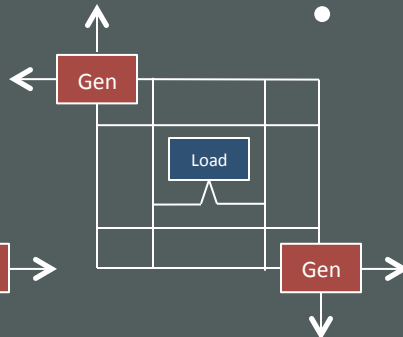
Radial Feed



Area Network



Spot Network



CHP Acceleration “Catalog” Program



CHP Acceleration Program PON 2568 Incentive Application (Attachment A)

CHP System Vendor	CHP System Owner	Site Owner
Company Name	Company Name	Company Name
Address	Address	Address
Contact Name	Contact Name	Contact Name
Phone	Phone	Phone
email	email	email

Site

Name

Address

Geo Code (Longitude and Latitude)

ISO Zone

Targeted Zone Identifier (if applicable)

Target Year

Is site a Facility of Refuge?

CHP System

Model

Nameplate

Is this an N+1 or 2N installation?

Incentive

Base Incentive	
Facility of Refuge bonus (10% of Base Incentive if applicable)	
Targeted Location bonus (10% of Base Incentive if applicable)	
Total Incentive	0

Schedule

Final Design Approval	
All Major Components of CHP System Delivered to Site or Approved Staging Area (Invoice #1)	
CHP System Fully Operational and Final Utility Approval Received (Invoice #2)	
CHP System Fully Commissioned, Performance Data Flowing to NYSEDA's Data Agent and Commissioning Report Submitted (Invoice #3)	

Applicant (CHP System Vendor) Signature

I certify that the above information, and all information submitted in connection with State Finance Law §139-j and §139-k, is complete, true, and accurate, that I have read and reviewed the Standard Terms and Conditions set forth in the attached Sample Agreement and that I accept all terms unless otherwise noted herein, and that the application requirements noted have been completed and are enclosed or will be submitted electronically. I affirm that I understand and will comply with NYSEDA's procedures under §139-j(3) and §139-j(6)(b) of the State Finance Law. I understand that this application may be disqualified if the solicitation requirements are not met. I, the undersigned, am authorized to commit my organization to this application.

Name	Signature	Date
Title		
Signatory must be legally able to bind the organization.		

This application is not considered received by NYSEDA until all required documentation has been submitted and the application has been deemed full and complete by NYSEDA.

CHP Acceleration Program PON 2568 Incentive Application (Attachment A)
Version 1.0 12/20/2012
<http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2568-CHP-Acceleration-Program.aspx>



Site Owner and CHP System Owner

The Site Owner and CHP System Owner do hereby acknowledge and support this application for a CHP Acceleration Program incentive being submitted by the Applicant (CHP System Vendor). The Site Owner and CHP System Owner understand that if this application is approved, NYSEDA will negotiate a contract with the Applicant and all subsequent incentive payments will be made to the Applicant. The Site Owner and CHP System Owner agree to facilitate reasonable pre- and post-installation site visits and inspections, including re-commissioning activities by NYSEDA or NYSEDA's agents as described in PON 2568. The Site Owner and CHP System Owner agree to permit NYSEDA or NYSEDA's agent to collect CHP System performance data as described in PON 2568 and RFI 2568 for a period of at least 3 years and to facilitate automated data communications through an internet connection or phone line. The Site Owner and CHP System Owner will allow NYSEDA or NYSEDA's agents to take photographs of the CHP System and exterior views of the site with explicit permission for NYSEDA to use, reproduce, distribute, exhibit, alter, publish or otherwise use such photographs in all forms, manner, including composite or distorted representations, and media, including electronic, print, digital, or electronic publishing via the Internet, and for all purposes, including advertising, trade, or any other lawful purposes.

