ALTERNATIVE ENERGY PROJECTS: SOLAR FURNACES AND WIND

Brandy Toft, Air Quality Specialist
LEECH LAKE BAND OF OJIBWE
Leech Lake Reservation

Rural community in North Central Minnesota

864,158 acres, over half is water/wetlands

260 miles of rivers/streams

270 fishable lakes, 40 wildrice lakes

Serving 12,000 in 11 communities
Leech Lake Reservation

Wood Products

Waste incinerator

Largest MN Coal EGU

Great Lakes Comp Station

Wood products

Paper mill

Coal EGU

Leech Lake Reservation

Former 2PM 2.5 Minivols

Wood Products

St. Regis Site

Cass Lake Middle School

Chatfield Site

Northern Lights

Proposed 50 meter Anemometer

-Meteorological Station
-PM 2.5 FRM Colocated
-Mercury Monitor
-Dioxin Monitor (background level)
-20 meter Anemometer
HOW DO WE REDUCE OUR CONSUMPTION; BECOME MORE SUSTAINABLE???
Minnesota has similar number of sun days as Houston, Texas 4.5 vs. 4.3 peak sun hours
4500 watt hours/sq meter or 4.5 KWH per day

GREAT but...

- How do we make it affordable?
- How do we make it not so technical?
BENEFITS OF SOLAR HEAT

- Long-term solution fostering self-reliance
- Ending public energy program dependency
- Clean technology
- Promotes national security
- Hedge against energy insecurity
- Social Justice and Environmental Issues addressed with the Same Dollars!
- Payback in an average of 17 years vs fossil fuels from LIHEAP averaging
EFFICIENCY BEFORE RENEWABLES

Conventional

Efficient

Integrated efficiency & renewable

Large price tag!

Conventional energy use

Renewable energy use
Leech Lake’s Pilot Project

- Study the effectiveness of solar air heating systems.
- Reduce CO2 emissions and emissions of other energy production pollutants (Hg, NO\textsubscript{x}, etc...).
- Improve indoor air quality.
- Establish a system and knowledge base for project replication.
- Increase the economic security of 8 low-income families.
Leech Lake’s Pilot Project

- Reduce the amount of resources leaving the Reservation to pay for fossil fuels.
- Prepare a workforce for the green jobs industry and create green jobs on Leech Lake Reservation.
- Train 12 Leech Lake Staff to install solar furnaces.
- Reduce the Tribal Government and taxpayer burden for Heating Assistance.
PROJECT PARTICIPANTS

- Meet the criteria for Leech Lake Tribal or Minnesota’s Heating Assistance Program;
- Must be weatherized;
- Sufficient space on a southern facing wall;
- Minimal shading of the collectors;
- Embrace the idea of using solar to offset heating load;
- Priority to families with sensitivity to air quality.
RURAL RENEWABLE ENERGY ALLIANCE

- Striving to address rural poverty with solar heat, foster energy security, reduce greenhouse gas emissions and break down the financial and informational barriers to the widespread use of solar energy.

- Society is at risk of developing a renewable divide where the more affluent communities will have greater access to solar energy.
SOLAR FURNACES

- Last 25-50 years
- Produce 8-9 BTUs annually
To date, RREAL installations have generated:

- BTUs: 497,579,023
- KWHs: 678,253

of clean, renewable solar energy!
“PRICE TAG”

$50,000
WIND ENERGY

LEECH LAKE’S WIND STUDY
LEECH LAKE WIND STUDY

- 20 and 50 meter studies
- Turbidity a large factor due to trees
- Modeled three locations on Reservation
  - Location on Tribal land
  - Be near a large load meter
  - Size turbine to load
50 meters  2 anemometers, 1 wind vane

40 meters  anemometers, wind vane

30 meters  anemometer

50 m = 164 feet

6 sets of guy wires 4 wires per set

Datalogger and temperature probe

Northern Lights Casino
ENERGY USAGE VS. TURBINE SIZE

Figure 18. Monthly Electricity Consumption by Facility vs. Monthly Electricity Production by Turbine

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Utility</th>
<th>Net Metering Rate</th>
<th>Retail Rate</th>
<th>Buy-back Rate</th>
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</thead>
<tbody>
<tr>
<td>Bug-O-Nay-Ge-Shig</td>
<td>Lake Country</td>
<td>$0.047 (same as facility rate)</td>
<td>$0.047</td>
<td>** $0.04</td>
</tr>
</tbody>
</table>
GREEN TEAM

- Team of 10 Leech Lake Staff
  + Strive to reduce and conserve
  + Find unique opportunities for Leech Lake
  + EDUCATE!!!
  + Research other opportunities and partnerships

- Continue with Solar Furnace and Wind projects
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