



### An Overview of Energy Efficiency

Energy efficiency means reducing the amount of energy that you need to perform a particular task. When you practice energy efficiency, you increase or maintain your level of service, but you decrease the energy used to provide that service through efficient technologies.

Examples include ENERGY STAR appliances, compact fluorescent and LED light bulbs, better insulation for buildings, more efficient windows, high-efficiency air conditioning equipment, and vehicles with higher miles per gallon (mpg). Another distinct strategy is energy conservation, which means that you change your behavior or lifestyle to reduce energy use. Examples include carpooling, using mass transit, turning thermostats down in the winter and up in summer, and other behavioral changes.

Improving energy efficiency is a “win-win” strategy — it saves money for consumers and businesses, reduces the need for costly and controversial new power plants, increases the reliability of energy supply, cuts pollution and greenhouse gas emissions, and lowers energy imports. There is vast potential for improving the energy efficiency of homes, appliances, businesses, and vehicles throughout Arizona.

*Renewables include hydropower, wood, solar, geothermal and waste materials.*

### Quick Facts:

- ◆ Population, 2015: 6,817,565
- ◆ Population growth rate, 2008-2015: 1.18% per year
- ◆ Number of households, 2015: 2,933,130

*Source: United States Census Bureau.*

### Primary Energy Consumption (2014)

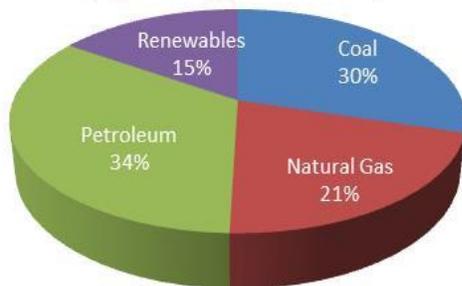
- ◆ Primary energy consumption: 1,423 trillion Btu
- ◆ Growth rate, 2008-2014: -0.52% per year
- ◆ Primary energy consumption per capita: 211.7 million Btu
- ◆ Ranking, energy consumption per capita: 45
- ◆ Ranking, total energy consumption: 27
- ◆ Ratio of consumption to production: 2.24

### Energy Expenditures (2014)

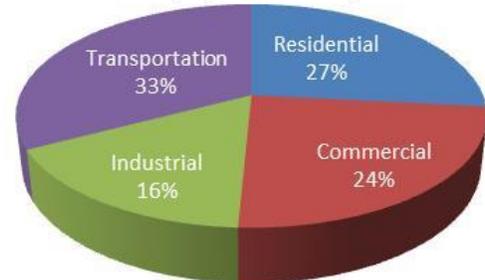
- ◆ Total energy expenditures: \$ 22.6 billion
- ◆ Ranking, energy expenditures: 23
- ◆ Energy expenditures per capita: \$ 3,360
- ◆ Ranking, energy expenditures per capita: 50

*Source: U.S. Energy Information Administration, State Energy Data System, March 2017.*

**2014 Primary Energy Consumption (by energy resource)**



**2014 Primary Energy Consumption (by end use)**



*Primary energy use includes the losses in electricity generation and distribution. Rankings are position among U.S. states plus D.C. (1 is highest, 51 is lowest).*

*Sources: U. S. Energy Information Administration ([www.eia.doe.gov](http://www.eia.doe.gov)) and U. S. Census Bureau([www.census.gov](http://www.census.gov))*

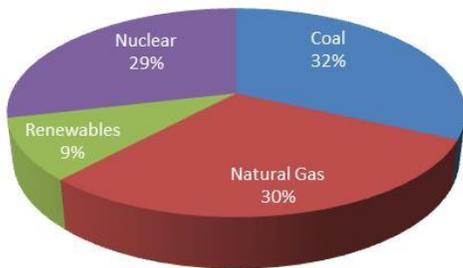
## Electricity Use (2015)

- ◆ Total retail sales: 77.3 billion kWh
- ◆ Ranking, total retail sales: 19
- ◆ Consumption growth rate, 2008-2015: 0.20% per year
- ◆ Electricity use per capita: 11,346 kWh
- ◆ Residential electricity use per household: 11,308 kWh
- ◆ Average retail price, all sectors: 10.34 cents/kWh
- ◆ Ranking, average electricity price: 18

