

# Common Sense Solutions for Management of Global Warming

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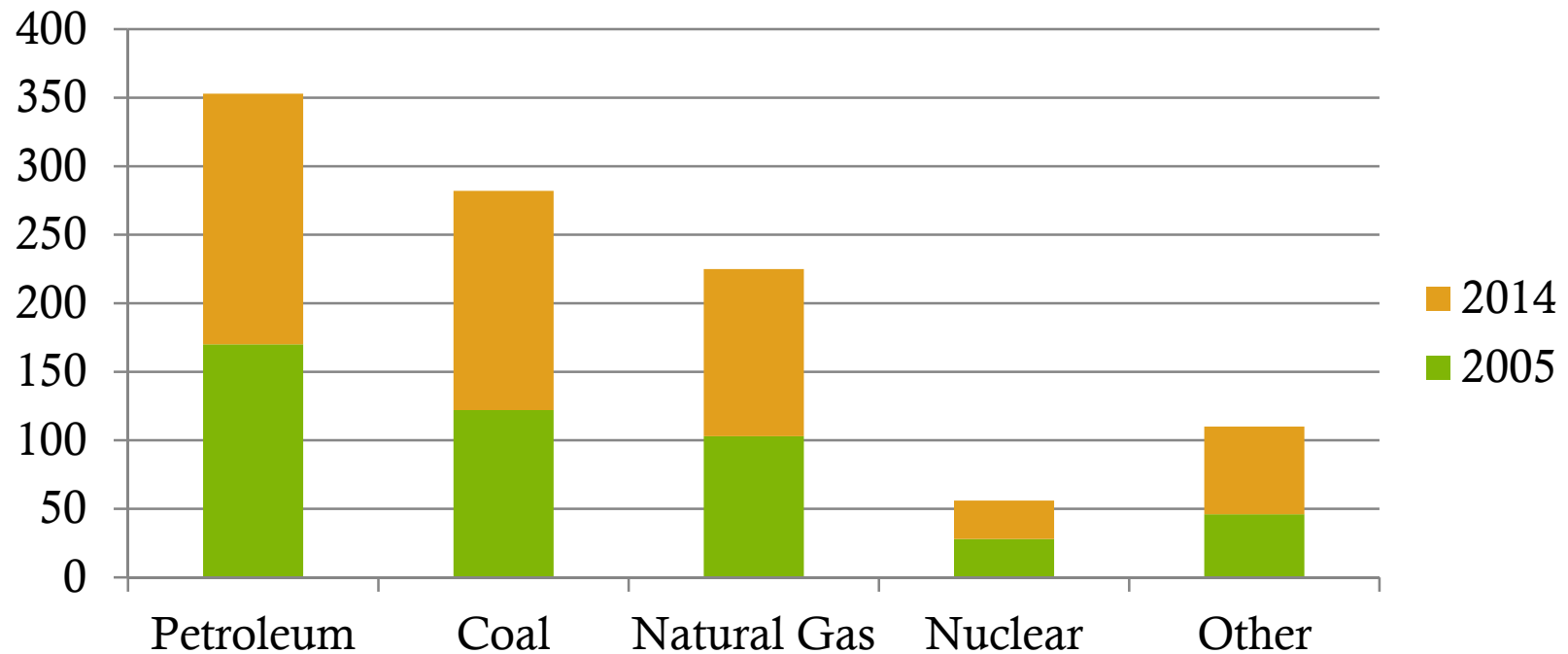
# Popular Notions on Global Warming

- ◆ Increasing Global Carbon Dioxide Levels (2.7%/year) Causes Global Warming and Ocean Acidification
- ◆ This is a Result of Increased Use of Fossil Fuels
- ◆ Global Environmental Disaster will ultimately Result
- ◆ Popular Perspectives advanced in the Media:
  - ◆ Fossil Fuels are “evil” and must be eliminated as an energy source beginning with Coal
  - ◆ Replace Fossil Fuels with Renewables beginning with Coal (No mention of **When** or **If** this is possible)
  - ◆ No mention of the COSTS of these “solutions” to the Global Economy or Human Populations

# EPA Prohibition

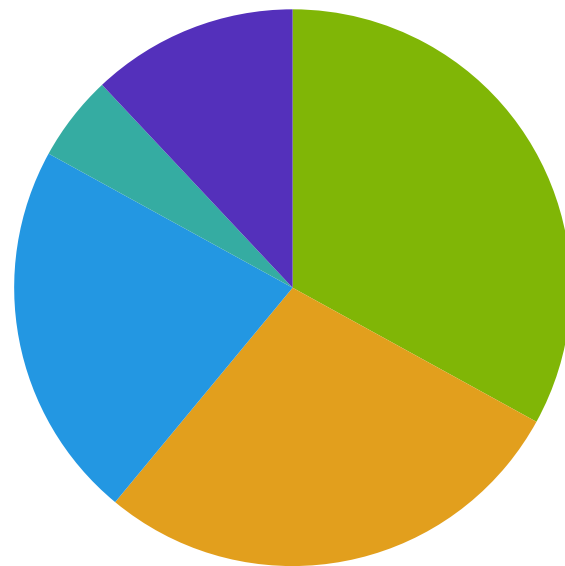
- ◆ On April 13, 2012, the U.S. Environmental Protection Agency (USEPA) promulgated new regulations that amounted to a prohibition on the Best Technologies Currently Available for constructing new coal fired power plants (640g/kilowatt-hour). Instead USEPA would mandate that unless a coal fired power plant met the same carbon dioxide (CO<sub>2</sub>) emission levels as achievable with power plants fueled by natural gas (454g/kilowatt-hour), it could not be built.

