

Energy Independence

or the rats of NIMBY

Jimmy Jia

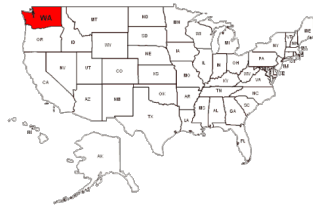
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What's the *boundary* of energy?

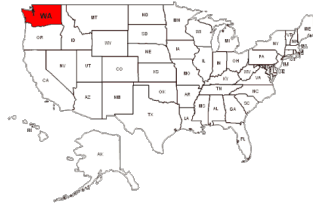


Local vs. Global: What's the *boundary* of energy?

Net Zero Homes



WECC Balancing region



Energy Independence

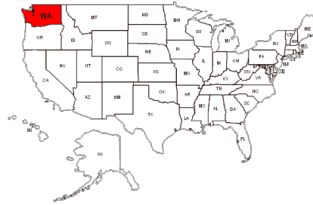


Local vs. Global: What's the *boundary* of energy?

Net Zero Homes



WECC Balancing region



Energy Independence



Net Zero implies the energy is in balance ***externally***. Where?

Energy independence implies the energy is in balance ***internally***. Where?

The Curse of the Frame of Reference

Cape Wind:

Curse those NIMBY people! The Global benefits is too important!



ND Fracking:

Curse those global petroleum industry! The local environment is destroyed!





Pascua Lama Copper Mine - Chile



BARRICK

Global Factors...

A Copper-Hungry World
Investment looking for Opportunity
Global Trade
"If we don't dig it, someone else will"
Costs Foregone: Where else... Pebble Mine?

... and National Issues...

Economic Activity & Revenues
Gov't & Special Interest Benefits
Foreign Investment (\$8.5b in Pascua to date)
Jobs for Citizens (5,500 Construction, 1,600 Ops)

The Resource Blessing

Hard Currency - Industry
Investment - Jobs
Strategic Role of Resource States

The Resource Curse

Exported Profits - Corruption
Environmental Damage
Lopsided Economies
Political, Foreign & Special Interests

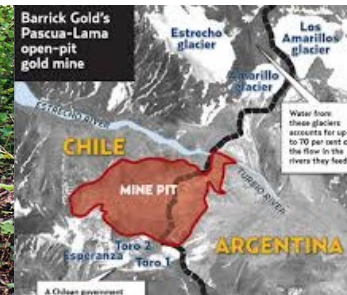
... with Local Effects

Watershed Contamination
Glacier & Environmental Disruption
"Exported" Profits
Different Job Structure & Workforce

Economic & Social Change

Good for Some, Bad for Others

Sources: <http://www.miningweekly.com/article/barrick-gold-suspends-pascua-lama-project-2013-10-31>,
<http://www.reuters.com/article/2013/09/25/chile-pascua-lama-suspension-idUSL2N0HL2E720130925>



Local vs. Global?

