

# Dresser-Rand & Supercritical CO<sub>2</sub>

sCO<sub>2</sub> Symposium 2016 (San Antonio, Texas)

# Safe Harbor Disclosure

The Private Securities Litigation Reform Act of 1995 provides a “safe harbor” for certain forward-looking statements so long as such information is identified as forward-looking and is accompanied by meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those projected in the information.

The use of words such as “may”, “might”, “will”, “should”, “expect”, “plan”, “outlook”, “anticipate”, “believe”, “estimate”, “appear”, “project”, “intend”, “future”, “potential” or “continue”, and other similar expressions are intended to identify forward-looking statements.

All of these forward-looking statements are based on estimates and assumptions by our management that, although we believe to be reasonable, are inherently uncertain. Forward-looking statements involve risks and uncertainties, including, but not limited to, economic, competitive, governmental and technological factors outside of our control, that may cause our business, industry, strategy or actual results to differ materially from the forward-looking statements.

These risks and uncertainties may include those discussed in the Company’s most recent filings with the Securities and Exchange Commission, and other factors which may not be known to us. Any forward-looking statement speaks only as of its date. We undertake no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise, except as required by law.

# Confidentiality

Any person allowing themselves to directly or indirectly receive the information contained in this presentation agrees that this presentation and all information contained herein and/or in any way distributed to the Receiver with respect to the same (verbal or otherwise) is the confidential and proprietary property of Dresser-Rand Company and is being provided to and received by the Receiver in confidence.

Receiver agrees not to divulge the contents hereof to any third party without the prior written approval of Dresser-Rand’s duly authorized representative.

Receiver shall advise any permitted recipient of the confidential information of the nature of the same and obtain their agreement to be bound to these terms before such confidential information is disclosed to them. Receiver on behalf of its principal, representatives, employees and themselves individually do hereby unconditionally agree to the terms hereof and agree to defend, indemnify, and hold Dresser-Rand harmless from and against any and all damages that result from Receiver’s failure to strictly comply with these terms. Receiver further agrees that failure to comply with these terms will cause Dresser-Rand to suffer irreparable harm. Your decision to remain and receive the information about to be presented to you shall constitute your unconditional acceptance to the foregoing.

