Tennessee Energy Efficiency and Renewable Energy Resources

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Rural Energy for America Program Workshop
February 9, 2022
Outline

• Tennessee Energy
• Energy Consumption and Expenditures
• Energy Economy in Tennessee
• Tennessee Energy Rankings
• Wind and Solar Potential
• Energy Use in Agriculture
• Current and Alternative Energy Uses
• Tennessee Energy Funding Opportunities
Tennessee Energy

- 28 Hydroelectric power plants
- 9 Natural-gas fired plants
- 6 Solar power plants
- 5 Coal-fired power plants
- 2 Nuclear power plants
- 1 Wind farm
- 1 Pumped-storage hydroelectric plant
- 1 Biomass plant

http://www.eia.gov/state/
Tennessee Energy Consumption, 1960-2019

Source: State Energy Data System, U.S. Energy Information Administration
Tennessee Energy Expenditures

- Tennessee spends over $26 billion annually on energy
- Tennessee Energy consumed per capita – 318 Million BTU
- Tennessee Energy expenditures per capita - $3,807 annually
- Average electric rate – 11.5 cents/KWh; Tennessee is among the lowest in the country
- Tennessee is the largest ethanol producing state in the Southeast US
2019 Tennessee End-use Consumption by Source

- Petroleum: 745.6 Trillion BTUs, 50% of all sources
- Electricity: 340.6 Trillion BTUs, 23% of all sources
- Natural gas: 301.6 Trillion BTUs, 20% of all sources
- Renewable energy: 65.9 Trillion BTUs, 4% of all sources
- Coal: 32.3 Trillion BTUs, 2% of all sources
- Total: 1,486 Trillion BTUs, 100% of all sources

2019 End-use Consumption by Sector

- Transportation: 666.8 Trillion BTUs, 44.9% of all sectors
- Industrial: 386.8 Trillion BTUs, 26.0% of all sectors
- Residential: 232.9 Trillion BTUs, 15.7% of all sectors
- Commercial: 199.5 Trillion BTUs, 13.4% of all sectors
- Total: 1,486 Trillion BTUs, 100% of all sectors

Source: Tennessee Department of Environment and Conservation
Tennessee Energy Economy

• TN’s advanced energy jobs – average wage is $64,000.
• Opportunity to increase employment and capital investments in rural TN
• Advanced energy industry can be a targeted industry cluster

Fast Facts: Tennessee’s advanced energy economy

- $45.8 BILLION Advanced energy’s contribution to state GDP
- 393,756 JOBS For Tennesseans
- 20,340 BUSINESSES in Tennessee’s advanced energy economy
- AE Growth OUTPACES Growth of the overall state economy

Tennessee Energy Efficiency Rankings

• Tennessee’s Energy Efficiency program spending - $19.2 million (US Average - $64 million)

• 2021 State Energy Efficiency Scorecard – 29th

Source: American Council for Energy-Efficient Economy
Tennessee Wind Energy Resource Potential

Tennessee - Annual Average Wind Speed at 80 m

Energy Use in Agriculture

- Key Energy consumption in Agriculture:
  - Tractor and field operations
  - Irrigation systems
  - Indoor and outdoor lighting
  - Farm shop energy use
  - Livestock building energy use
  - Grain drying
  - Livestock water systems

## Current and Alternative Energy Sources

<table>
<thead>
<tr>
<th>Current Energy Use</th>
<th>Alternative Energy Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>Wind Turbine</td>
</tr>
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<td></td>
<td>Photovoltaic panel</td>
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<td>Micro-hydro system</td>
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<td>Anaerobic Digester</td>
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<tr>
<td>Hot Water (Electric/gas/propane)</td>
<td>Solar Thermal System</td>
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<td></td>
<td>Geothermal (desuperheater)</td>
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<tr>
<td>Heater Air (Electric/gas/wood/propane)</td>
<td>Solar Air Collector</td>
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<td>Transpired Solar Collector</td>
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<td></td>
<td>Geothermal (Ground Source Heat Pump)</td>
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<td>Biomass</td>
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<td>Passive Solar Design</td>
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<tr>
<td>Transportation Fuel</td>
<td>Biofuel</td>
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<tr>
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<td>Renewable Electricity (Electric/hybrid vehicles)</td>
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</tbody>
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Source: Understanding Energy, University of Tennessee Extension Publication SP 757-G
Tennessee Clean Diesel Fuels Fund

