Clean

Reliable

Competitive

Integrated

Power Purchase Agreements & Other Innovative Approaches

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MAG Greening Water & Wastewater Infrastructure Workshop

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HDR

ONE COMPANY | *Many Solutions*®

Why are we here?

The character of a society is the cumulative result of the countless small actions, day in and day out, of millions of people.

- Duane Elgin

Our Goals

- Help you brainstorm where opportunities might exist
- Leave you with a better understanding of how to fund & finance a project
- Make the connections between your concepts and a completed project
- Describe the mechanisms for funding, and the advantages & pitfalls

Your Goals

Higher

Where does your organization fall on this continuum?

Lower

Choosing the Right Shade of "Green"

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What's Your Dream?

- Energy/Facility Audits
- In-pipe turbines
- Solar panels
  - Reservoirs
  - Floating on recharge basins
  - Landfills
- Wind and wave powered desalination
- Gas powered drivers for WTP pumping
- Solar thermal desalination with combined heat and power generation
- Small scale open-channel hydro power
- Fuel cell evaluations
- Cogeneration
- Biosolids to solid fuel (EnerTech process)
- Pumped storage for hydro power generation and for desalination
- Energy Service Companies
- FOG to biodiesel

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Wind Powered Desal – Large Scale

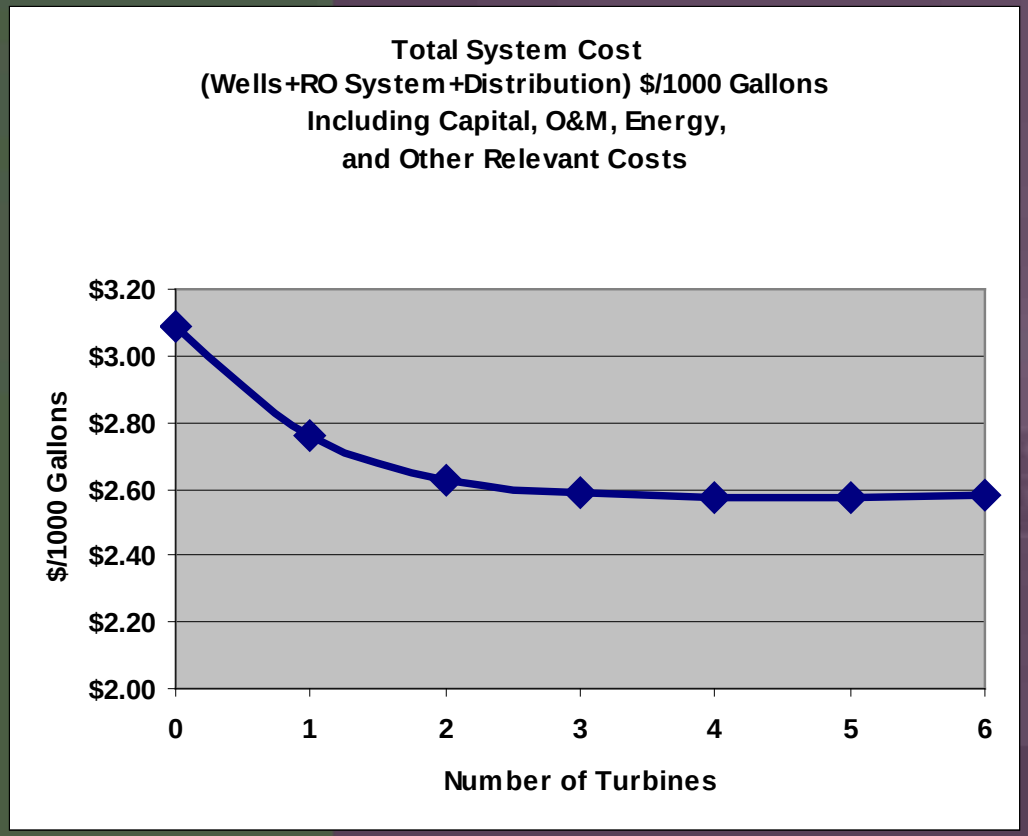
- Perth, Australia:
  - 10-20% reduction in rainfall in past 30 years
  - Needed new water source
  - Seawater Reverse Osmosis
  - 38 MGD: $324M (2006)
  - 82 MW detached wind farm provides renewable energy source on grid
    - Wind farm: 272 GWh/year
    - SWRO demand: 185 GW/year
  - ERI isobaric energy recovery devices