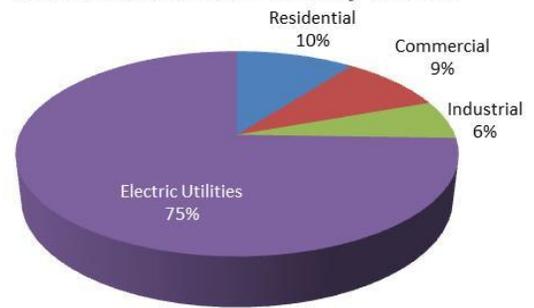
## Natural Gas Use (2015)

- ◆ Natural gas consumption: 352.6 Bcf
- ◆ Ranking: 22
- ◆ Consumption growth rate, 2008-2015: -1.76% per year
- ◆ Natural gas use per capita: 51,717 cf
- ◆ Residential natural gas use, (per residential consumer): 28,737 cf

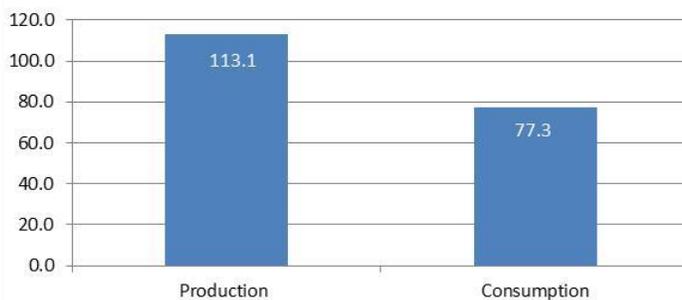
**2015 Electricity Generation Breakdown**



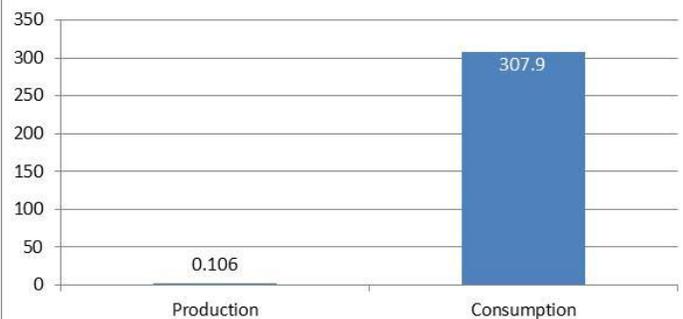
**2015 Natural Gas Use by Sector**



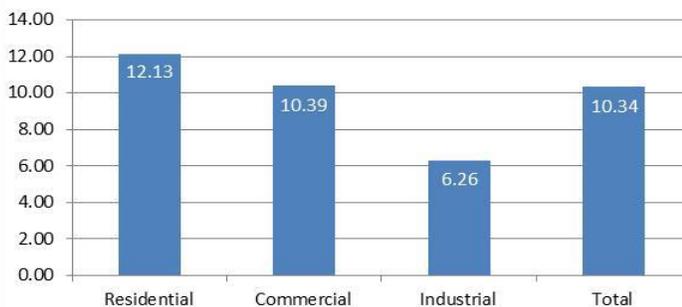
**2015 Electricity Production and Consumption (Billion kWh)**



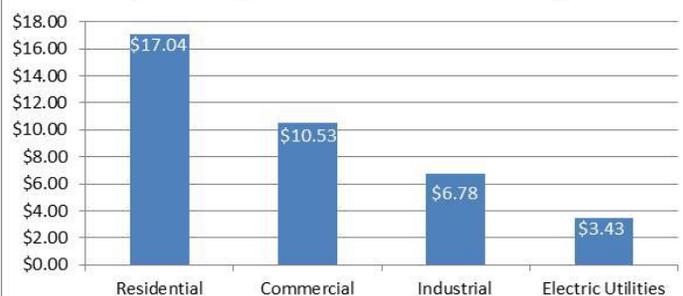
**2015 Natural Gas Production and Consumption (Billion Cubic Feet)**



**2015 Electricity Average Retail Prices (cents/kWh)**



**2015 Natural Gas Average Retail Prices (Dollars per Thousand Cubic Feet)**



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## Status of Energy Efficiency in Arizona

### Electricity Demand-Side Management

The Arizona Corporation Commission (ACC) has adopted stringent energy efficiency standards that require investor-owned electric utilities to achieve 20 percent electricity savings by 2020. As a result, Arizona Public Service, Tucson Electric Power, and UNS Electric offer a wide variety of energy efficiency programs for residential and business customers. Salt River Project, a large self-governed utility, implements efficiency programs as well as part of its overall sustainable energy portfolio. Total spending by these utilities on electric energy efficiency programs in 2015 was \$119 million, or about 1.6 percent of utility revenues.

