How do We Power Texas with Renewables

Based on the latest data, here's what it would take to power Texas entirely with wind, solar, and storage:

Current Texas Electricity Demand

Texas consumed around 372 TWh of electricity in the first nine months of 2025, representing a 5% increase from 2024 U.S. Energy Information Administration. Demand is projected to reach approximately 425 TWh in the first nine months of 2026 U.S. Energy Information Administration, suggesting annual consumption approaching 500+ TWh when extrapolated for the full year.

Current Renewable Infrastructure (as of 2025)

- **Wind capacity**: ~42 GW installed
- **Solar capacity**: ~25 GW installed
- **Battery storage**: Growing rapidly, with batteries supplying an average of 4 GW around 8 pm during summer 2025 Electrek
- **Current renewable share**: Wind and solar provided 37.7% of ERCOT's electricity through the first eight months of 2025 IEEFA

What's Needed for 100% Renewable

While there's no single definitive study for Texas specifically, research on 100% renewable grids indicates several key requirements:

Massive capacity buildout: To account for intermittency (wind and solar don't generate 24/7), you need significantly more nameplate capacity than peak demand. Wind typically achieves a 34% capacity factor and solar around 23% in Texas. This means you'd need roughly:

- **150-200 GW of wind** (about 4-5x current capacity)
- **100-150 GW of solar** (about 4-6x current capacity)

Enormous storage requirements: This is the biggest challenge. Research shows costs increase nonlinearly as systems approach 100% renewable, largely because of seasonal mismatches ScienceDirect. You'd likely need:

- **Multi-day to seasonal storage**: Tens to hundreds of GWh of battery storage for daily/weekly cycles
- **Long-duration storage**: For periods of low sun and wind, potentially including hydrogen production or other technologies

Transmission upgrades: Without transmission system upgrades, increasing curtailments will occur as renewable capacity doubles U.S. Energy Information Administration, wasting potential clean energy.

The Cost Challenge

Studies of 100% renewable systems for the U.S. show incremental abatement costs from 99% to 100% renewable reach $930 per ton of CO2 ScienceDirect, indicating the last few percentage points are extremely expensive due to the need for firm backup capacity.

The good news: Texas is already demonstrating that high renewable penetration works well. The practical path forward likely involves getting to 80-90% renewable (which is far more economical) while using some natural gas for reliable backup during challenging weather periods.