Costs

- Capital
  - Desalination Plant $324 million
  - Connecting System (IWSS) $63 million
  - Total $387 million
- Operating and Maintenance
  - Desalination and transfer pumps+ membranes$ 19 million/year
- Unit Costs
  - Total Unit Cost $ 1.16/kL
  - Fence Unit Cost $ 1.00/kL (US $0.75/kL)

Source: D&WR Quarterly, November / December, 2006

Wind Powered Desal – Small Scale



- 3 MGD; Seminole, TX
- 2000 ppm TDS feed water
- Santa Rosa formation, ~1200 feet deep
- Traditional energy use for water treatment with RO - $3.10/1000 gal
- Wind energy drives the cost down to $2.60/1000 gal

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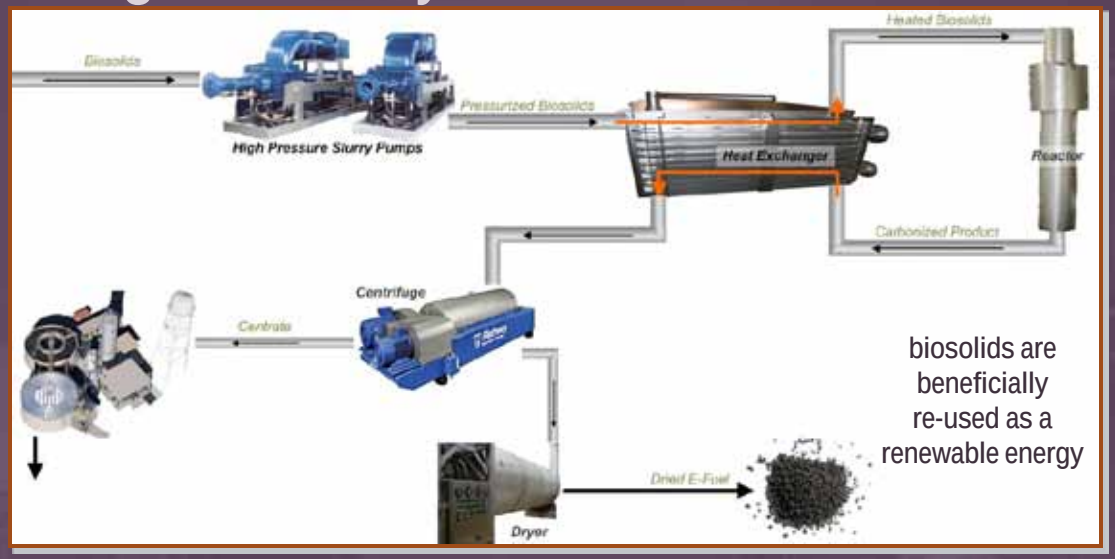
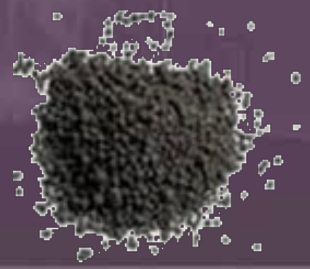
Source: Michael Hightower, Sandia National Labs

Managing Biosolids: SlurryCarb

A technology that applies heat and pressure to biosolids in order to improve their mechanical dewatering efficiency



