



Energy-Water Nexus in Texas

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Purpose of the Report

- Water for Energy
- Energy for Water
- Identify Data Gaps
- Policy Recommendations

Water for Energy

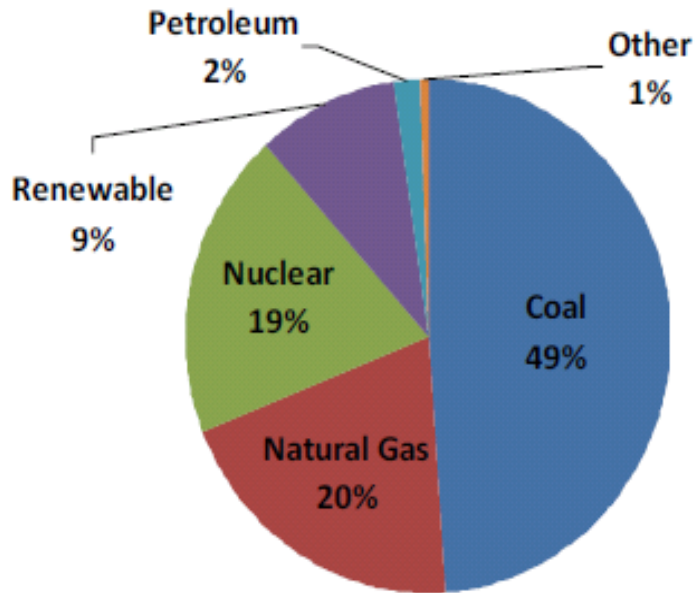
- Fuel type
 - Natural Gas
 - Coal
 - Nuclear
 - Solar
- Cooling technology
 - Open loop
 - Closed loop
 - Dry or air
 - Hybrid

Not included

- Mining
- Transportation

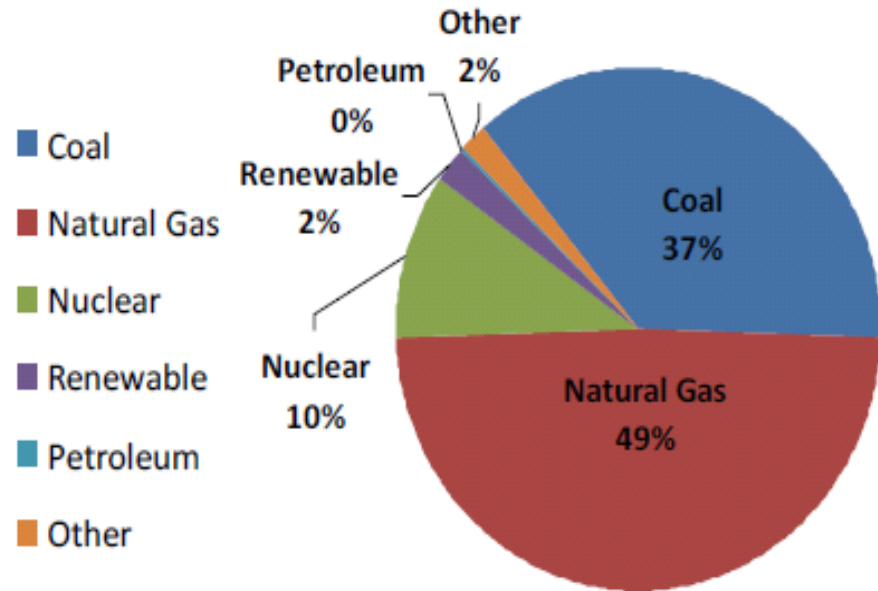
U.S. Electricity Generation by Source

(Total: 4,100 billion kWh)



