

# Introduction

- This was created to give a general overview of Solar Heating. This class is not intended to cover all aspects of Solar Heating.
- Additional educational opportunities should be pursued to expand on this base of knowledge. You are encouraged to attend these classes based upon your interest or involvement with Solar Heating.
- Proper design practices are imperative for optimum safety, power production requirements & financial liabilities.
- Client contact and involvement in the design process is crucial. Great care and consideration should be given to the clients needs and understanding of each project.
- Additional responsibilities include the education of local authorities, reviewers and inspectors, as to the design process, system functionality, new technologies, & code interpretation.

# Solar Heating Industry, History & Trends

## Brief Solar History

- Using the sun as a sustainable energy source is far from a new concept.
  - Past societies have been using the sun as an energy source for thousands of years.
  - Native Americans designed entire cities to face south.
    - Keeping their homes cool during the hot summer months and taking advantage of the low southern sun during the winter



# History Continued

- In 1891 Clarence Kemp invented the first solar water heater called the “Climax”. Simply a black water tank inside an insulated box, with one side made from glass.
- In 1909 William Bailey began selling the “Day and Night” solar water heater. Separating the storage tank from the actual collector.
- In 1913 the flat plate collector was born, using an alcohol and water mix as an antifreeze heat exchanging medium
- Natural Gas was discovered in California and became more cost effective than solar.

# History Continued

- Florida 1935-1941 spawned a construction boom that resulted in 60,000 solar thermal systems being installed. 80 percent of the homes built at this time were solar equipped.
- The 1950's and 60's society had very little interest in renewable energy applications. Leaving the solar industry stagnant until the Arab oil embargo of 1973 .
- The late 1970's and 80's sparked another solar trend. Jimmy Carter installs solar thermal panels on the white house
- Government on all levels begins to pass legislation for solar tax credits and incentives.



