

CHP eCatalog and Accelerator

Entropy Research LLC | Exergy Partners Corp | Analytical Energy Solutions
May 1, 2017 – December 31, 2021

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U.S. DOE Advanced Manufacturing Office Program Review Meeting
Washington, D.C.

June 11-12, 2019

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Overview

Project Title:

Packaged CHP eCatalog and Accelerator

Timeline:

Project Start Date: 05/01/2017

Budget Period End Date: 12/31/2021

Project End Date: 12/31/2021

Barriers and Challenges:

- Develop an easy to use technical site balancing the needs of site energy engineers with the complexities of next generation Packaged CHP Systems
- Engaging the CHP Packaging community to submit technical data for inclusion into the eCatalog.
- Engaging key market actors (states, utilities and municipalities in using and promoting the eCatalog.

AMO MYPP Connection:

- Target 13.4: Support a 20% reduction in installed cost of commercially available, packaged (<10 MW) CHP systems (while maintaining >75% system efficiency at HHV).

Project Team and Roles:

- **Entropy Research LLC** – Coordination Lead for the Packaged CHP Accelerator and support for the eCatalog development, technical review of Packaged CHP systems and coordination with CHP Packagers, Installers, and Developers.
- **Exergy Partners Corp.** - Coordination Lead in eCatalog development. Overall responsible for eCatalog project development, technical review of Package CHP systems and coordination with CHP Packagers, Installers, and Developers, and support for the Packaged CHP Systems Accelerator.
- **Analytical Energy Solutions** – development of the eCatalog website and support for all eCatalog process flows.
- **ICF** – Program support for the Packaged CHP Accelerator
- **Lawrence Berkeley National Laboratory** – CHP Deployment Program Lead and oversight for eCatalog development and Packaged CHP Accelerator

CHP eCatalog and Accelerator

Problem Statement

- CHP systems have traditionally been individually designed and engineered to meet specific requirements at the site, resulting in extended project timelines and additional cost.
- When treated as a unique solution, CHP is often viewed as a risky investment due to lack of comparable operating data needed by financiers and project developers.
- A solution is the development of pre-packaged CHP systems that include standardized engineering design and verified performance data.
- Experience has shown that public/private partnerships can accelerate the development and market acceptance of packaged CHP solutions for commercial, institutional, multi-family and light industrial applications.



Objective

- Develop web-based catalog (“eCatalog”) of pre-qualified DOE-recognized packaged systems that meet DOE technical specifications provided by vendors with demonstrated resources, warranties, and service agreements to ensure performance to design; supported by robust state and utility market engagement programs to promote the eCatalog and provide technical assistance to users navigating the project development process.

Technical Innovation

Web-based system to provide verified performance data on commercially available CHP packages to growing markets in commercial, institutional, multi-family and light industrial applications with little historical experience with CHP and limited technical resources

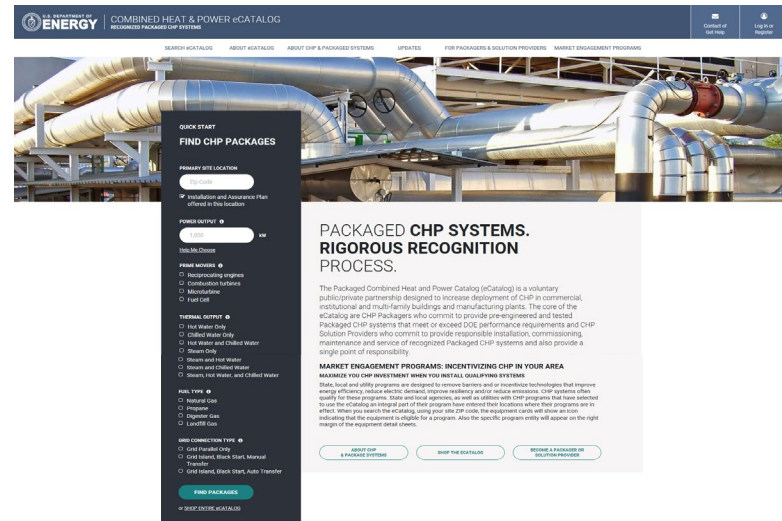
Basis

Based on the success of a New York State Research and Development Authority Packaged CHP catalog program, a properly designed and promoted national Packaged CHP system platform with broader focus would likely accelerate market acceptance of emerging packaged CHP systems.

Outcomes

Using market based web platform technology to efficiently review CHP system design and performance information, and provide an easy end-user experience, as well as an easy and efficient technical interface with CHP packagers.

(CHP eCatalog and Accelerator)



Technical Approach

SEARCH eCATALOG ABOUT eCATALOG ABOUT CHP & PACKAGED SYSTEMS UPDATES FOR PACKAGERS & SOLUTION PROVIDERS CUSTOMER ENGAGEMENT PARTNERS

FOCUS YOUR RESULTS DISPLAYING: 121 Packages ordered by Relevance

reset | save search | favorites

PRIMARY SITE LOCATION
10005
Selected: New York, NY

ASSURANCE PLAN OFFERED
 Prioritize systems that offer an assurance plan

CUSTOMER ENGAGEMENT PARTNER
 Prioritize program-eligible packaged systems

POWER OUTPUT (kW)
kW Size

APPLY Help Me Choose
120% of unit size and a min. of 70% of unit size.