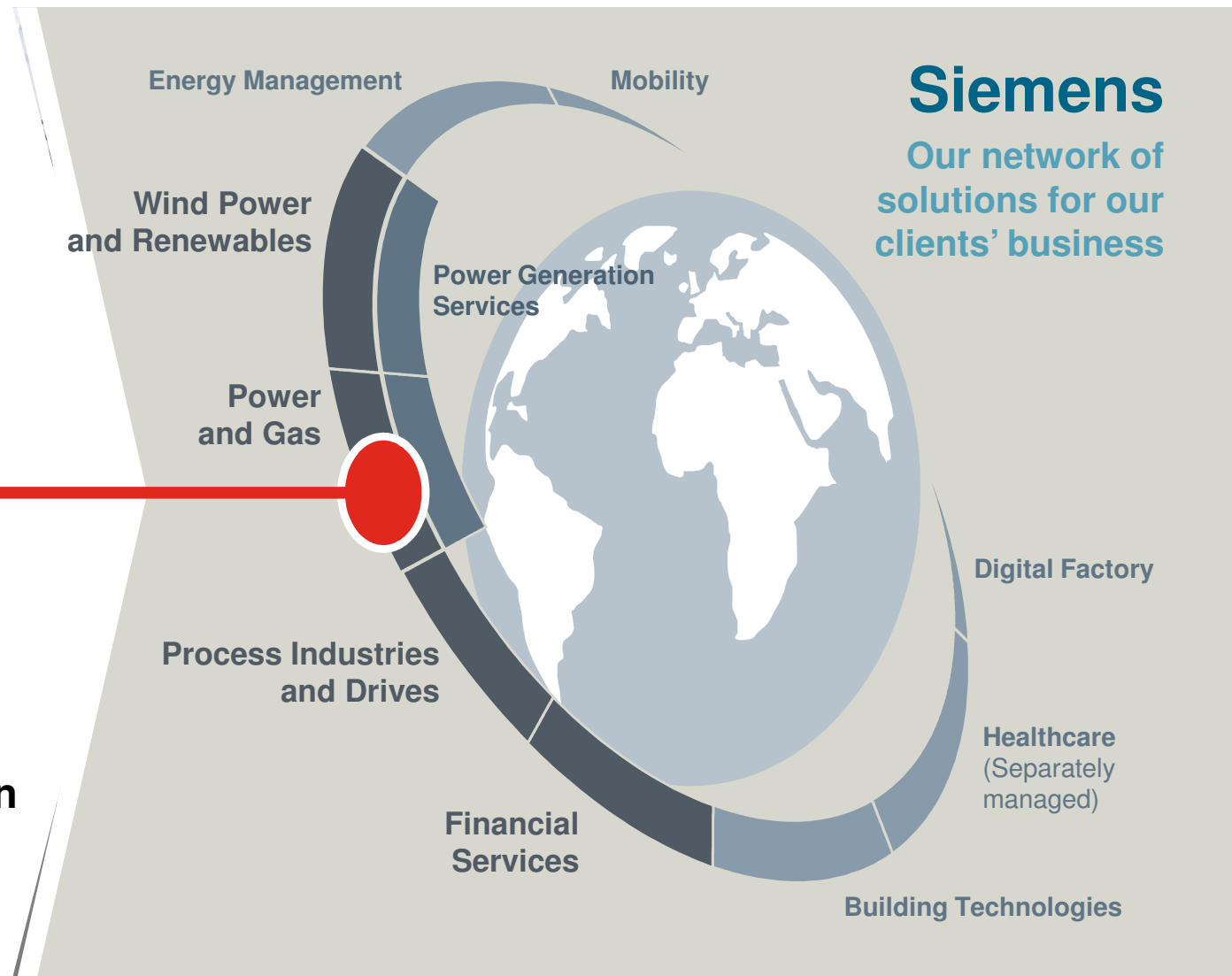
# Dresser-Rand, A Siemens Business

## Oil & Gas and Environmental Solutions

**DRESSER-RAND**  
A Siemens Business

**DRESSER-RAND**  
A Siemens Business

An expanded capability within  
the Siemens World with a  
broad band of knowledge for  
future success



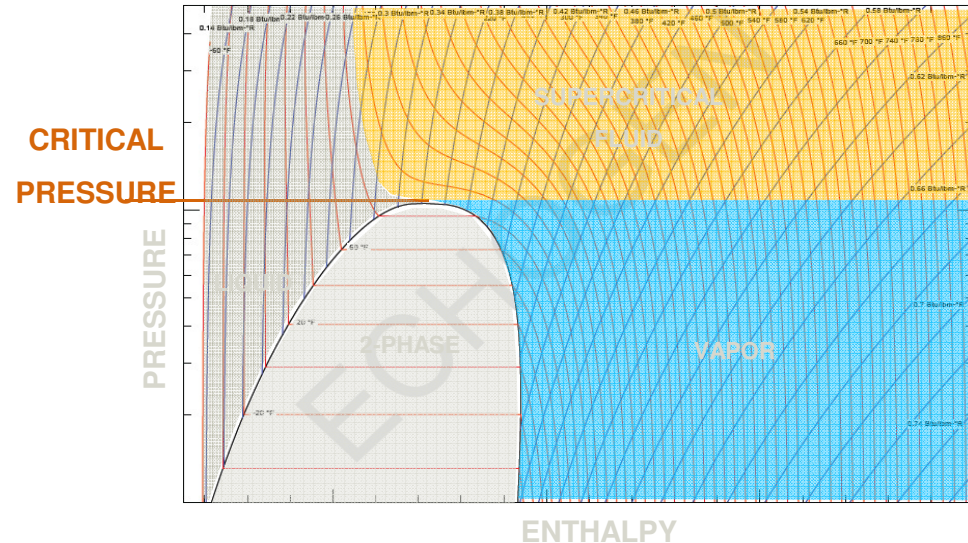
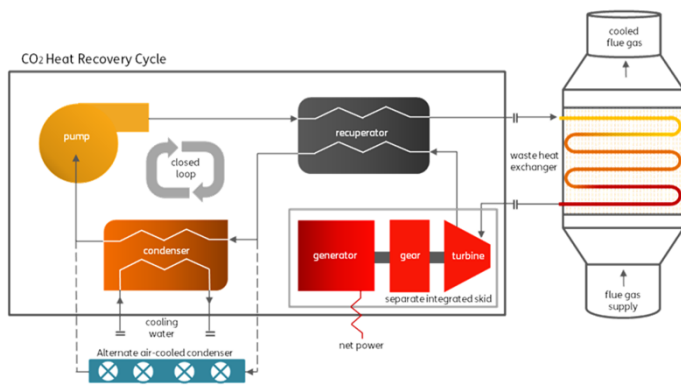
# Dresser-Rand & sCO<sub>2</sub>



