

# Petroleum

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# U.S. PETROLEUM USE

- 1% usage in the US for electricity
- 137 active pumps
- 198 mil barrels of recoverable conventional oil



# U.S. PETROLEUM USE

- 17,967,088 barrels capacity per day
- The United States imported approximately 9 million Barrels in 2014



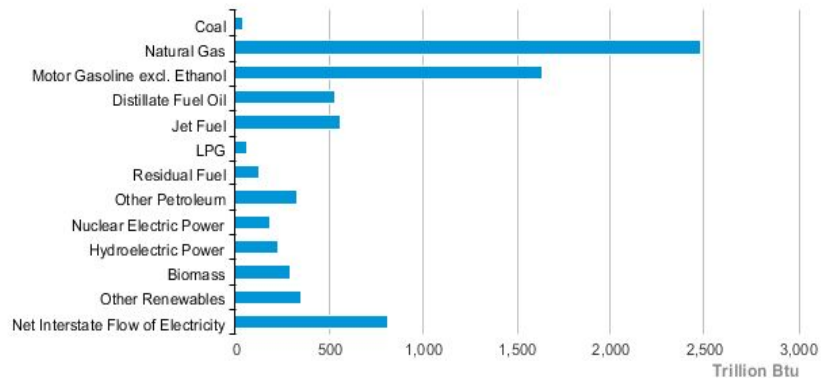
# U.S. PETROLEUM USE

- The United States exports small volumes of domestically produced crude oil, most of it to Canada, which may actually return to the United States as refined products.

# CALIFORNIA OIL FACTS

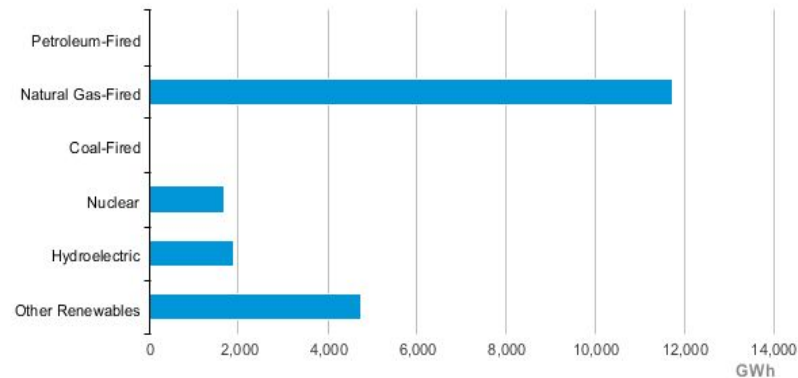
- 3rd in the nation in crude oil production

California Energy Consumption Estimates, 2013



 Source: Energy Information Administration, State Energy Data System

California Net Electricity Generation by Source, Jul. 2015



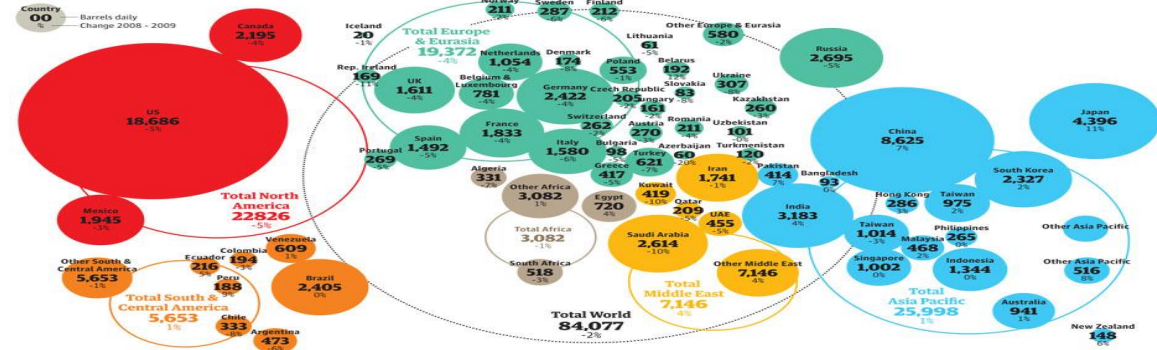
 Source: Energy Information Administration, Electric Power Monthly

