

Energy and the Environment

Introduction



Ripped from the Headlines

U.S. to Be Top Oil Producer by 2015 on Shale, IEA Says

World Running Out Of Time To Stop Global Warming, UN Report Says

Reuters

Posted: 04/06/2014 10:54 am EDT | Updated: 04/06/2014 10:59 am EDT



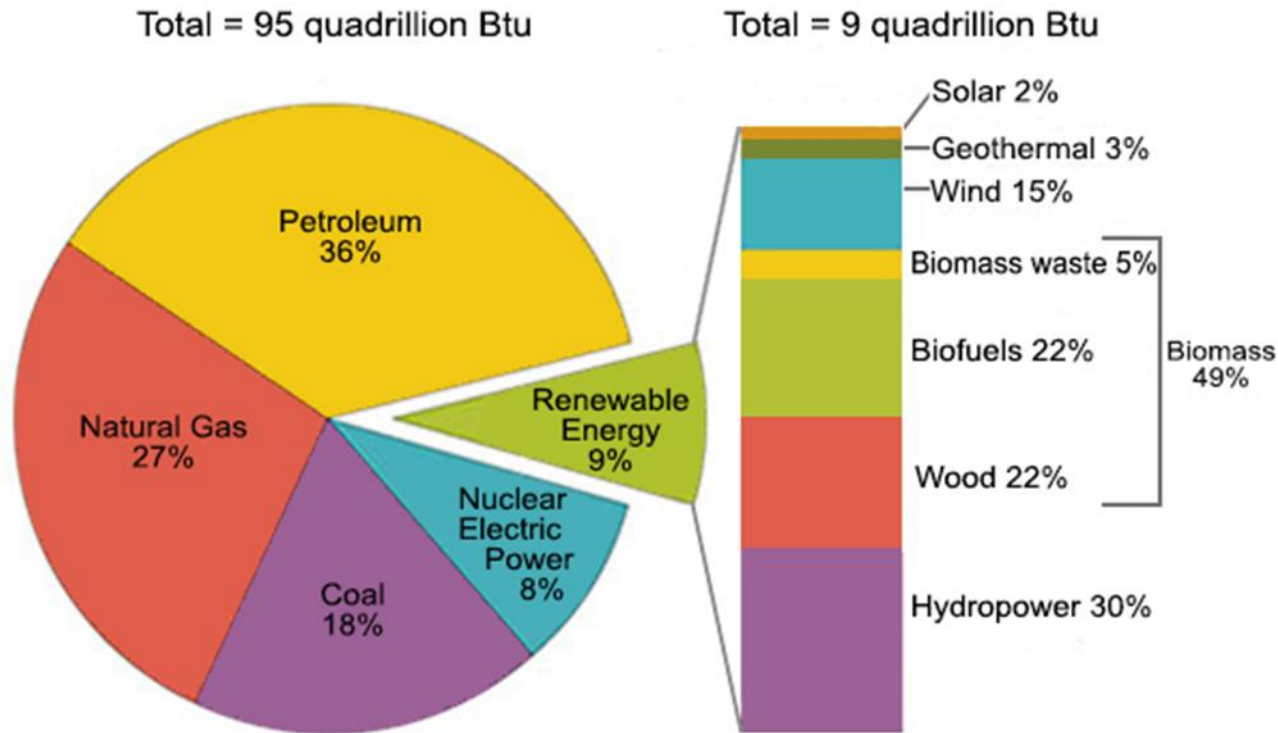
U.S. energy agency sees oil imports falling to zero by 2037

Pollution Killed 7 Million People Worldwide in 2012, Report Finds

EPA, enough is enough; end the war on coal

Energy Consumption in America

U.S. energy consumption by energy source, 2012



Note: Sum of components may not equal 100% due to independent rounding.

Source: U.S. Energy Information Administration, Monthly Energy Review, Table 1.1 and 10.1 (April 2013), preliminary 2012 data.

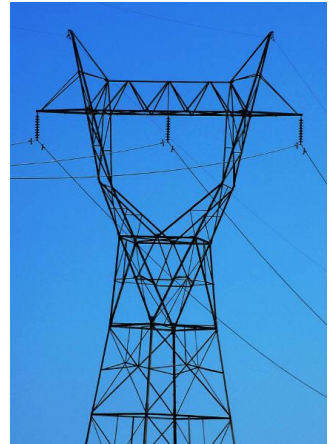
Of the energy we consume in the U.S., ~40% goes to electricity generation

What happens
when we flip on
the light switch?