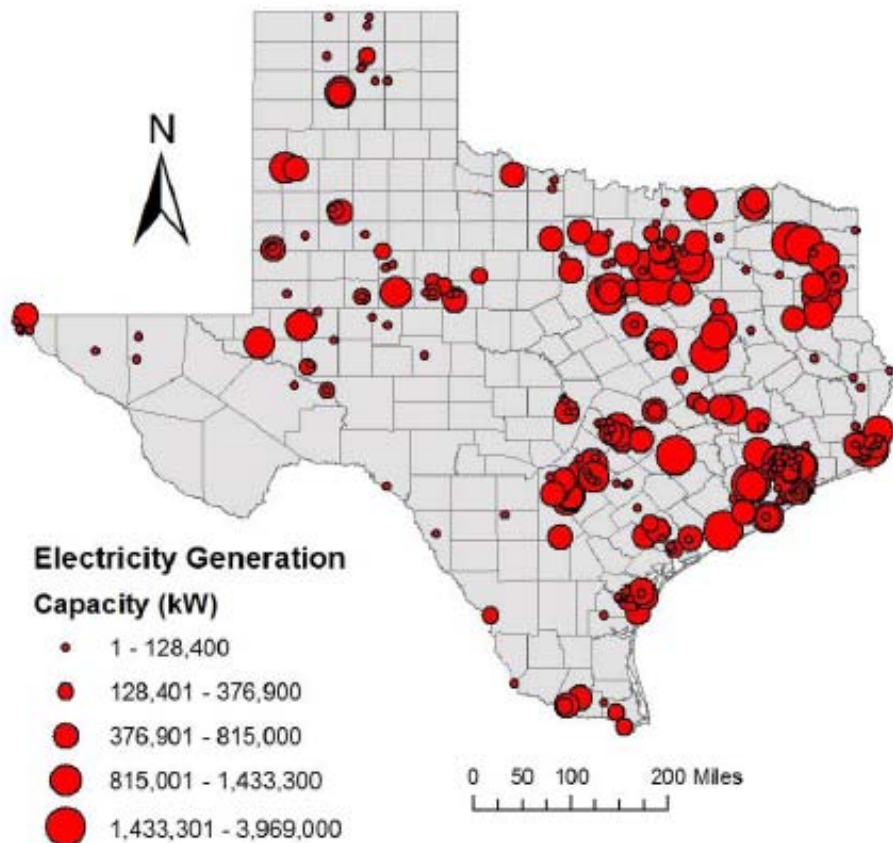
Texas Electricity Generation by Source

(Total: 400 billion kWh)