The product E-Fuel is used as a replacement for fossil fuels such as coal



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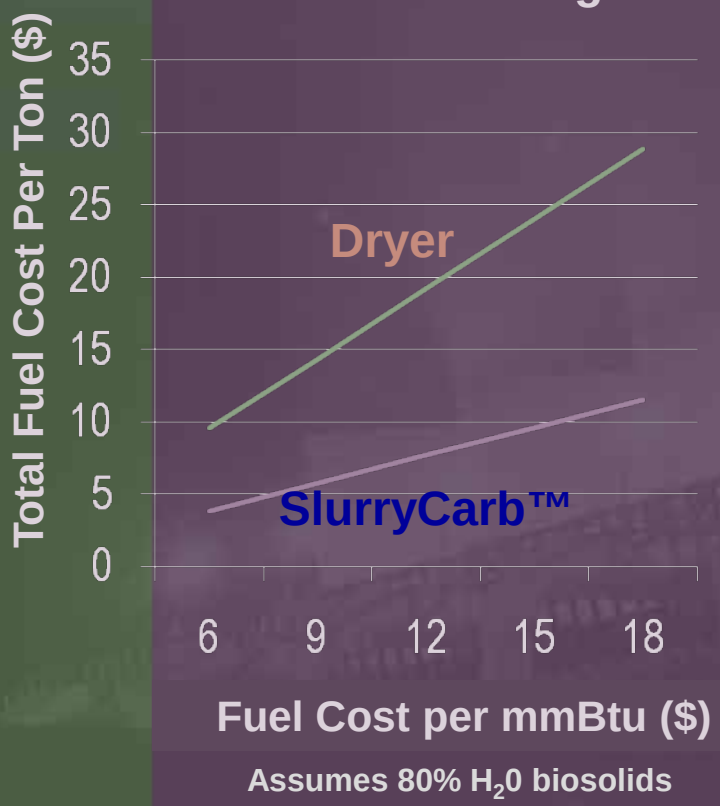
Managing Biosolids: SlurryCarb

Fuel Cost Savings



Assumes 80% H_20 biosolids

Energy Consumption

	H_2O Evaporated	Total Energy
Drying	80 tons	160,000,000 Btu
SlurryCarb	18 tons	64,000,000 Btu

Assumes 100 tons of biosolids at 80% H_20

- SlurryCarb™ process requires 60% less fuel per ton compared to a conventional dryer

FOG to Biodiesel

Lee County Biodiesel Processing Facility Design and Permitting Services, Florida

- HDR is providing design and permitting services for a 120,000-gallon-per-year B100 biodiesel processing facility.
- Fuel sources come from available waste vegetable oils and other potential feedstocks.
- The renewable fuel produced will be blended with petroleum diesel fuel used by the county's vehicle fleet in an effort to reduce air emissions.

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The Proper Steps

- Conceptualize
  - Have you performed a holistic audit/evaluation?
  - What resources do you have?
  - Where are your needs?
  - Opportunities to connect resources to needs?

The Right Steps

- Conceptualize
- Perform Feasibility Study
  - Where can I put it / do I have enough space?
  - What partners do I have / need?
  - What benefits are gained now? Later?
  - What's missing?
  - Understand and quantify the risks/rewards (SROI)
    - Quantify non-monetary elements
  - Determine the economics (TBL) of the solution independent of the funding & financing

The Right Steps

- Conceptualize
- Perform Feasibility Study
- Evaluate Funding & Finance Mechanisms
  - Inherent Cost Savings
    - Pay attention to effect on rate plans
    - Immediate savings may come from other part of solution
  - Federal & State Grants
  - Clean Renewable Energy Bonds (tax credit)
  - Qualified Energy Conservation Bonds (tax credit)
  - Low Cost Loans
  - Utility Credits
  - Power Purchase Agreements

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Power Purchase Agreement is Last…

- Power Purchase Agreement (PPA)
  - Power provider builds infrastructure and produces energy on host's site
  - Provider sells power to the host at a contract price for a term
  - Host may be able to purchase assets at end of term
- PPAs' finest hour may have come and gone
- Get's you "green", but may not be smartest long term move
- Mark Reader w/ Stone & Youngberg is here to tell you why…