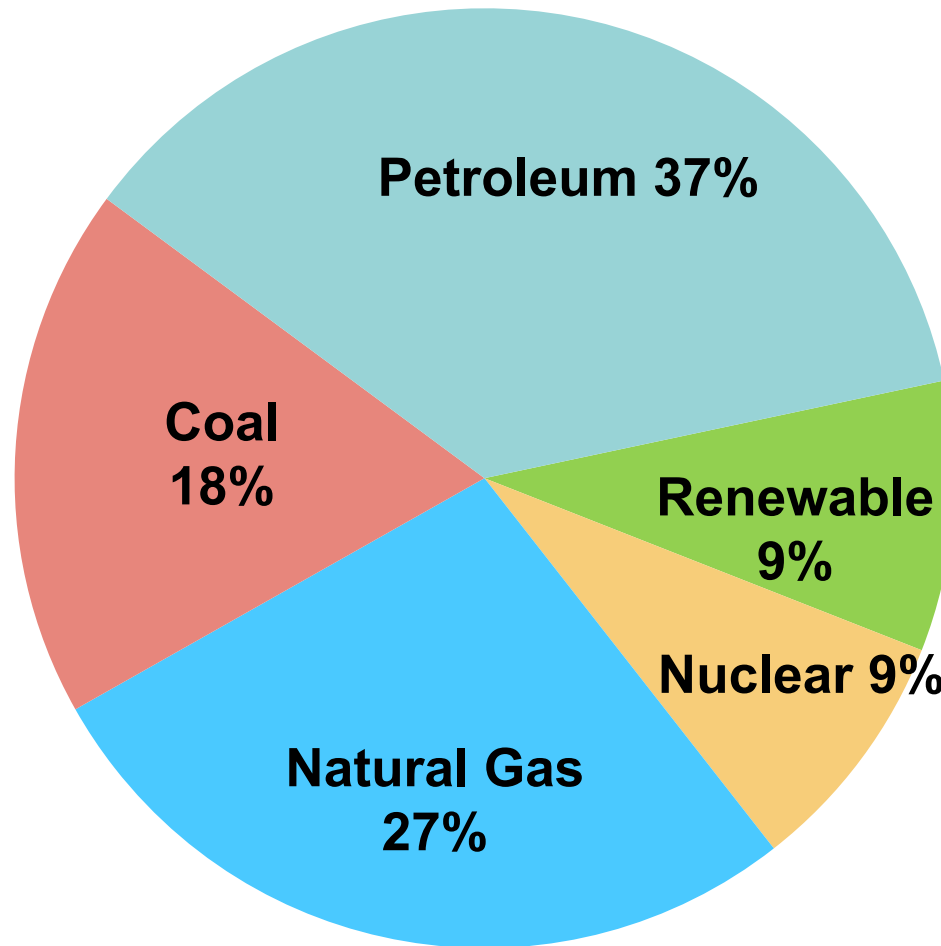
How do we reconcile global good vs. local damage