# World Total Energy Consumption by Fuel Type



# Total 2014 World Energy Consumption in Percent by Fuel

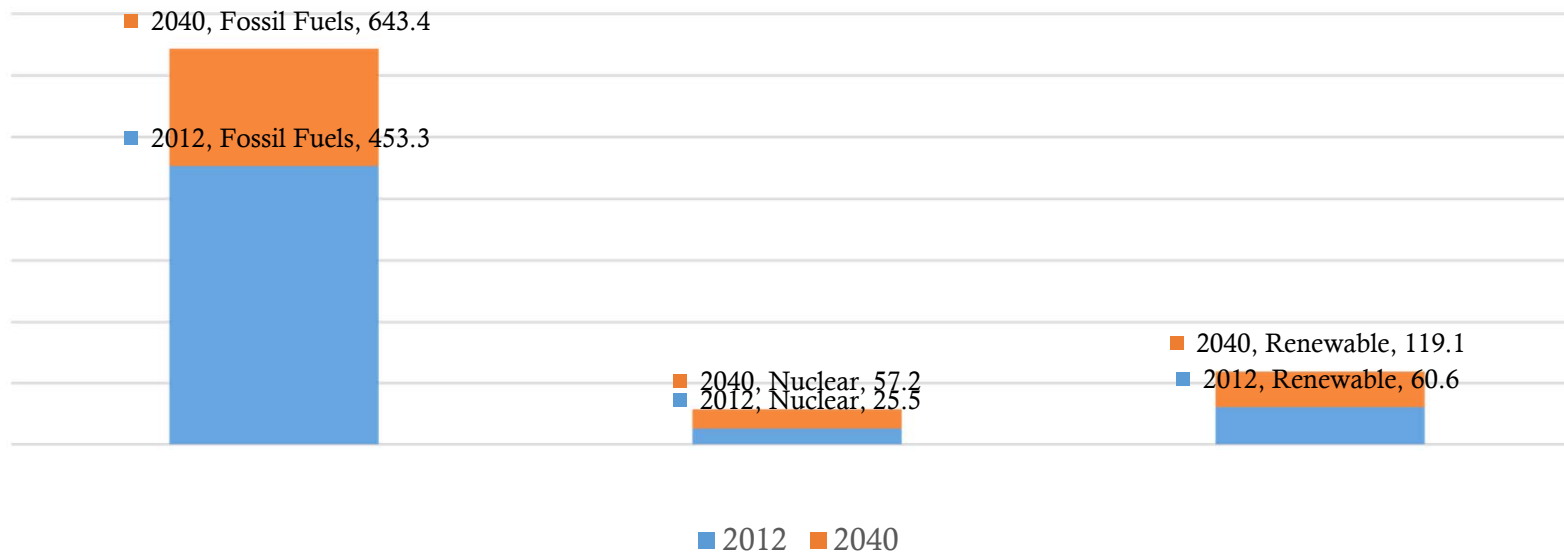
**Percent**



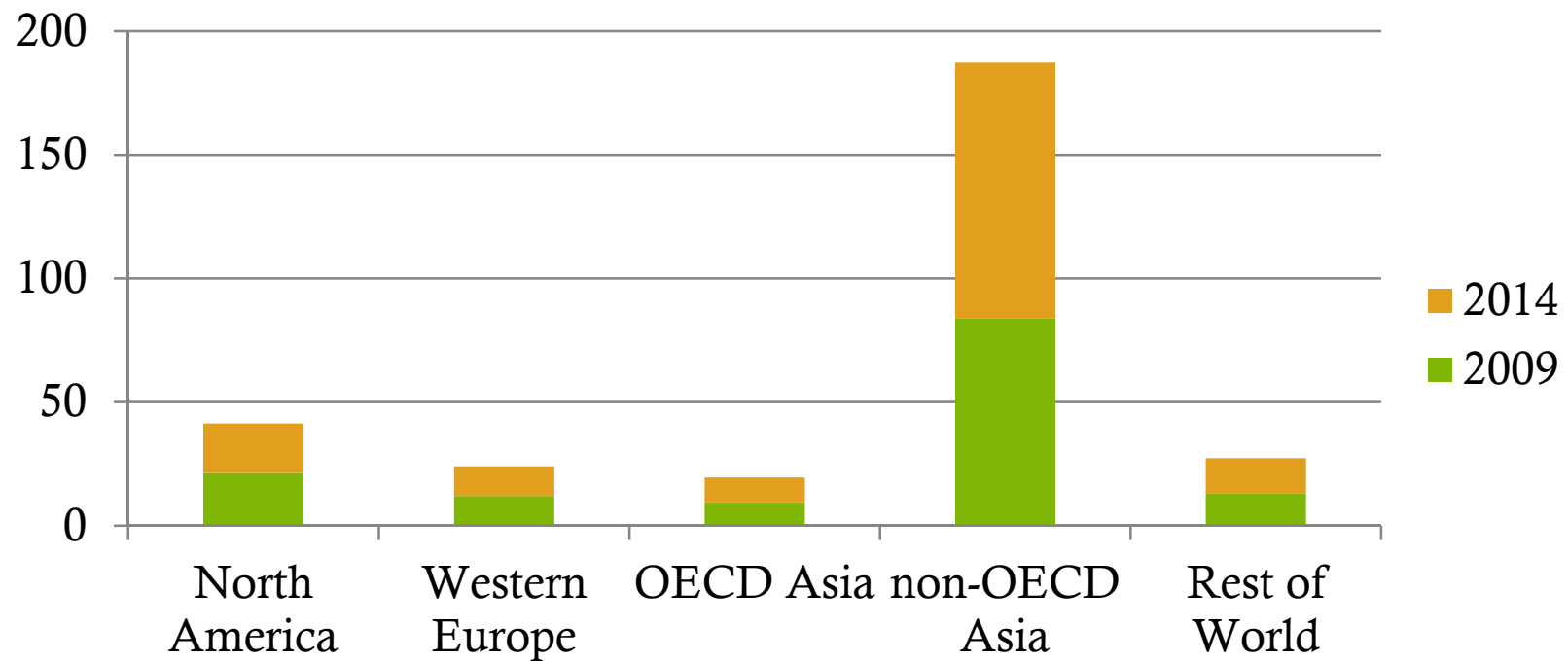
- Petroleum
- Natural Gas
- Coal
- Nuclear
- Other