- ◆ ACC order: <http://www.swenergy.org/news/regional?Year=2010#294>
- ◆ Arizona Utility Programs: <http://www.swenergy.org/programs/utilities/state/arizona>

### Natural Gas Demand-Side Management

The ACC has also adopted energy efficiency standards for investor-owned gas utilities. As a result, Southwest Gas Corporation implements energy efficiency programs, including promotion of ENERGY STAR<sup>®</sup> gas appliances, low-income home retrofit, ENERGY STAR homes, commercial high efficiency equipment, and distributed generation programs. The total budget for gas utility energy efficiency programs in Arizona was about \$3.7 million in 2016.

- ◆ Arizona Utility Programs: : <http://www.swenergy.org/programs/utilities/state/arizona>

### Building Energy Codes

Arizona has no mandatory statewide energy codes. Fifteen municipalities, such as Phoenix, Glendale, Peoria, Tempe, Casa Grande, Pima County, Prescott and Tucson, have adopted the 2012 version of the International Energy Conservation Code (IECC); Scottsdale, Chandler and Paradise Valley have adopted the 2015 IECC, and other cities and counties are in the process of adopting the 2015 IECC. The U.S. Department of Energy estimates that new homes built in Arizona complying with the 2012 or 2015 IECC (rather than the 2006 version) will save \$486 per year in energy costs.

- ◆ More info: <http://www.swenergy.org/buildings/energy-codes/arizona>

### Energy Efficiency Standards

In 2005, Arizona adopted minimum efficiency standards for 12 products not covered by federal standards. These standards took effect in 2008. In 2009, Arizona adopted minimum efficiency standards for pool pumps and spas.

### State Energy Efficiency Scorecard

The American Council for an Energy-Efficient Economy (ACEEE) has ranked states based upon scores in six categories including: 1) utility and public benefits of energy efficiency programs; 2) combined heat and power (CHP); 3) building energy codes; 4) transportation policies; 5) appliance and equipment efficiency standards; and 6) state government initiatives. In the 2016 state scorecard, Arizona was 18<sup>th</sup> among all states with a score of 21 out of a possible 50 points.

<http://aceee.org/research-report/u1606>

#### Electricity Conservation Potential and Impacts in Arizona\*

Savings potential in 2020:	21%
Avoided new power capacity:	3,239 MW
Net dollar savings (2010-2030):	\$7.3 billion
Net increases in jobs by 2020:	10,400
Water savings by 2020:	4.1 billion gallons/year

\*Based on the High Efficiency Scenario in SWEET's study *The \$20 Billion Bonanza: Best Practice Electric Utility Energy Efficiency Programs and Their Benefits for the Southwest*. This study, completed in 2011, presents the energy savings potential and impacts from a strong commitment to utility energy efficiency programs over a 10-year period.

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# Residential Energy Consumption Survey (2015)

## Housing Characteristics

The U.S. Energy Information Administration has published housing characteristics data from the 2015 Residential Energy Consumption Survey. The EIA presents regional aggregates of household characteristics in the Mountain South region, which includes Arizona, Nevada and New Mexico. The table below indicates the percentage of households that report having, using, or practicing the following equipment and/or behaviors in their homes:

Find household too drafty at least some of the time	38%
Single Pane Windows	31%
Homes with Efficient Lighting	
At least one CFL Bulb	84%
At least one LED Bulb	28%
Two or more Refrigerators	26%
Energy Star Refrigerator	43%
Energy Star Dishwasher	29%
Energy Star Clothes Washer	40%
Three or more Televisions	33%
Electric Heat (all types)	44%
Programmable Thermostat	51%
Central Air Conditioning	79%
Use an Evaporative or Swamp Cooler	19%
Use a Ceiling Fan	84%
Electric Water Heating	37%

*Source: U. S. Energy Information Administration, 2015 Residential Energy Consumption Survey: Housing Characteristics Tables.*

## More Information on Energy Efficiency

- ◆ American Council for an Energy-Efficient Economy (ACEEE) [www.aceee.org](http://www.aceee.org)
- ◆ Alliance to Save Energy [www.ase.org](http://www.ase.org)
- ◆ Consortium for Energy Efficiency <https://www.cee1.org/>
- ◆ ENERGY STAR<sup>®</sup> Products [www.energystar.gov](http://www.energystar.gov)
- ◆ Southwest Energy Efficiency Project [www.swenergy.org](http://www.swenergy.org)
- ◆ U.S. DOE's Energy Efficiency & Renewable Energy Programs <https://energy.gov/eere/office-energy-efficiency-renewable-energy>