RETECH2012

4th Annual Renewable Energy Technology Conference & Exhibition

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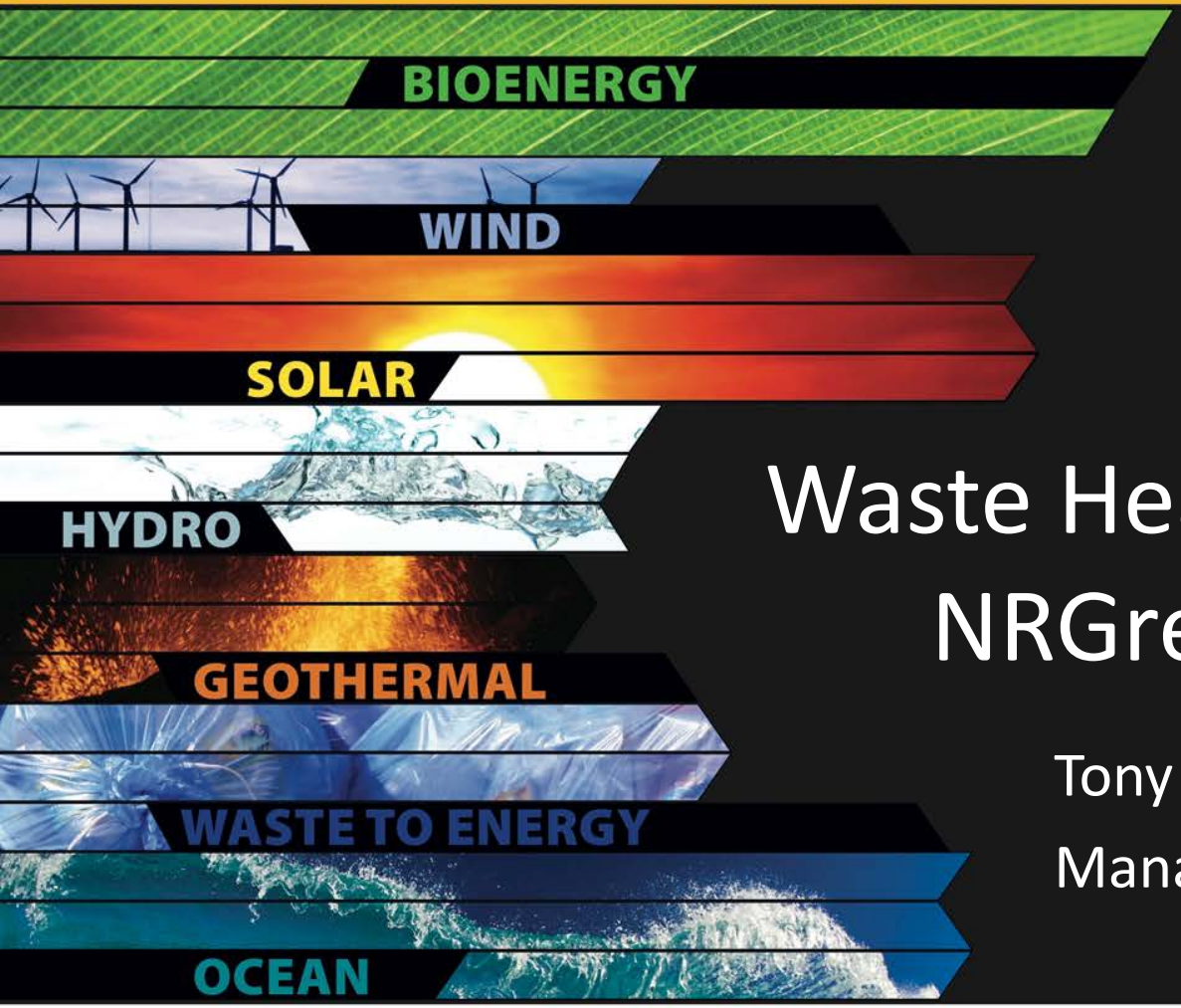