The Site Owner and CHP System Owner hereby acknowledge that NYSEDA's role in this installation is that of a funder, and that NYSEDA would not fund the incentive payments to the Applicants without Site Owner and CHP System Owner agreeing to indemnify and hold NYSEDA harmless from all liability. Therefore, the Site Owner and CHP System Owner hereby agree to protect, indemnify and hold harmless NYSEDA and the State of New York from and against all liabilities, losses, claims, damages, judgments, penalties, causes of action, costs and expenses (including, without limitation, attorneys' fees and expenses) imposed upon or incurred by or asserted against NYSEDA or the State of New York resulting from, arising out of or relating to the installation and performance of the CHP System.

Site Owner Signature

Name	Signature
Title	
Signatory must be legally able to bind the organization.	
Sworn to before me this ___ day of _____, 2___	
Notary Public Signature	Stamp of Notary Public

CHP System Owner Signature (Must be signed if the CHP System Owner is not the Site Owner)

Name	Signature
Title	
Signatory must be legally able to bind the organization.	
Sworn to before me this ___ day of _____, 2___	
Notary Public Signature	Stamp of Notary Public

CHP Acceleration Program PON 2568 Incentive Application (Attachment A)
Version 1.0 12/20/2012
<http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2568-CHP-Acceleration-Program.aspx>

Plus:

- Financial Plan
- Schedule (max 12 months to operation)
- List of Necessary Permits
- Electrical Inter-connection CESIR Cost Estimate
- Utility Gas Availability
- Feasibility Study

Must apply BEFORE equipment is delivered to site or staging area



CHP Acceleration “Catalog” Program

System “re-commissioning” in sophomore year

Win-Win-Win-Win-Win Outcomes:

- **Customer:** confidence, “vetted” system
- **Developer:** transparency of program
- **Equipment Vendor:** marketing edge
- **Auth-having-Juris:** familiarity & comfort
- **NYSERDA:** acceleration of uptake

NYSERDA's Current CHP Programs

- **Strategy #1: Simplicity is most important**

- Small-to-medium (50 kW – 1.3 MW)
- Identify replicable designs/opportunities
- Promote standardization for streamlining
- PON 2568 -- \$60 million Incentive Pool Budget
- Maximum \$1.5 million per project



Like "Modular" Housing



Like "Shopping Off The Rack"

- **Strategy #2: Customization is most important**

- Medium-to-large (greater than 1.3 MW)
- Promote custom design to maximize efficiency
- PON 2701 -- \$40 million Incentive Pool Budget
- Maximum \$2.6 million per project



Like "Stick-built" Housing



Like "Custom Tailored"

CHP Larger Than 1.3 MW

Program Format (max incentive = \$2.6 million):

- Engineering study demonstrating system will meet site needs and program requirements
- Performance-based incentive payments
 - Payment of funds scaled to kWh and peak time kW as determined throughout 2-years of Measurement & Verification (this protects use of public funds)
- Performance criteria
 - Fuel Conversion Efficiency
 - Exhaust emissions
 - Operation during Summer Peak

Combined Heat and Power (CHP)

Incentives Budget (2011 – 2015)

PON 2568 CHP Acceleration	less than 1.3 MW	\$60 Million*
<u>PON 2701 CHP Performance</u>	<u>greater than 1.3 MW</u>	<u>\$40 Million**</u>
Total	All Sizes	\$100 Million

* \$60 million = \$20 million via SBC4 T&MD + \$40 million via IPEC

** \$40 million is via SBC4 T&MD

Thank You!



www.nyserda.ny.gov

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NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels. NYSERDA professionals work to protect our environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York since 1975.

- When will sufficient experience with the “Catalog” format be available to determine if it is working?
- What would be the benefits to the marketplace if other states adopted a similar “Catalog” approach?
- Have multiple states used a common “Catalog” as the basis for other energy-efficiency programs?

