Assistant Secretary Indian Affairs
Office of Indian Energy and Economic Development

Renewable Energy Program

Department of Energy
Tribal Energy Program Review
October 25 to 29, 2010
Acting Director, Stephen Manydeeds
Stephen.Manydeeds@bia.gov
Office of Indian Energy and Economic Development (OIEED) seeks to spur job growth and sustainable economies on American Indian reservations.
OFFICE OF INDIAN ENERGY AND ECONOMIC DEVELOPMENT (OIEED)
OIEED BUSINESS MODEL
## Indian Trust Lands Renewable Energy Potential

<table>
<thead>
<tr>
<th>Resource</th>
<th>Number of Reservations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>60</td>
</tr>
<tr>
<td>Woody Biomass</td>
<td>179</td>
</tr>
<tr>
<td>Waste to Energy Biomass</td>
<td>223</td>
</tr>
<tr>
<td>Geothermal Electric</td>
<td>60</td>
</tr>
<tr>
<td>Geothermal Heat</td>
<td>267</td>
</tr>
<tr>
<td>Hydroelectric*</td>
<td>6</td>
</tr>
<tr>
<td>Compressed Earth Blocks*</td>
<td>3</td>
</tr>
<tr>
<td>Solar**</td>
<td>All</td>
</tr>
</tbody>
</table>

*Known to DEMD

**Available everywhere
DEMD

RENEWABLE ENERGY PROJECTS

47 Projects

- Wind – 8
- Solar – 5
- Geothermal
  - High temp – 5
  - Low/med temp – 2
- Hydroelectric – 9
- Tidal – 1

- Biomass
  - Woody – 4
  - Waste – 7
- Compressed Earth Blocks – 2
- Multiple Resource review – 4
## EMDP 2010 Renewable Projects

**23 Renewable Energy Projects funded, totaling $4.57 million**

<table>
<thead>
<tr>
<th>Tribe</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campo Band of Mission Indians</td>
<td>Wind</td>
</tr>
<tr>
<td>Catawba</td>
<td>Solar</td>
</tr>
<tr>
<td>Chemehuevi</td>
<td>Solar</td>
</tr>
<tr>
<td>Cherokee</td>
<td>Hydroelectric</td>
</tr>
<tr>
<td>Colville Confederated Tribes</td>
<td>Woody Biomass</td>
</tr>
<tr>
<td>Duckwater Shoshone</td>
<td>Multiple</td>
</tr>
<tr>
<td>Fond du Lac</td>
<td>Woody Biomass</td>
</tr>
<tr>
<td>Fond du Lac</td>
<td>Waste to Energy</td>
</tr>
<tr>
<td>Hoopa Valley</td>
<td>Hydroelectric</td>
</tr>
<tr>
<td>Hualapai</td>
<td>Solar</td>
</tr>
<tr>
<td>Iowa Tribe of Oklahoma</td>
<td>Wind</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tribe</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroostook Band of Micmacs</td>
<td>Multiple</td>
</tr>
<tr>
<td>Nez Perce</td>
<td>Waste to Energy</td>
</tr>
<tr>
<td>Oneida</td>
<td>Waste to Energy</td>
</tr>
<tr>
<td>Paskenta Band of Nomlaki</td>
<td>Woody Biomass</td>
</tr>
<tr>
<td>Paskenta Band of Nomlaki</td>
<td>Waste to Energy</td>
</tr>
<tr>
<td>Passamaquoddy</td>
<td>Waste to Energy</td>
</tr>
<tr>
<td>Penobscot</td>
<td>Multiple</td>
</tr>
<tr>
<td>Forest County Potawatomi</td>
<td>Woody Biomass</td>
</tr>
<tr>
<td>Chippewa Cree</td>
<td>Hydroelectric</td>
</tr>
<tr>
<td>Ute Mountain Ute</td>
<td>Solar</td>
</tr>
<tr>
<td>Winnebago</td>
<td>Wind</td>
</tr>
<tr>
<td>Yakama</td>
<td>Hydroelectric</td>
</tr>
</tbody>
</table>
Grouped by main function -

- Community Scale (Small Scale)
  - Saving energy/money

- Industrial Scale (Medium Scale)
  - Use directly
  - Added Value
  - Job creation

- Utility Scale (Large Scale)
  - Energy sales
**Community Scale (Small Scale)**

- Local
- Offset energy
  - Net metering
- Money saver
- Limited jobs
- DEMD focus:
  - Compressed Earth Blocks
  - Ground source heat pumps (geothermal)
Crow CEB Project
Incorporation of GSHP