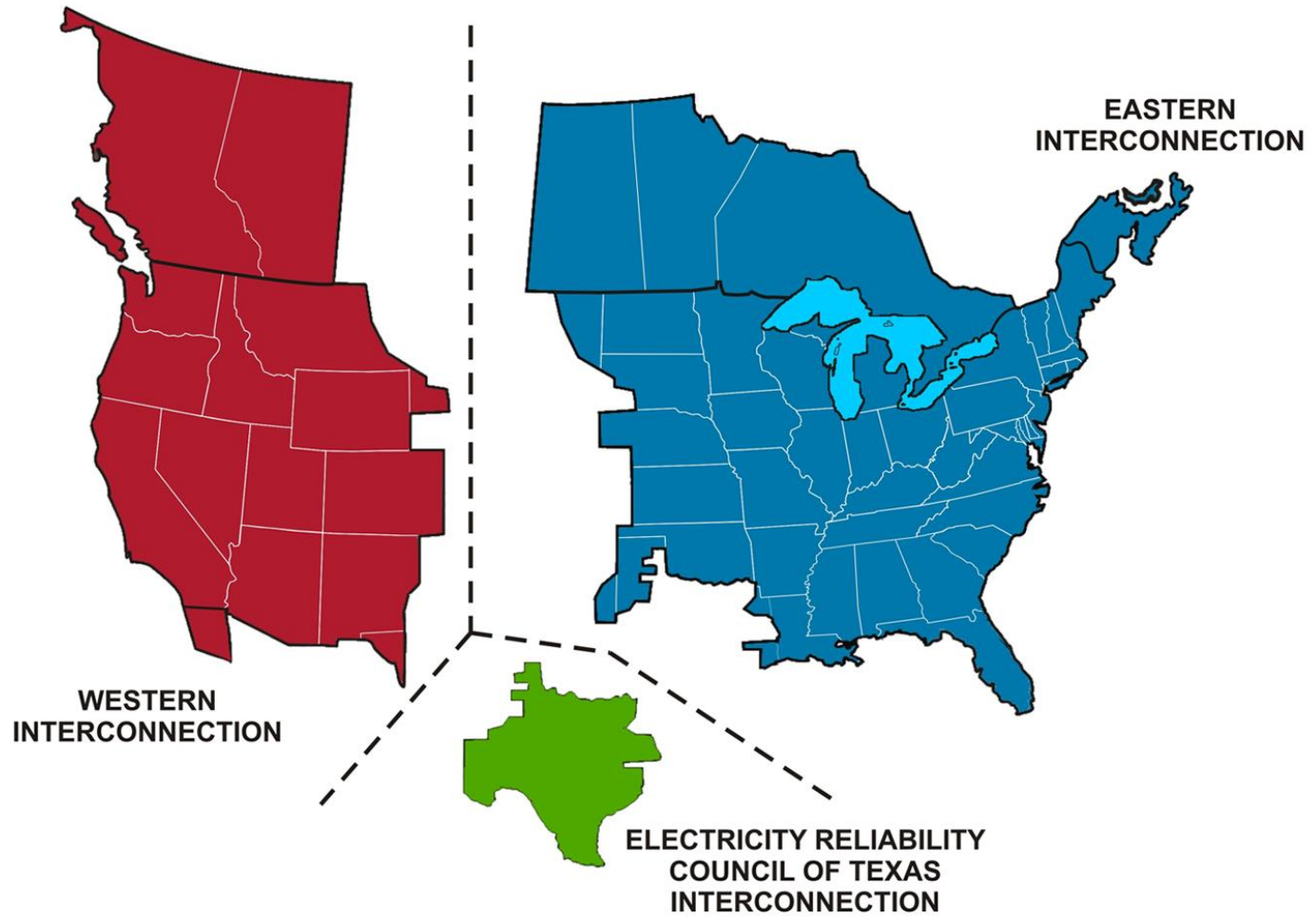


**Renewable
Resources**



**Non-Renewable
Resources**

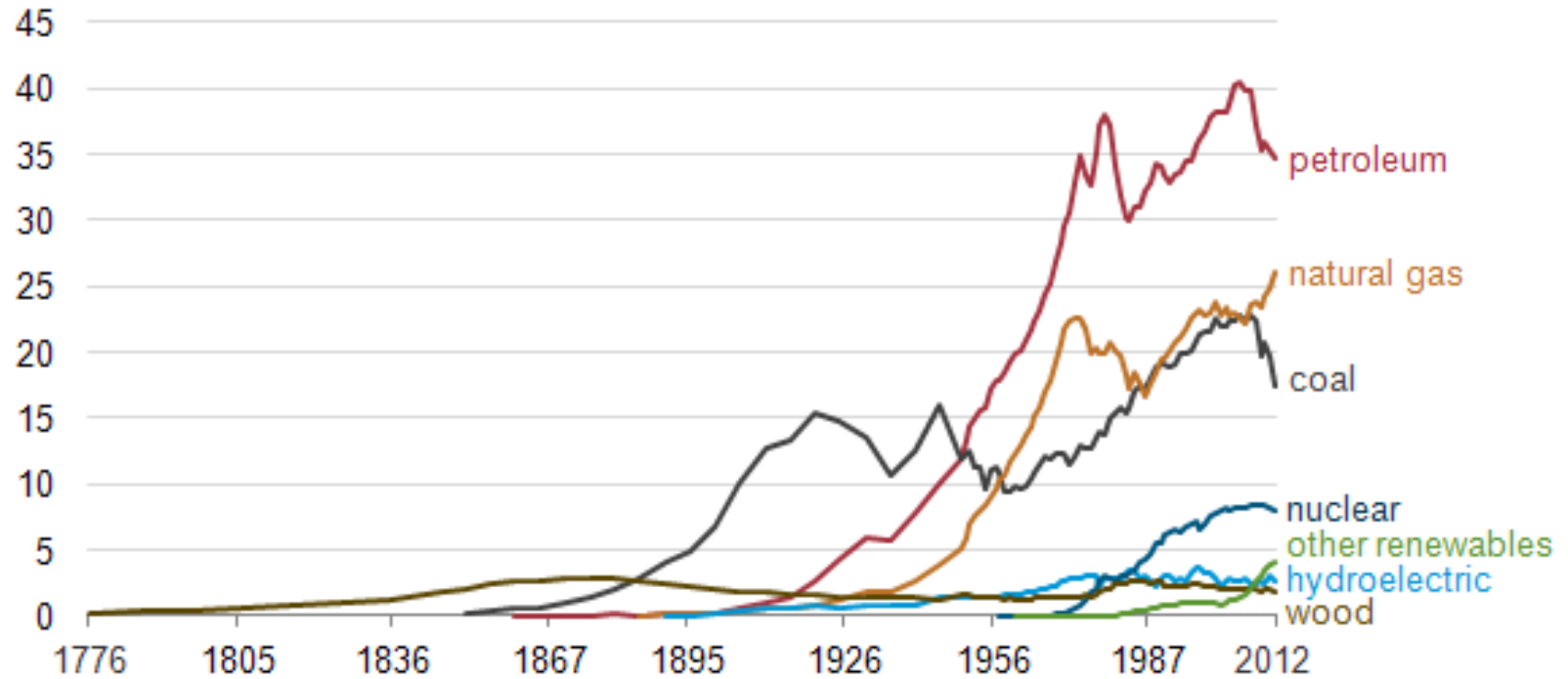
The Grid



Historical Trends

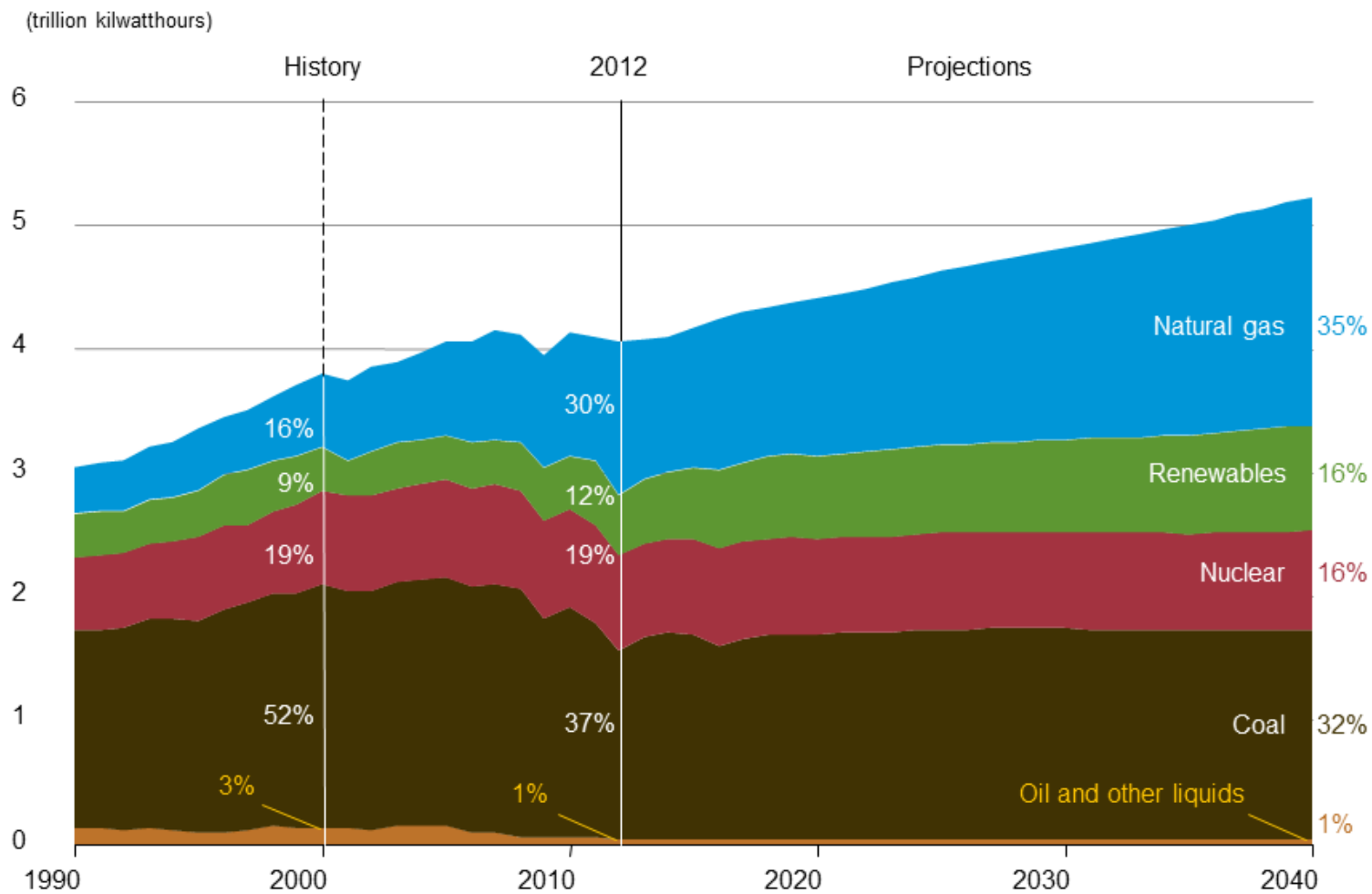
History of energy consumption in the United States (1776-2012)

quadrillion Btu



Where are we now?