DOE CHP Technical Assistance Partnerships: Working with State Energy Offices to Deploy CHP



Thomas Bourgeois
US DOE Northeast CHP Technical Assistance Partnership
December 4, 2013



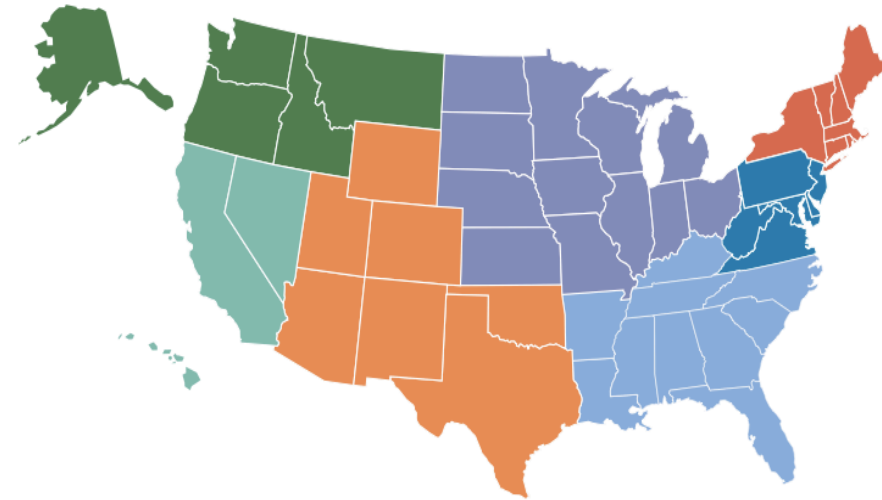
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CHP Technical Assistance Partnerships

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CHP Technical Assistance Partnerships Key Activities

- **Market Opportunity Analysis.**
Supporting analyses of CHP market opportunities in diverse markets including industrial, federal, institutional, and commercial sectors
- **Education and Outreach.**
Providing information on the energy and non-energy benefits and applications of CHP to state and local policy makers, regulators, end users, trade associations, and others.
- **Technical Assistance.**
Providing technical assistance to end-users and stakeholders to help them consider CHP, waste heat to power, and/or district energy with CHP in their facility and to help them through the development process from initial CHP screening to installation.



[http://eere.energy.gov/
manufacturing/distributedenergy/
chptaps.html](http://eere.energy.gov/manufacturing/distributedenergy/chptaps.html)



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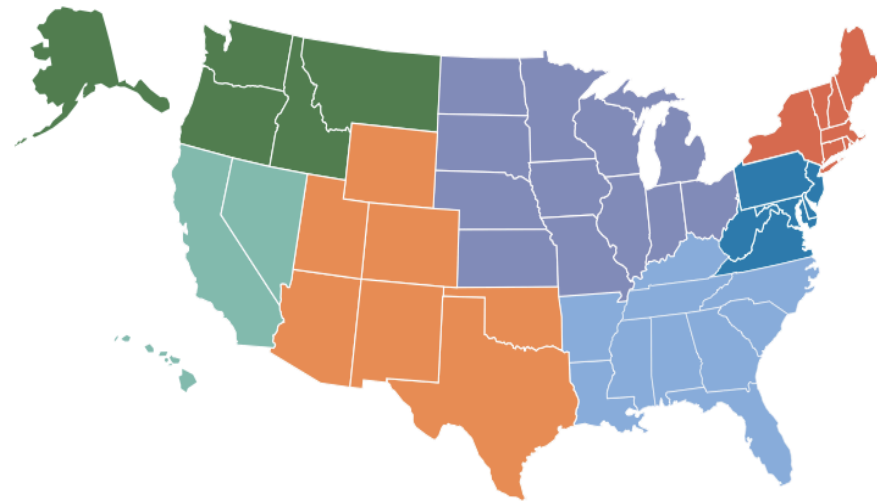
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President's Executive Order 13624: 40GW of new CHP by 2020

CHP Technical Assistance Programs are critical components of achieving the goal:

- Regional CHP experts
- Provide fact-based, un-biased information on CHP
 - Technologies
 - Project development
 - Project financing
 - Local electric and natural gas interfaces
 - State best practice policies
- Vendor, fuel, and technology neutral



[http://eere.energy.gov/
manufacturing/distributedenergy/
chptaps.html](http://eere.energy.gov/manufacturing/distributedenergy/chptaps.html)



