Introducing the:
Integrated Cooling & Heating Module

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Integrated Cooling & Heating Module
Introduction

- Integrated CHP Systems Corp. is a systems integrator specializing in the design and provision of prepackaged thermally activated technologies for integration with a variety of on-site electric generating technologies.

- We are working in conjunction with various partners to provide a modular solution for single stage absorption based cogeneration systems – the ICHM.
Cogen Design

• Typical Commercial Building Electric & Thermal Load Profile

• Thermal Requirements:
  – Hot Water + Chilled Water

• An Absorption Chiller provides chilling from heat input – it is a thermally activated cooling technology
Annual Load Factor

3 MW Building
w/ 1 MW CHP System

Heating  Cooling  Electricity
ICM Heat  ICM Cool  ICE Elec
Product Development Partners

- CEC PIER Award
  - Integrated CHP Systems Corp.
  - DE Solutions, Inc.
  - BluePoint Energy, Inc.
- SoCalGas Funding Support
- York International

Goals of the Agreement:

“The goal of this Agreement is to **significantly reduce the installed cost of CHP integrated HVAC systems for Commercial and Light Industrial applications. The goals will be accomplished through 1) the development of standardized factory assembled heating/cooling modules and 2) absorption chiller and engine heat management system that are cost optimized for CHP performance.”
ICHM

• The ICHM is a pre-fabricated Integrated Cooling & Heating Module designed for cogen applications with IC engines.

• The ICHM includes an absorber, load heat exchanger, cooling tower, condenser pump, system controls, pipe, valves and fittings in an outdoor enclosure.

• The ICHM provides simultaneous heating and cooling for maximum load factor.
The ICHM

Design
Cooling & Heating Equipment
Engineering
Fabrication
Commissioning
@ 30% Less Cost
with National Service Network

Single Source of Responsibility
Design

• Compatible with multiple generator platforms and control systems.
• Packages for engines from 250 kW to 2 MW. Larger systems also available.
• Standardized design reduces costs.
• Pre-Engineering provides reliable performance and reduced commissioning costs.
• National Service Network.
Components

Major U.S. Suppliers:

- Absorber – York
- HEX – Flat Plate Inc.
- CT – Baltimore Air Coil
- Controls – Allen Bradley
- Cd Pump & By-Pass
- Heat Load Control
- Sensors, PV&F
- Skid & Enclosure
Control System

- PLC Based Controller
- Interface between Engine, Building, Absorber, Load HEX and Data Acquisition System.
- A single 2-Wire MODBUS connection is provided for communications and data acquisition.
- Indicator Lights and a display screen provide local interaction.
Installation

- Steel Skid
- Rigging Points
- Outdoor Enclosure
- Flanged Piping Connections
- Single Electric Connection
- Single Control Connection
- Remote Cooling Tower
Service & Maintenance

- The ICHM is designed to allow service access to all major components.

- York Service provides commissioning and maintenance contracts.
Benefits

• Cost Effective – saves 30% on installed cost over stick-built systems.
• Pre-Engineered – integrated thermal system for IC engine application.
• Prefabricated – built as a modular package under controlled conditions.
• Single Power & Control Connections – easy installation and data acquisition.
• Reliable – design, fabrication and commissioning by one company.
• National Service Network – complete service through York International.
Additional Benefits

- One Company responsible for design, fabrication and commissioning.
- Integrated Controls & Safeties
- Reduced Start-up Issues
- Outdoor Enclosure
- Compact Size
The ICHM comes in 7 frame sizes for engines from 250 kW to 2 MW.

Cooling output ranges from 65 tons to 400 tons.
The ICHM has been benchmarked with all the major US continuous duty, lean-burn natural gas engines.
Economics

ICHM costs are below site constructed systems of comparable quality and components on an output basis.

Reduce Payback with Rebates
Simultaneous Hot Water increases Load Factor
## Economics

- **ICHM output is major contributor to CHP profit**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Size</td>
<td>1,400 kW</td>
</tr>
<tr>
<td>ICHM Model</td>
<td>D2</td>
</tr>
<tr>
<td>Cooling Output</td>
<td>340 Tons</td>
</tr>
<tr>
<td>Cooling Season</td>
<td>3,000 Hrs/Yr</td>
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<tr>
<td>Cooling Load Factor</td>
<td>85 %</td>
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<tr>
<td>Heating Output</td>
<td>5,900 MBH</td>
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<tr>
<td>Heating Season</td>
<td>4,500 Hrs/Yr</td>
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<tr>
<td>Heating Load Factor</td>
<td>95 %</td>
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<tr>
<td>Average Electric Power Cost</td>
<td>$0.12/ kWh</td>
</tr>
<tr>
<td>Average Natural Gas Cost</td>
<td>$0.90/MMBH</td>
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<tr>
<td>Chiller Efficiency</td>
<td>0.60 kW/Ton</td>
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<tr>
<td>Boiler Efficiency</td>
<td>85 %</td>
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<tr>
<td>ICHM Equipment Cost</td>
<td>$560,000</td>
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<tr>
<td>ICHM Installation Cost</td>
<td>$48,500</td>
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<tr>
<td>Total ICHM Cost</td>
<td>$608,500</td>
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<tr>
<td>Total Rebate Amount</td>
<td>$0</td>
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<tr>
<td>Net ICHM Cost</td>
<td>$608,500</td>
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<tr>
<td>Annual Electric Power Cost</td>
<td>$62,354</td>
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<tr>
<td>Annual Natural Gas Cost</td>
<td>$267,062</td>
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<tr>
<td>Annual Total Energy Cost</td>
<td>$329,415</td>
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<tr>
<td>ICHM Payback</td>
<td>1.8 Years</td>
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<tr>
<td>ICHM 5-Year Contribution</td>
<td>$207,715</td>
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<tr>
<td>ICHM Contribution after 5 Years</td>
<td>$329,415</td>
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<tr>
<td>Peak Electric Demand Reduction</td>
<td>204 kW</td>
</tr>
<tr>
<td>Emissions Credit Output Value</td>
<td>1,768 kW</td>
</tr>
</tbody>
</table>

**Notes:**
1. Cost includes FOB Site and Commissioning
2. Estimate based on typical installation requirements
Modular CHP

• The ICHM is matched with each generator line for seamless control integration and optimized performance.

• An ICHM based CHP System provides the customer with an off-the-shelf modular solution. Its simplicity of installation, reliable performance and reduced cost achieve industry goals.
Markets

- Absorption based IC Engine CHP System
Questions

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