Figure 13. Electricity generation by fuel, 1990-2040



The Energy Debate

Energy Security
Energy Independence
Cost
Jobs

VS

Climate Change
Water Use
Air Pollution
Water Pollution



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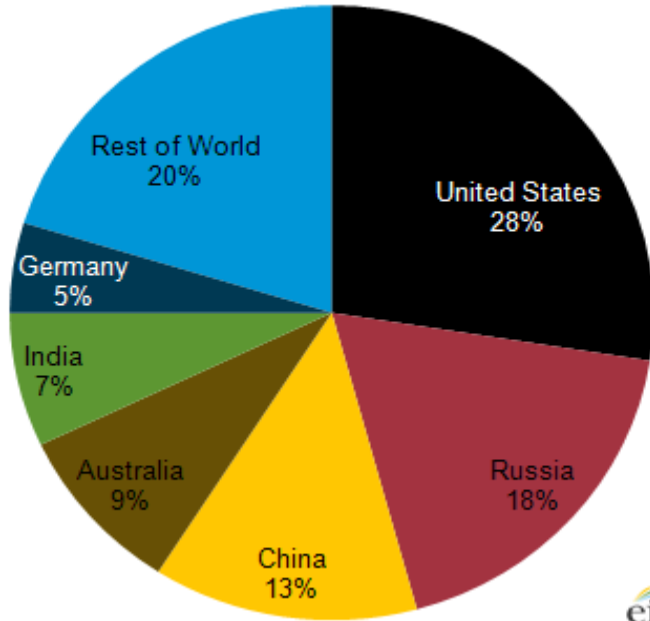


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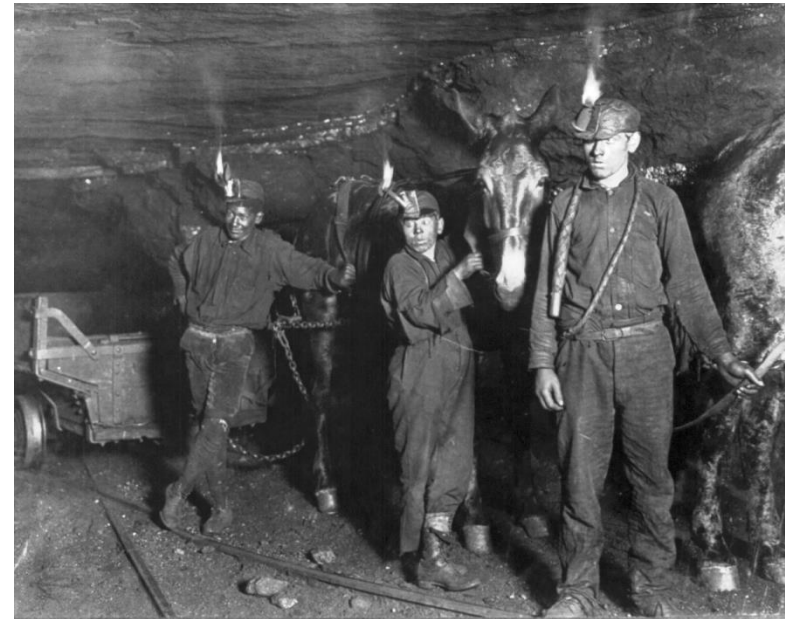
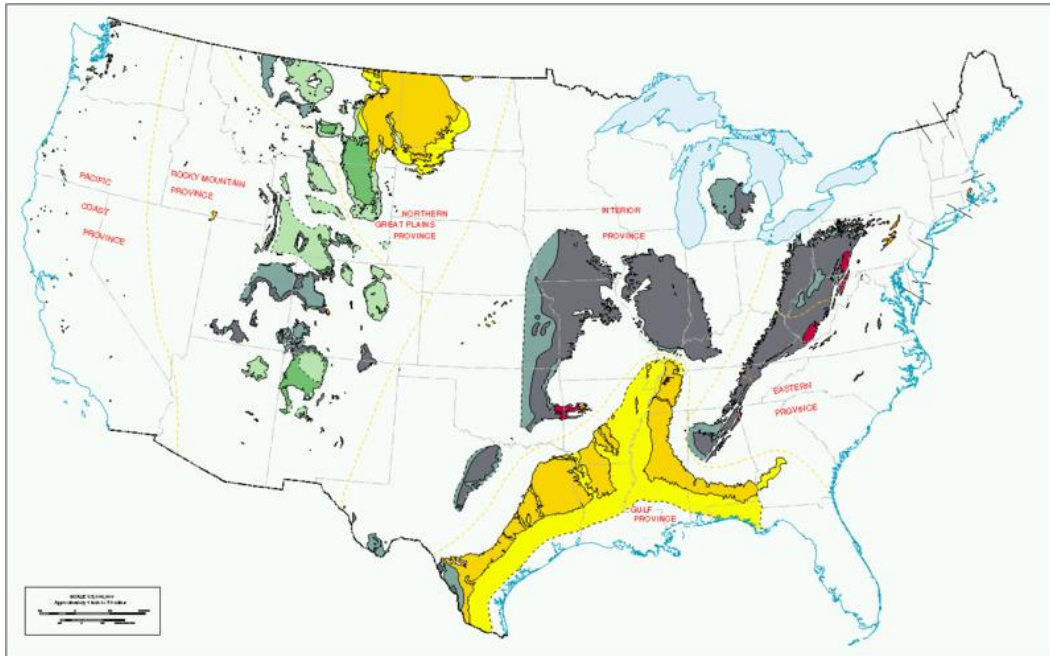
EPA, enough is enough; end the war on coal

Global share of recoverable coal reserves

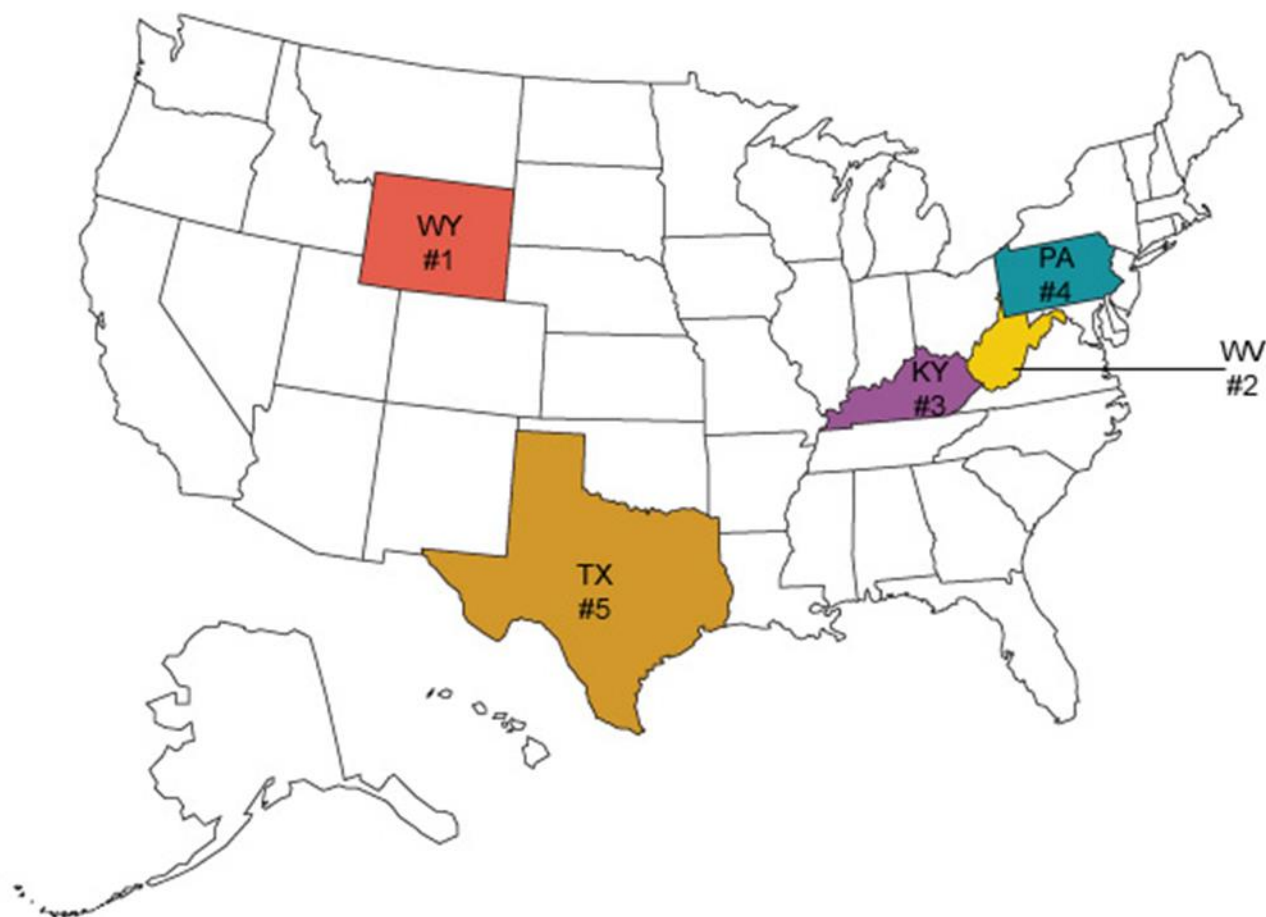


Coal

U.S. has large reserves of coal



Top Coal Producing States, 2011



Source: U.S. Energy Information Administration, *Quarterly Coal Report* (June 2012).