# World Total Energy Consumption by Fuel Source from 2012 to 2040

World Projection in Fuel Use in Quadrillion Btu

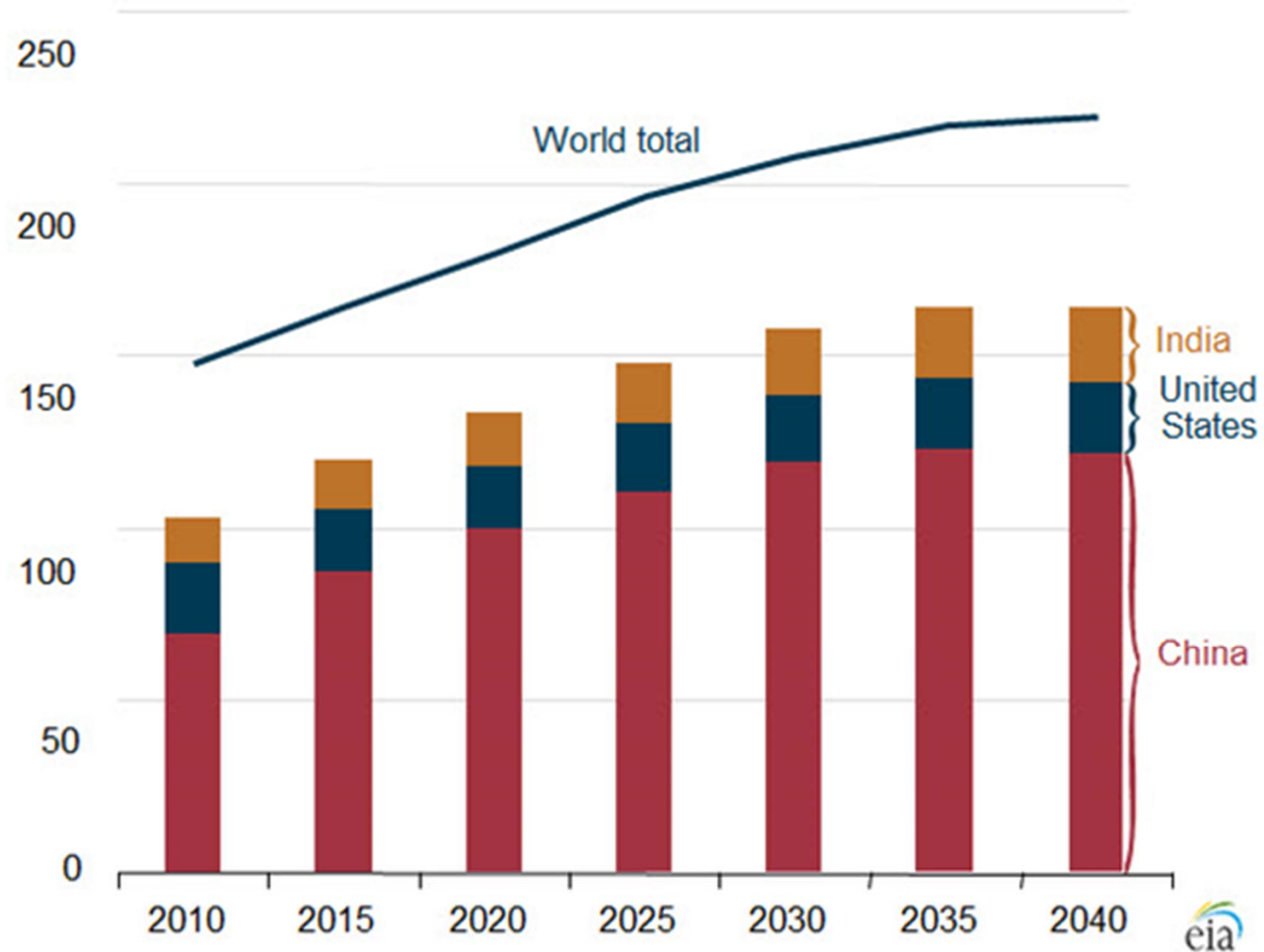


# World Coal Production by Region



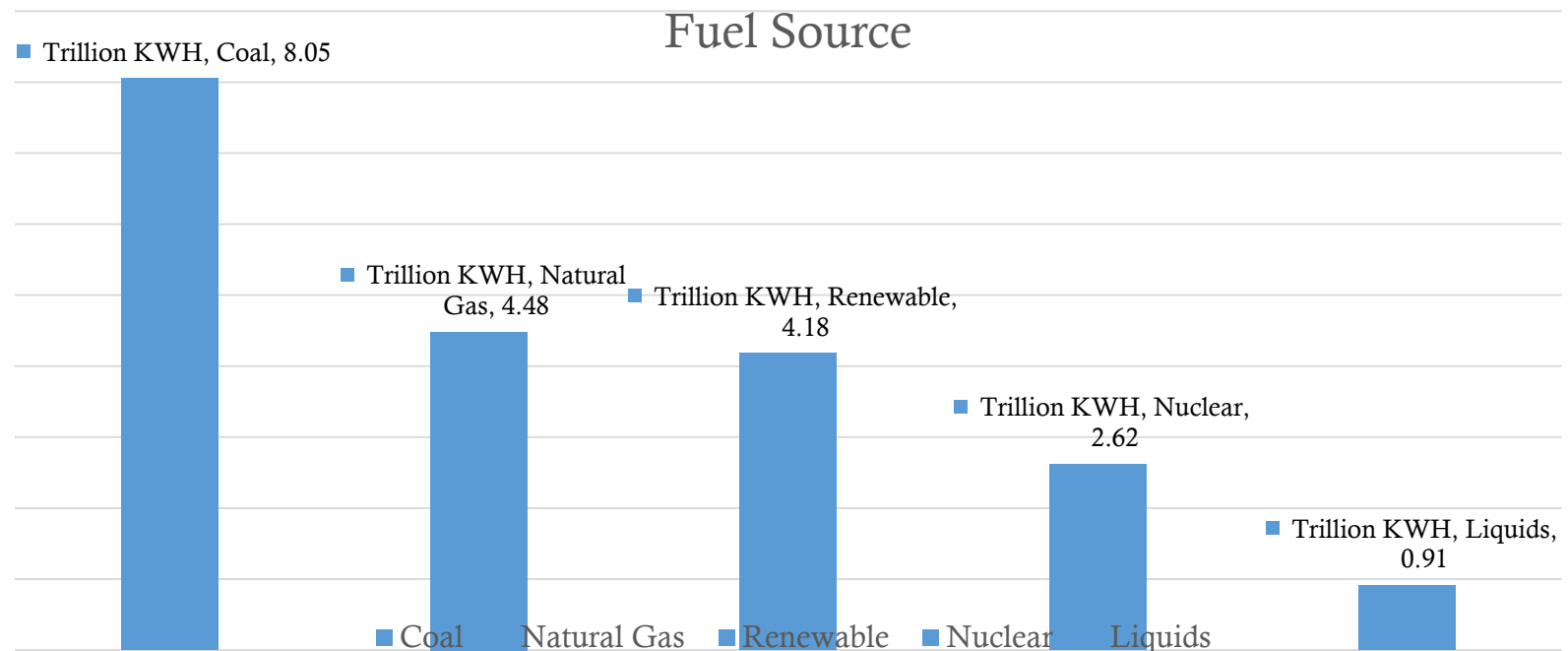
# World coal consumption by leading countries, 2010-2040

