Energy Security of the United States

Basic concepts and historical development

Outline of Lectures

- Basic overview of the energy consumption of the United States
  - Energy mix
  - Global position of the U.S.
  - Oil imports and domestic production
  - Importance of the transport sector
- National Energy Strategies and Policies
  - Concept of energy independence
  - Domestic energy policies from Nixon to Obama
- Energy security and foreign policy
  - Foreign policies that ensure a supply of energy
  - Iran and Venezuela – affect on U.S. global interests
- Domestic Supply Interruptions
  - Hurricane Katrina
  - Outer Continental Shelf
- Ensuring energy security – measures the U.S. should adopt

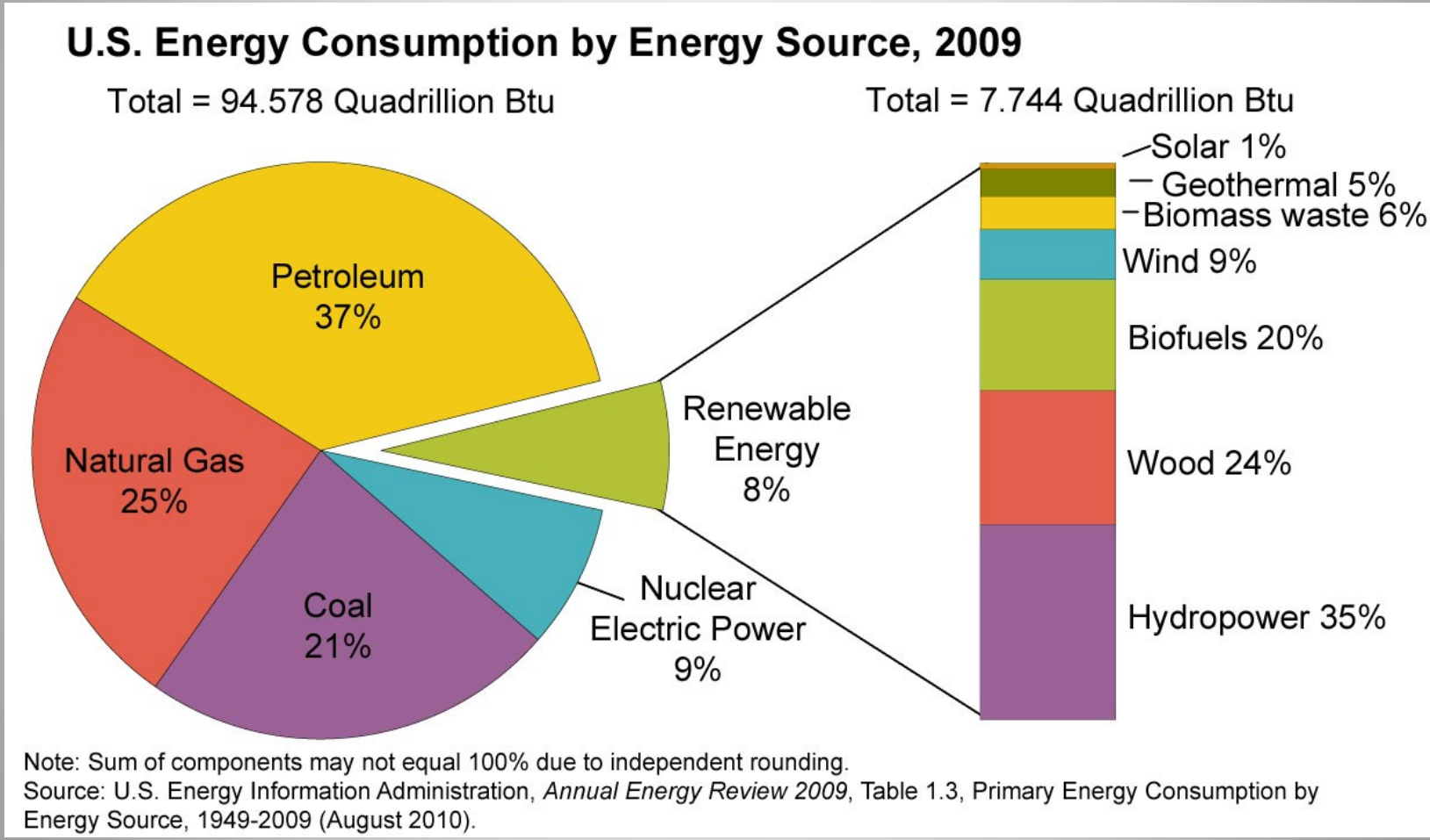
The Basics

- U.S. is the largest state economy in the world
- Largest participant in the global energy system
  - Largest consumer
  - Included among the largest producers of coal and natural gas
  - Largest importer
  - 3rd largest producer of oil

Why is everything in America so LARGE?