Why move away from Coal?

Air emissions:

-particulates, carbon dioxide, sulfur dioxide, nitrogen oxides, mercury

Water Use

Waste water Discharges:

-Selenium, arsenic, mercury

Solid Waste

Mining Impacts



National Geographic



Slate.com

Questions to Answer about Coal

Can clean coal technologies make coal combustion clean?

If we want to leave coal behind, what will replace it?



Nuclear Power



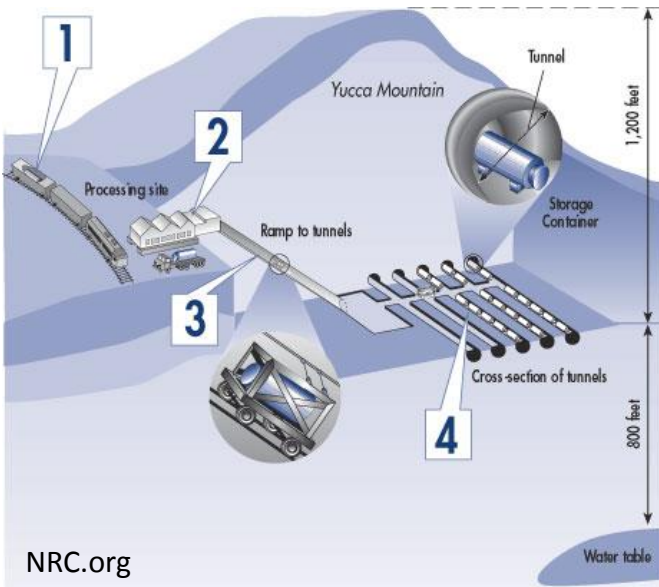
Air Emissions:

- No carbon dioxide, sulfur dioxide, and nitrogen oxide emissions from combustion