Or

Local advantage vs. global detriment

Which side we err on? should

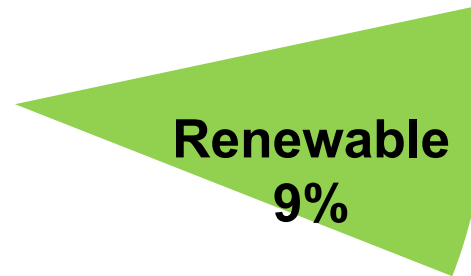
USA Energy Fuel Mix 2012



USA Energy Fuel Mix

The Renewable Wedge

- All of this fuel is locally created and consumed

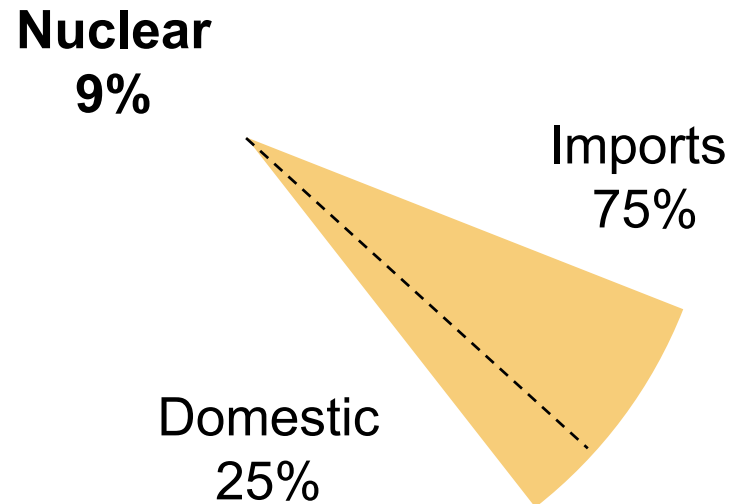


- Solar
- Geothermal
- Wind
- Hydro
- Biomass

USA Energy Fuel Mix

The Nuclear Wedge

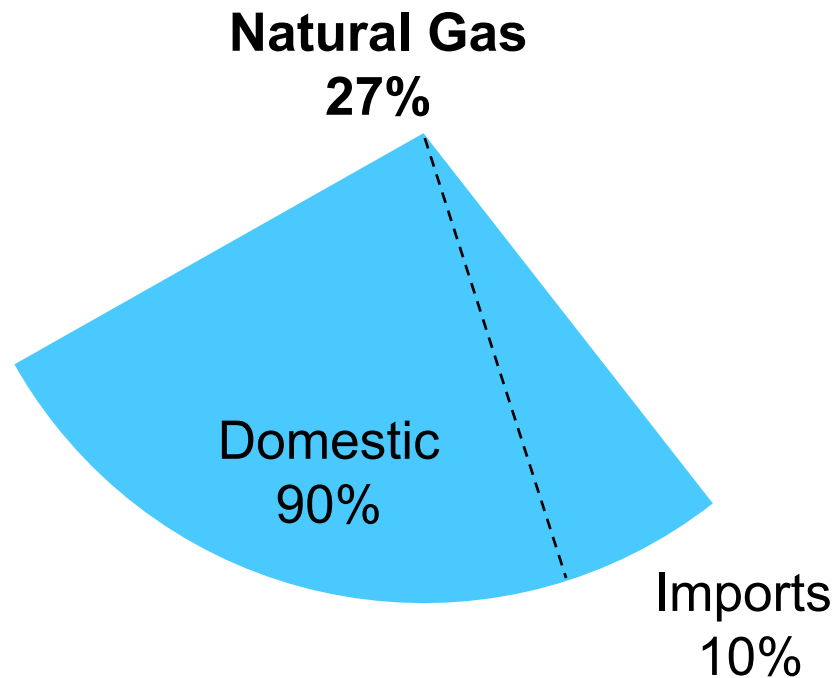
- USA (25%), Canada (25%), Australia (25%) are primary suppliers



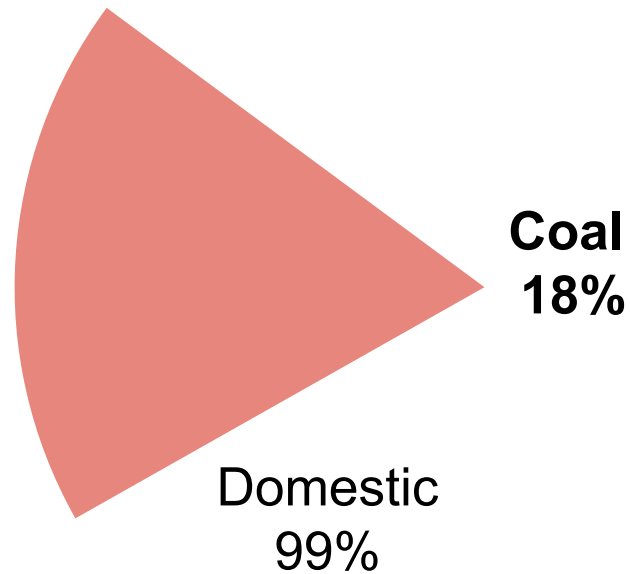
USA Energy Fuel Mix 2012

The Natural Gas Wedge

- 90% of fuel is domestic
- 10% is imported (Canada and Mexico)