quadrillion Btu

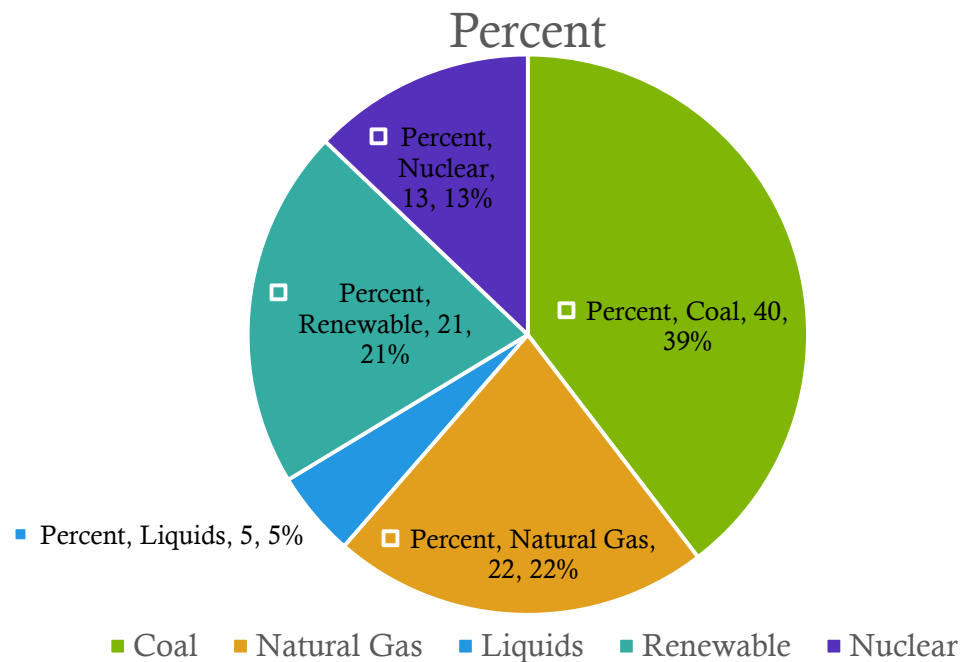




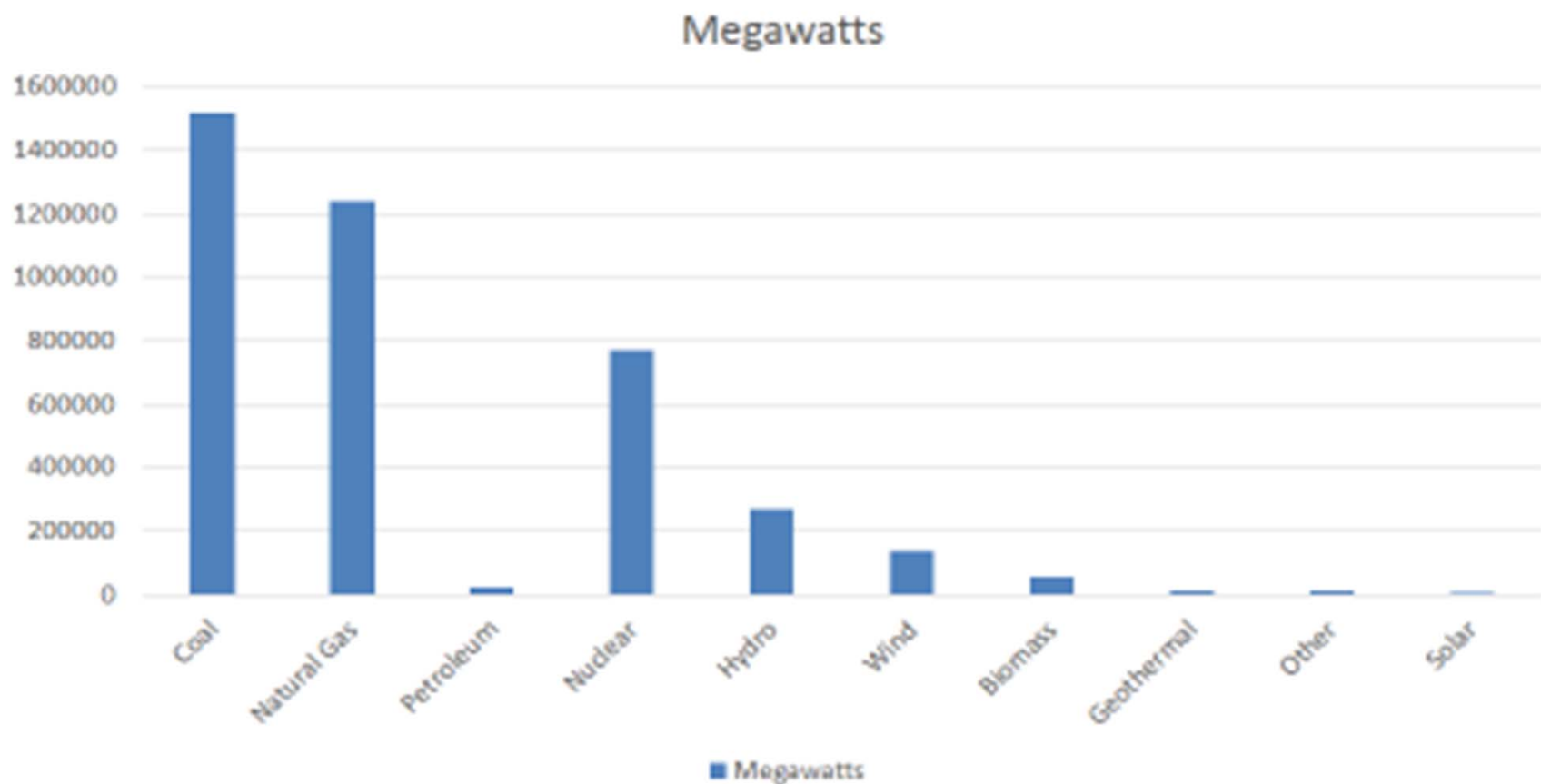
# 2010 Global Electricity Production by Fuel Source



# 2010 Global Electricity Production by Fuel