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State Energy Offices & CHP TAPS: Invaluable Partnerships

CHP TAPs work with State Energy Offices (SEOs) in a variety of ways:

- Promote state CHP incentive and deployment programs
- Help SEOs share information on key state organizations and companies that support CHP deployment
- Co-host target market workshops and webinars to prospective end-users
- Identify high profile opportunities for project support



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The Northeast CHP TAP's work with SEOs

The NE CHP TAP has worked closely to support state incentive programs including:

- NY: NYSERDA's suite of CHP incentives
- CT: CEFIA's CHP finance program and DEEPs microgrid pilot
- MA: Alternative Portfolio Standard and Mass Saves Program
- RI, ME, NH & VT incentives for CHP



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NYSERDA & Northeast CHP TAP

NYSERDA recently launched a 1st of kind CHP Market Acceleration “Catalog” Program

- Northeast CHP TAP is identified in the catalog as a source of technical & market information
- Northeast CHP TAP aggressively co-markets the catalog and other CHP programs to target key markets including hospitals, nursing homes, and other appropriate candidates



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NYSERDA & Northeast CHP TAP

Northeast CHP TAP conducts expos and workshops in collaboration with NYSERDA to promote CHP

Example: CHP Expo on November 22nd, 2013

- CHP “matchmaking expo” that brought building owners/managers/representatives to meet CHP catalog vendors
- Included 10 CHP vendors and attracted over 300 attendees
- Vendors expressed great enthusiasm for this model of connecting them to markets



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Connecticut DEEP / CEFIA & Northeast CHP TAP

In 2012 CT DEEP launched a 1st of kind Microgrid Pilot Program

- NE CHP TAP is listed as a source of support for the program
- NE CHP TAP actively offering support to program participants to help incorporate CHP into microgrid plans

NE CHP TAP organized a Microgrid Workshop at CT DEEP in Hartford, CT

- Presentations by CT DEEP, CEFIA, CT Utilities and NE CHP TAP showcased Phase II of the nationally innovative Microgrid Pilot Program
- NE CHP TAP explained tools available for communities to facilitate high efficiency CHP designs – 3 communities have requested assistance thus far.



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Connecticut DEEP/CEFIA & Northeast CHP TAP

- NE CHP TAP is working with CEFIA and CT DEEP to fashion innovative new financial instruments for promoting new CHP projects in the region (via the C-PACE program and Microgrid Pilot Program - Phase II)



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Massachusetts Energy Offices & Northeast CHP TAP

The Massachusetts Alternative Portfolio Standard is unique among the state incentive programs with an operating payment for high efficiency CHP

- NE CHP TAP provided educational support during the design of the program
- NE CHP TAP was involved in discussions about design standards for APS meters



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Massachusetts DOE & Northeast CHP TAP

- NE CHP TAP conducts meetings in support of the robust CHP incentives in MA
- Examples:
 - June 19, 2013: The NE CHP TAP convened a well attended (Standing Room Only) meeting at the in Waltham, MA to promote MA utility CHP programs.
 - March 21, 2013: Co-convened by MA DOER and NE CHP TAP, the annual meeting of Northeast CHP Initiative drew 150 attendees in Boston .



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Efficiency Vermont & Northeast CHP TAP

- Efficiency Vermont is reviewing CHP incentives
- Northeast CHP TAP provides educational and technical assistance
- Northeast CHP TAP conducted a meeting with the Vermont Hospitals' Association to promote high efficiency CHP project development in healthcare sector.