“A road not taken” -  
JCarter

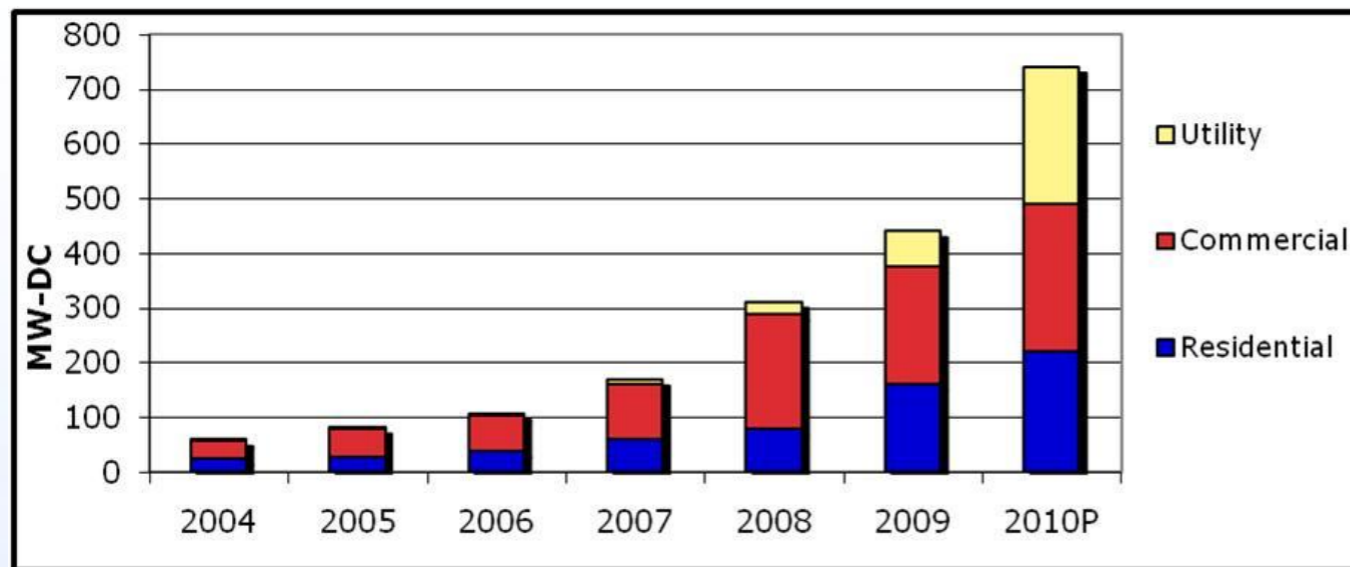


# Solar Today

- The US is back on the solar wagon.
- President Obama has helped to encourage renewable energy in many of the same ways as Former President Jimmy Carter.
  - Providing funding
  - Promoting Incentives
  - Installing solar on the White House



