

Tennessee

House Energy Task Force



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Vision Statement:

An energy independent United States with energy-production-driven prosperity for the State of Tennessee, especially for East Tennessee.

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Tasks:

- Encourage Investment
 - Disseminate promising technology information
 - Seek out promising energy companies
 - Existing
 - Inside Tennessee
 - Outside Tennessee
 - Entrepreneurial Start ups
 - Seek out willing venture capitalists
 - Coordinate “business incubators” and other assistance
 - Encourage rapid investment for the most promising energy technologies and enhancements

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Tasks:

- Coordinate
 - Government grants
 - Tax incentives
 - State executive agencies
 - Eliminate or reduce interference
 - Streamline permit & application processes
 - State higher education institutions
 - Support studies
 - Institutional assistance and partnering

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Traditional Energy Sources

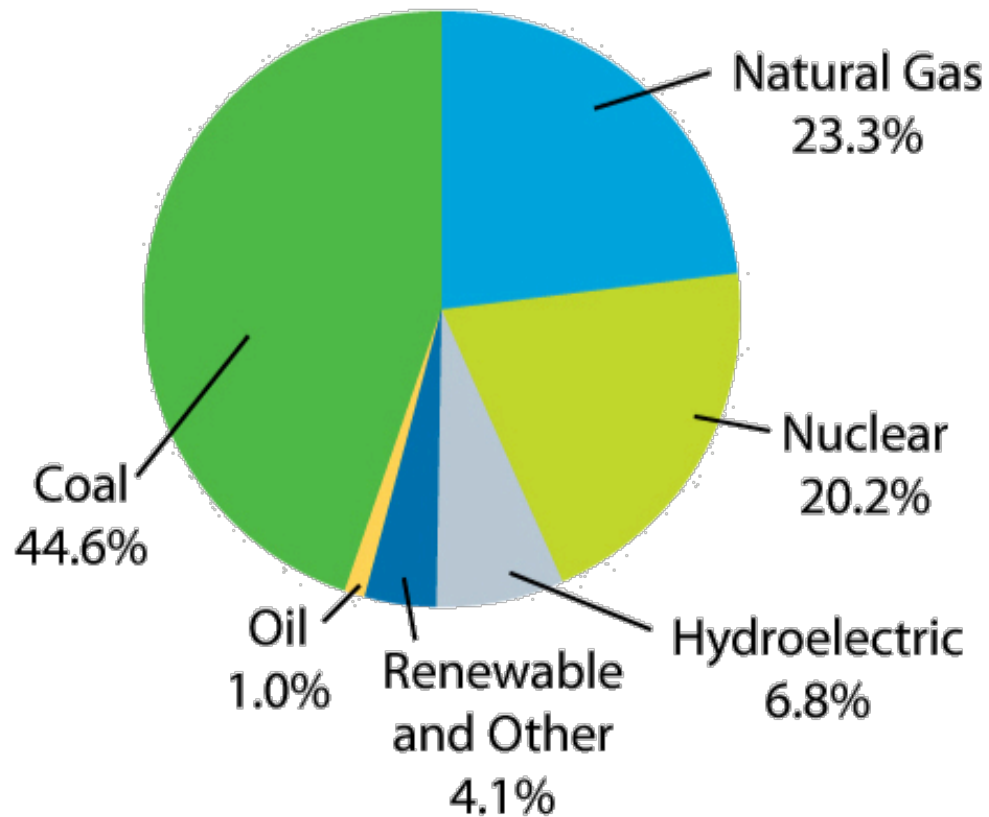
- Petroleum
- Natural gas
- Coal
- Nuclear

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Traditional National Energy Sources



Source: U.S. Energy Information Administration

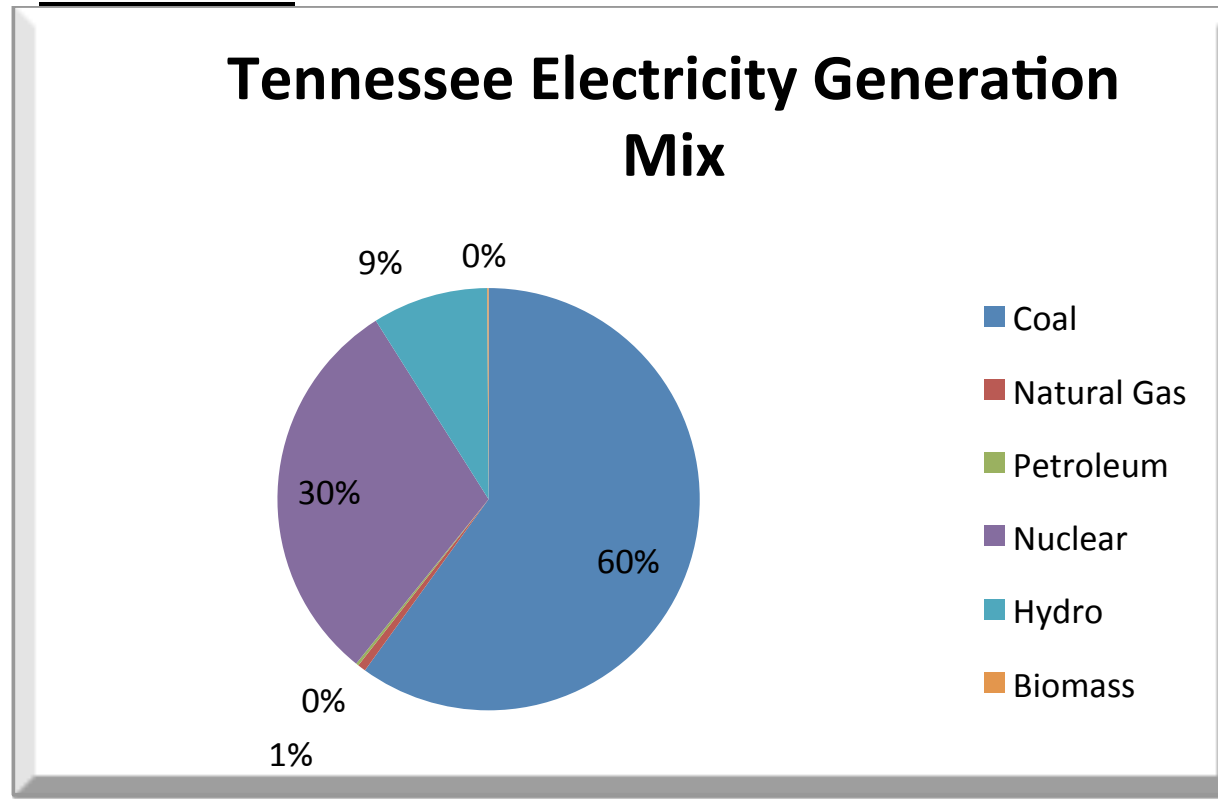
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Traditional Tennessee Energy Sources