Water Use

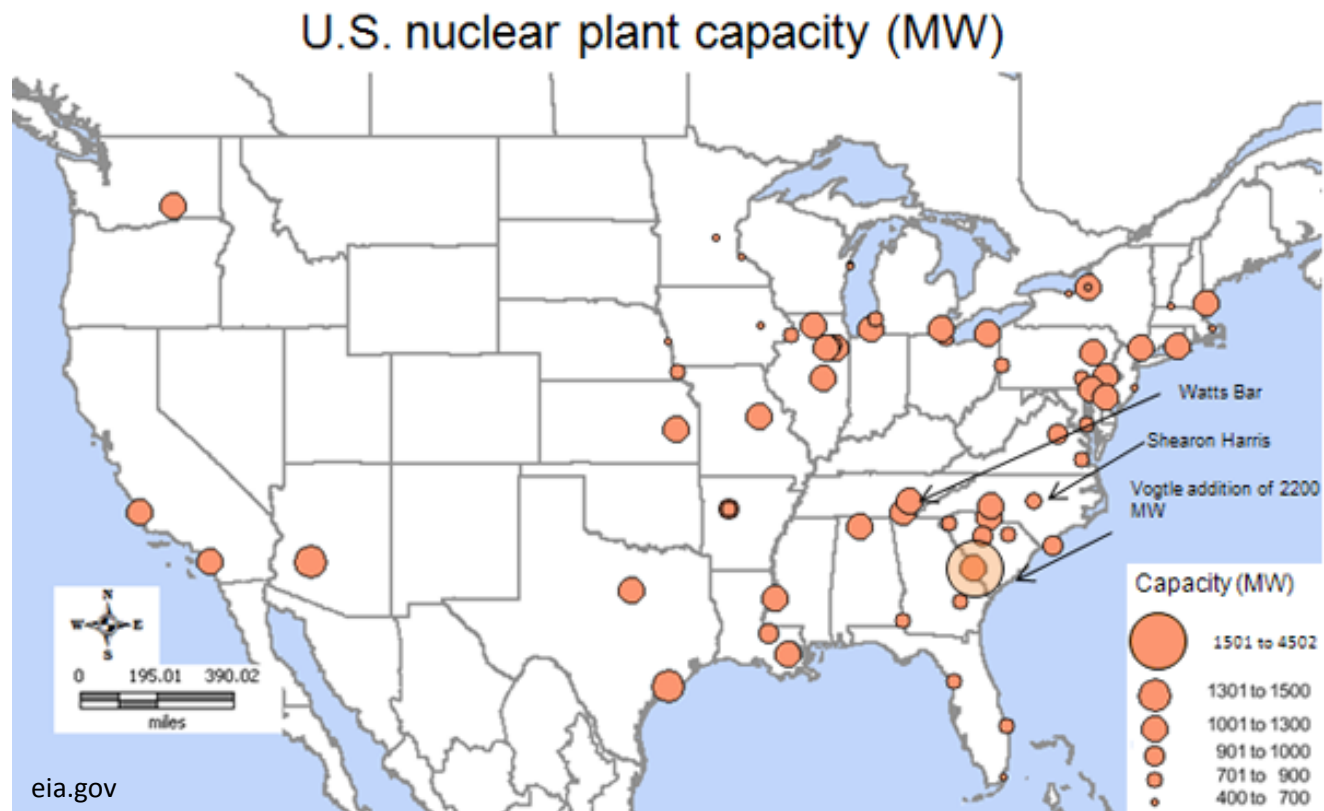
Spent Fuel

Radioactive Waste

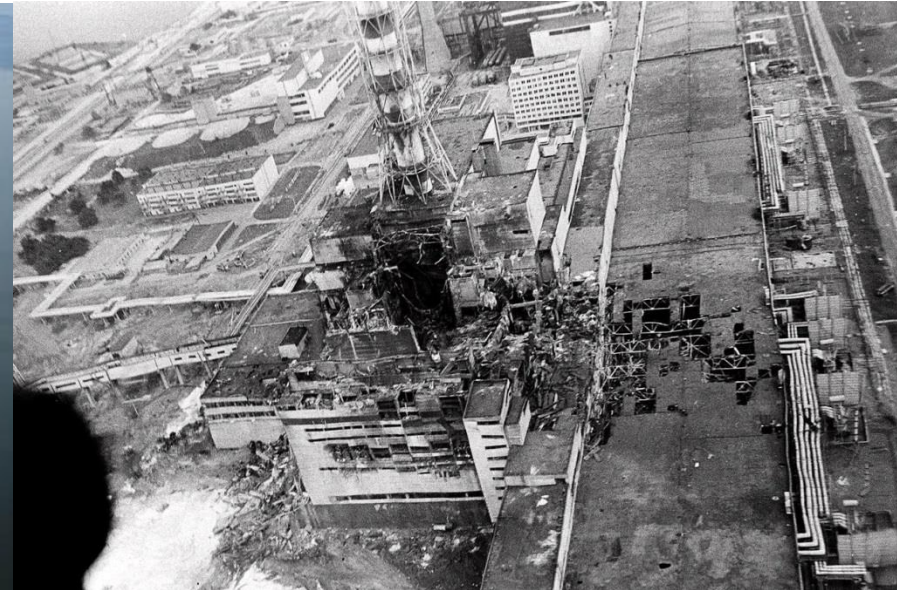


65 operating nuclear plants in the United States with 104 reactors

Last construction permit issued in 1978 for the Shearon Harris plant in NC



Nuclear Power



Time

The Atlantic



Telegraph.co.uk

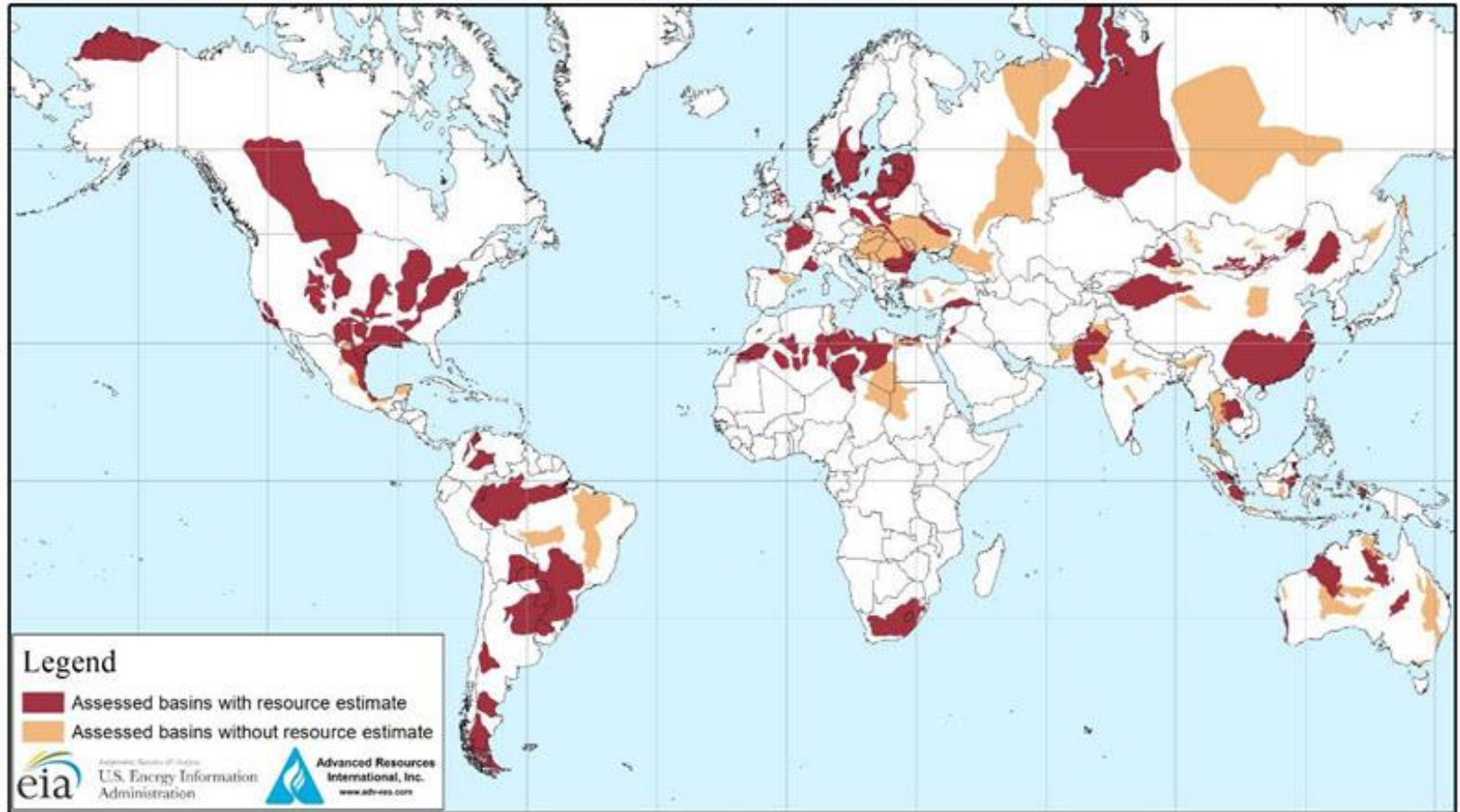
Questions:

Can we make it safe?

What do to with radioactive waste?

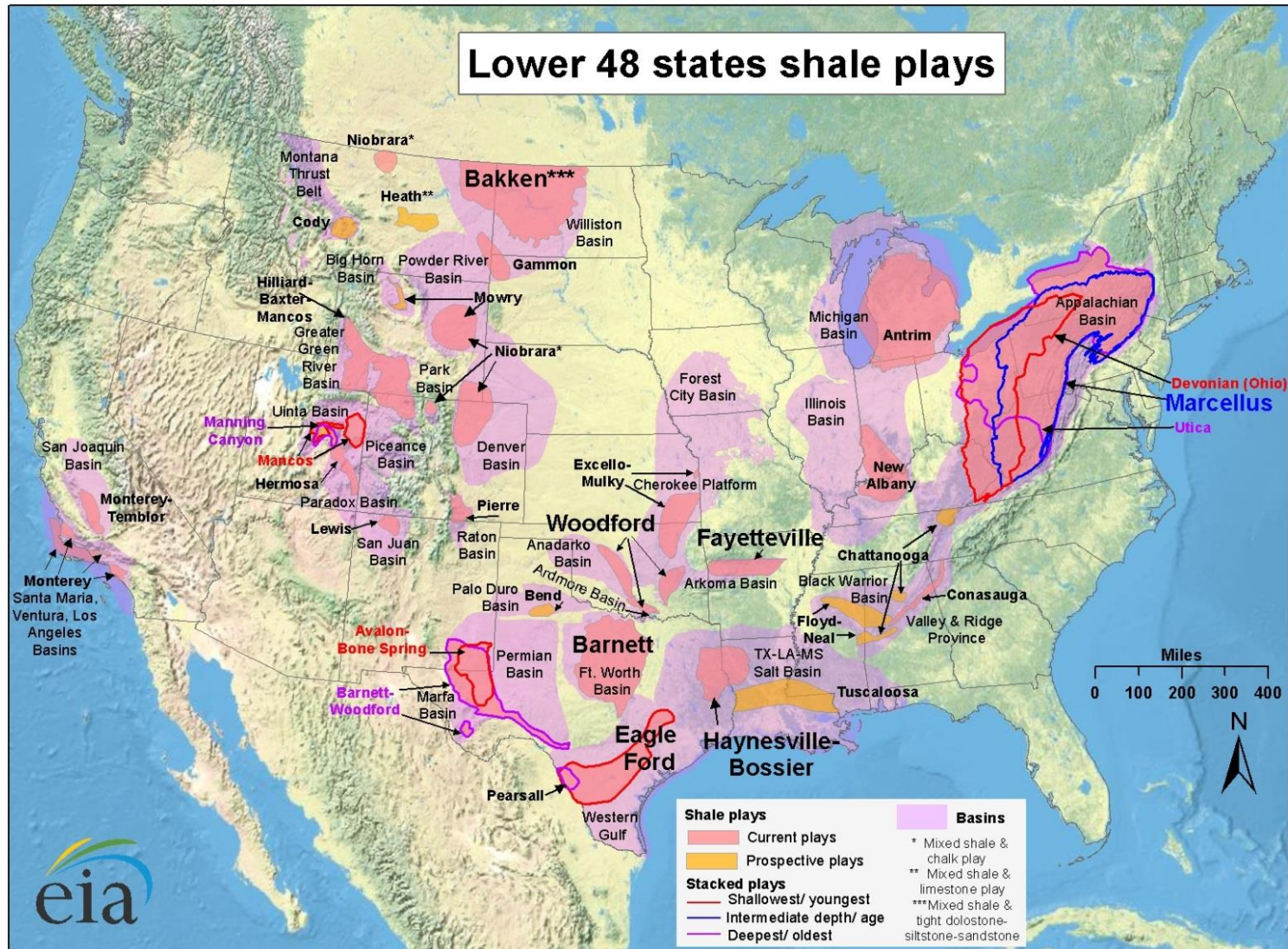
Shale Gas Reserves Worldwide

Figure 1. Map of basins with assessed shale oil and shale gas formations, as of May 2013



Source: United States basins from U.S. Energy Information Administration and United States Geological Survey; other basins from ARI based on data from various published studies