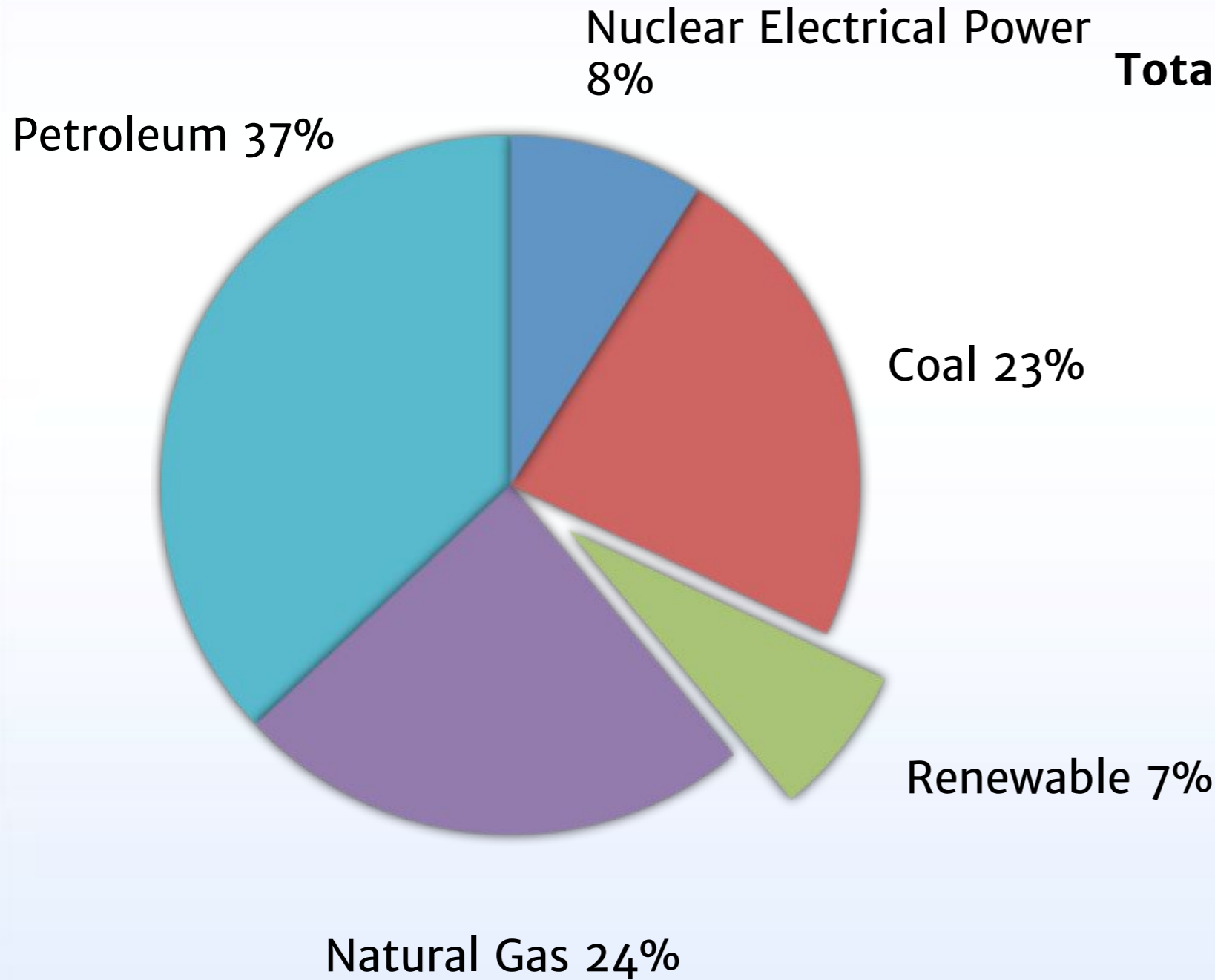
US Solar Market Growth



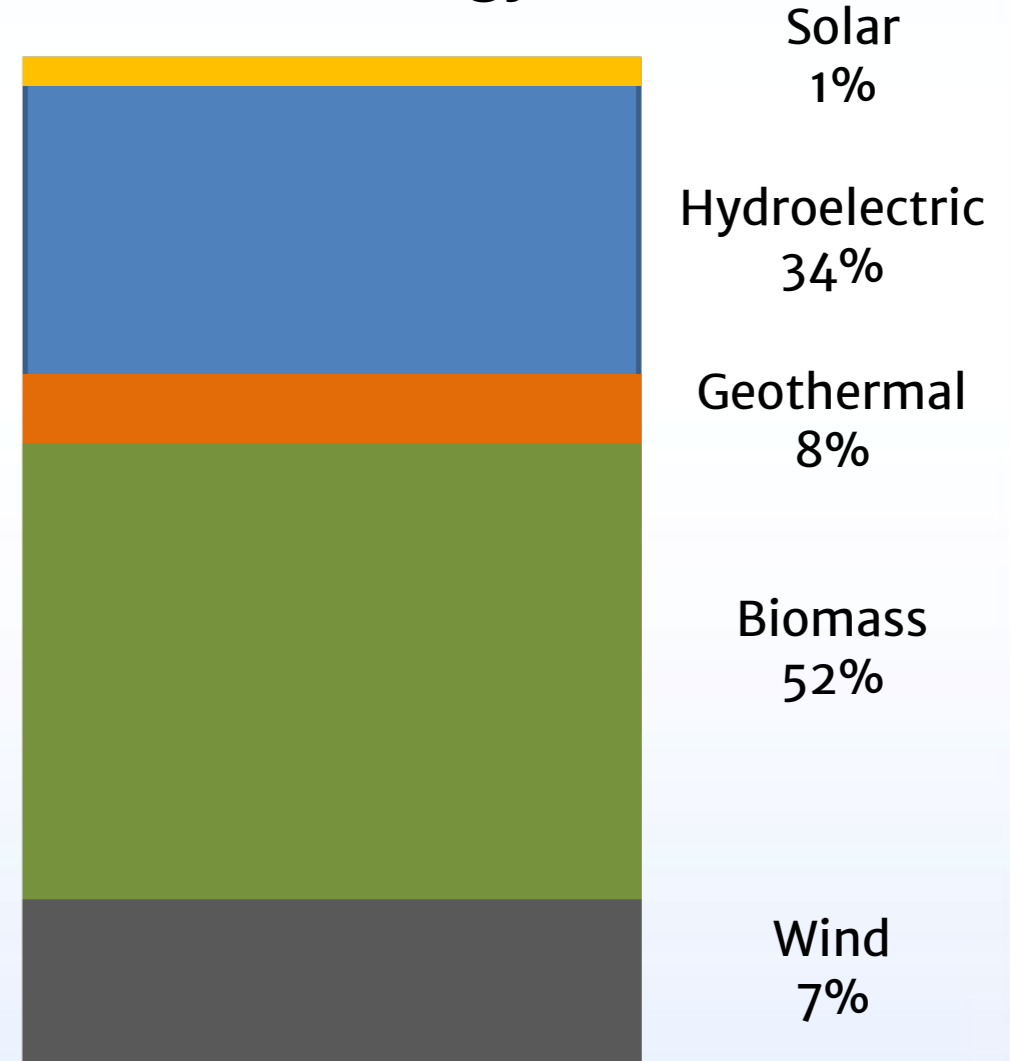
# US Energy Consumption

99.438 Quadrillion Btu