PRIME MOVERS
 Reciprocating engines (39)
 Microturbine (82)

THERMAL OUTPUTS
 Hot Water Only (120)
 Steam and Hot Water (1)

FUEL TYPE
 Natural Gas (120)
 Digester Gas (1)

GRID CONNECTION TYPE
 Grid Parallel Only (47)
 Grid Island, Black Start, Auto Transfer (63)

OUTDOOR INSTALLATION
 Required (94)

PACKAGED IN THE U.S.A.
 Final System Packaging facility is in the U.S.A. (94)

PACKAGED SYSTEM FOOTPRINT

AV Available SP Solution Provider AP Assurance Plan CE Local Support OO Outdoor Install FP Within Footprint U.S.A. Packaged Installed Favorite

M555 C

Power Output: 547 kW
Thermal Output: Hot Water Only
Fuel: Natural Gas
Prime Mover: 1x Reciprocating engine
Grid Connection: Black Start, Auto

FULL MATCH (100%)

C600S-ICHP HPNG DM MAX EFFICIENCY

Power Output: 600 kW
Thermal Output: Hot Water Only
Fuel: Natural Gas
Prime Mover: 3x Microturbine
Grid Connection: Black Start, Auto

FULL MATCH (100%)

M375 OM

Power Output: 366 kW
Thermal Output: Hot Water Only
Fuel: Natural Gas
Prime Mover: 1x Reciprocating engine
Grid Connection: Black Start, Auto

FULL MATCH (100%)

M375 C

Power Output: 366 kW
Thermal Output: Hot Water Only
Fuel: Natural Gas
Prime Mover: 1x Reciprocating engine
Grid Connection: Black Start, Auto

FULL MATCH (100%)

C800S-ICHP HPNG DM MAX EFFICIENCY

Power Output: 800 kW
Thermal Output: Hot Water Only
Fuel: Natural Gas
Prime Mover: 4x Microturbine
Grid Connection: Black Start, Auto

FULL MATCH (100%)

C65-ICHP HPNG GC

Power Output: 65 kW
Thermal Output: Hot Water Only
Fuel: Natural Gas
Prime Mover: 1x Microturbine
Grid Connection: Parallel Only

FULL MATCH (100%)

C800S-ICHP HPNG GC MAX EFFICIENCY

Power Output: 800 kW
Thermal Output: Hot Water Only

FULL MATCH (100%)

JMC 420

Power Output: 1,429 kW
Thermal Output: Hot Water Only

FULL MATCH (100%)

M285 C

Power Output: 281 kW
Thermal Output: Hot Water Only

FULL MATCH (100%)

PERFORMANCE DATA

	100% GROSS POWER			75% GROSS POWER			50% GROSS POWER			25% GROSS POWER		
	95°F	59°F	0°F	95°F	59°F	0°F	95°F	59°F	0°F	95°F	59°F	0°F
Ambient Temperature	95°F	59°F	0°F	95°F	59°F	0°F	95°F	59°F	0°F	95°F	59°F	0°F
CHP Fuel Input (MMBtu per hour HHV)	10.70	11.40	10.90	9.00	8.60	8.20	6.00	5.70	5.50	2.60	2.30	2.20
POWER Gross Electricity Output (kW)	879	1,000	1,000	750	750	750	500	500	500	200	200	200
Net Electricity Output (kW)	879	1,000	1,000	750	750	750	500	500	500	200	200	200
Net Electric Efficiency % (HHV)	28.0	29.9	31.3	28.4	29.8	31.2	28.4	29.9	31.0	26.2	29.7	31.0
HOT WATER Supply Temp to Site (°F)	180 °F			180 °F			180 °F			180 °F		
HW flow (GPM)	500	500	500	500	400	400	300	300	300	200	100	100
Return Temp from Site (°F)	161	163	167	166	164	169	164	166	170	170	163	167
Hot Water Capacity (MMBtu/hr)	4.60	4.30	3.10	3.50	3.20	2.30	2.30	2.10	1.40	1.00	0.90	0.60
Thermal Efficiency % (HHV)	43.0	37.7	28.4	38.9	37.2	28.0	38.3	36.8	25.5	38.5	39.1	27.3
CHP Fuel Use Eff % (Hot Water Operation)	71.0	67.7	59.7	67.3	67.0	59.3	66.8	66.8	56.5	64.7	68.8	58.3

Unique Verified System Level Performance Data

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Results and Accomplishments

2021 Goals:

25 CHP Vendor allies and over 100 pre-qualified, DOE-recognized packaged CHP systems and 15 Customer Engagement Partners (CEPs) in states, communities, or utilities.

