

# Texas Biomass and Bioenergy Overview

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## GENERAL OVERVIEW

In 2003, Texas consumed an estimated 12,369.8 trillion Btu (3,625 trillion kWh) of energy, ranking 1<sup>st</sup> nationally.<sup>1</sup> Petroleum accounted for about 46 percent of total consumption, with natural gas and coal each providing 37 and 13 percent of the state's energy respectively. Another major energy source was nuclear energy, which accounted for approximately 3 percent of the state's total energy consumption, respectively. Biomass supplied over 78.6 trillion Btu (23 billion kWh), or about 1 percent of Texas's total consumption, ranking it 15<sup>th</sup> compared to other states nationwide.<sup>1</sup>

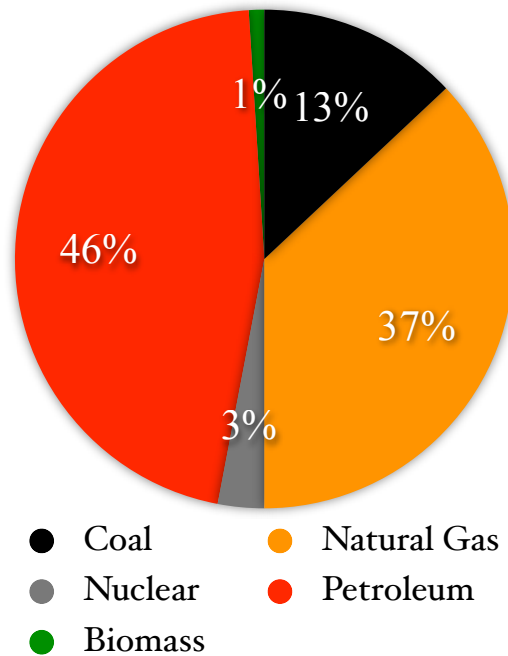
Texas's total energy consumption increased by over 2,970 trillion Btu (870.4 trillion kWh) between 1980 and 2001, an average annual increase of 1.4 percent. Electricity consumption increased by over 466.19 billion Btu (136.6 million kWh), an annual increase of 2.7% over the same period. Annual per capita petroleum use for transportation was estimated to be 22 barrels for 2001, an increase of 0.8 barrels since 1980.<sup>2</sup>

It has been estimated that 460,000 trillion Btu (134 trillion kWh) of electricity could be generated using biomass fuels in Texas.<sup>3</sup> Of this amount, 109,000 trillion Btu (31.9 trillion kWh) would come from agricultural wastes, 150,000 trillion Btu (43.9 trillion kWh) from woody wastes, 51,000 trillion Btu (14.9 trillion kWh) from biogas, and 150,000 trillion Btu (43.9 trillion kWh) from landfill biomass.<sup>3</sup>

## FOREST-BASED RESOURCES

Texas has over 11.9 million acres of forestland.<sup>4</sup> In 2003, logging operations in the state produced 1.4 million dry tons of forest residues.<sup>5</sup> Softwoods made up 69% of these residues while hardwoods made up 31%. Tops, limbs, and other debris accounted for 2.8 tons while stumps accounted for another 0.6 tons.<sup>6</sup> A 1999 study indicated that at \$40/dry ton, 814,000 dry tons of forest residues would be available for bioenergy use.<sup>7</sup> At \$50/dry ton, over 1 million dry tons would be available.<sup>7</sup>

**Texas Energy Consumption by Source, 2003**



Source: Energy Information Administration<sup>1</sup>

Based on 2003 data, the Texas Forest Service estimates that over 5.9 million tons of mill residues were produced in East Texas, 85% of which was softwood and 15 percent was hardwood.

<sup>6</sup> Components of the residues included chips (50%), bark (36%), sawdust (8%), and shavings (6%). At \$30/dry ton, 1.6 million dry tons of residues would be available for bioenergy.<sup>7</sup> At \$50/dry ton, over 4 million dry tons would be available.<sup>7</sup>

Urban wood wastes also provide a viable feedstock. Texas produces 2.3 million dry tons of urban wood biomass annually.<sup>8</sup>

Studies in Texas are also researching the potential of using mesquite and other range resources for the production of bioenergy.

## AGRICULTURAL RESOURCES

Determining the amount of agricultural biomass that could be available from crops, but more importantly crop residues, is difficult to quantify. Texas has

approximately 38.7 million acres of cropland.<sup>9</sup> Residues include corn stover, rice hulls, and other plant stalks. In Texas, it was estimated that 6 million dry tons of agricultural residue biomass could be used for bioenergy.<sup>10</sup> For dedicated energy crops, such as hybrid poplars and switchgrass, an estimated 9.1 million dry tons could be produced each year for \$50/dry ton.<sup>7</sup>

Livestock manure also provides another significant resource. Manure produced from the 7.2 million head fed each year amounts to more than 5 million tons/year on an as-collected basis.<sup>11</sup> Additionally, an estimated 2.3 million tons of poultry litter and 472,000 tons of swine manure was produced in 2004.<sup>11</sup> All together, manure management could provide 58,000 dry tons of matter annually.<sup>8</sup>