Source in Percent of Total



# 2012 U.S. Electric Generation by Fuel Source (thousand megawatts)



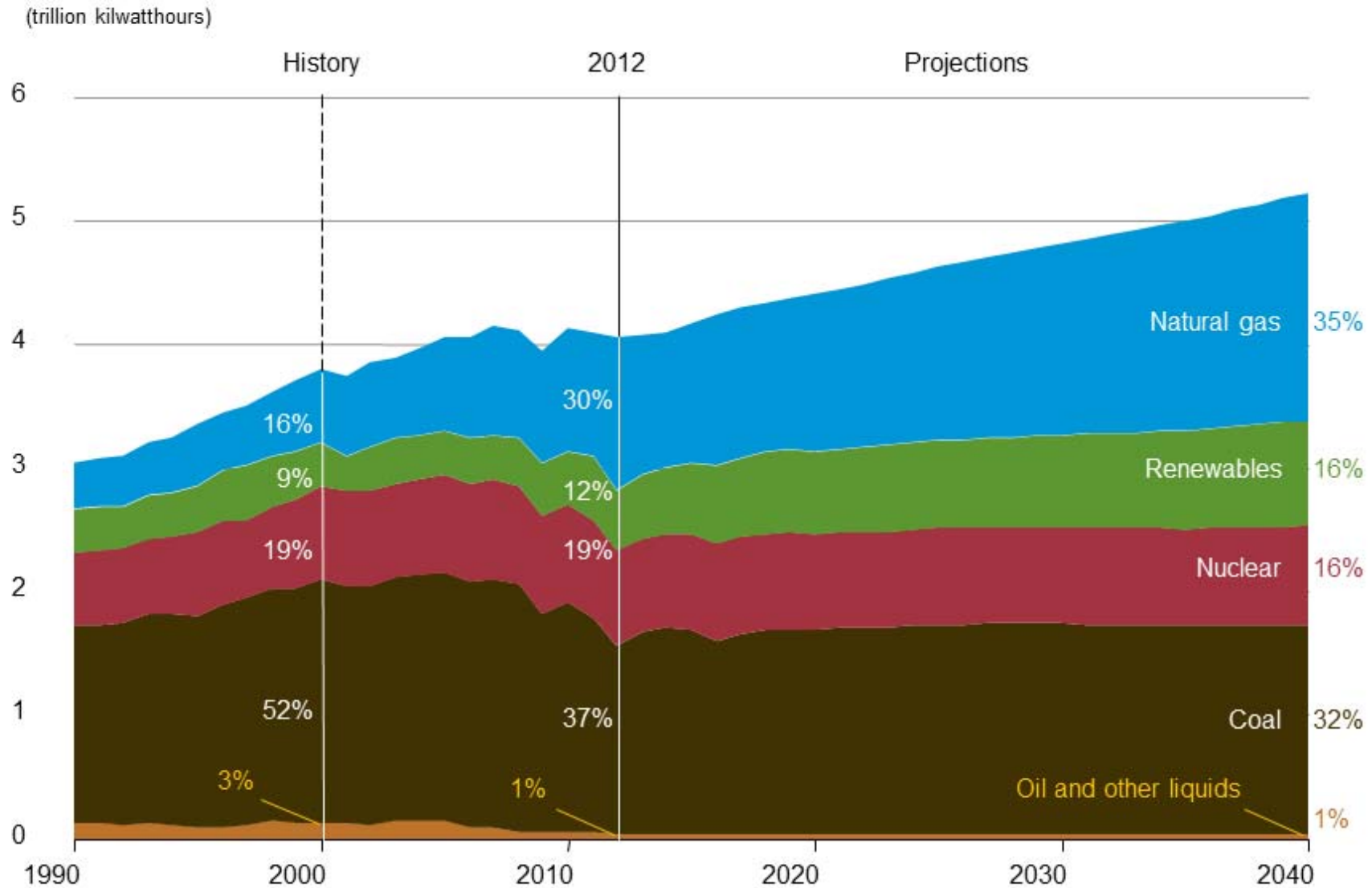
# 2012 U.S. Electric Generation by Fuel Source (Percent)