Results:

- eCatalog version 1.0 release candidate launched April 1, 2019
- Results to date: 27 vendor allies and over 37 pre-qualified, DOE-recognized packaged CHP systems and 7 state, community, or utility CEPs.

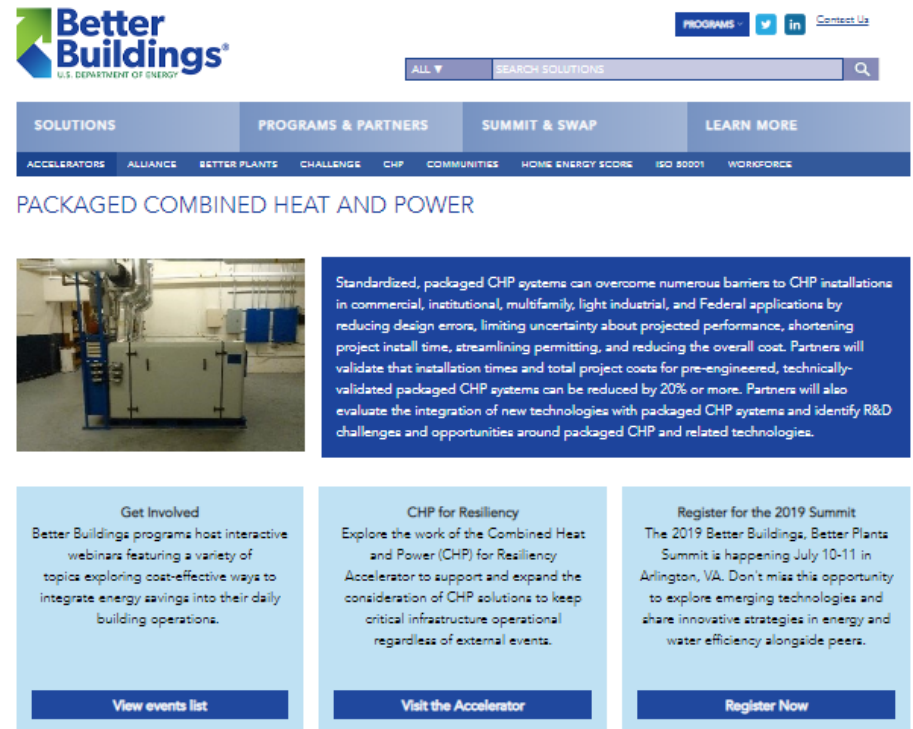
Work to be completed:

- Expand vendor base to 50, expand CHP system size to 10 MW, add fuel cell prime movers, add combustion turbine prime movers, add waste heat to power applications, add site installation data.
- Develop CEP roadmaps in stakeholder locations.
- Launch eCatalog version 2.0

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Transition

- Success is a robust Packaged CHP eCatalog actively used by the market and requiring modest updating and maintenance to accommodate new technologies and package innovations.
- Supported by the *Packaged CHP Accelerator*, consisting of 15 CHP Supplier (vendor) and 15 Customer Engagement Partners that form the core of the project's transition into the market and development of eCatalog version 2.0.
- Accelerator Engagement Partners promote the eCatalog to end users and design engineers, and integrate the eCatalog into state, local and utility CHP deployment programs.



The image is a screenshot of the Better Buildings U.S. Department of Energy website. At the top left is the logo for Better Buildings, U.S. Department of Energy. To the right are social media icons for Twitter, LinkedIn, and Facebook, along with a 'Contact Us' link. Below the logo is a search bar with the text 'SEARCH SOLUTIONS' and a magnifying glass icon. A navigation menu below the search bar includes 'SOLUTIONS', 'PROGRAMS & PARTNERS', 'SUMMIT & SWAP', and 'LEARN MORE'. Under 'SOLUTIONS', there are sub-links for 'ACCELERATORS', 'ALLIANCE', 'BETTER PLANTS', 'CHALLENGE', 'CHP', 'COMMUNITIES', 'HOME ENERGY SCORE', 'ISO 50001', and 'WORKFORCE'. The main heading is 'PACKAGED COMBINED HEAT AND POWER'. Below this is a large blue box with a photograph of a CHP unit on the left and text on the right: 'Standardized, packaged CHP systems can overcome numerous barriers to CHP installations in commercial, institutional, multifamily, light industrial, and Federal applications by reducing design errors, limiting uncertainty about projected performance, shortening project install time, streamlining permitting, and reducing the overall cost. Partners will validate that installation times and total project costs for pre-engineered, technically-validated packaged CHP systems can be reduced by 20% or more. Partners will also evaluate the integration of new technologies with packaged CHP systems and identify R&D challenges and opportunities around packaged CHP and related technologies.' Below this are three smaller blue boxes with white text and buttons. The first is 'Get Involved' with a 'View events list' button. The second is 'CHP for Resiliency' with a 'Visit the Accelerator' button. The third is 'Register for the 2019 Summit' with a 'Register Now' button.

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