Shale Gas in the United States



Natural Gas Combustion is Cleaner than Coal Combustion

Air Emissions

- Reduced carbon dioxide and nitrogen oxide emissions
- Emissions of sulfur dioxide and mercury are negligible compared to coal combustion

No Solid Waste

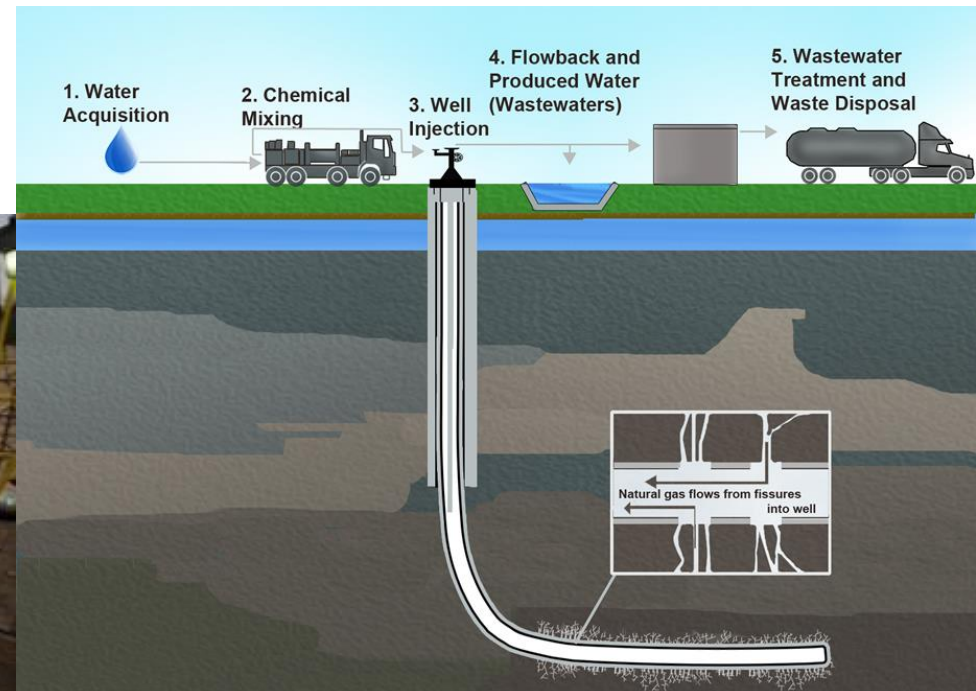
Hydraulic Fracturing, aka “Fracking”

Environmental Impacts of Extraction Process

- Water Use
- Air pollution at fracking sites
- Groundwater, surface water, and soil contamination
- Contaminated Wastewater: Flowback and Produced Water



The Guardian



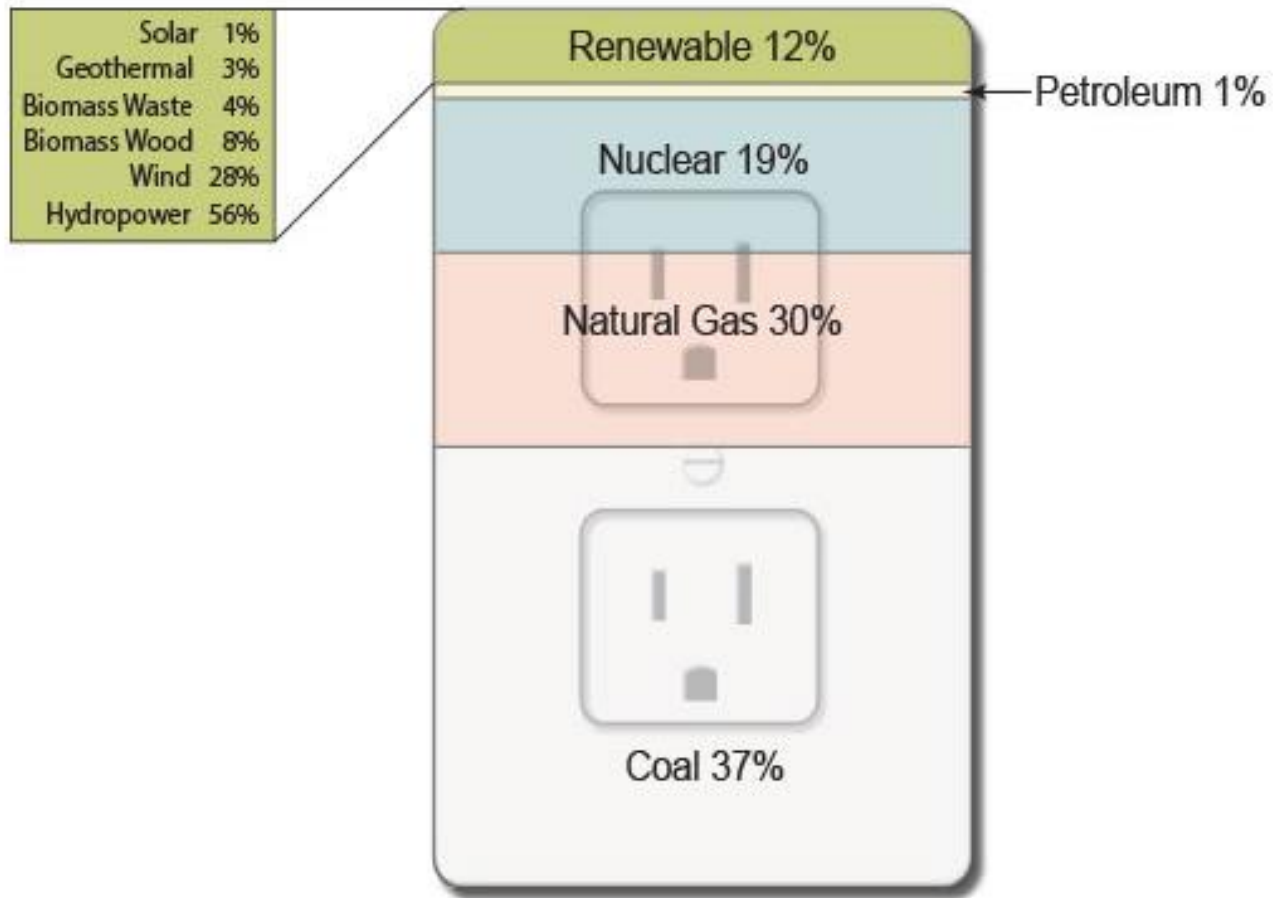
wikipedia

Questions about Shale Gas

- Should we be fracking?
- If so (or if it's inevitable), what needs to be done to reduce the environmental impact?



Renewable Energy on the Horizon



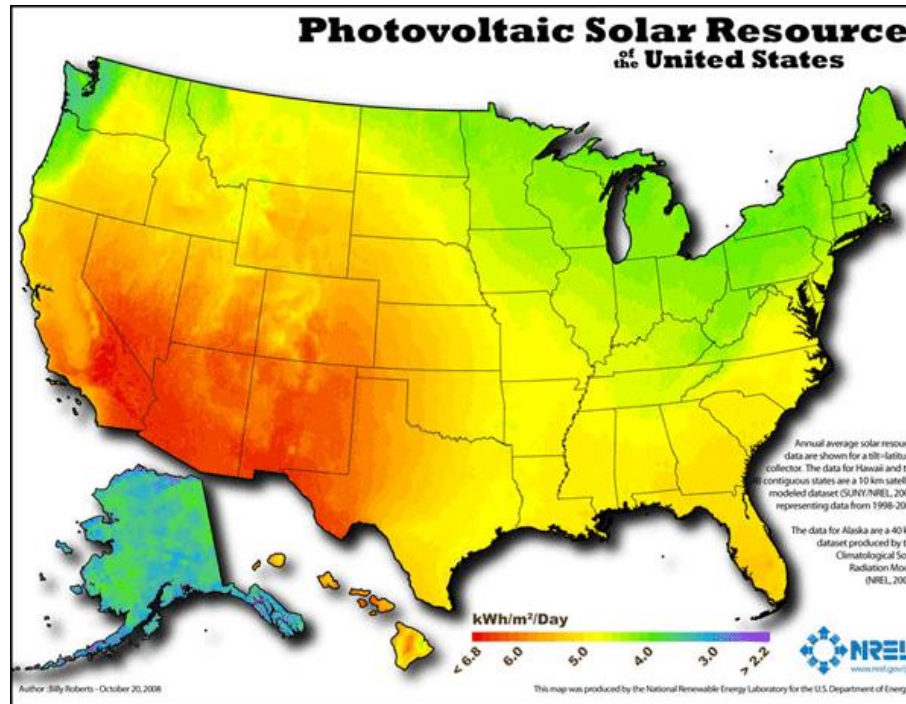
Source: U.S. Energy Information Administration, *Electric Power Monthly* (March 2013). Percentages based on Table 1.1 and 1.1a; preliminary data for 2012.