# Growth of Renewables for US Electrical Power

	2011 (billion kwh)	2040 (billion kwh)
Coal	1730	1829
Natural Gas	1000	1582
Nuclear	790	903
Renewables	526	858

# Electricity generation by fuel, 1990-2040



# TIME Required for Renewables to Replace Coal Electric Power in the U.S.

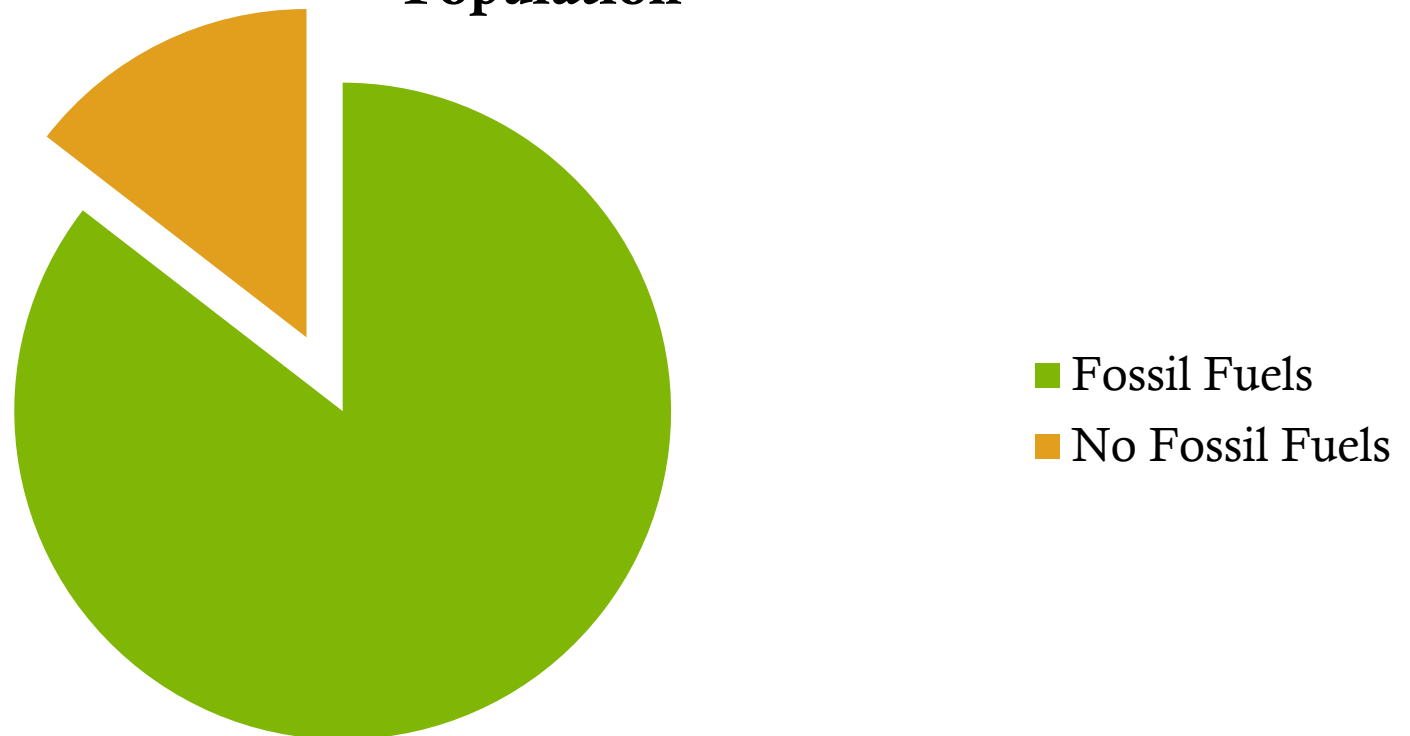
- ◆ 2012
  - ◆ Coal 37% of total fuels used
  - ◆ Renewables 12% of total fuels used
- ◆ 2040 (30 years = apx one generation)
  - ◆ Coal 32% of total fuels used (*A reduction of 5% in a generation*)
  - ◆ Renewables 16% of total fuels used