Other design aspects:
- Structural Insulated Panels, Thermally Efficient Windows and Doors

Tribe partnered with OIEED’s DEMD and CU-Boulder

### Construction Type

- **Mobile**
  - Elect Furnace (kWh/10)
  - Propane Furnace (gal)
  - Heat Pump (kWh/10)

- **Framed**
  - Elect Furnace (kWh/10)
  - Propane Furnace (gal)

- **Proposed CEB**
  - Elect Furnace (kWh/10)
  - Propane Furnace (gal)
  - Heat Pump (kWh/10)

### Heating Value of Fuel

- **Natural Gas** 1,000 btu/ft³
- **Propane** 71 kBtu/gal
- **Fuel Oil #2** 115 kBtu/gal

### Annual Heating Costs

- **$0**
- **$200**
- **$400**
- **$600**
- **$800**
- **$1,000**
- **$1,200**
- **$1,400**
- **$1,600**
- **$1,800**
Industrial Scale (Medium Scale)

- Manufacturing industry would bring jobs to the Reservation
- Industry needs:
  - Inexpensive, steady electricity
  - Labor force
  - Land
- DEMD focus:
  - Biomass (woody and waste), geothermal (electric and direct heat), hydroelectric
  - Projects that have similar vision
Input parameters

- 20 MW facility
- Capital cost - $ 83 MM
  - $4150 / MW
- 20% Equity
- Green tags - $0.02/kWh
- Tribal – No Fed/State taxes, no tax credits
- Current average residential electric rate - $0.97/kWh
## Industrial Scale Biomass Economics

### Taxed business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06</td>
<td>-</td>
<td>-</td>
<td>(43)</td>
</tr>
<tr>
<td>0.10</td>
<td>13.1</td>
<td>11.4</td>
<td>(1)</td>
</tr>
<tr>
<td>0.14</td>
<td>2.5</td>
<td>50.8</td>
<td>31</td>
</tr>
</tbody>
</table>

### Tribal business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06</td>
<td>-</td>
<td>-</td>
<td>(78)</td>
</tr>
<tr>
<td>0.10</td>
<td>-</td>
<td>-</td>
<td>(34)</td>
</tr>
<tr>
<td>0.14</td>
<td>11.2</td>
<td>17.5</td>
<td>11</td>
</tr>
</tbody>
</table>
**INDUSTRIAL SCALE WASTE TO ENERGY ECONOMICS**

- **Input parameters**
  - 30 MW facility
    - $5,333 / MW
  - Capital cost - $160 MM
  - Tipping fee – $35/ton
  - 20% Equity
  - Green tags - $0.02/kWh
  - Current avg. residential rate - $0.097/kWh
  - Tribal – No Fed/State taxes, no tax credits
## Industrial Scale Waste to Energy Economics

### Taxed business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.04</td>
<td>19.8</td>
<td>0.4</td>
<td>(12)</td>
</tr>
<tr>
<td>0.06</td>
<td>8.2</td>
<td>25.2</td>
<td>9</td>
</tr>
<tr>
<td>0.08</td>
<td>1.7</td>
<td>47.3</td>
<td>27</td>
</tr>
</tbody>
</table>

### Tribal business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.04</td>
<td>17.0</td>
<td>2.7</td>
<td>(17)</td>
</tr>
<tr>
<td>0.06</td>
<td>6.3</td>
<td>18.7</td>
<td>16</td>
</tr>
<tr>
<td>0.08</td>
<td>4.1</td>
<td>32.5</td>
<td>30</td>
</tr>
</tbody>
</table>
INDUSTRIAL SCALE

DEMD Assistance

- Resource determination
- Marketing brochure development
  - Currently – Oneida, Colville, Fond du Lac, Metlakatla
- Connect a Tribe with a company that fits the Tribe’s business model
Oneida Nation Energy Recovery Facility

- Oneida Seven Generations Corporation
- 5 MW power plant,
  - 150 tons/day MSW
  - Potential to expand to 20 MW
- Pyrolysis/Gasification
- Recycling
- 30 Full time jobs
- Break ground this fall
Oneida Energy Recovery Facility
OIEED Assistance

- EMDP Funding
  Division of Energy & Mineral Development

- Brochure Development
  Division of Energy & Mineral Development
  And
  Division of Economic Development