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Other Northeast State Activities

- Conducted joint CHP workshop with New Hampshire Department of Environmental Services to share best practices. Target Audiences were:
 - Regulators
 - Policymakers
- Convened a conference with New Hampshire state officials and the University of New Hampshire in Durham to showcase their CHP system
- Supported CHP events with the Rhode Island Manufacturers Association (RIMA)



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CHP Technical Assistance Partnerships

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CHP Solves Problems Facing States

- High Efficiency, Environmentally Superior CHP Applications Address Numerous Issues of Concern to Business and State Leaders
 - Improves productivity and economic competitiveness
 - Supports economic development policies
 - Can defer or avoid costly electric Transmission and Distribution capital investments
 - reduces air emissions
 - can support critical infrastructure resiliency, business continuity



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Challenges & Hurdles to CHP Development Remain

- Interconnection policies
- Standby Rates
- CHP's Role in Clean Energy Portfolio Standards
- Export Power Sales
- Emerging Opportunities (e.g. Critical Infrastructure, microgrids)



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The Guide provides state policy makers with actionable information regarding:

- Design of standby rates
- Interconnection standards for CHP with no electricity export
- Excess power sales
- Clean energy portfolio standards
- Emerging market opportunities: CHP in critical infrastructure and utility participation in CHP markets

In development: State workshops w/ PUCs on the Guide & how to refine policy implementation to achieve greater CHP.



Guide to the Successful Implementation of State Combined Heat and Power Policies

Industrial Energy Efficiency and Combined Heat and Power Working Group

Driving Ratepayer-Funded Efficiency through Regulatory Policies Working Group

March 2013

The State and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

Learn more at www.seeaction.energy.gov

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What is the SEE Action Network?

- Network of 200+ leaders and professionals, led by state and local policymakers, bringing energy efficiency to scale
- Support on energy efficiency policy and program decision making for:
 - Utility regulators, utilities and consumer advocates
 - Legislators, governors, mayors, county officials
 - Air and energy office directors, and others
- Facilitated by DOE and EPA; successor to the National Action Plan for Energy Efficiency



To stay updated on SEE Action activities and resources, sign-up for email alerts:

www1.eere.energy.gov/seeaction/index.html



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SEE Action IEE/CHP Working Group

Focus: Improve energy efficiency in the U.S. manufacturing sector through programs and policies that support industrial efficiency and implementation of combined heat and power.