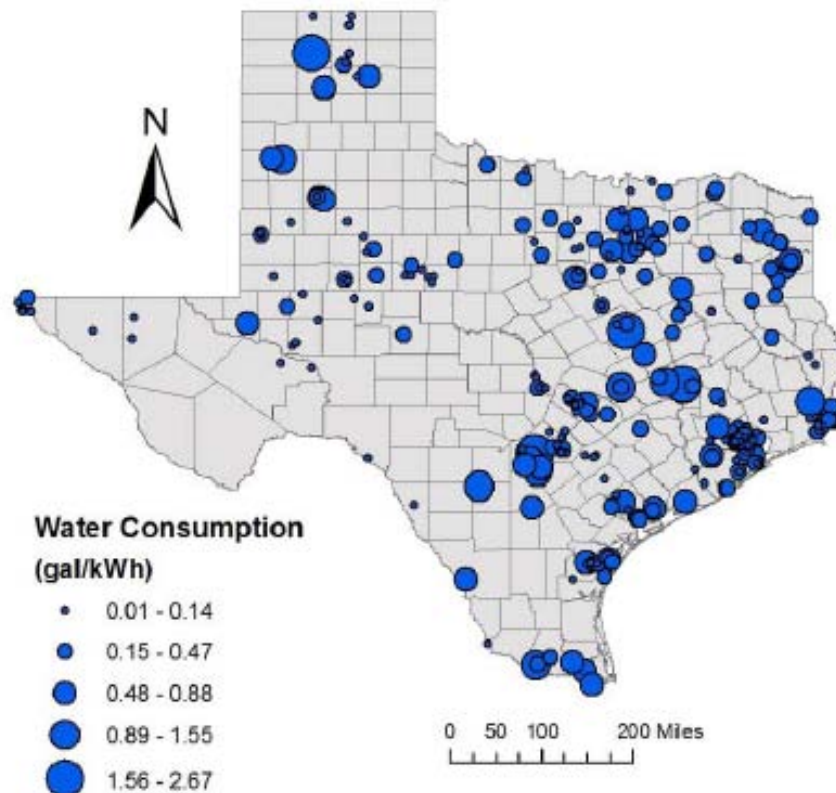


- Coal
- Natural Gas
- Nuclear
- Renewable
- Petroleum
- Other

Capacity for Electricity Generation in Texas Power Plants



Water Consumption for Cooling of Texas Power Plants



Texas' 258 power plants have capacity = 110 GW

Actual Generation – 400 terawatt-hours

What about Texas?

- 157,000 million gallons (482,100 acre-feet) of water annually.
 - enough water for over 3 million people for a year, each using 140 gallons per person per day
 - Not total capacity
- Power plants are responsible for an estimated 2.5% of the total water consumption for Texas (consumption only)
- Data and Reporting Gaps
 - Withdrawal amounts
 - Evaporative losses