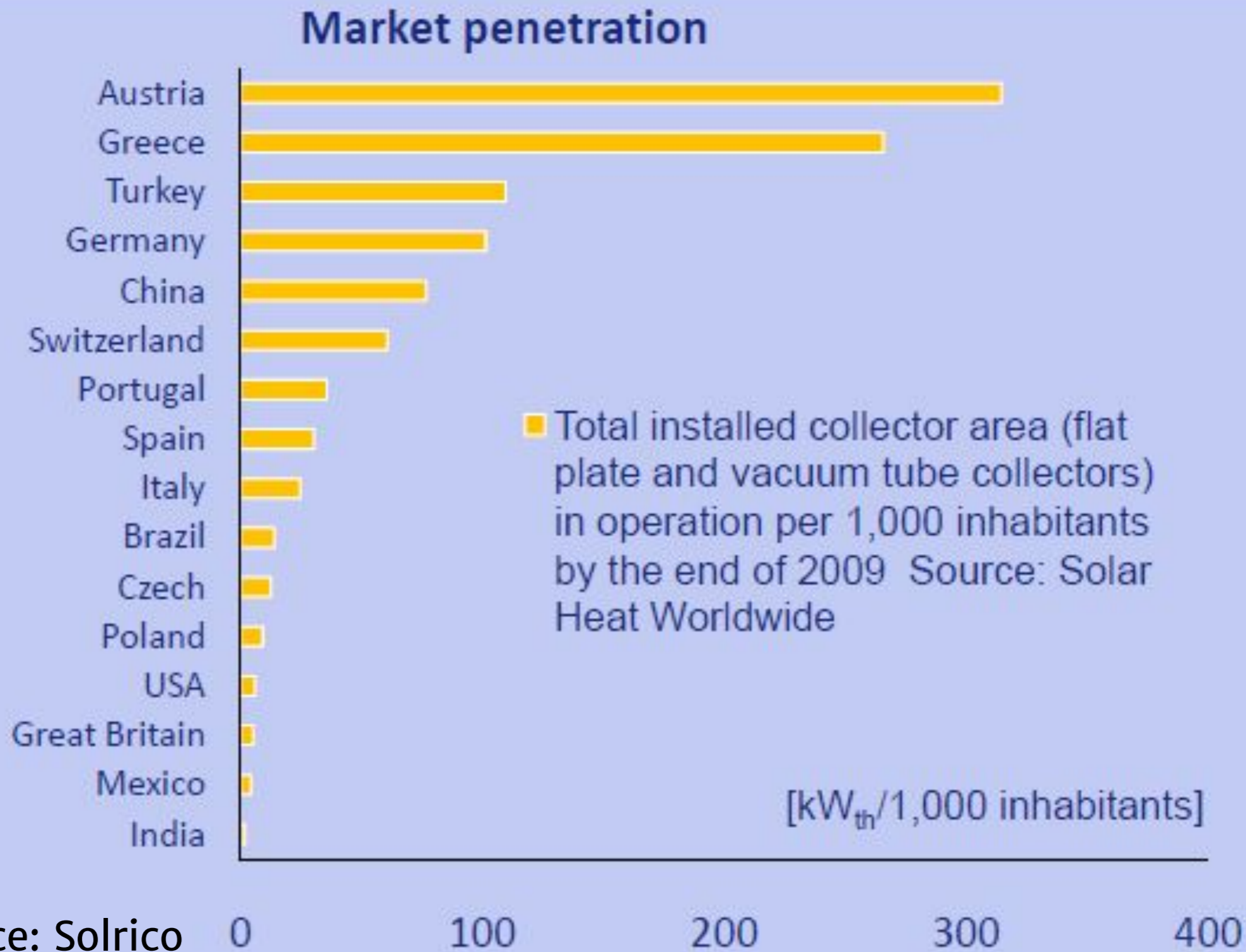
7.367 Quadrillion Btu



## Total Renewable Energy Breakdown



# Market Penetration for Solar Hot Water



Source: Solrico