- U.S. culture is truly an energy based culture
- It is one of the most energy intensive ways of life in the world
- Compared to other IEA countries, it has abundant energy resources
- Imports resources at a relatively low cost and with low levels of taxation

Energy Mix


U.S. Energy Consumption by Energy Source, 2009
Total = 94.578 Quadrillion Btu
Total = 7.744 Quadrillion Btu
Petroleum 37%
Natural Gas 25%
Coal 21%
Nuclear Electric Power 9%
Renewable Energy 8%
Solar 1%
Geothermal 5%
Biomass waste 6%
Wind 9%
Biofuels 20%
Wood 24%
Hydropower 35%
Note: Sum of components may not equal 100% due to independent rounding.
Source: U.S. Energy Information Administration, Annual Energy Review 2009, Table 1.3, Primary Energy Consumption by Energy Source, 1949-2009 (August 2010).

Global Consumption

- Top consumer of oil in the world
- 2008, in thousands of barrels per day

United States	**19,498**
Japan	4,785
Russia	2,916
Brazil	2,485
Canada	2,261

Source: http://www.eia.doe.gov/country/index.cfm

Global Production

- U.S. consumes the most but doesn't produce the most (2008, in thousands of barrels)

Saudi Arabia	**10,782**
United States	8,514
China	3,973
Mexico	3,186
Kuwait	2,741