- Provide guidance on model programs and policies that support industrial efficiency and implementation of CHP.
- Developed a blueprint for action that drives the following goals:
 - Achieve a 2.5% average annual reduction in industrial energy intensity through 2020
 - Install 40 gigawatts (GW) of new, cost-effective CHP by 2020.
- Priority Solutions and Actions:
 - Driving demand for industrial energy efficiency and CHP
 - Moving the market toward adoption of CHP technologies
- Co-chairs: Joshua Epel, Chair, Colorado Public Utilities Commission; Todd Currier, Washington State University Extension Energy Office
- ~~~ 20 Working Group members: Industry, state, NGO, utilities. John Cuttica.~~

NGA Policy Academy Overview

- The goal of the Policy Academy is to assist governors in improving the productivity and competitiveness of their state's industrial sectors through the increased use of energy efficiency and CHP technologies.
- By developing policies and programs that support the more efficient use of energy, industry in states can realize financial savings and redirect it towards innovation and job creation.



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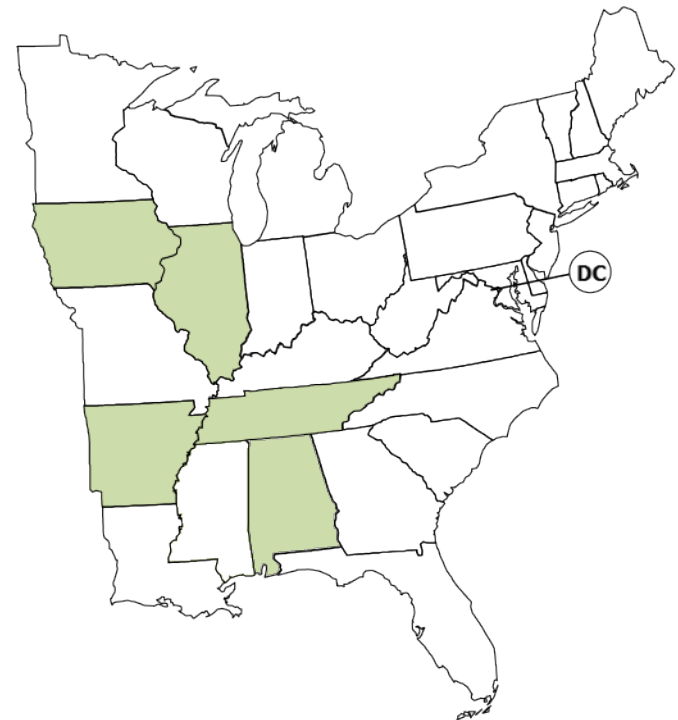
CHP Technical Assistance Partnerships

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NGA Policy Academy Winners

State teams developed vision/goals, and action plans to deploy CHP:

- Alabama
- Arkansas
- Illinois
- Iowa
- Tennessee



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CHP Technical Assistance Partnerships

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Why these five states?

- Competitive solicitation from ~ 27 applications
 - Large energy-intensive industrial sectors
 - Significant CHP technical potential
 - State has increased attention on IEE and/or CHP
 - Opportunities for CHP to address Boiler MACT and coal retirements
 - Involvement from key stakeholders: legislators; regulators; utilities; and industry

	Existing CHP sites	Existing Capacity (MW)	Industrial CHP Tech Potential (MW)	Boiler MACT Affected Facilities
AL	40	3,312	1,900	41
AR	16	497	1,400	30
IA	34	590	1,600	22
IL	129	1,333	5,400	25
TN	24	512	1,600	16



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CHP Technical Assistance Partnerships

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DOE / CHP TAP Contributions

- Funded by DOE Office of Weatherization & Intergovernmental Programs (WIP)
- Midwest and Southeast CEAC staff assistance to state teams
 - Midwest was part of initial Illinois team
 - Participation in Convening meetings and Governors Summits
 - Answered technical and policy questions
