The United States
Self Inflicted Energy Crises

The 1970 Arab Embargo
A Wakeup call Ignored

- By the start of the 1970's, the environmental movement had gained significant momentum
- Average Auto Mileage about 12 miles a gallon
- U.S. oil production declining
  - 1970, 22% Imported
  - 1973, 36% Imported
  - 2008, 63.4% Imported

Washington Unwilling or Unable to Respond with Effective Energy Strategies

- Political Leadership
- Auto Manufactures
- Labor Unions
- Consumers
- Environmentalist

The SUV was Born

- Manufacturers pressed government to ease auto mileage standards
- Drop in fuel prices brought about renewed interest in bigger and more powerful cars
- If Government did not lower the standard manufacturers forced to close many American auto plants where large and luxury cars are assembled

The Unintended Consequences of Inaction

- 20% of Trade Deficit
- Foreign Intrigues
- Sovereign Wealth Funds
- Transfer of Funds to Unfriendly Nations
- National Security

2008 World Consumption (BBL/Day)

Source: CIA World Fact Book 2008

World	80,290,000	%
United States	**20,800,000**	**26%**
European Union	14,570,000	18%
China	7,000,000	9%
Japan	5,353,000	7%
Russia	2,916,000	4%
Germany	2,618,000	3%
India	2,438,000	3%
Canada	2,290,000	3%
South Korea	2,130,000	3%
Brazil	2,100,000	3%
Mexico	2,078,000	3%
Saudi Arabia	2,000,000	2%
France	1,999,000	2%
United Kingdom	1,820,000	2%
Italy	1,732,000	2%
Iran	1,630,000	2%

Top 15 countries Exporting to the U.S.

(Thousand Barrels per Day)

Energy Information Administration (May 2008)

Country	8-Mar	YTD 2008
Canada	2,542	2,532
Saudi Arabia	1,542	1,556
Mexico	1,358	1,331
Nigeria	1,174	1,132
Venezuela	1,033	1,152
Iraq	773	697
Algeria	441	780
Russia	402	384
Angola	388	350
Virgin Islands	290	351
Ecuador	238	186
United Kingdom	218	155
Kuwait	208	266
Brazil	191	172
Colombia	165	240

Oil Production (June 2007)

Source: CIA World Factbook

Country	bb/day
Saudi Arabia	9,475,000
Russia	9,400,000
United States	**7,610,000**
Iran	3,979,000
China	3,631,000
Mexico	3,420,000
Norway	3,220,000
Canada	3,135,000
Venezuela	3,081,000
United Arab Emirates	2,540,000
Nigeria	2,451,000
Kuwait	2,418,000
Iraq	2,130,000
United Kingdom	2,075,000
Libya	1,720,000

