Eastern Band of Cherokee Indians

Strategic Energy Plan

Funded By: Department of Energy

Technical Support: SCIES at Clemson University

Project Manager – Damon Lambert
Eastern Band of Cherokee Indians
Technical Support – Robert Leitner
Associate Director
South Carolina Institute for Energy Studies –
Clemson University
EBCI Tribal Government

- Three-branch Government
- There are over 13,725 enrolled members of the Tribe today
- 8,200+ members live on the land held in trust for the ECBI by the US government called the “Qualla Boundary”
- 52 tracts totaling 56,688 acres in 5 NC counties
- Bordered by the Great Smoky Mountains National Park
Project Overview

• Strategic Energy Plan
  – Identify renewable energy and energy efficiency alternatives available on the Qualla Boundary
  – Assess the benefits and costs of each alternative
  – Create a strategic plan for the development and implementation of the selected alternatives
Project Location

- The home of the Eastern Band today is the 56,698-acre Qualla Boundary in Western North Carolina adjacent to the Great Smoky Mountains National Park.
Legend

- RESERVATION_BOUNDARY
- GSMNP_BOUNDARY
- BRPV_BOUNDARY
- COUNTY_BOUNDARY

Project Location, cont.
Project Participants

- Sub consultant and Energy Committee
  - Energy Committee: Staff from CDOT, Planning and Development, Environmental Department, Executive Office, GIS Department, and Directors of Finance and Natural Resources and Construction
- Tribal Council and Business Committee
Project Participants, cont.

• Generations Qualla
Objectives

- Analyze all available energy production and conservation options.
- Complete Strategic Energy Plan with a list of ‘next steps’
- Have The Executive office and Tribal Council adopt the plan.
- Begin implementation of the next steps
Demographics

- Qualla Boundary population: 8,092 (US Census, 2000)
- Population within 50-mile radius (the distance to Asheville) approximately 350,000
- Largest area employer is Harrah’s Cherokee Casino and Hotel which employs 1,830
  - Largest employer in NC west of Asheville
- EBCI Tribal Government employs over 1,000
- Other major employers:
  - Cherokee Indian Hospital: 236 employees
  - Cherokee Boys Club: 620 employees
Cherokee: A Major Tourist Destination

- A gateway to both the Blue Ridge Parkway and the Great Smoky Mountains National Park – two of the top three most visited recreation areas in the United States
  - 2,267,625 visitors at Cherokee entrance to GSMNP
  - Over 536,000 visitors from the Blue Ridge Parkway
- Over 3.6 million visitors to Harrah’s Cherokee Casino
- Over 1,460,000 overnight visitors on the Qualla Boundary in 2006 (76,394 campsite nights, 507,545 hotel/motel nights*)
- 2,489 hotel/motel rooms and 2,106 campsites are available on the Qualla Boundary

(Source: National Park Service, NC Department of Transportation, and Blue Ridge Parkway)
Processes for Plan Formulation

• Information Gathering
  - Very difficult and time consuming
  - Information was very informative
  - Had to project information to fill in the gaps
  - Outside Agencies can be an asset or detriment

• Analysis
  - Results may be surprising
  - Example: EBCI spent over $1 million in Electricity, and $1 million in vehicle fuel*

• Projections/Results
• Action Steps

*Gov. expenses, tribal enterprises not included.
Energy Project Selection Criteria

• Four criteria established in the Tribe’s Comprehensive Economic Development Strategy were used to assess each energy alternative
  – Consistency with community values, goals and plans
  – Community impact
  – Readiness to proceed
  – Management capacity
Preliminary Findings – Wind Energy

- Two potential sites
- Both sites owned by Tribal government
- Site 1 is away from tourist areas
- Site 2 borders the Blue Ridge Parkway
Site Topography & Dominant Wind Direction

Site 1

Site 2
Wind Results and Recommendations

- **Site 1** - Analysis for 8 1.5 MW turbines predicts 40% capacity factor. This site is recommended for feasibility study.
- **Site 2** - Not recommended due to lower predicted capacity factor (30%) and proximity to the Blue Ridge Parkway.
- A 3rd site was identified and recommended for initial screening.
Preliminary Findings – Solar/Biomass

Eliminated due to:

• High cost
• Lack of adequate resource
• Lack of land / topography
Preliminary Findings - Municipal Solid Waste (MSW) to Energy

- Proven technology
  - Currently 89 facilities in the US with a capacity of 2700 MW
- Current situation
  - Tribe collects MSW on the Boundary and for surrounding counties
  - 3 tractor trailers are used to haul 60 tons per day to landfill in GA
  - Tipping fees paid
- Given avoided cost potential + revenue from electricity generation, does MSW-to-Energy make sense?

Results
- Cost savings ($840K/yr) and electricity sales income ($0.6-1.2 M/yr) outweighed by capital ($9M) and operating costs ($1.2M/yr)
- Not recommended
Municipal Waste Water to Energy

Proven technology
• 22% of MWW plants in US use anaerobic digestion
• 266 plants convert gas to power

Current situation
• Tribe operates 1.8 MGD waste water treatment facility
• One of the top three consumers of electric power
• Existing facility not conducive to energy production
  – Uses aerobic processing
  – Too small
• However, the Tribe has plans to install a 5.5 MGD facility in the near future
  – 126 KW power
  – 192 KW of excess heat

Recommendation
Given the small additional cost of a CHP unit, this project was recommended for further study
Biodiesel from Waste Oil & Grease

- Tribe is located in a high tourist area
  - 1,100 food service establishments within 50 miles of Cherokee
  - Phone survey of 30% of restaurants in 3 counties used to estimate available supply
    - Total – 14,500 gal/month
    - Possible – 8,700 gal/month
  - Tribe currently uses 270,000 gal of diesel per year
    - 22,500 gal/month
    - 4,500 gal of B100 required for B20 blend
    - Can meet Tribe’s need + external sales