**7 (30 year) GENERATIONS REQUIRED FOR RENEWABLES TO REPLACE COAL FOR ELECTRIC POWER IN THE U.S.**

## 2014 WORLD POPULATION

7.210 billion with Fossil Fuels or 1.226 billion without

**Population**





# Impacts on Social Justice

- ◆ Currently, about 83% of the world population depends upon fossil fuel as an energy source
- ◆ A “renewables only world” is improbable in any foreseeable future and if pursued would result in a level of social injustice of “catastrophic” proportions
- ◆ Advocating that the world halt progress on “clean and efficient” fossil fuel production and use is likely to delay reductions in CO<sup>2</sup> emissions because the world is not prepared to do without current levels of energy consumption.

# A Relevant Lesson from History

## U.S. Alcohol Prohibition 1920-1933

- ◆ **Total Alcohol Consumption Levels was reduced by 50%**
- ◆ **ORGANIZED CRIME** under Al Capone came to control the supply of beer from Canada to Florida bringing in \$60 million a year in profits at his 10,000 speakeasies.
- ◆ The repeal of prohibition championed by Franklin Roosevelt and others emphasized the need to raise tax revenue and weaken the base of **ORGANIZED CRIME!**

# The Goal of Prohibition



# The Result of Prohibition

## PUBLIC ENEMIES



AL "SCARFACE" CAPONE



"BUGSY" SIEGEL



"PRETTY BOY" FLOYD



FRANK COSTELLO



"MACHINE GUN" KELLY



JOHN DILLINGER



"BABY FACE" NELSON



"LUCKY" LUCIANO

# Impacts of Fossil Fuel Prohibition

- ◆ US Prohibitions on Fossil Fuels beginning with coal by establishing legal barriers to construction of State of the Art, High Efficiency Coal Fired Power Plants sends a message to the world that efforts to implement clean coal technology are useless. The result is that **the world is discouraged from building more efficient less polluting technologies leading to greater levels of global CO<sup>2</sup> not less.**

# Impacts of Fossil Fuel Prohibition

- ◆ The popularization of propaganda that fossil fuels are “an evil” will stigmatize any person or institution involved with its production or use such that only those that have no problem with that label will be associated with it.