# Water Heating Type

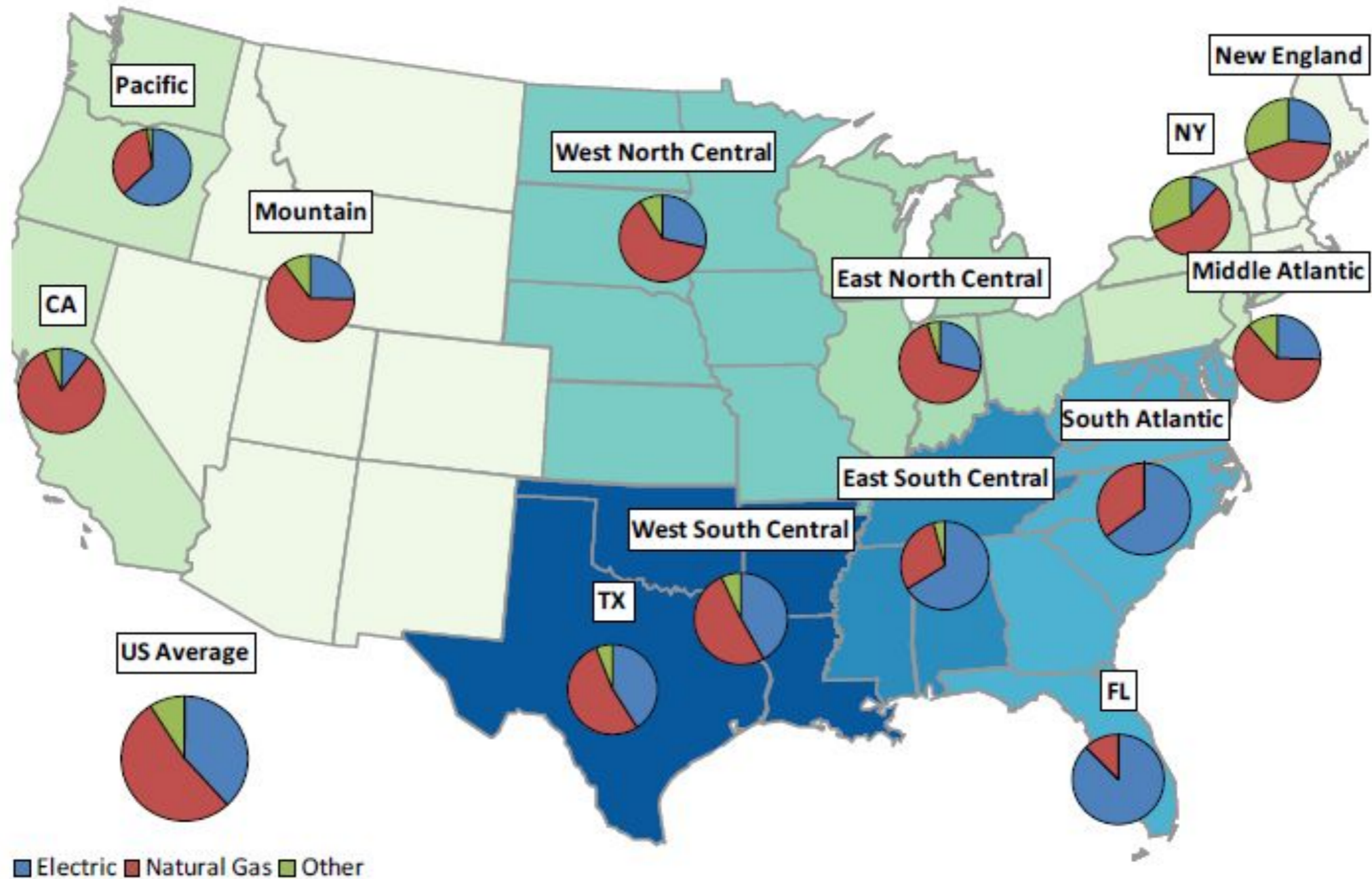


Figure 1. Regional distribution (by U.S. census region) of the number of houses using a particular water heating fuel type