- Cost analysis underway
- Recommendation TBD based on cost analysis
  - Appears positive at this time
Preliminary Findings - Hydropower

4 sites surveyed based on DOE Virtual Hydropower Prospector website

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<thead>
<tr>
<th>Site</th>
<th>Power (MW)</th>
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<tbody>
<tr>
<td>1</td>
<td>0.61</td>
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<tr>
<td>2</td>
<td>0.13</td>
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<tr>
<td>3</td>
<td>0.13</td>
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<tr>
<td>4</td>
<td>0.10</td>
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</table>
Hydropower Assessment Process/Results

• Analysis performed using
  – Flow data from VHP website and NCDNR
  – RETSCREEN hydropower cost model

• Site visits

• Results – No sites recommended due to cost and impacts on other uses
  – Gradual slope would require long penstock or significant dam
  – Impacts on tourism, fishing, swimming, etc.
Preliminary Findings – Energy Efficiency

- Energy Efficiency
  - Tribal Members
    - Residential Buildings
  - Tribal Government
    - Commercial Buildings
    - Buildings / Operations
    - Transportation

• **Energy Efficiency for Tribal Members**
  • No data for individual tribe members available
  • Regional data suggests the “big 3” are
    – Space heating
    – Lights and appliances
    – Water heating
• **Numerous options assessed based on**
  – Cost
  – Ease of implementation
  – Energy savings potential
Energy Efficiency for Tribal Members

• Recommendations
  – Routine HVAC service and repair
  – Weatherization program including HVAC duct testing and sealing
  – Compact florescent lighting
  – Energy Star replacement HVAC & appliances
  – Assess codes and standards used for new construction
  – Energy education
  – Consider cash incentives to encourage purchase of high efficiency equipment
Energy Efficiency for Tribal Government Buildings & Operations

- Electricity data available by Tribal Gov’t division & program
- Total Usage = $1.0M/yr
- Top 10 users consume 75% of total
- Recommendations
  - Energy Audits of major buildings (20 planned)
  - Energy offset for sewer system
  - High efficiency street lighting

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Fund</th>
<th>Division</th>
<th>Program</th>
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<tr>
<td>TUWAT</td>
<td>Water &amp; Sewer</td>
<td>Tribal Utilities</td>
<td>Water Treatment</td>
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<td>SENCT</td>
<td>Senior Citizen</td>
<td>Social Services</td>
<td>Public Assistance</td>
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<td>Sewer</td>
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<td>Qualla Recreation</td>
<td>Economic Development</td>
<td>Civic Center</td>
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<td>Roads</td>
<td>Roads</td>
<td>Street Lights</td>
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<td>TCPOP</td>
<td>Tsali Care</td>
<td>Health &amp; Medicine</td>
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<tr>
<td>TRAVL</td>
<td>Travel &amp; Promotions</td>
<td>Economic Development</td>
<td>Fairgrounds</td>
</tr>
</tbody>
</table>
Energy Efficiency for Tribal Government Transportation

- Tribe currently operates 423 vehicles & uses 487,651 gallons of fuel / year
- Recommendations
  - Right sizing of vehicle fleet
  - Driver training
  - Increased use of hybrids & electric vehicles where possible
  - Add fuel economy as a requirement for future vehicle purchases

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Gallons</th>
<th>% of Total Fuel</th>
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</thead>
<tbody>
<tr>
<td>Unleaded</td>
<td>218,036</td>
<td>44.7%</td>
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<tr>
<td>Diesel</td>
<td>213,267</td>
<td>43.7%</td>
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<tr>
<td>Biodiesel</td>
<td>56,348</td>
<td>11.6%</td>
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<tr>
<td>Total</td>
<td>487,651</td>
<td>100%</td>
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</table>

<table>
<thead>
<tr>
<th>Fleet Inventory (as of June 2008)</th>
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<tr>
<td><strong>Light Duty Vehicles</strong></td>
</tr>
<tr>
<td>Autos</td>
</tr>
<tr>
<td>Pickup Trucks</td>
</tr>
<tr>
<td>SUV's</td>
</tr>
<tr>
<td>Vans</td>
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<tr>
<td>Hybrid Vehicles</td>
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<tr>
<td><strong>Heavy Duty Vehicles</strong></td>
</tr>
<tr>
<td>All</td>
</tr>
<tr>
<td><strong>Off-road</strong></td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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Project Status/Activities to Complete

• Energy efficiency opportunities for Tribe members and Tribal government identified
  – Energy audits of government buildings and assessment of high efficiency street lights already underway
• 11 renewable energy opportunities assessed
  – 3 recommended for more detailed feasibility studies
    • Wind farm on Rattlesnake Mountain
    • CHP unit for new MWW facility
    • Biodiesel production facility (pending)
• One additional opportunity identified
  – Wind resource on Lickstone Ridge

• Finalize Findings and action steps
• Present to Tribal Council
• Adopt the plan
• Continue integration with Generations Qualla
• Determine funding avenues
Future Plans

• Wind Feasibility Studies
• Proceed with a proposed EBCI funded renewable energy fund to complete energy efficiency projects on existing facilities and other small projects
• Continue Negotiations with Duke Energy on solar installations
QUESTIONS

Opportunity like this takes 11,000 years to create.

Office of Planning and Development
Eastern Band of Cherokee Indians
Cherokee, North Carolina

- Advanced Infrastructure  
- Tax Incentives  
- Sovereign Nation Benefits  
- Over 5 Million Visitors Annually  
- Supportive Agencies & Programs