Energy Data



Source: Energy Information Administration

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Alternative Energy Sources

- Small Nuclear
- Clean Coal
- Biomass
- Solar
- Wind
- Geothermal



Nuclear

- Large megawatt plants (104 active sites in USA)
 - Very long licensing lead times
 - Extremely capital intensive upfront
 - Long construction lead times
- Vulnerable to grid disruptions
- Current national grid contribution of 20%
- Forecast (required) national grid contribution of 39%
- Waste disposal remains politically contentious

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Nuclear – Tennessee

- Large megawatt plants
 - Third Watts Bar unit – ahead of schedule
- Current national grid contribution of 20%
- Current Tennessee grid contribution of 30%
- Oak Ridge National Laboratory
 - Large local employer
 - Premier research facility for nuclear power
 - Trans-Uranic Waste
 - Consortium for Advanced Simulation of Light Water Reactors



Small Nuclear

- **Small megawatt plants** (intended for municipalities)
 - Proven technology (conceptually similar to nuclear submarine power plants)
 - Capital intensive upfront (lower than traditional large plants)
 - Licensing and construction lead times (long but potentially shorter than traditional large plants)
- Waste disposal remains politically contentious
- Not large-scale grid limited
 - Reduces potential impacts from “rolling blackout,” natural disaster outages and terrorist attack



Clean Coal

- Bergius Process
 - Coal liquefaction (process used by Wehrmacht in WWII)
 - Currently undeveloped and expensive
- Fischer-Tropsch Process
 - Hydrogenation to syngas to gasoline... now in use by Sasol in South Africa (process used by Wehrmacht in WWII)
 - Currently developed and economically expensive but viable
- Karrick Process
 - Carbonization to primarily solid fuel and limited oil amounts
 - Environmentally friendly (production and use)
 - Pilot plant under construction



Clean Coal

- Karrick Process

- Originally developed in 1920's
 - Initially used for coal-to-liquid fuel conversion
 - Effective but expensive in this use
- Modified by Dr. Wolfe in late 1990's
 - Removes nearly all intrinsic coal pollutants
 - Environmentally closed-loop production process
 - BTU output of carbon end-product nearly equal to input coal
 - Oil by-product
 - Approximately 1 barrel per ton of processed coal



Clean Coal

- Karrick Process Output
 - Carbon end-product nearly pure
 - Combustion source
 - Primary combustion by-products
 - CO₂
 - Water
 - Reduced fly ash
 - Biologically neutral fly ash
 - Steel industry coke source
 - Combined with paper industry by-product (black liquor)
 - Additional heat treatment
 - Stack scrubber substitute for activated charcoal



Biomass

- Corn and Sugar to Ethanol Process
 - Proven technology in current use
 - Competes with food crop production
- Switchgrass to Ethanol Process
 - Large scale pilot production plant in use (Vonore)
 - Uses “weed” that grows well on, otherwise, unproductive crop land
 - Current logistics increase expense
- Algae Direct to Diesel Process
 - Environmentally attractive
 - Not fresh water dependent
 - Current production expenses high

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Solar – legislation enabled 2009

- Maximum forecast contribution of 3%-5%
- Manufacturing
- Site availability
 - Annual days of sunshine
- Gas turbine backup expense
 - Acquisition, operation and maintenance
 - Fuel costs variability
- Silicon panel cost/inefficiency/durability

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Summary

- Environmental pressures
 - Manageable
 - Publicity required
- Worldwide demand increase
 - Emerging economies – China & India
 - European total dependence on imports
- Essential need
 - National security and economic survival
 - Current planning not properly addressing
 - Near term – Clean coal & increased domestic oil
 - Far term – Combination of nuclear & alternatives