# The Goal of a Renewables Only World



# The Result of a Renewables Only World

**FAMINE**



**POVERTY**



**WAR**



**DEATH**

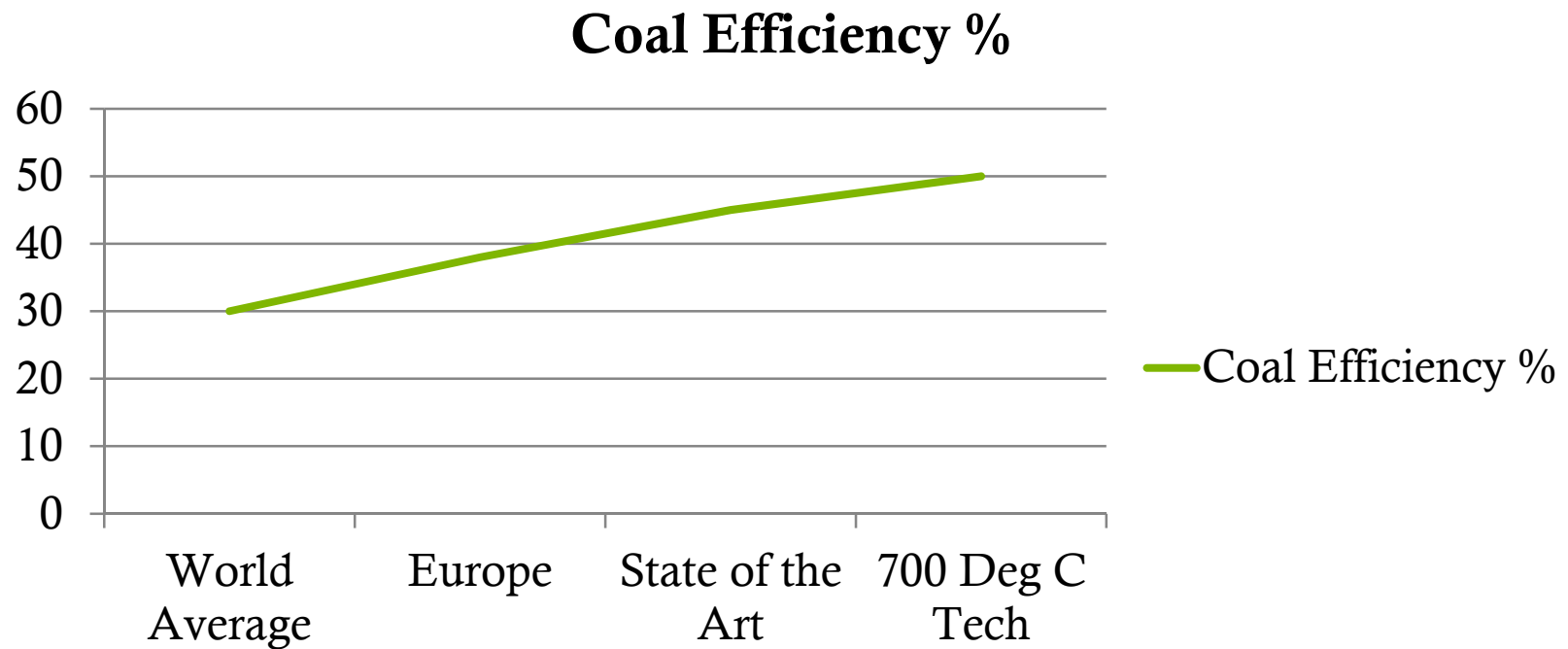




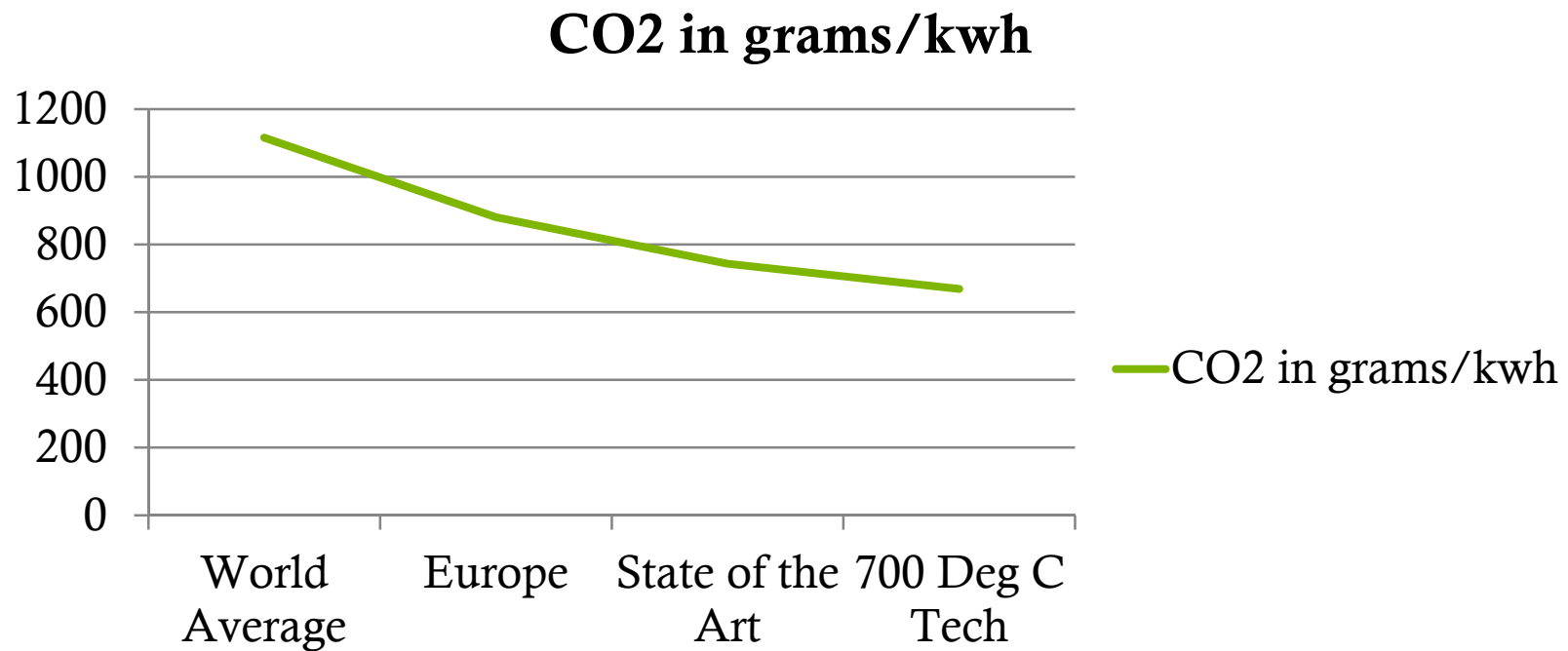
# Common Sense Solutions

- ◆ The current Worldwide average **efficiency** for coal used to produce electricity is **30%**.
- ◆ The conversion of all US coal power plants to existing improved “ultra-supercritical 700 degree C” technology for producing electricity with coal would increase efficiency to **50%**. A **40%** increase in efficiency (resulting in the production of the same amount of electricity with less coal).
- ◆ This same technology results in an additional **40%** reduction in carbon dioxide emissions from the coal that is burned.
- ◆ It is conceivable that the world could make this conversion a reality in the foreseeable future **profoundly reducing the global production of Carbon Dioxide.**

# Efficiency of Coal Conversion Related to Current Technologies



# Carbon Dioxide Produced Related to Coal Fired Power Technologies



# Conclusions

- ◆ Solutions must be globally applicable to be effective.
- ◆ Solutions that negatively impact the global economy and human population quality of life will not be adopted.
- ◆ Quantitative US fossil fuel reductions will have very little impact globally.
- ◆ The unmanageable TIME FRAME for replacement of fossil fuels with renewables demands that all fuels be made increasingly efficient with reduced rates of carbon emissions as quickly as technology allows.
- ◆ Prohibitions of fuel specific BACT solutions will have a negative rather than positive impact on the problem.

# Sources of Data

- ◆ Energy data is from the U.S. Energy Information Administration at: [www.eia.gov](http://www.eia.gov)
- ◆ Global Human Population figures based on U.S. Census Bureau data found at: <http://www.census.gov/popclock>
- ◆ Best Available Control Technologies for Coal Fired Power Plants at: [www.worldcoal.org/coal-the-environment/coal-use-the-environment/improving-efficiencies](http://www.worldcoal.org/coal-the-environment/coal-use-the-environment/improving-efficiencies)
- ◆ U.S. Environmental Protection Agency (USEPA): [www.epa.gov](http://www.epa.gov)

Questions?