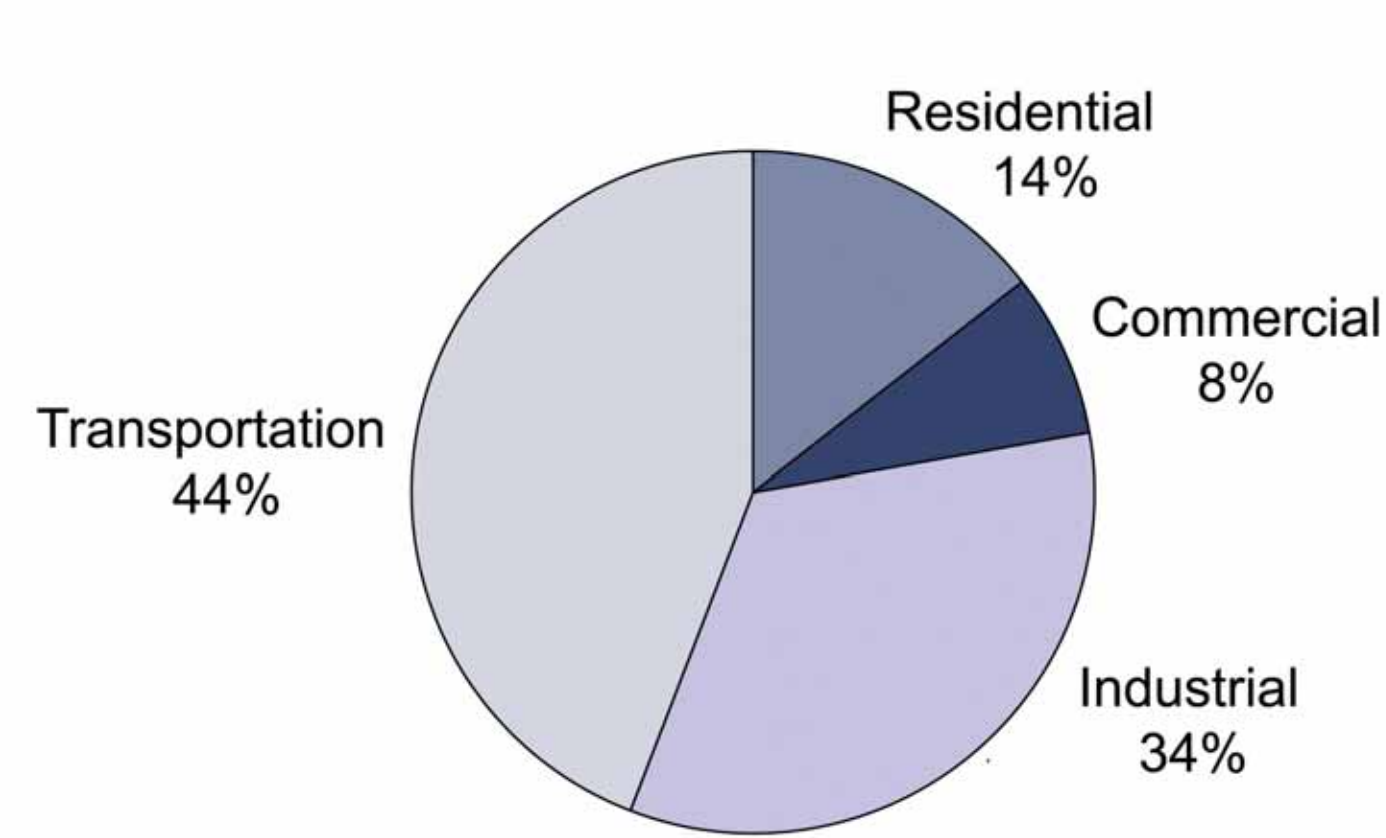
Breakdown of Sources of Energy in the United States

Source: Energy Information Administration, *outlook 2008*

Year	2006	2010	2030
Petroleum	41%	39%	37%
Natural Gas	23%	23%	20%
Coal	23%	22%	25%
Nuclear Power	8%	8%	8%
Hydropower	3%	3%	3%
Biomass	2%	3%	5%
Other Renewable Energy	1%	1%	2%

U. S Direct Energy Consumption by Sector, 2007

Source: U.S. Dept. of Energy EIA August 2007



“The Inconvenient Reality”

- Fossil Fuels Will Not be Replaced by Renewable Energy Sources
- Global Warming is a Political Reality
- As of Jan. 1, 2008, 74 Commercial Coal Plants, 141 Natural gas Plants and 11 Petroleum Plants have been Canceled
- No new Refineries or Nuclear Plants have been built in the last 30 years

The Environmentalist Solution to the Energy Crises

- Energy Conservation
- Renewable and Clean Energy
  - Wind
  - Solar
  - Ethanol
  - Hydrogen

Wind Energy

- Wind is a clean, inexhaustible energy resource
- Currently generates more than 11,000 megawatts (MW) of electricity (1million homes)
- Requires a 1.9 cent per kilowatt hour tax credit to be competitive
- Major concern is land use, aesthetic and danger to wildlife
- Requires large land areas to be effective

Solar Energy

- A massive switch from fossil fuels to solar could supply 69% of the U.S.'s electricity by 2050
- A vast area of photovoltaic cells would have to be erected
- Large solar concentrator power plants would be built
- A new direct-current power transmission backbone would deliver solar electricity across the country
- But $420 billion in subsidies from 2011 to 2050 would be required to fund the infrastructure and make it cost-competitive as well as committing 46,000 square miles of land primarily in the Southwest (The size of the state of Pennsylvania)

Ethanol

- Legislation now requires 9 billion gallons for 2008 and a five-fold increase in use by 2022
- To meet this requirement, farmers will directly plow up more forest or grassland, which releases to the atmosphere much of the carbon previously stored in plants and soils
- Requires a 51 cent per gallon tax credit to be competitive
- Ethanol has 20% less energy content then gasoline
- Requires a new distribution system
- Consumes more energy then it produces