Solar

Sunlight is the most abundant source of energy...

Questions:

- Is solar energy becoming competitive cost wise?
- Are there hidden environmental impacts (e.g. rare earth metal mining)?



Biomass



Two main paths:

Burning biomass

Landfill gas to energy

Questions:

- How much power can these plants generate?
- How are the air emissions from biomass plants?
- What about the food vs fuel debate?

Wind

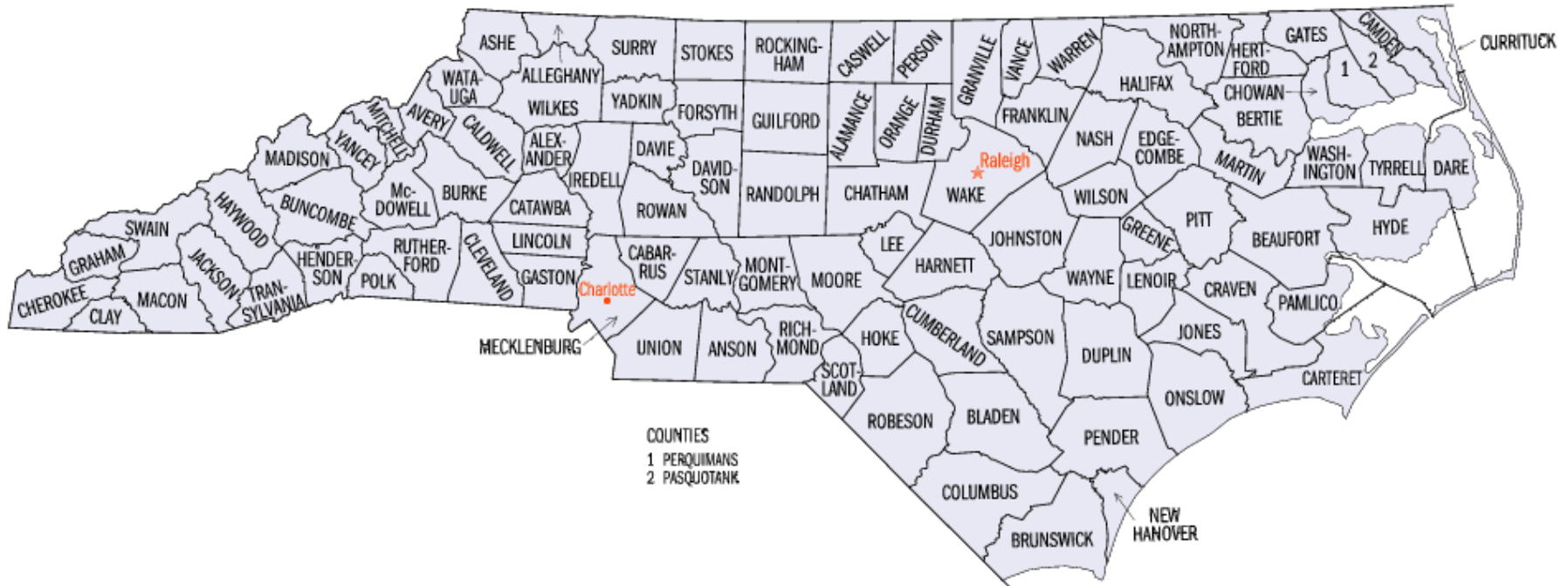


A clean and renewable energy source

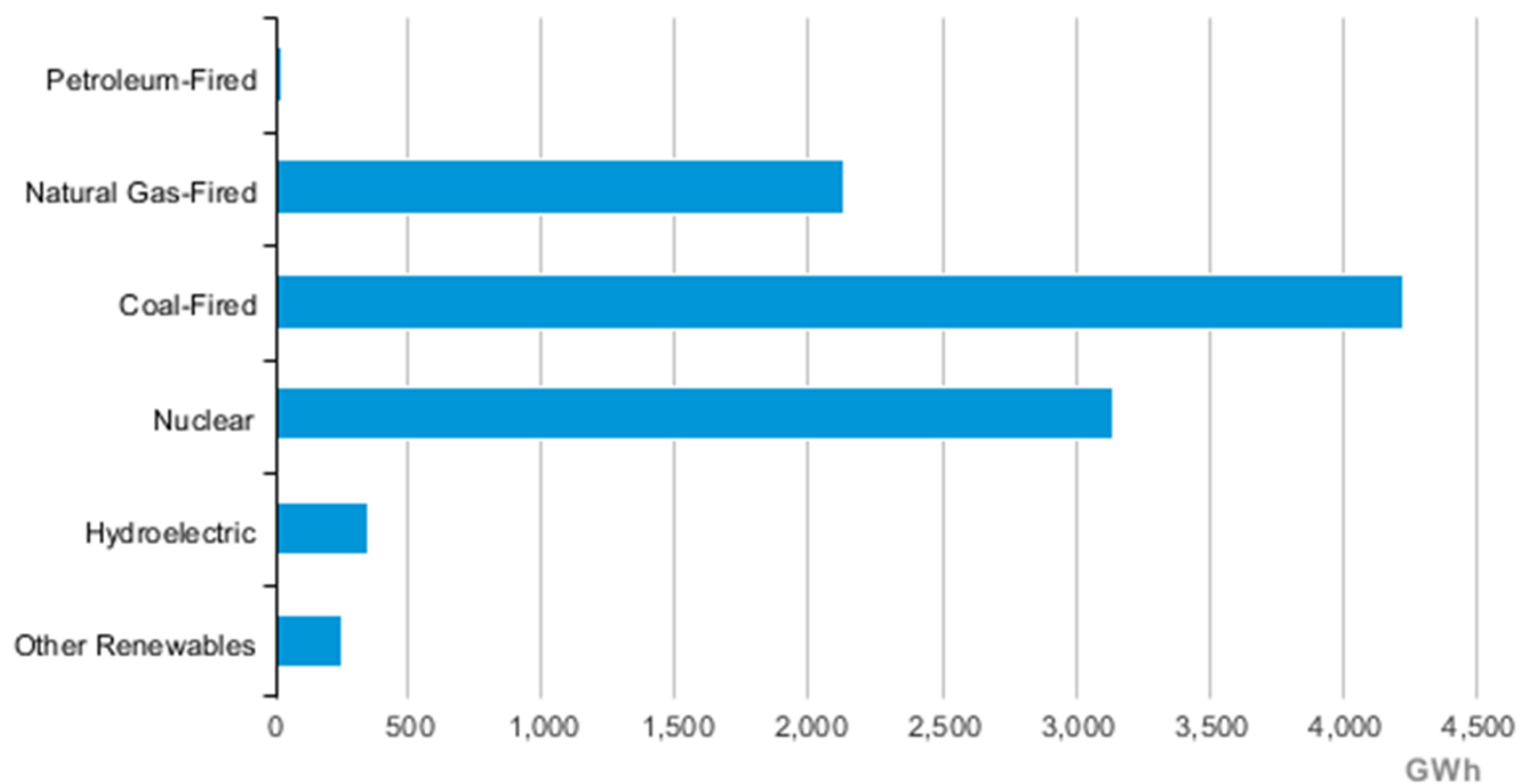
Questions about wind energy:

- Can turbines supply enough electricity to make a difference?
- Intermittent supply of electricity

What's Happening in North Carolina?