Source: http://www.eia.doe.gov/country/index.cfm

Global Proven Oil Reserves

2008, in billions of barrels

Saudi Arabia	**262.3**
Iran	136.3
Kuwait	101.5
Venezuela	80.0
United States	21.0

Source: http://www.eia.doe.gov/country/index.cfm?view=reserves

Global Oil Importers

2008, in thousand barrels per day

United States	**12,224**
China	3,670
South Korea	2,210
France	1,897
Italy	1,519

Source: http://www.eia.doe.gov/country/index.cfm

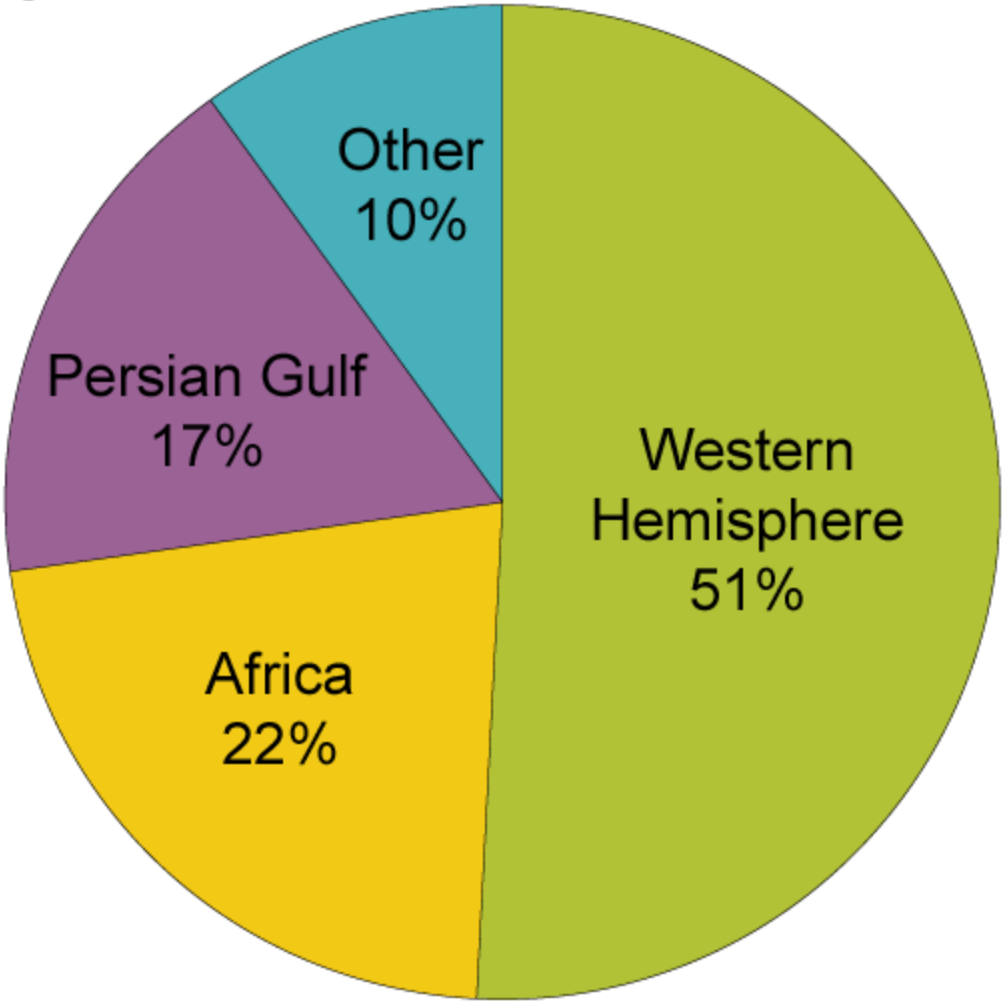
U.S. Oil Suppliers

- 2009, in thousand barrels per day

Canada	**1,936**
Saudi Arabia	1,013
Nigeria	720
Iraq	456
Algeria	276

Source: http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/company_level_imports/current/import.html

Sources of U.S. Net Petroleum Imports, 2009



Source: U.S. Energy Information Administration, *Petroleum Supply Annual 2009*.

Domestic Production of Oil

- In 2009, 50% of U.S. crude oil production came from 5 states:

Texas	**21%**
California	11%
Louisiana	3.5%

Source: http://www.eia.gov/energyexplained/index.cfm?page=oil_where

Basics about domestic production

- Domestic oil production peaked in the 1970s
- It increased by 7% in 2009 due to a 35% increase in production in federal waters in the Gulf of Mexico
- Around 1/3 of U.S. Oil was produced in offshore wells in the Gulf of Mexico
- Over 40% of total U.S. petroleum refining capacity and 30% of U.S. natural gas processing capacity is located along the Gulf Coast

Source: http://www.eia.doe.gov/special/gulf_of_mexico/index.cfm#gom_factsheet

Global Oil Market

- Oil can be transported easily
- Natural gas or electricity are constrained by pipelines or transmission grids
- Effect on U.S. energy security
  - Where the U.S. acquires its oil has become irrelevant
- Disruptions in supplies or increase in demand will be distributed across the global market
- Attempts by suppliers to target certain importers with supply reductions cannot succeed because oil will be sold to those who will pay for it

Transport Sector

- The U.S. economy is powered by gasoline, diesel and other fuels
- Around 70% of the oil consumed in the U.S. is used for transportation
- Americans own more than 242 million motor vehicles
- Although the U.S. population consists of 5% of the world's population, it uses more than 33% of all petroleum consumed for road transportation

Relevant factors

- Goods and people travel larger distances
- Population is highly mobile
- Without strong incentives, it is difficult for people to change their behaviour
- E.g. – during Jan-May 2008, gasoline prices rose by 25.5% but consumption fell by only 3%
  - Incomes remained stagnate

Other reasons

- System as a whole is less efficient than most other industrialized countries
  - Less developed public transportation system
  - Higher annual mileage per capita
  - Vehicles with low mileage performance
    - U.S. SUVs will average 24.1 mpg by 2011
    - EU similar vehicles will average 47 mpg by 2012
  - Low energy prices caused by low taxes on energy
  - In 2009, the average retail gas prices in the U.S. was $2.61 per gallon
    - France – $6.36
    - Italy – $6.47
    - United Kingdom – 5.87

Source for gas prices: http://www.eia.doe.gov/aer/txt/ptb1108.html

Summary

- The U.S. is a society based on consumption
- It is self-sufficient in electricity which is mostly powered by coal, natural gas and nuclear power
- Energy security for Americans means a stable, cheap supply of oil
- Oil fuels its transportation sector and drives its economy
- A threat or disruption in the supply of oil equals a threat to the stability and growth of its economy

National Energy Strategies and Policies

- The “modern” energy policy strategy of the U.S. can said to have started in 1973
- Since then, the U.S. has pursued a number of different energy policies
- Debate has concerned the balance between increasing supply and encouraging conservation

Energy Independence

- Concept which has played a major role in the energy security debate
- Both Republicans and Democrats have pursued this policy
- Definition of energy independence varies
  - Eliminating all use of imported oil
  - Stopping increases in the share of imported oil
- Eliminating all oil imports is nonsense
  - Not an economically viable option for the U.S.
  - Production vs. Consumption
  - Demand changes in the patterns of consumption and production of fuels
- Import dependency is a fact of life for many countries
  - E.g. Continental Europe, Japan, South Korea

Nixon (1969-74)

- Launched “Project Independence”
  - Goal was to achieve self-sufficiency by 1980
  - Declared that U.S. science, technology and industry can free the U.S. from dependence on foreign oil
  - Not a realistic goal
- Policy of strong government intervention in the price of oil
  - Contributed to the increase in prices during the OPEC embargo
  - Government established price ceilings
    - Resulted in some oil being withdrawn from the market, furthering aggravating the increase in prices
  - Rationed gasoline
    - Netherlands didn’t ration gas but let the prices rise, and did not face long lines at the filling stations