Bio-fuels are an Indefensible Bad Environmentally Driven Decision

- As the US ramps up ethanol production, other crops will decline contributing to world hunger:
  - corn by 62 per cent,
  - wheat by 31 per cent,
  - soybeans by 28 per cent,
  - pork by 18 per cent and
  - chicken by 12 per cent
- A massive destructive reorientation of the agriculture markets
- Contributes to the water shortage (2000gal of water produces as little as 1gal of ethanol)

Hydrogen
The Holly Grail

- Unfortunately, experts say it will be 40 years or more before hydrogen has any meaningful impact on gasoline consumption
- Currently, hydrogen fuel cells are costly to produce and fragile
  - 200 hp engine $11,000
  - Goal in 2010 $ 4,500
- Hydrogen can be produced chemically from methanol or electrochemically from water
- Most of today's hydrogen is produced using the cheapest source natural gas
- There's no distribution system or standardized method of storage, which is crucial since hydrogen fuel is a gas that must be kept under high pressure.

The U.S.’s Most Abundant Sources of Energy

- Coal
- Shale Oil
- Nuclear
- Oil Deposits

Coal

- Is one of the most abundant and cheapest energy sources
- Enough coal to last 250 years
- Provides 23% of our energy needs
- Considered a dirty fuel
- Integrated gasification combined cycle produces synthesis gas to generate electricity
- Can be converted into gasoline or jet fuel
- Major issue is the capture of carbon dioxide
  - Electro-Catalytic
  - Ammonia
  - Sequestering

Shale Oil

- Deposits in the United States are easily the largest in the world (1.0-1.2 trillion barrels of shale oil in the Rocky Mountain area)
- Competitive with conventional crude oil at $50 per barrel
- During the oil crisis of the 70's investors lost billions of dollars when the price of oil dropped to $10 a barrel
- In 2005 Royal Duch Shell announced that its in-situ extraction technology could be competitive at prices over $30/bbl
  - Reduction in standard surface environmental problems
  - Requires barriers to prevent significant environmental impact to waterwater aquifers
- The federal government currently owns 72% of all known oil shale in the US.

Nuclear Energy

- A cheap, clean source of power that does not use fossil fuels or add greenhouse gases to the atmosphere
- The major problem is radioactive waste disposal and the potential of a catastrophic disaster
- Statistically, nuclear power has a far better safety record than coal-fired electricity generation
- One option for nuclear waste disposal is storage in a long-term facility (Yucca Mountain in Nevada)
- No new nuclear plants have been ordered since 1973
- In 2005 The European Union supplied 30.2% of its energy

Oil Deposits

- The third leading world producer of oil
- Have massive oil reserves
- U. S. oil production peaked in 1970 at 11.3 million barrels per day
- Restricted from drilling off the east and west coast of the U.S. and Alaska
  - ANWR: 4.3 billion to 12 billion barrels of oil
  - Coast of Louisiana: more than 3 billion barrels, and perhaps as much as 15 billion barrels
  - The outer continental shelf estimated 86 billion barrels, plus 420 trillion cubic feet natural gas

We Can Achieve Oil Independence

- We need to have the will to accept change and compromises
- Requires leadership
- There are things that we can do now with today’s technology
- Others need investments to assure our energy independence in the future

There is No Single Silver Bullet to Solve this Problem

- Promote conservation by accelerating the transition to high mileage transportation (35MPG or greater) by raising the price of gas to $5 per gal or more
  - Use the income to provide incentives to offset the cost differentials of conventional vehicles
- Open public lands, off shore and in Alaska to exploration and drilling for oil and gas
- Authorize the use of Yucca Mountain in Nevada for storage of nuclear waste and expedite rapid expansion of nuclear energy
- Facilitate the investment in clean coal and shale oil by establishing price floors

Invest in Alternate Sources in Energy

- Hydrogen Cell development
- Solar Energy
- Non Food Crop Fuel Production
- Wind

We Have Choices

- We can continue on our present course having to deal with foreign entanglements (Iraq and Afghanistan)
- Being dependent on foreign countries that are not necessarily our friends, having our economy held hostage
- Or we can make the changes necessary to become energy independent

The U.S. Remains One of the Only Countries in the World That Chooses as a Matter of Policy to Lock Up its Natural Resources

(Wall Street Journal)