- Guaranteed Loan
  Division of Capital Investment
**Business Advantages**

- Located adjacent to the Green Bay metropolitan area
- There is an international seaport within 6 miles that serves domestic and foreign trade
- Close proximity to airport and rail lines
- Easy highway access corridors to Milwaukee, Chicago, Minneapolis, and beyond
- Significant tax advantages
- History of successful business endeavors
- Labor force available

Oneida Business Park
UTILITY SCALE (LARGE SCALE)

- Power plant
- Produce and sell electricity
- Makes money
- Limited jobs
- DEMD focus:
  - Wind Atlas
    - Potential Wind Forums
    - Current Projects in negotiations
  - Solar Atlas
UTILITY SCALE WIND ECONOMICS

Input parameters

- 150 MW facility
- Capital cost - $375 MM
  - $2500 / MW – (with eff. $7500 / MW)
- Replacement Costs (yr 15) – $188 MM
- 20% Equity
- Green tags - $0.02/KWh
- Current avg. residential rate - $0.097/KWh
- Tribal – No Fed/State taxes, no tax credits
- 33% capacity factor
## Utility Scale Wind Economics

### Taxed business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>14.4</td>
<td>-</td>
<td>(54)</td>
</tr>
<tr>
<td>0.12</td>
<td>12.1</td>
<td>5.7</td>
<td>(16)</td>
</tr>
<tr>
<td>0.15</td>
<td>2.9</td>
<td>25.0</td>
<td>36</td>
</tr>
</tbody>
</table>

### Tribal business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>-</td>
<td>-</td>
<td>(100)</td>
</tr>
<tr>
<td>0.12</td>
<td>13.8</td>
<td>4.0</td>
<td>(52)</td>
</tr>
<tr>
<td>0.15</td>
<td>11.2</td>
<td>14.9</td>
<td>19</td>
</tr>
</tbody>
</table>
Input parameters

- 3.5 MW facility
- Capital cost - $23 MM
  - $6571 / MW
- Replacement Costs (yr 15) – $4.6MM
- 20% Equity
- Green tags - $0.02/kWh
- Current avg. residential rate - $0.097/kWh
- Tribal – No Fed/State taxes, no tax credits
- 16% efficient
# Utility Scale Solar Economics

## Taxed business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>-</td>
<td>-</td>
<td>(8)</td>
</tr>
<tr>
<td>0.30</td>
<td>18.7</td>
<td>1.5</td>
<td>(4)</td>
</tr>
<tr>
<td>0.50</td>
<td>3.9</td>
<td>20.2</td>
<td>2</td>
</tr>
</tbody>
</table>

## Tribal business

<table>
<thead>
<tr>
<th>Electricity $/kWh</th>
<th>Payback Yrs</th>
<th>ROR %</th>
<th>NPV @12% $ MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>-</td>
<td>-</td>
<td>(11)</td>
</tr>
<tr>
<td>0.30</td>
<td>-</td>
<td>-</td>
<td>(7)</td>
</tr>
<tr>
<td>0.50</td>
<td>11.8</td>
<td>13.7</td>
<td>1</td>
</tr>
</tbody>
</table>
Objective: Assist Tribes in the promotion of Indian lands for commercial wind development.

Class 3 and higher NREL wind data overlaying Indian Reservation lands.
Native American Wind Resource Atlas

Included Information

- General text on the Reservation and Tribe
- Publicly available
  - Reservation boundary
  - Wind resource
  - Existing transmission lines
  - Digital elevation model
  - Location map
  - Contact information
- Proprietary
  - Only included at the request of the Tribe
  - Project specific information
Washington International Renewable Energy Conference
- March 2008
- 246 exhibitors, 5,000 registrants

Wind Power 2008
- June 2008
- 776 exhibitors, 13,000 registrants

RETECH Conference
- February 2009
- 140 exhibitors, 3,000 registrants

Wind Power 2009
- May 2009
- 1,280 exhibitors, 23,000 registrants

Wind Power 2010
- May 2010
- 1,400 exhibitors, 20,000 registrants
Tribal representatives present their ideas on an ideal partnership

Commercial wind developers present information on their company and initial plans for development in a one-on-one setting with Tribal representatives

DEMD aids Tribe with development of commercial wind prospectus and supplementary maps
Winter Jojola-Talburt
winter.jojola-talburt@bia.gov

Roger Knight
roger.knight@bia.gov