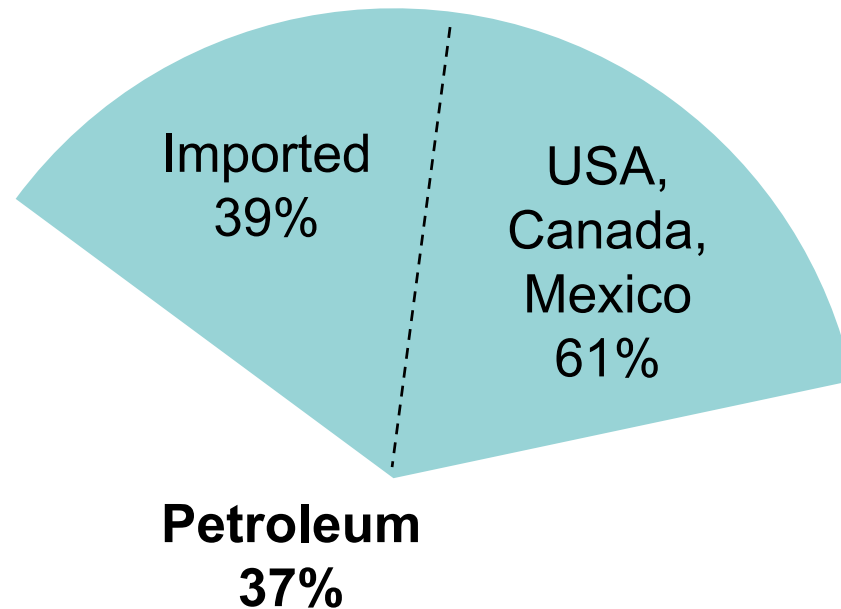
USA Energy Fuel Mix 2012



The Coal Wedge

- 99.2% of fuel is domestic
- 0.8% is imported

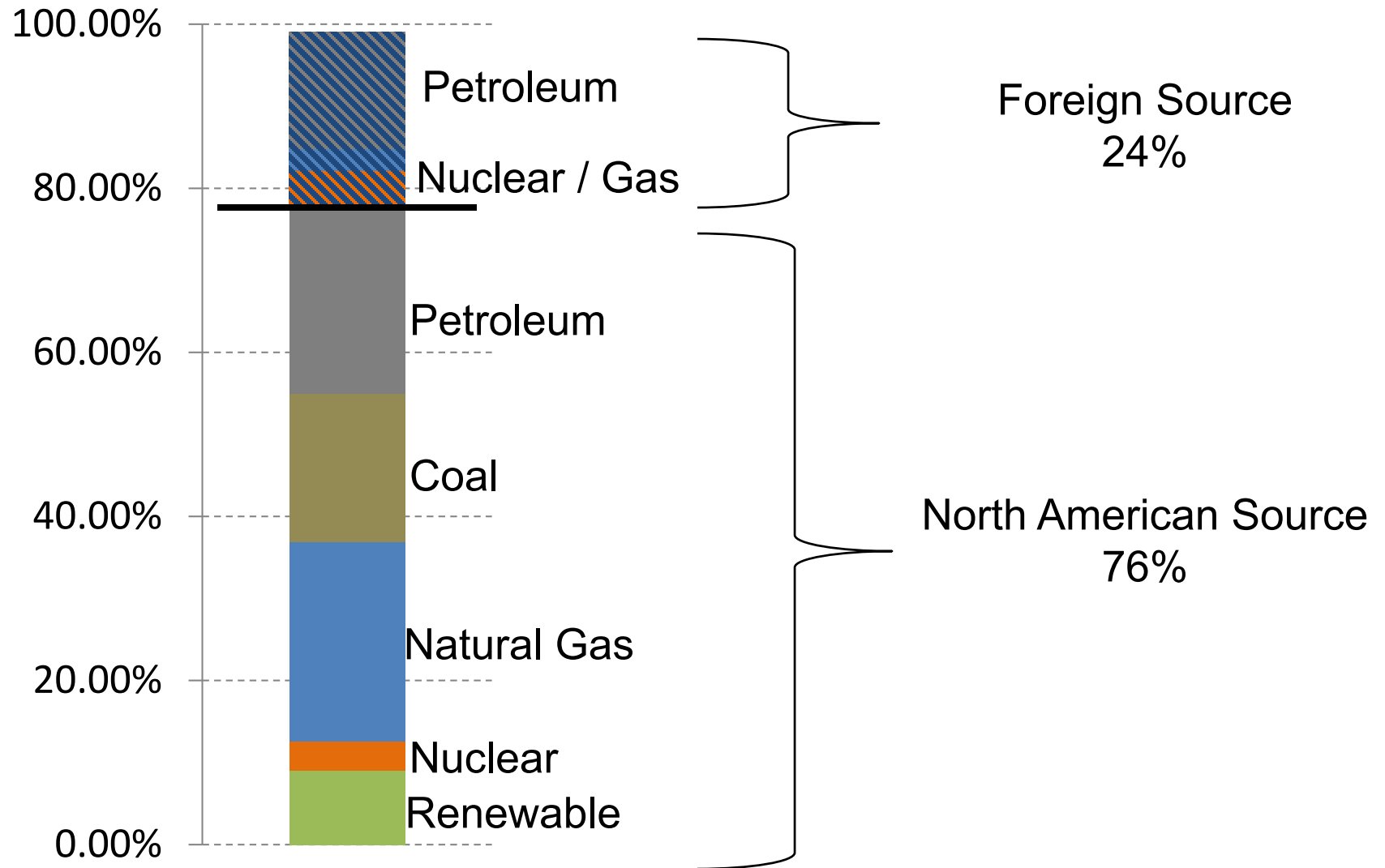