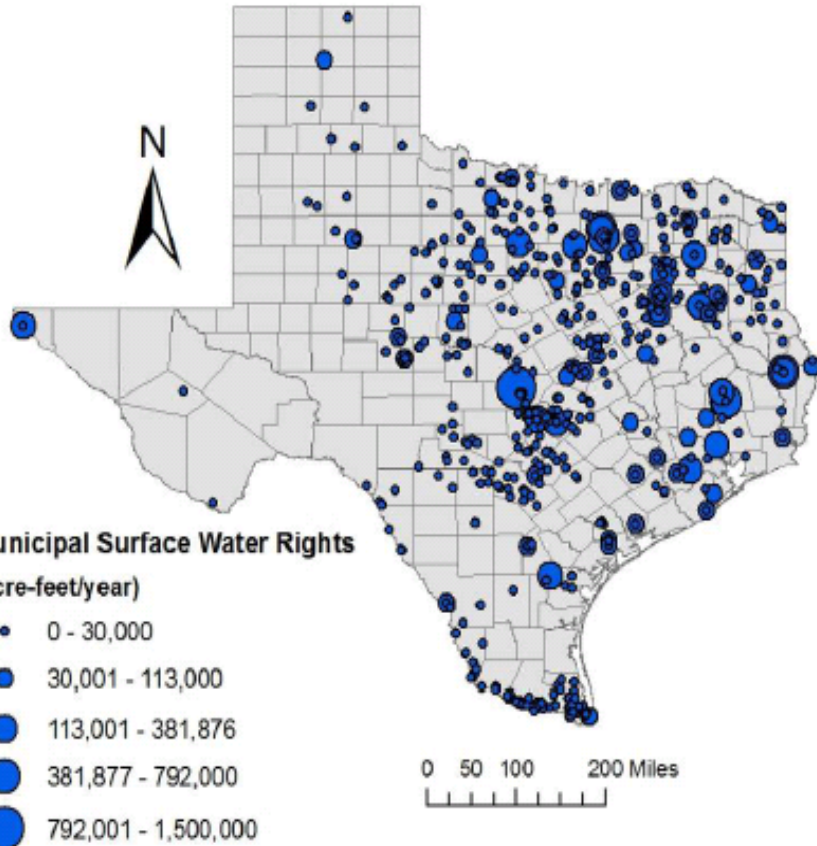
Energy for Water

- Treatment
- Wastewater Treatment

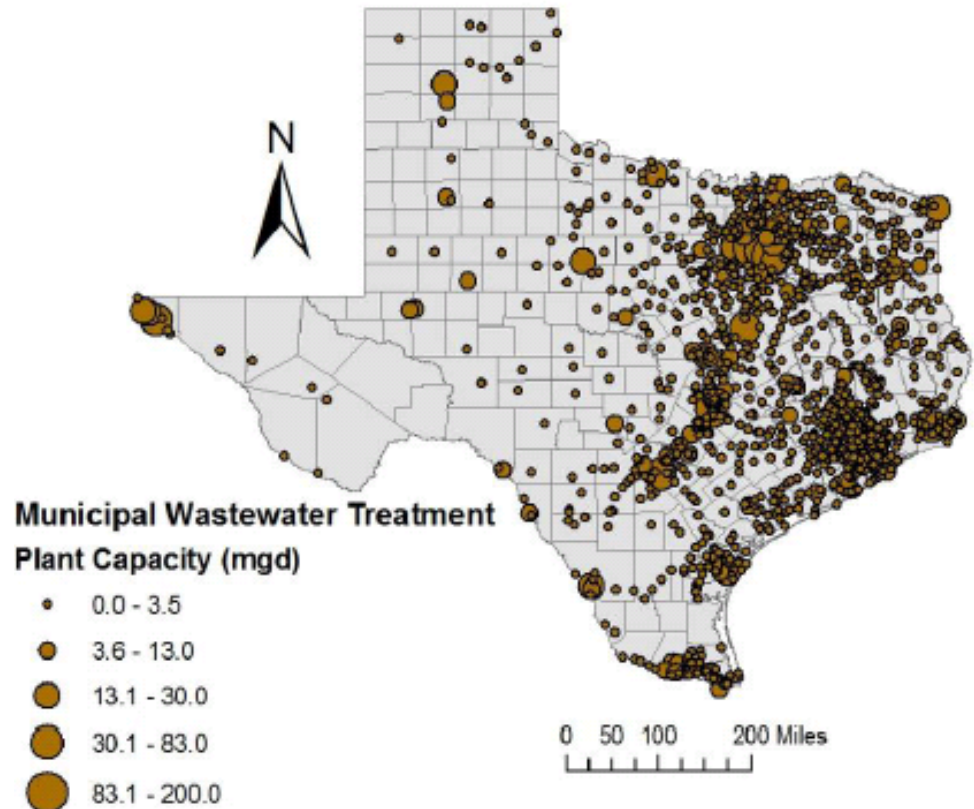
Not included

- Collection and Conveyance
 - Groundwater v surface water
- Distribution
- In-home Uses
- Irrigation

Municipal Surface Water Rights in Texas



Municipal Wastewater Treatment Plants in Texas



sent at the low end to advanced treatment with

Texas public water supply =
4.5 million acre-feet/yr

On the Water side . . .

- 2.1 to 2.7 TWh of electricity for water systems and
- 1.1 to 2.2 TWh for wastewater systems each year –
 - enough electricity for about 100,000 people for a year.
- Together 0.8 to 1.3% of total Texas electricity and 2.2 to 3.4% of industrial electricity use annually.
- Data Gaps
 - Water treatment plant power usage
 - Wastewater treatment plant power usage
 - End Use Energy requirements
 - Pumping and conveyance

Other considerations

- Population growth
- Fuel Mix & CCS
- Climate change
- Air quality considerations
- Technology
- Water supply proposals

Policy Recommendations

- Require that applications for new power plants include an analysis of the water footprint of various types of cooling options applicable to the proposed plant.
 - local climate and air quality,
 - water availability, including instream flow requirements,
 - fuel type and plant efficiency.
- Require water availability in the siting of new fossil-fueled power plants or concentrated solar (include extreme drought events).
- Provide state statutory and regulatory incentives for implementation of less water-intensive power plant cooling technologies.
- Provide state-approved guidance (from the Texas Water Development Board and/or the State Energy Conservation Office) to water suppliers and wastewater treatment providers to help quantify energy use and cost savings associated with water conservation.
- Conservation and Efficiency in both sectors
- Fill data gaps



Funding and oversight mechanisms are separate
Energy planners assume they have the water they need
Water planners assume they have the energy they need

Hierarchy of policymaking is dissimilar
***Energy*: top-down powerful federal energy agencies**
***Water*: bottom-up powerful local water agencies**

Policy

- HB 4206
- S. 531, the Energy and Water Integration Act of 2009
 - Senators Bingaman & Murkowski
 - Calls for studies and assessments of the energy-water nexus
- American Clean Energy and Security Act of 2009 (ACES)
 - Call for changes to the energy mix with implications for water use



www.edf.org/texasenergywater nexus

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