 - Connected states with CHP end-users and industry experts
- ICF International provides CHP market data and Boiler MACT presentation



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CHP Technical Assistance Partnerships

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Major Outcomes and Highlights

- Alabama
 - Greater understanding of regulatory environment for CHP
 - Commitment to improved awareness and ongoing dialogue
 - Potential expansion of [Alabama Saves](#) program
- Arkansas
 - PSC commitment to doubling of EERS targets with review of CHP eligibility (doubling delayed one-year at request of utilities)
 - PSC to continue investigating barriers
 - Governors Office / Energy Office interest in financing options
- Tennessee
 - Tennessee Energy Efficiency Summit



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CHP Technical Assistance Partnerships

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Major Outcomes and Highlights

■ Iowa

- Understanding CHP Barriers and Educating Stakeholders
- IEDA (SEO) to continue non-utility-related CHP activities of National Governors Association (NGA) Policy Academy including endorsement of DOE Boiler MACT (Maximum Achievable Control Technology) Technical Assistance
- Iowa Utilities Board will continue to examine utility-related aspects of CHP
- http://www.iowaeconomicdevelopment.com/userdocs/documents/ieda/Enhancing_IndustryFinalReport.pdf

■ Illinois

- Moving towards including CHP in Next 3 Year EEPs Plans
- IL EPA and SEO endorsement of DOE Boiler MACT Technical Assistance
- Investigate “Permit by Rule”
- URL to their Action Plan will be posted on MidWest CHP Technical Assistance Partnership shortly

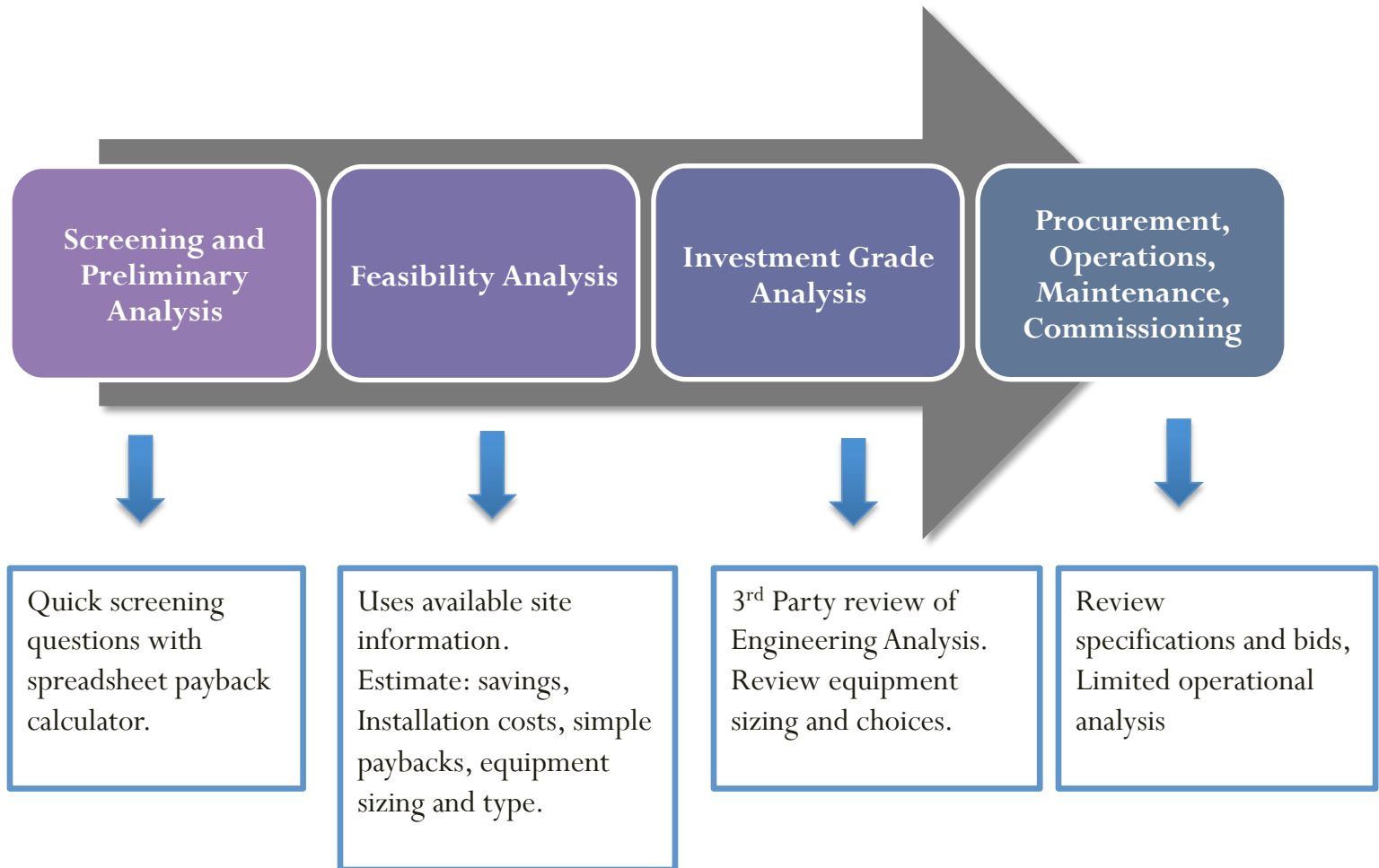


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CHP TAP Technical Development Assistance



Thank You!

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Energy Efficiency &
Renewable Energy

Questions and Answer Session

Resources

- Advanced Manufacturing Office's (AMO) Industrial Distributed Energy <http://www1.eere.energy.gov/manufacturing/distributedenergy/index.html>
- AMO's CHP Project Profiles www.eere.energy.gov/manufacturing/distributedenergy/chp_projects.html
- CHP program and policy resources also available through SEE Action Network's Industrial EE and CHP Working Group, including the ***Guide to Successful Implementation of State CHP Policies*** www.eere.energy.gov/seeaction/combined_heat_power.html
- State & Local Solution Center Technologies resource portal – Updated in early 2014

One-on-One Assistance

- CHP Technical Assistance Partnership www.eere.energy.gov/manufacturing/distributedenergy/chptaps.html