USA Energy Fuel Mix 2012



The Petroleum Wedge

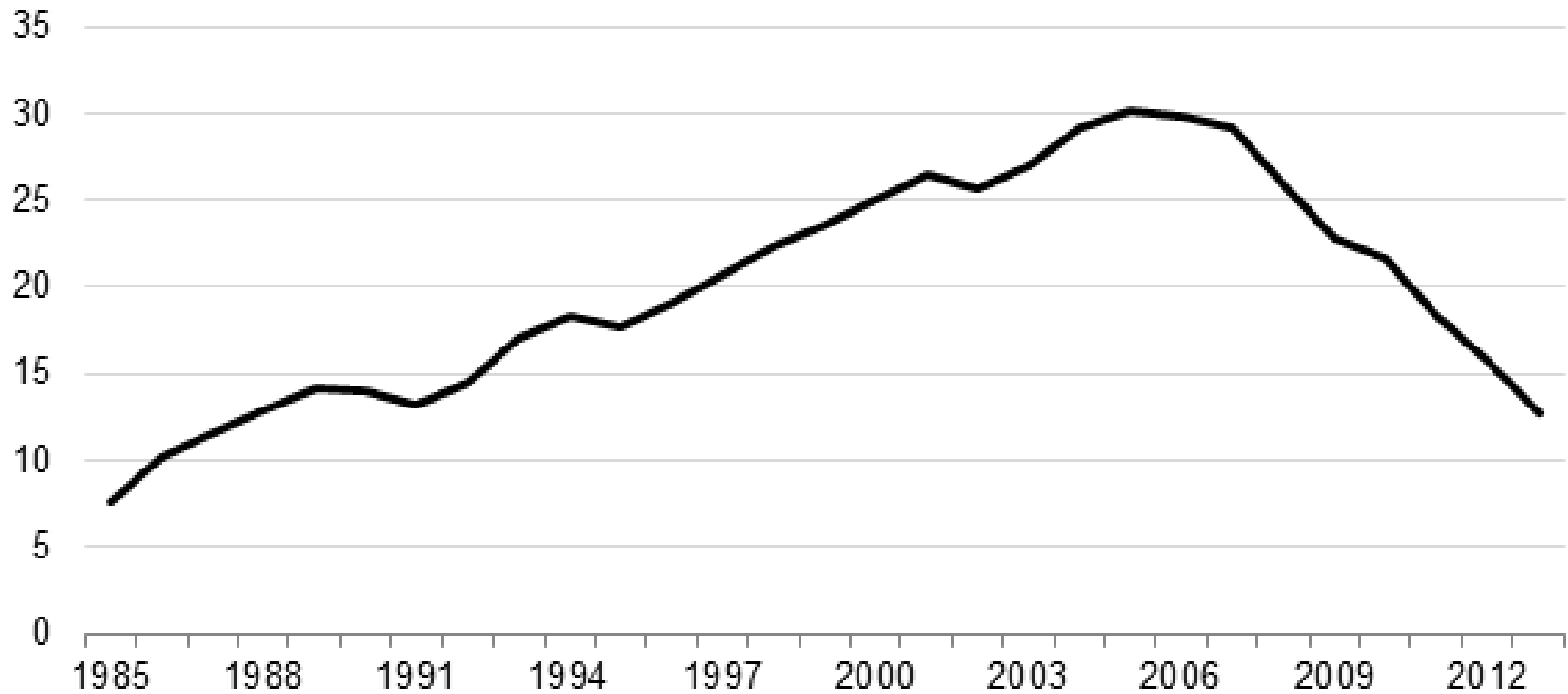
- 61% of fuel is domestic
- 39% is imported

How do we achieve *Energy Independence*?