Ford (1974-77) and Carter (1977-81)

- Established the International Energy Agency
- Created the U.S. Department of Energy
- Passed a series of laws aimed at decreasing the energy intensity of the U.S. economy and reducing the share of imported oil
  - 1974 Energy Reorganization Act
  - 1975 Energy Policy and Conservation Act
    - Strategic Petroleum Reserves
    - Corporate Average Fuel Economy
  - 1978 National Energy Act
    - Energy Tax Act
    - Gas Guzzlers Tax
- High energy prices and government initiated conservation incentives resulted in a 15% decline in U.S. Consumption from 1979-1985

Reagan (1981-89)

- Brought a change in the approach towards energy
- Carter's administration – growth of government intervention in the energy market – new controls, regulations, agencies were established
- Adhere to free market principles and began to deregulate the energy sector

- Supported an energy policy of “strategic reserves and strategic forces”
  - Supported the Strategic Petroleum Reserves
  - Supported a strong military presence in the Middle East
- Encouraged greater domestic oil production
- 1987 releases “Energy Security Report”
  - Describes the rising oil dependency
  - “higher import dependence could increase the risk of major supply disruptions that are damaging our economic well-being and energy security”
  - Affects national security, military preparedness and foreign policy
  - Recommends increasing supply by opening up the Arctic National Wildlife Refuge and the Outer Continental Shelf to oil development

George H.W. Bush (1989-93)

- 1992 Energy Policy Act
  - Should implement the policies outlined in his National Energy Strategy
  - Various measures to weaken American dependence on imported petroleum, provide incentives for clean and renewable energy, promote energy conservation
  - Failed to include 2 measures which would have limited oil imports
    - Increased Alaskan exploration
    - Stricter vehicle efficiency standards

Clinton (1993-2001)

- With Clinton, there was hope that something might change...
- 1992 Vice-President Al Gore published his book “Earth in the Balance”
  - “it ought to be possible to established a coordinated global program to accomplish the strategic goal of completely eliminating the internal combustion engine over, say, a 25-year period”
- However, Clinton’s administration is noted for putting energy issues on the backburner – it was not a priority issue
- 1995 National Energy Policy Plan
  - Energy consumption, economic growth, environment

Bush Jr. (2001-09)

- 2005 Energy Policy Act
  - 1st comprehensive energy policy act since 1992
  - Provisions:
    - Energy efficiency – through grants, rebates for efficient building construction, household appliances, provides standards and reduction targets for buildings
    - Renewables - electricity production from renewable resources, authorizes wind and other alternative energy producers, increased the amount of ethanol that must be mixed with gas
    - Oil and Gas – incentives for drilling in the Outer Continental Shelf and the production of oil and gas from marginal wells
    - Vehicles – tax credits for hybrid cars
  - Criticisms:
    - Fails to adequately address U.S. dependence on oil imports, set a renewable electricity standard, reduce global warming

Bush Jr. does even more...

- 2007 State of the Union Address – introduces the goal of “20 in 10”
  - Aims to reduce gasoline usage by 20% in the next 10 years (by 2017)
- 2007 Energy Independence and Security Act
  - Responds to Bush’s vision
  - Provisions:
    - 1st increase in vehicle fuel economy standards (CAFE) in more than 30 years
    - Carmakers are required to raise gas mileage by 40% to 35 mpg by 2020
    - Renewable Fuel Standard requires fuel producers to use at least 36 billion gallons of bio-fuels by 2022
    - Improved standards for appliances and lighting

Obama

- 2009 American Recovery and Reinvestment Act
  - Supports investments to lower energy dependence largely through renewable energy technologies
  - Supports a variety of alternative fuel and advanced vehicle technologies through grant programs, tax credits, research and development
  - Increases the gas mileage requirement to 35.5 mpg by 2016

Why is progress in energy policy so slow?

- Traditional aversion to government intervention in the market
- Lack of close cooperation between the administration and congress, federal government and states
- All have different policy agendas
- Difficulty in coordinating federal and state roles have caused delays in developing infrastructure such as LNG terminals, opening the OCS for exploration/production, developing unconventional resources of oil

Summary

- Debate on energy policy in the U.S. has concerned the federal government's role in energy
- Shifted from policies reliant on the federal government to more dependent on market forces
- Policies have centered around increasing supply and encouraging conservation
- Failed to adequately respond to crises in oil supply and maintain policies that might protect the country from periods of oil instability