# Water Heating Energy Usage

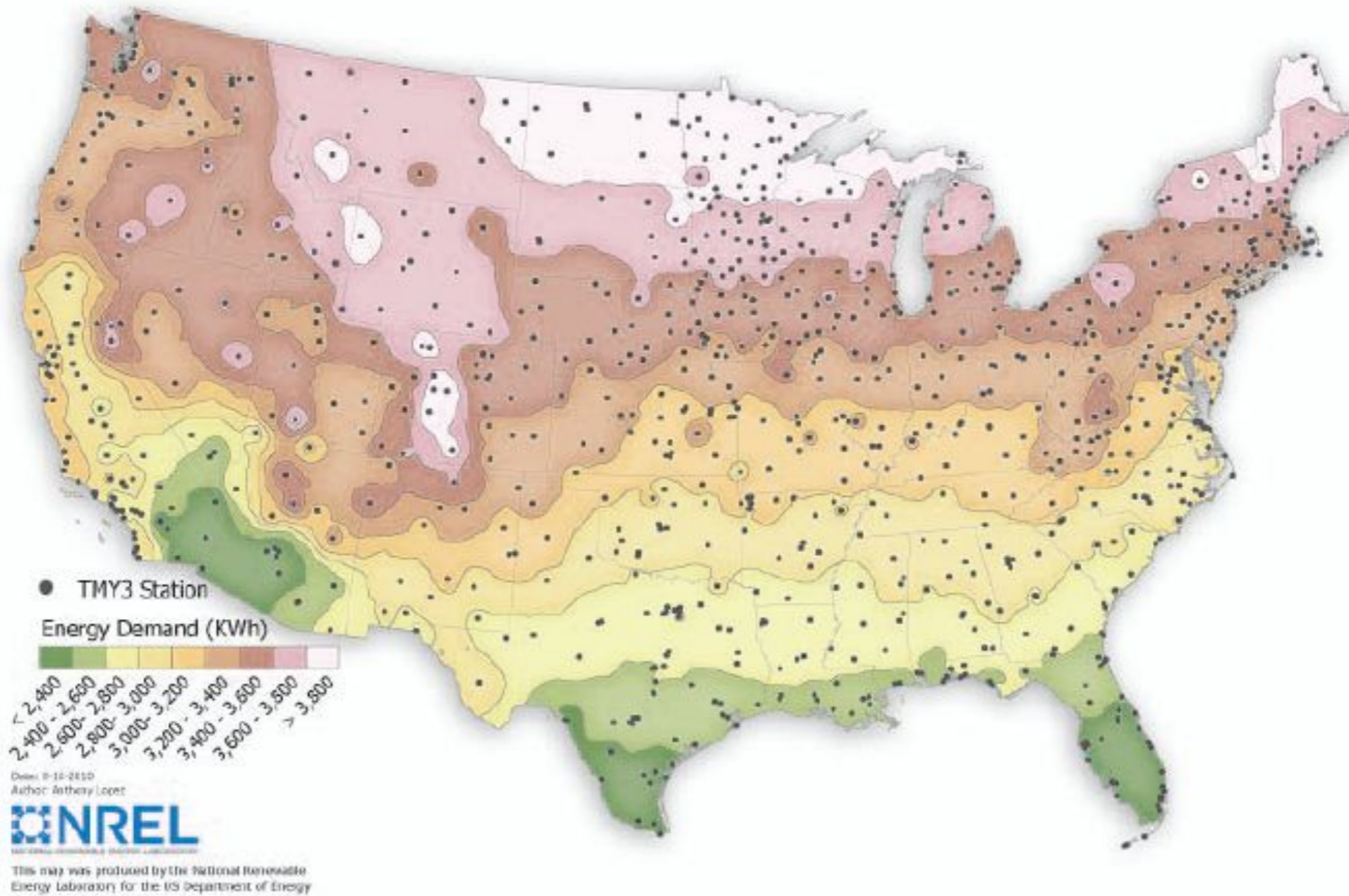
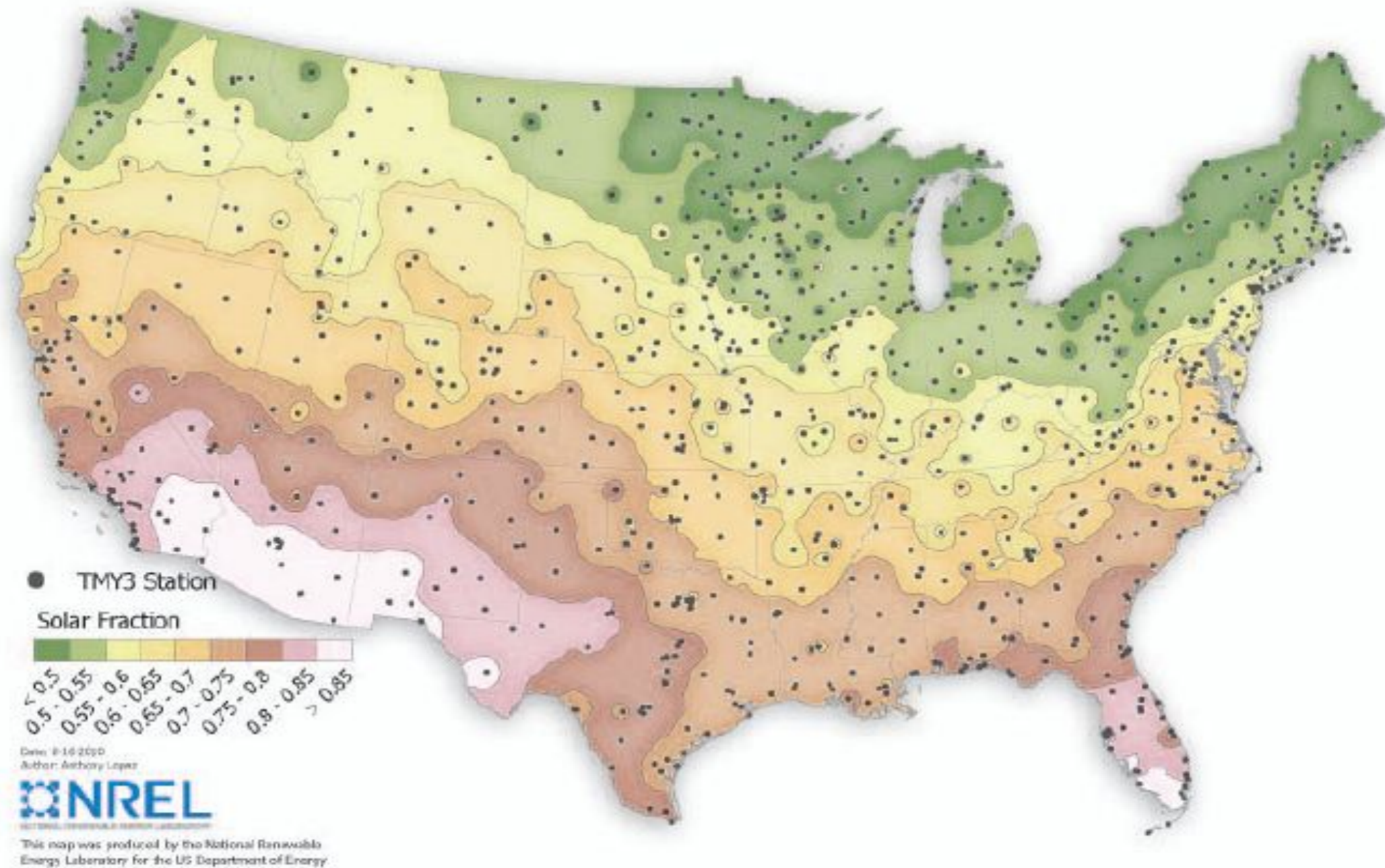


Figure 2. Regional variation in hot water heating energy demand (kWh) for a single-family residence with a constant load profile



# Annual Solar Fraction



**Figure 4. Variation in annual solar fraction (percent of daily load met by the SWH system) for the base case SWH with an electric auxiliary water heater**