History of Imports

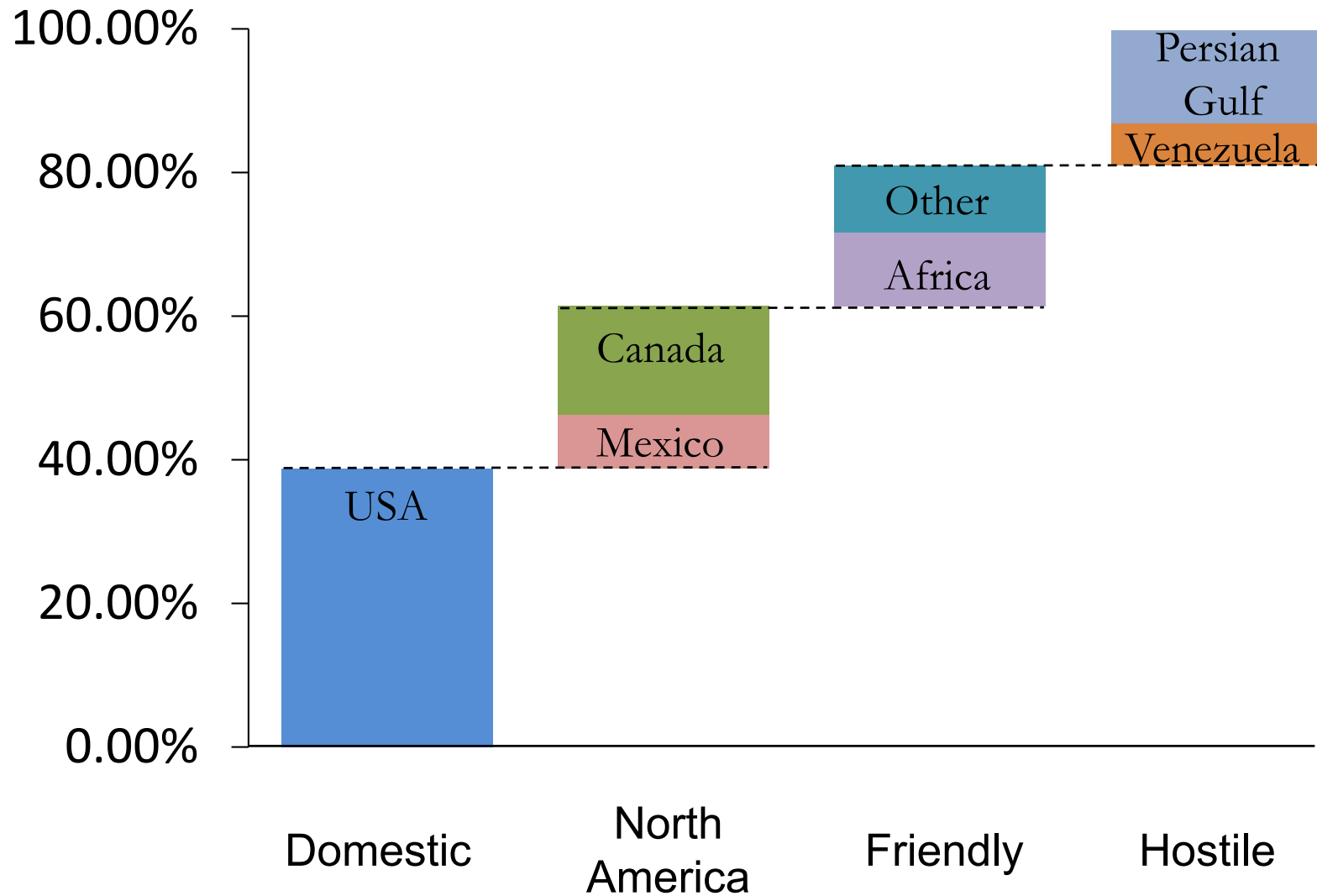
U.S. net energy imports (1985-2013)
quadrillion Btu



How do we achieve *Energy Independence*?

- **U.S. energy independence** relates to the goal of reducing the U.S. imports of oil and other foreign sources of energy.

Energy Security of Petroleum



Military Defense Spending

In Afghanistan:

- 22 gallons of fuel per soldier per day
- \$400-500 per gallon not uncommon



70% of all logistics are dedicated to moving fuel and water

Over 3000 soldiers / contractors killed in convoys between 2003-2007

Strategic Petroleum Reserves

As of May 8, 2015

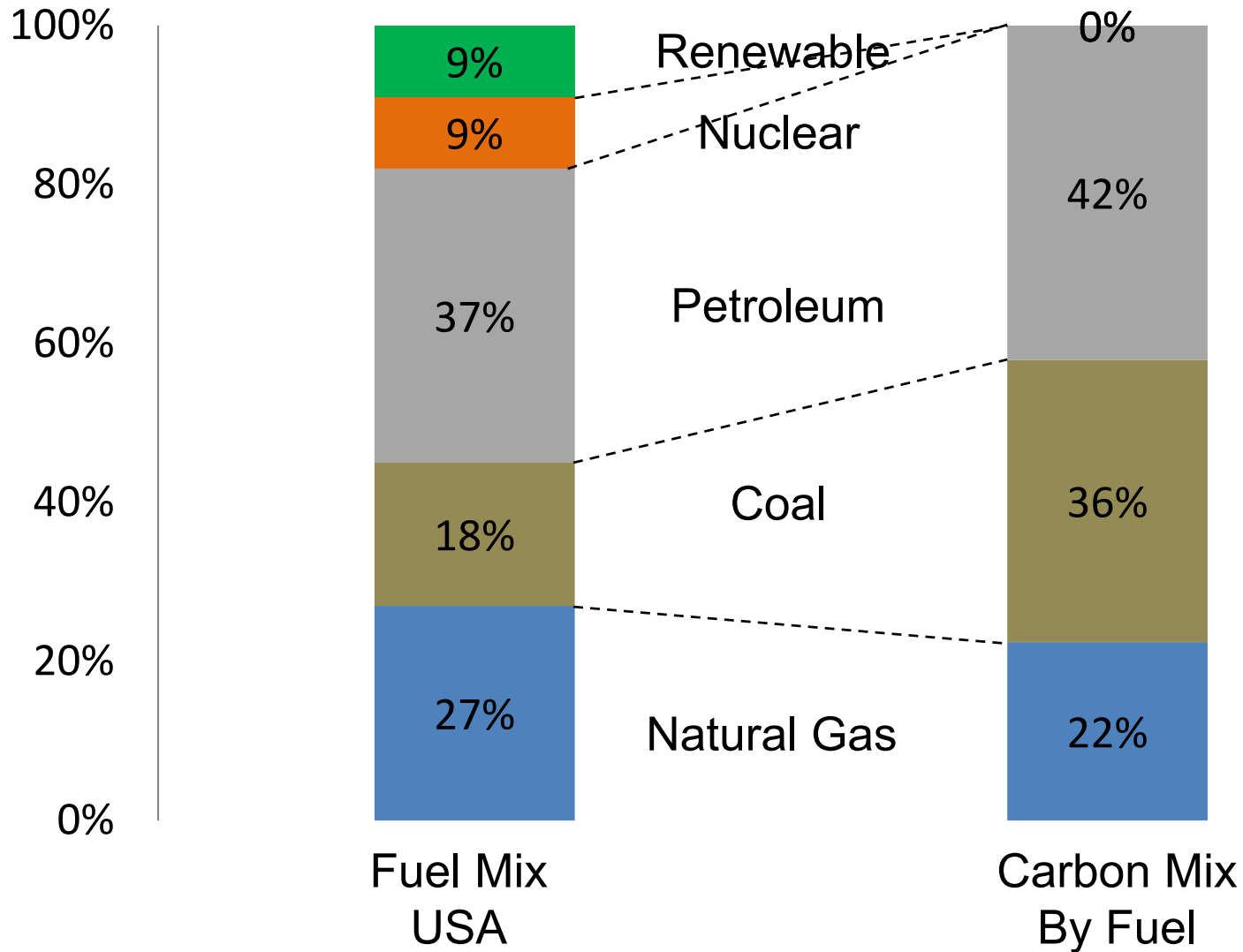
- 691 million barrels
- 727 million barrels capacity
- Or 37 day supply