North Carolina Net Electricity Generation by Source, Nov. 2013



Source: Energy Information Administration, Electric Power Monthly

Your Power Profile

U.S. ENV



Clean Energy

[Contact Us](#) Search: All EPA This Area

You are here: [EPA Home](#) » [Climate Change](#) » [Clean Energy](#) » [Energy and You](#) » How clean is the electricity I use? - Power Profiler

Power Profiler

In the United States, electricity is generated in many different ways, with a wide variation in environmental impact. Electricity generation from the combustion of fossil fuels contributes toward unhealthy air quality, acid rain, and global climate change.

Many electricity customers can choose their provider of electricity or can purchase green power from their utility. In fact, you might now have the option of choosing cleaner, more environmentally friendly sources of energy.

Enter your ZIP code and electric utility to:

- Compare the fuel mix and air emissions rates of the electricity in your region to the national average.
- Determine the air emissions impacts of electricity use in your home or business

Your 5-digital ZIP code:

Power Profiler does not provide information about the environmental attributes of electric power generated by individual companies. For company-specific information, access EPA's [eGRID database](#).

Clean Energy Home

Basic Information

Energy and You

Clean Energy Programs

Clean Energy Resources

Site Map

Energy and You

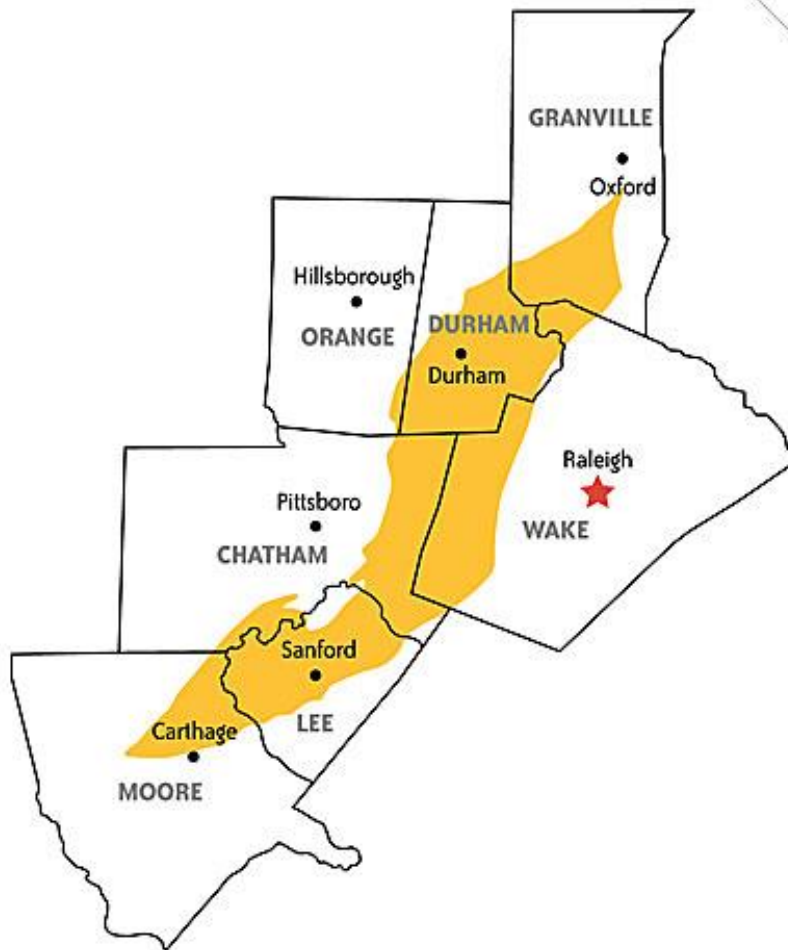
How does electricity affect the environment?

How clean is the electricity I use? Power Profiler

How can I reduce my impact?

Glossary

Triassic basins



Fracking in our backyard?

Fracking in North Carolina

Politics & Government

10:03 PM TUE MARCH 4, 2014

North Carolina Lawmakers Look At How To Tax Fracking Companies

North Carolina Returns EPA Grant For Fracking Study

News Observer | Posted: 09/25/2013 3:02 pm EDT

Environment

8:56 AM FRI APRIL 11, 2014

Some Energy Speculators Drop Drilling Leases In Lee County

Coal Ash: Dan River Spill

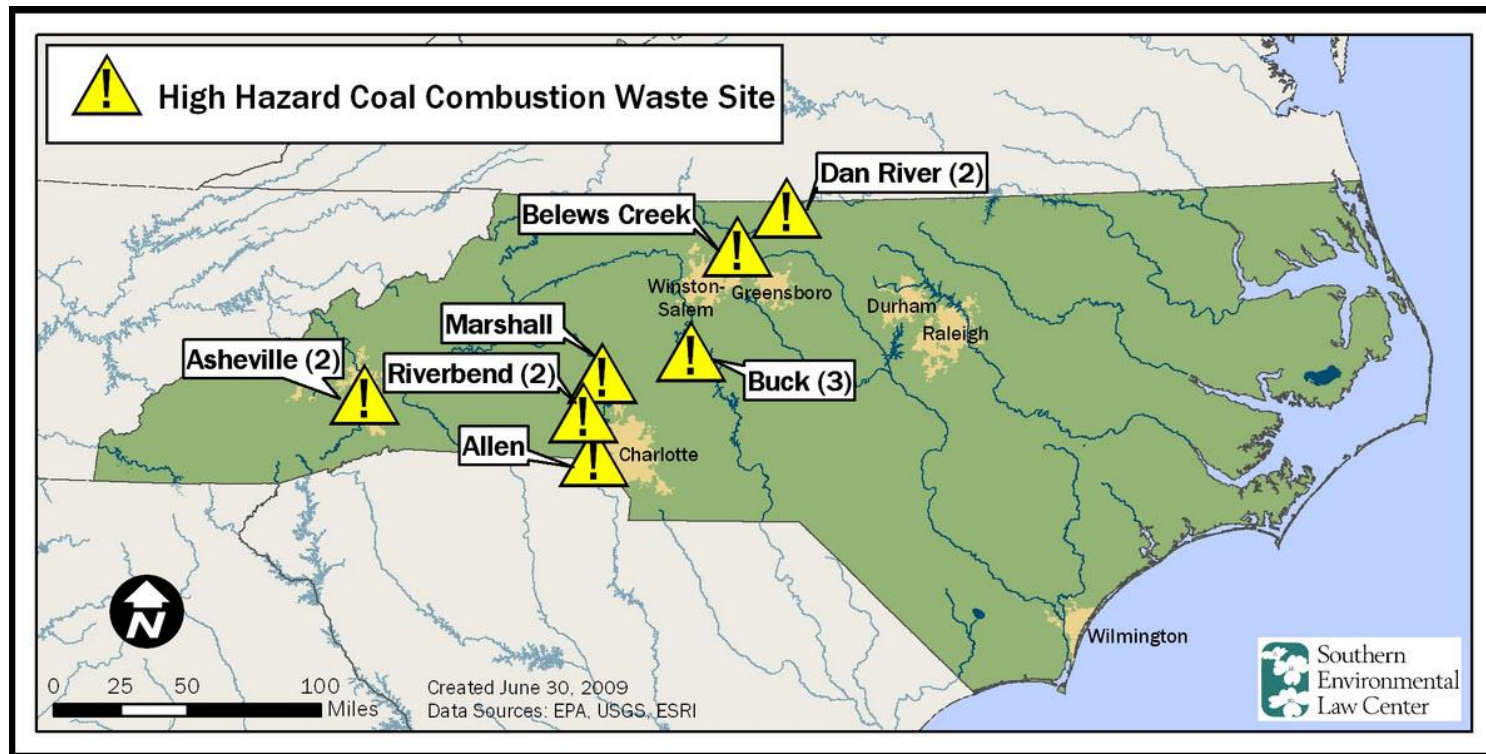
30,000 to 39,000 tons of ash released into the river



Coal Ash Ponds in North Carolina

Seven plants have ash ponds that are classified as “High Hazard” by the U.S. EPA

Documented groundwater and surface water contamination



Renewable Energy?



Forbes.com