- **Volkswagen Diesel Mitigation Trust**
  - Prioritize school buses/New alternative fuel vehicles
  - Medium to large trucks (1992-2009 Model Range)
  - Shuttle and transit buses

- **$310,000 was available in FY 2021-2022**

- **Maximum vehicle funding requests are**
  - 25% for vehicles that meet the current NOx standard
  - 35% for vehicles that meet the low-NOx standard
  - 45% for vehicles that have no tailpipe

- **Funding is also available to:**
  - repower an older diesel vehicle;
  - convert an older diesel vehicle to run on an alternative fuels
  - installing truck stop electrification equipment
Building Resilient Infrastructure and Communities (BRIC) Fund

• Eligible activities:
  – Support communities through capacity-building
  – Mitigation projects to increase resilience and public safety, large infrastructure projects and support critical services and facilities
  – Management costs, administrative costs associated with specific mitigation project

• FY 2021 FEMA – BRIC funding - $500 million
  – State/Territory allocation: $57.4 million
  – Tennessee set-aside: $600,000
Energy Efficiency Grant and Loan - Schools

• Low-interest loan to fund energy-efficiency projects in Tennessee’s public K-12 schools

• Eligibility:
  – Public K-12 schools and special school districts
  – Technical assistance to public K-12 schools, special school districts, achievement school districts and charter schools

• Eligible Projects:
  – Lighting upgrades               - Water and wastewater treatment
  – Pumps and motors               - Heating, ventilation and airconditioning
  – Building insulation            - Load shifting projects
  – Energy management systems

• Interest rate fixed:
  – Loans up to $3 million; 1.5% for term of loan
  – Loans greater than $3 million; 1.5% for term of loan of $3 million and 2% for remaining funds requested

• Loan must be repaid from energy cost savings within 16 years
## Other State Incentives for Renewables and Energy Efficiency

<table>
<thead>
<tr>
<th>Name</th>
<th>State/Territory</th>
<th>Category</th>
<th>Policy/Incentive Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Easements</td>
<td>TN</td>
<td>Regulatory Policy</td>
<td>Solar/Wind Access Policy</td>
</tr>
<tr>
<td>Energy Efficient Schools Initiative - Grants</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Grant Program</td>
</tr>
<tr>
<td>Energy Efficient Schools Initiative - Loans</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Loan Program</td>
</tr>
<tr>
<td>Pathway Energy Efficiency Loan Program</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Loan Program</td>
</tr>
<tr>
<td>Green Energy Tax Credit</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Industry Recruitment/Support</td>
</tr>
<tr>
<td>Sales Tax Credit for Clean Energy Technology</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Sales Tax Incentive</td>
</tr>
<tr>
<td>Green Energy Property Tax Assessment</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Property Tax Incentive</td>
</tr>
<tr>
<td>Green Energy Supply Chain Franchise and Excise Tax Credit</td>
<td>TN</td>
<td>Financial Incentive</td>
<td>Corporate Tax Credit</td>
</tr>
</tbody>
</table>

Source: Database of State Incentives for Renewables and Efficiency [https://programs.dsireusa.org/system/program/tn](https://programs.dsireusa.org/system/program/tn)
References

- Database of State Incentives for Renewables and Efficiency – [https://programs.dsireusa.org/system/program/tn](https://programs.dsireusa.org/system/program/tn)
- Energy Efficient Loan Program - [https://www.tn.gov/eesi/apply-now.html](https://www.tn.gov/eesi/apply-now.html)
- Tennessee Department of Environment and Conservation - [https://www.tn.gov/environment/program-areas/energy.html](https://www.tn.gov/environment/program-areas/energy.html)
- Wind Energy in Tennessee - [https://windexchange.energy.gov/states/tn](https://windexchange.energy.gov/states/tn)
Questions?

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Pathway Lending – Energy Efficiency Loan Program

• Private non-profit lender supported by private and public funding
• Loan Size: $20,000 to $5 million
• 2% interest rate for 5 years; 5% interest rate for 10 years
• Closing fees – 1% program fee, $350 documentation fee and other fees
• Eligibility:
  – Any industrial, commercial, private non-profit business, or local government facilities
  – Any project that reduces utility consumption across electric, gas, and/or water
• Common projects:
  – HVAC replacements
  – Air compressors
  – Cool roofs
  – Lighting
  – Solar
  – Agricultural Systems:
    - Circulation fan systems
    - Totally enclosed houses
    - Insulated tunnel doors
    - Radiant heating systems
    - Attic inlet systems
    - Improved side wall air inlet systems
    - Dimmable LED lightings