**CURRENT ACTIVITIES**

When constructing a new building or reconstructing an older building, all Texas state agencies must analyze the cost of providing energy through conventional sources versus alternative energy sources. If the use of alternative energy sources is economically feasible, they must be used in construction.<sup>12</sup>

The Austin City Council has approved a 10-year Strategic Plan proposed by Austin Energy. The plan sets a renewables portfolio standard of 20% by 2020.<sup>11</sup> Net metering is also provided to Austin Energy customers with on-site generating capabilities. Customers must be interconnected with the utility’s system. The maximum capacity is 20 kW and the power must be generated by a renewable energy source such as solar, wind, geothermal, hydroelectric, and biomass or biomass-based waste products. Statewide, Net metering is allowed for qualifying facilities with a generating capability of 50 kW using renewable energy sources.<sup>12</sup>

In 1999 the Public Utility Commission of Texas (PUCT) adopted rules for the state's Renewable Energy Mandate, establishing a renewable portfolio standard (RPS), a renewable-energy credit (REC) trading program, and renewable-energy purchase requirements for competitive retailers in Texas. The 1999 standard called for 2,000 megawatts (MW) of new renewables to be installed in Texas by 2009, in addition to the 880 MW of existing renewables generation at the time. In August 2005, Senate Bill 20 increased the renewable-energy mandate to 5,880 MW by 2015 (about 5% of the state's electricity demand), including a target of 500 MW of renewable-energy capacity from resources other than wind. The

<b><u>Texas’s Biomass Resources</u></b>	
<b>Corn Produced (Silage and Grain)<sup>19</sup></b>	
	7,312,600 tons
<b>Soybeans Produced<sup>19</sup></b>	
	111,600 tons
<b>Wheat Produced<sup>19</sup></b>	
	1,008,000 tons
<b>Conservation Reserve Program<sup>20</sup></b>	
	4,044,892 acres enrolled
<b>Municipal Solid Waste<sup>21</sup></b>	
	45,898,387 tons generated
<b>Logging Residues<sup>5</sup></b>	
	1.4 million dry tons
<b>Poultry<sup>19</sup></b>	
	672,782,000 head
<b>Livestock<sup>19</sup></b>	
	17,090,000 head

2005 legislation also set a goal of reaching 10,000 MW in renewable energy capacity by 2025. As of early 2005, 1,190 MW of new renewable energy had been added, representing about 3% of the state's total electric generating capacity.

The PUCT also established a REC-trading program that began in July 2001 and will continue through 2019. Under PUCT rules, one REC represents one megawatt-hour (MWh) of qualified renewable energy that is generated and metered in Texas. A Capacity Conversion Factor (CCF) is used to convert MW goals into MWh requirements for each retailer in the competitive market. Each energy retailer in Texas is allocated a share of the mandate based on that retailer’s pro rata share of statewide retail energy sales. The program administrator maintains a REC account for program participants to track the production, sale, transfer, purchase, and retirement of RECs. Credits can be banked for 3 years, and all renewable additions have a minimum of 10 years of credits to recover over-market costs.

In February 2006, the State Energy Conservation Office sponsored a workshop entitled “Road to Renewables ’06 Ethanol/Biodiesel Workshop and Expo.” The purpose of the expo was to bring together all sectors of the alternative fuels industry together to discuss the development of this new industry in Texas.<sup>13</sup>

City Public Service of San Antonio is the first fleet in Texas to use corn and forestry-derived ethanol as an alternative fuel for its fleet. Approximately 37% (130 vehicles) of the CPS fleet are flex-fuel vehicles.<sup>13</sup>

The State's Innovative Energy Demonstration Program works to increase public awareness of the state's renewable energy sources, increase infrastructure, and demonstrate new technology. Solar, wind, and biomass demonstration projects are funded.<sup>14</sup>

Nacogdoches Power is beginning to develop a 100 mW wood-fueled plant in East Texas. It is estimated that the plant would create 500 jobs for the area.<sup>15</sup>

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## LINKS TO OTHER TEXAS RESOURCES

Texas State Energy Conservation Office <http://www.seco.cpa.state.tx.us/>

Texas Department of Agriculture <http://www.agr.state.tx.us/>

Texas Forest Service <http://txforestservicetamu.edu/>

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Panda Ethanol has recently announced plans to build three manure gasification facilities in the northern panhandle of Texas. The towns of Hereford, Sherman, and Muleshoe will each be home to a 105 million gallon per year ethanol plant.<sup>16</sup>

There are 7 constructed and/or announced ethanol production facilities throughout the state of Texas. Fuels for these plants include corn, grain sorghum, cotton gin residues, and cattle manure.<sup>17</sup> Texas also currently has nineteen landfills that are producing methane for energy production and another 54 identified as potential sites.<sup>18</sup>

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15) Nacogdoches Power. <http://www.nacogdochespower.com/>

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