**DRESSER-RAND**  
A Siemens Business

## Supercritical CO<sub>2</sub> (sCO<sub>2</sub>) Waste Heat to Power Technology Solution

<http://www.dresser-rand.com/products-solutions/systems-solutions/waste-heat-recovery-system/>



## Dresser-Rand (D-R) & Echogen – Strategic Partnership

- Investment: D-R has acquired equity interest in Echogen
- Supply: D-R provides key components of the Echogen system
- License: D-R sells, delivers, & supports Echogen systems to specific markets WW (including Oil & Gas)
- Technical leadership: D-R Seattle Technology Center
- Echogen Technology Day @ D-R (September 2014)

**DRESSER-RAND**  **ECHOGEN**  
power systems

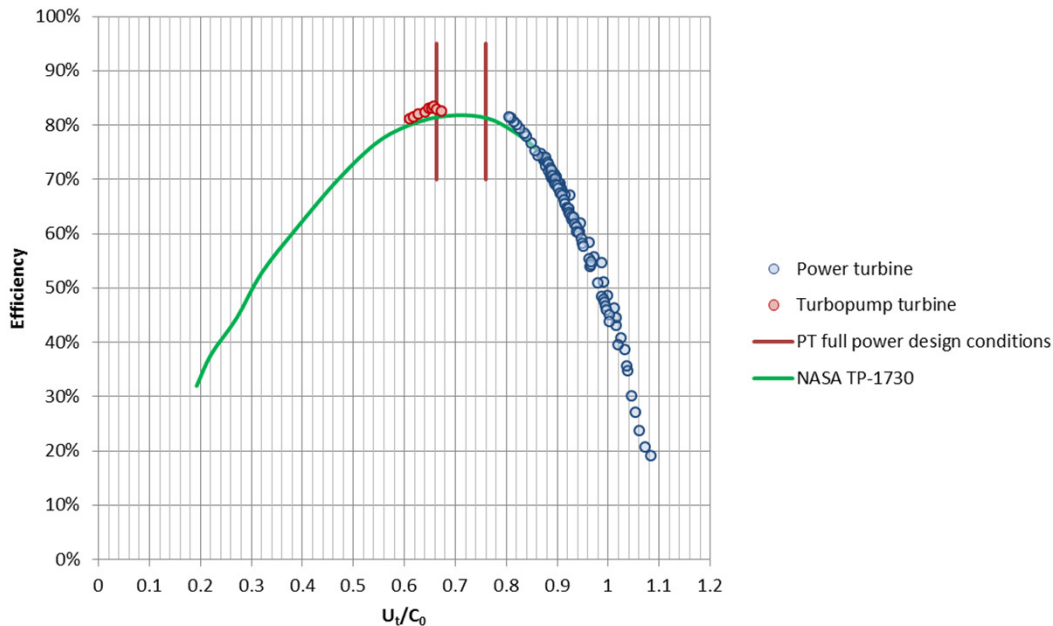
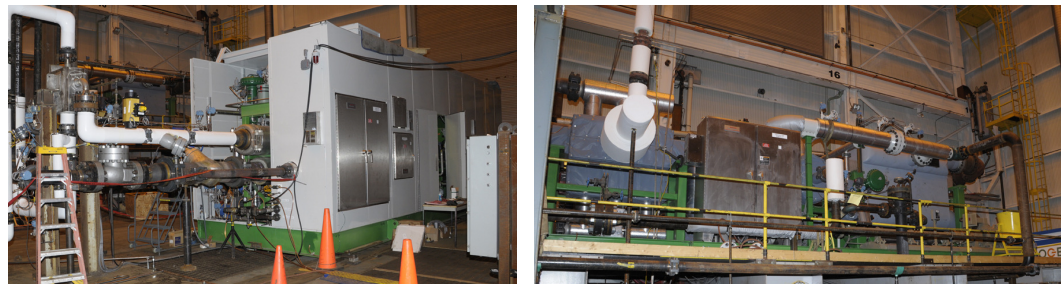
**Dresser-Rand Invests in Echogen Power Systems' Innovative Waste Heat Recovery Technology**