Waste Heat to Power at NRGreen Power

Tony Straquadine

Manager, Government Affairs

Overview – NRGreen Power

- NRGreen Power Limited Partnership is an Alliance Pipeline affiliate established in 2006
- Commercial development of waste heat electrical generation opportunities at Alliance Pipeline compressor stations

Successful Development

- Four existing facilities in Saskatchewan
- 5+ years of safe (no incident) operation at Kerrobert
- 3+ years safe (no incident) operation at Loreburn, Estlin, and Alameda
- Semi attended operation – ORMAT ORC technology
- Long-term PPA with SaskPower
- Maximum generating capacity @ 5.4 MW/hr per station

Successful Development (con't)

- Saskatchewan facilities are operated in accordance with our compliance strategy for safe operations
- NRGreen contracts staff from Alliance Pipeline
- Technicians are trained, qualified, and competent
- Gas Control Centre in Calgary provides 24/7/365 monitoring and remote shut down
- Operating practices and procedures, Management of Change and Integrity Program in place

New Initiatives – Alberta, Canada

- NRGreen announced plans for a new Recovered Energy Generation project in Alberta:
  - 1st global application of GE's innovative ORegen system
  - Designed to reliably **generate 14 Megawatts** of electricity per hour with no new emissions or incremental fuel
  - Project is funded in part from Alberta's Climate Change Emissions Management Corporation (CCEMC)
  - Projected in-service date: Q1 2013
- Deregulated market risk offset by PPA & CCEMC funding
- NEB precedent defines regulatory treatment

Future Opportunities

Alberta Projects: Whitecourt (14 MW)
Proposed: Irma (6 MW), Morinville (6 MW)

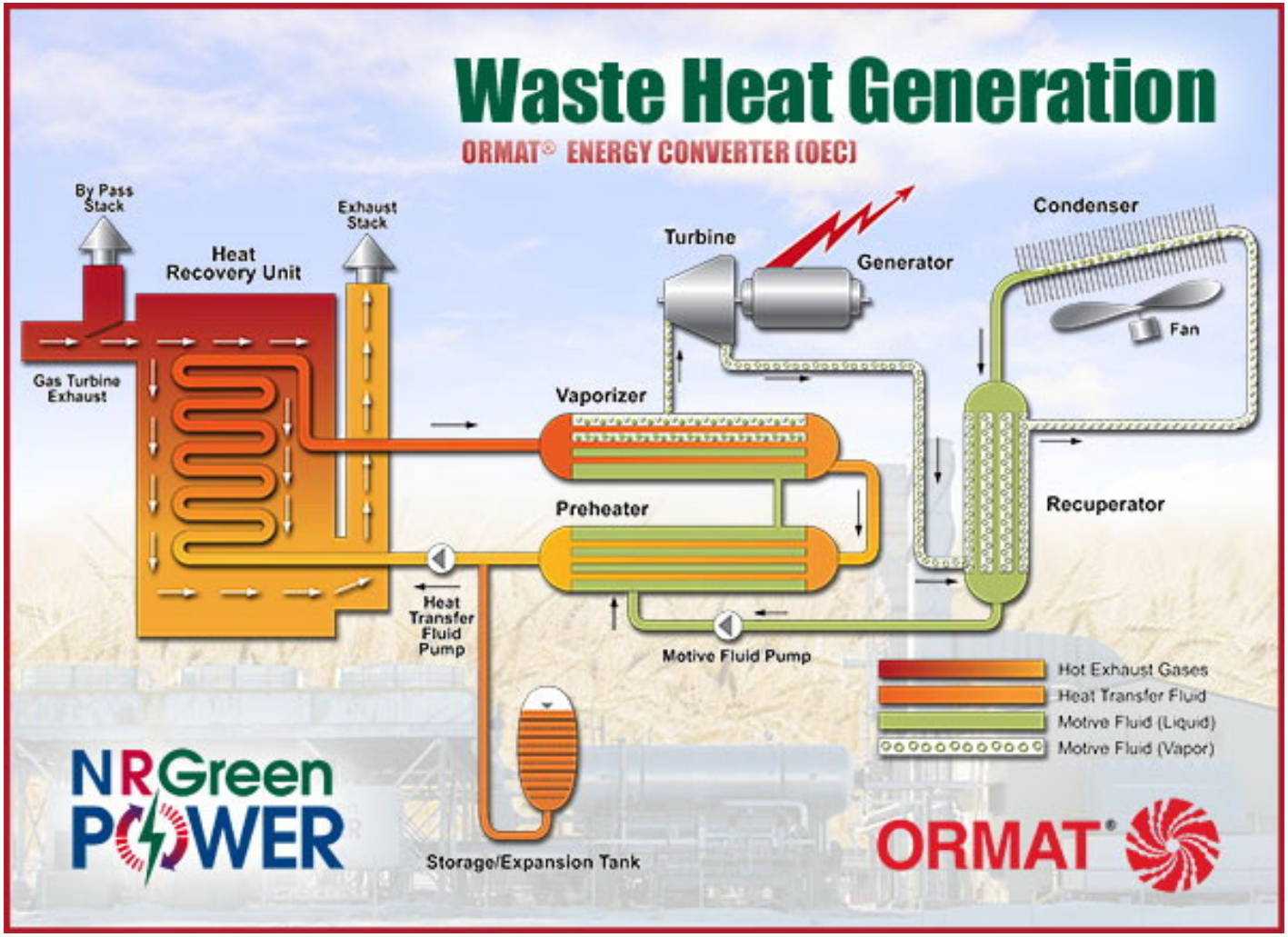
These projects will provide the following benefits:

- Create ~ 5 FTEs
- Produce 200,000 MWh of generation per year (~52,000 homes)
- Produce 110,000 tonnes of GHG Offsets per year
- Represents ~ $100 million of capital investment
- Produce no new GHG emissions and uses no water for operations

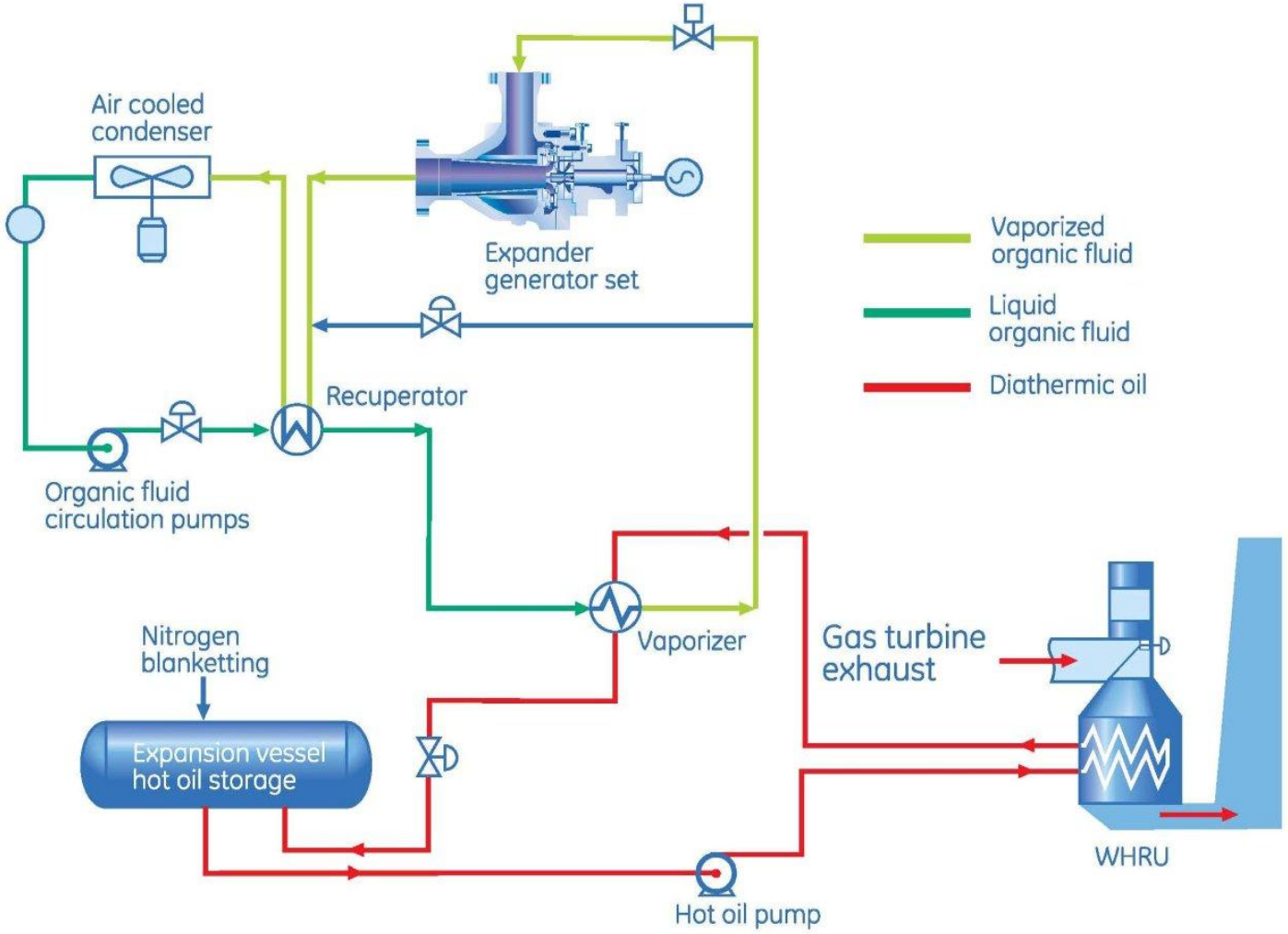
Waste Heat to Power Generation Process

- Innovative technology consists of two processes
- The 1st process loop captures waste heat from hot turbine exhaust using a heat exchanger that contains circulating thermal oil (DowTherm – Q), and a waste heat oil heater (WHOH)
- The 2nd process loop is the energy converter system that transfers the heat from the thermal oil to a circulating organic working fluid (nC5) through a series of heat exchangers using the Organic Rankine Cycle (ORC) process

Organic Rankin Cycle - Ormat



G.E. ORegen


Air cooled condenser
Expander generator set
Vaporized organic fluid
Liquid organic fluid
Diathermic oil
Recuperator
Organic fluid circulation pumps
Nitrogen blanketting
Vaporizer
Gas turbine exhaust
Expansion vessel hot oil storage
WHRU
Hot oil pump

NRGreen/Alliance Estlin, SK Facility

NRGreen/Alliance Kerrobert, SK Facility

U.S. Development Challenges

- Heat to Power applications are NOT on a level playing field with other emission-free power
- Perceived U.S. Regulatory uncertainties:
  - Allow for pipeline-related entities to develop projects outside of the current rate-base & rate of return
  - Clearly define Shipper 'hold-harmless' provisions
  - Consider developing a Waste Heat to Power Policy Statement
- Lack of demand for Heat to Power by Utilities

Closing

- NRGreen Power has a solid, safe and efficient operating history
- Advantages of NRGreen Power's Projects include:
  - Electricity generation that produces no new greenhouse gas emissions
    - Reliable source of power from pipeline compressors
  - Technology can be applied to existing industrial facilities and pipelines
- Requires Public Policy Support on the State / Federal levels to facilitate future development of Waste Heat to Power Projects in the U.S.

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