Oakdale Renewable Energy Plant
Getting Ahead of the Curve
Oakdale Renewable Energy Plant
Vision

Provide 100% of the Electrical Power, Heating and Cooling to the Oakdale Campus from Renewable Sources
Oakdale Campus Growth

- State Hygienic Lab
- UI/UIHC Data Center
- Library High Density Archive Facility
- Engineering Research Building/Wave Basin
- Oakdale Environmental Management Facility
Oakdale Campus
Projected Total Campus Load to 2012

- Electrical Power  5.5 MWe
- Steam Load       24.5 K LBS/Hr
- Cooling Load     3.3 K Tons

Peak Loads based on current master plan.
Oakdale Renewable Energy Plant Goals

- Provide Safe, Reliable, Cost Effective Utilities
- Provide Educational and Research Opportunities for Students and Faculty
- Develop Reproducible Commercial Models
Oakdale Renewable Energy Plant Goals

- Maintain a Leadership Role in Renewable Energy Implementation
- Reduce Greenhouse Gas Emissions
- Develop and Maintain Strategic Partnerships (Commercial, Utility, Educational, Facilities)
Oakdale Renewable Energy Plant

- Other Biogas Sources
- City of Iowa City Landfill Gas
- OREP
- Campus Electric
- Campus Thermal Energy Steam & Hot Water Load
- Export excess electric to grid
OREP Concept

Trigeneration with renewable fuel maximizes system efficiency and minimizes greenhouse gas footprint.
Biogas Pipeline Benefits

- Enables use of lower cost landfill gas
- Provides UI purchased energy savings
- Provides City of Iowa City revenue stream
- Public/private partnerships possible with digester and gasifier supplying additional biogas to OREP
Oakdale Renewable Energy Plant

Landfill Gas Pipeline
- 1 to 4 MWe Equivalent Gas Available from Iowa City Landfill
- 2.8 to 3.2 MWe Generating Capacity installed 2009

Anaerobic Digester Gas
- Compatible with Landfill Gas and Natural Gas Fueled Engine/Generator
- Sized to Meet Energy Demand
Oakdale Renewable Energy Plant

Syngas Gasification

- Made from Numerous Biomass Feedstocks
- Operating in Europe (Guessing, Austria) for 7 Years
- Requires Additional Processing to be Compatible with Natural Gas, Landfill Gas or Digester Gas in Engine Generator
Oakdale Renewable Energy Plant
Improve **Reliability** of the District Energy Systems

- Underground Electrical Utilities
- Direct tie to 69 KV Transmission
- Loop feed to vital buildings
- Increase to 13.8 KV Distribution
Oakdale Renewable Energy Plant

Improve **Efficiency** of the District Energy Systems

- Install Base Load Electric Generation with Heat Recovery
- Cogenerate Hot Water Heating for New Facility
- Evaluate Upgrade to Hot Water Heating for Existing Facilities
- Utilize Adsorption Chillers to Optimize Chilled water System Efficiency
Oakdale Renewable Energy Plant

Install Generation Capacity

- Back-up Power for Hygienic Lab and Data Center
- Primary “Green” Generation Capacity
- Reduce or Eliminate Natural Gas Dependency
- Reduce Purchased Electric Costs
- Market “Green” Power to the Electrical Grid
- Provide Combined Heat and Power Capability to Improve Efficiency
Oakdale Renewable Energy Plant
Adsorption Chiller

Advantages

- Utilizes Low Grade Heat Recovered from Electrical Engine/Generators that would otherwise be wasted
- Can be Installed in Phases and in Smaller Increments (Satellite Plants)
- Reduces Chilled Water Distribution Piping Required.
- Reduces Electrical Load Demand
# Oakdale Renewable Energy Plant

Schedule to Meet 2012 Demand

<table>
<thead>
<tr>
<th>Year</th>
<th>Elect Distribution</th>
<th>Back-up Elect Eng 1&amp;2</th>
<th>Landfill Gas Pipeline</th>
<th>Biogas Elect Gen</th>
<th>Mechanical Distribution</th>
<th>Chiller Water System</th>
<th>Syngas Elect Gen</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Vision Realized

- Renewable energy plant at Oakdale (OREP)
- Increased use of renewable energy on UI Main Campus
- Effective utilization of local by-products and waste streams to produce energy
- Decreased dependency on out-of-state energy and fuel sources
- Increased energy security for UI
- Successful model for other universities, industrial complexes, and communities
- Position the UI as a Center for Bio power research and training
Oakdale Renewable Energy Plant

Questions?