Expands Environmental Solutions Platform and Extends Market Opportunity for Dresser-Rand's Product Portfolio

**HOUSTON, Feb. 24, 2011 /PRNewswire** -- Dresser-Rand Group Inc. ("Dresser-Rand") (NYSE: DRC) announced today that Dresser-Rand Company has entered into a definitive agreement with Echogen Power Systems of Akron, Ohio under which Dresser-Rand will acquire a minority interest in Echogen as well as certain license and exclusive market rights to Echogen's technologies and intellectual property. Dresser-Rand's investment will be used to advance Echogen's technology development, including the design and construction of waste heat recovery systems utilizing turbo-expanders provided by Dresser-Rand.

Restricted

# EPS100 – Factory Qualification Testing @ D-R

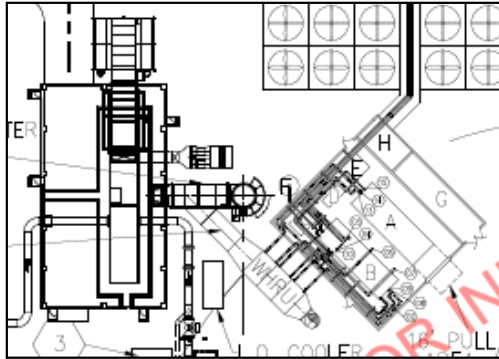


- Completed all Phases I-IV of testing
  - ▣ I : Validation of components
  - ▣ II: Full speed no load
  - ▣ III: Durability
  - ▣ IV: Partial load endurance test
- System control and stability fully demonstrated
- Component performances meet or exceed expectations
- Turbopump run to max conditions
- Generator speed control stability demonstrated
- Power turbine electrical output = 3.1 MWe max to date (gross nominal power = 8MW)
  - ▣ Limited by available heat on test stand
- 310 hours turbopump run time
- 150 hours power turbine run time

**Highest net power produced by any sCO<sub>2</sub> power cycle system globally**  
**Final step: Field deployment & operation**

# sCO<sub>2</sub> in Oil & Gas

## Midstream



## LNG

**Gastech**  
Conference & Exhibition  
Korea | KINTEX 1 | 24 - 27 March 2014

C. B. Meher-Homji, D. Messersmith, P. Pillai  
Bechtel Corporation

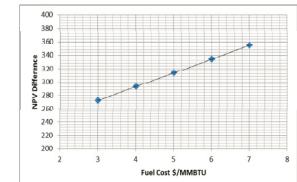
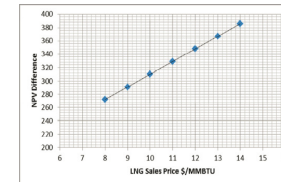


A NPV type analysis was conducted of the two scenarios-

- Case 1- Traditional power generation
- Case 2- Power generation using sCO<sub>2</sub>

The following assumptions were used:

- Life: 20 years
- Discount Rate: 10%
- LNG Cost FOB: 8\$/MMBTU
- Fuel Cost: 3\$/MMBTU
- Plant Availability: 95%
- CO<sub>2</sub> Emission Tax: \$40/tonne



Acknowledgements: We gratefully acknowledge the assistance of Dresser-Rand and Echogen Power Systems.

## Upstream Offshore



**Turnkey Solutions / Service Contracts / Project Developer Option**

## What Next: D-R's Industry Perspective

### **Deploy the available technology in the field for long-term operation... NOW!**

- Derisking stepped approach
- Get EPC firms even more involved (key Balance of Plant aspects)
- Learning about Operational Costs is almost as important as confirming Capital Costs

### **Balance support between short-term applications & long-term research vision**

- Funding mechanisms
- Quick-wins are critical to future broad deployment

### **Promote Build Own Operate Transfer models to facilitate introduction to the markets**

- Involvement from across the value chain
- End users' commitment to step up once the technology is demonstrated

### **Value Proposition, Value Proposition, Value Proposition!**

- Quantify advantages over alternative incumbent solutions
- Ability to back it up with real experience data => See above!

**sCO<sub>2</sub> is truly just around the corner!**

# Contact



**Thomas Soulas**  
Director Business Development  
Advanced Energy Systems

Houston, Texas, US

E-mail:

[tsoulas@dresser-rand.com](mailto:tsoulas@dresser-rand.com)

**Dresser-Rand.com**