# WORLD PETROLEUM USE

- 5.5% of world energy

## Oil consumption around the world

Thousand barrels daily 2009



SOURCE: BP STATISTICAL REVIEW OF WORLD ENERGY

## World oil consumption

Thousand barrels daily, 1965 - 2009



# HISTORY AND POLITICS

- Early uses for petroleum include caulking and as mortar
- In 1853 Ignacy Lukasiewicz discovers how to distil oil on an industrial scale
- Advent of the car skyrockets use of petroleum

# HISTORY AND POLITICS

- Primary source of electricity in many countries by the 50's
- Oil crisis of the 70's left countries to find different sources of electricity
- Today oil is used primarily for automobiles and factory production



# SCIENCE

- Formed from remains of ancient marine animals under extreme heat and pressure
- Crude oil is composed of hydrocarbons, which are mainly hydrogen (about 13% by weight) and carbon (about 85%).

# SCIENCE

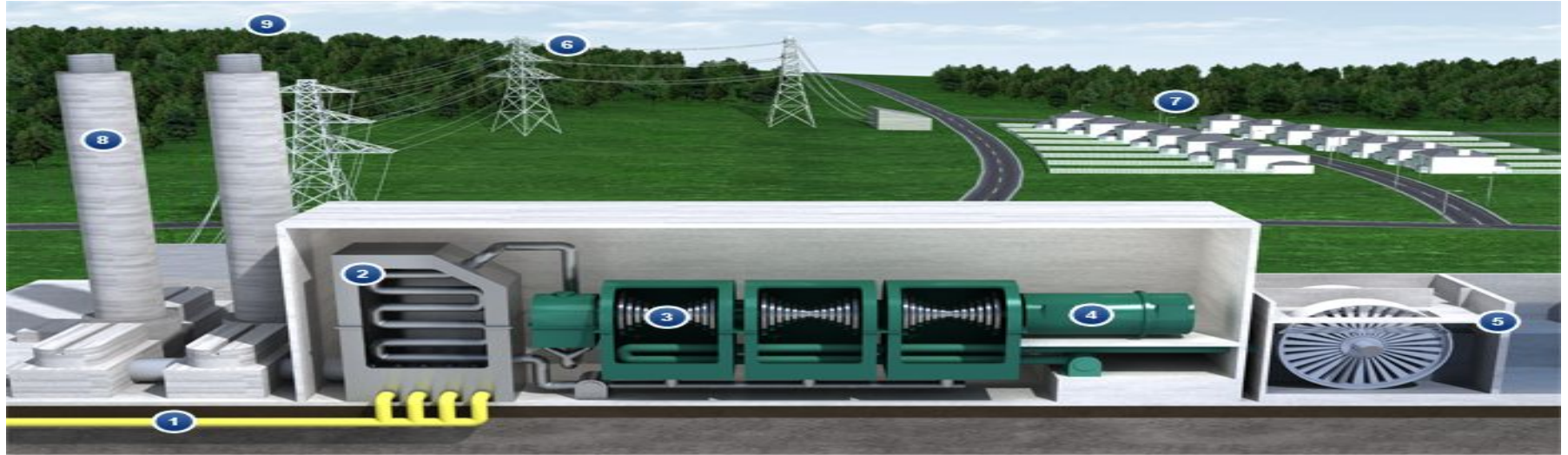
- Most refined petroleum fuels have a energy output to mass of 45MJ/KG



# **DRILLING, REFINING, ELECTRICITY**

- Oil is pumped from deep underground by drills and rigs
- The crude oil is transported to refining plants
- Oil is distilled by heating it and then condensing it
- The vapors condense in different layers such as kerosene, propane, and resids

# DRILLING, REFINING, ELECTRICITY



- 1 Oil supply
- 2 Boiler
- 3 Steam turbine

- 4 Turbine generator
- 5 Water supply
- 6 Electricity transmission (power lines)

- 7 Consumer homes and businesses
- 8 Exhaust stack
- 9 Exhaust gas plume

# ENVIRONMENT

- Oil has the potential to be spilled at all stages of petroleum production
- Petroleum is toxic to all forms of life and can be catastrophic to an ecosystem
- Burning of petroleum releases CO<sub>2</sub> into the atmosphere contributing to the greenhouse gas effect