The State of Water:
Why it is a great time to be in the business!
Agenda

- Introduction
- Future trends
- A couple quick examples
- What does it mean for the YP?
- Wrap up & Questions
What are you looking for?

- A small sample of YP’s provided the following:
  - Work that is not boring
  - Opportunities to learn new things
  - Some have desire to do good for the environment
  - Stability
  - Want to use what has been learned
Activated Sludge process discovered Late 1800’s
Many treatment plants only had primary treatment until late 1960’s
Secondary treatment boom – Clean Water Act, 1972
Has remained relatively unchanged since.
Focus always on meeting discharge permit conditions.
Water market driven by:

- Regulatory Requirements
- Energy/Cost
Market is also seeing an attitude shift

We need a cultural shift

Current: use water & energy once & dispose of it (tax payer costs)
Integrated Resource recovery (tax payer revenues)

Open linear system
Closed loop system

Dr. Nicholas Ashbolt, EPA
http://www.ecosanservices.org
Example 2: Urban Resource Recovery Center

The Urban Water Resource Recovery Center

- Sewage
- Primary Clarification or Filtration
- Low Energy Membrane for BOD and TDS removal
- Electricity
  - Methane
  - Efficient Electricity Generation
  - CO2
- Nutrient Removal and Recovery
- Optimized Anaerobic Digester
- Algae Conversion to Biodiesel
- Final Filter
- Biodiesel
- Brackish water for cooling, irrigation
- Fuel savings
- Inorganic Fertilizer

- Primary Revenue
  - Ultrapure water for industry makeup and aquifer recharge
  - Peak electricity sales to grid or local use

- Other Revenue
  - Urban waste disposal
  - Carbon credits
  - Sewage treatment fees

- Secondary Revenue
Plant is a hub not the end.
Innovative Urban Planning
In the field of industrial ecology, the waste outputs of one enterprise are converted into input resources for use by another enterprise. Industrial ecology is a form of biomimicry that aims to reduce the ecological footprint and recycle resources for water and materials.
What can be recovered?

- Water – Heat/Cooling, irrigation, water recharge, urban planning
- Nutrients – Phosphorus, nitrogen & carbon
- Energy – Liquid and solid
  - Biogas
  - Solids combustion (incineration, gasification, etc)
  - Hydraulic
Example 3: Only treat what has to be treated.

Figure 3: Source-separation options that start at the household (adapted from Ashbolt et al. 2006)
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Table 1 – Projected Revenue, Energy and O&M Costs for Trucked Waste Co-digestion

<table>
<thead>
<tr>
<th>Waste Source</th>
<th>Waste Volume</th>
<th>Projected Tipping Fees (Trucks per Week) ($/Year)</th>
<th>Projected Methane Gas Value ($/Year)</th>
<th>Projected O&amp;M Costs ($/Year)</th>
<th>Projected Net Benefit ($/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spent Barley</td>
<td>&lt;1</td>
<td>$5,000</td>
<td>$7,000</td>
<td>($12,000)</td>
<td>$1,000</td>
</tr>
<tr>
<td>Liquor Still Waste</td>
<td>&lt;1</td>
<td>$4,000</td>
<td>$11,000</td>
<td>($13,000)</td>
<td>$2,000</td>
</tr>
<tr>
<td>Meat Production Float</td>
<td>19</td>
<td>$200,000</td>
<td>$345,000</td>
<td>($300,000)</td>
<td>$245,000</td>
</tr>
<tr>
<td>Soft Drink Can Crushing Waste</td>
<td>1</td>
<td>$10,000</td>
<td>$9,000</td>
<td>($2,000)</td>
<td>$17,000</td>
</tr>
<tr>
<td>Mustard Production Waste</td>
<td>7</td>
<td>$73,000</td>
<td>$38,000</td>
<td>($40,000)</td>
<td>$71,000</td>
</tr>
<tr>
<td>Noodles and Rice Production Waste</td>
<td>1</td>
<td>$10,000</td>
<td>$39,000</td>
<td>($35,000)</td>
<td>$14,000</td>
</tr>
<tr>
<td>Brewing Malt</td>
<td>&lt;1</td>
<td>$5,000</td>
<td>$6,000</td>
<td>($5,000)</td>
<td>$6,000</td>
</tr>
<tr>
<td>Dairy Acid Whey and Lactose</td>
<td>14</td>
<td>$147,000</td>
<td>$200,000</td>
<td>($55,000)</td>
<td>$292,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>45</strong></td>
<td><strong>$450,000</strong></td>
<td><strong>$650,000</strong></td>
<td><strong>($460,000)</strong></td>
<td><strong>$640,000</strong></td>
</tr>
</tbody>
</table>
Energy producer?

Figure 1: European Wastewater treatment plant
Energy Data
August 2003 to December 2006
Production vs. Consumption

FIGURE 6-1
Process Flow Diagram for the Selected Alternative: Digestion with Thermal Processing and Electrical Generation

Key
Blue Shading:          Unit process
Green Shading:         Recoverable
Orange Shading:        Disposal

Copied from Green Bay Metropolitan Sewerage District, 2011, Solids Management Plan - Final
GreenWhey Project – Waste to energy

Regional Waste to Energy Project

**Project Highlights**

- Over 300,000 gal of high strength wastes from over 10 food processing facilities
- Generate 3.2 MW of electricity
- Generate 362 million BTU per day heat
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Future of Wastewater Treatment

- Shift toward recovery & reuse
- Shift toward centering treatment as a hub
- Discharge permit is important but other factors are also important
- Public/Private partnerships are important (i.e. urban ecology).
What does this mean for you?

- Recall what you are looking for?
  - Work that is not boring
  - Opportunities to learn new things
  - Some have desire to do good for the environment
  - Stability
  - Want to use what has been learned
What does the future look like?
- Full of promise
- Providing opportunities to make a difference

What do you want to do?
Have I convinced you that it is a great business to be in?
Questions?

Thank You!

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