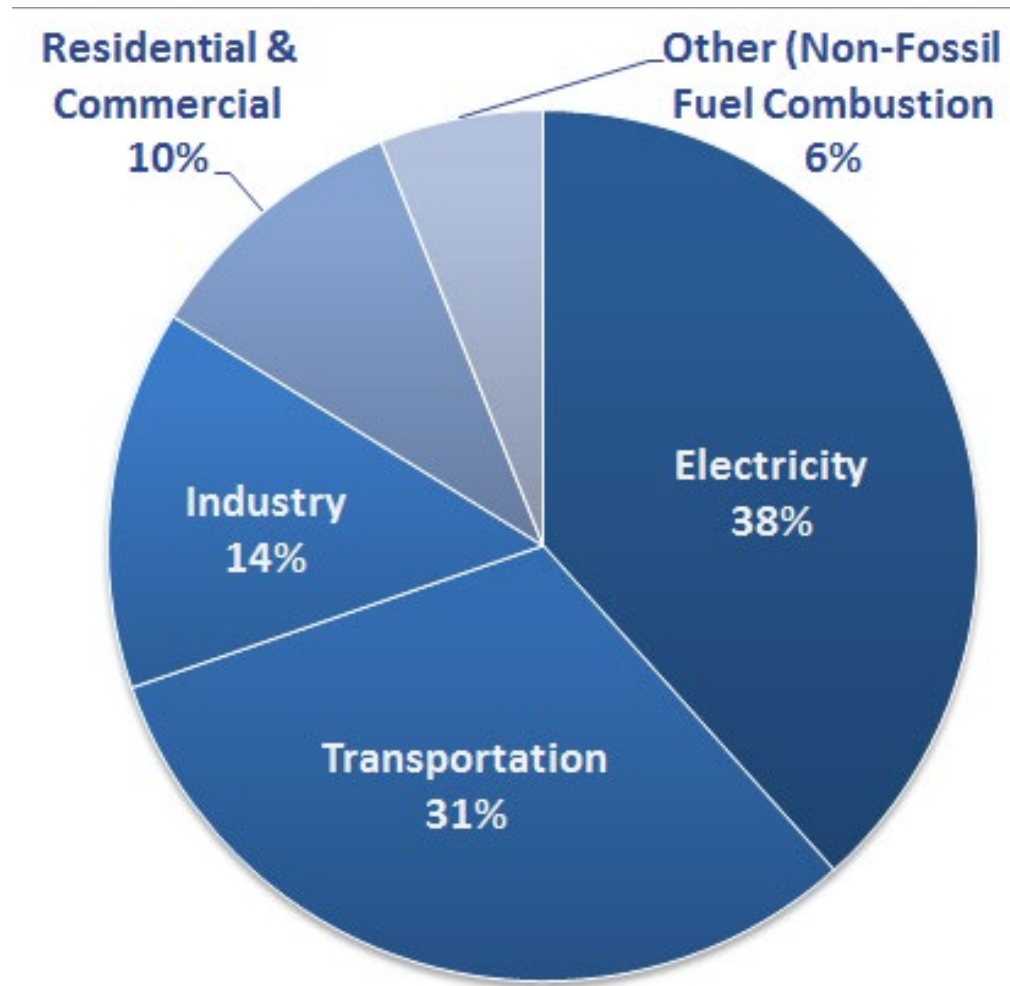
How do we achieve *Energy Security*?

- **Energy security** is the association between national **security** and the availability of natural resources for **energy** consumption. Access to cheap **energy** has become essential to the functioning of modern economies

Carbon Emissions of Fuels in the USA



Consumption end uses of energy



Linking Environment and Security

Linking Environment and Security

Environmental degradation, inequitable access to natural resources and the transboundary movement of hazardous materials can lead to conflict and pose a risk to national security and human health.

How do we achieve *Environmental Security*

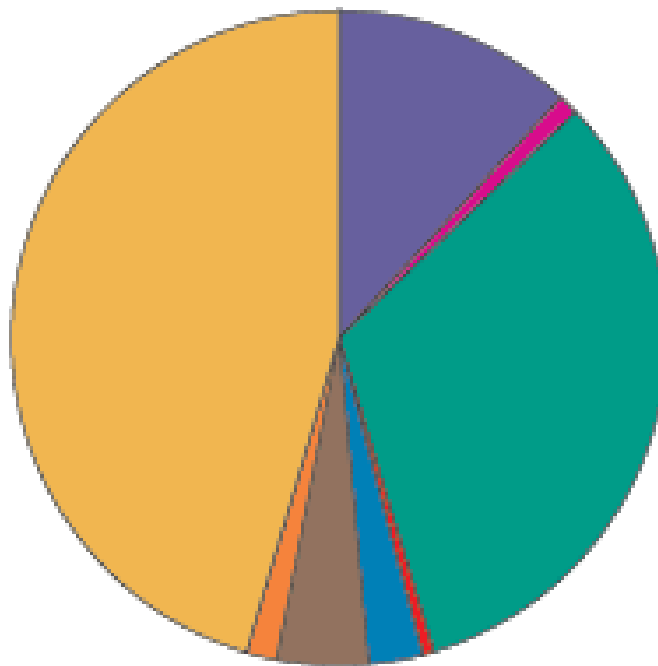
Environmental security is **environmental** viability for life support, with three sub-elements: preventing or repairing military damage to the **environment**, preventing or responding to environmentally caused conflicts, and protecting the **environment** due to its inherent moral value.

Water is processed Energy

1.8 billion people live with water scarcity

Desalination would cost \$113 billion per year and consume 1,350 TWh of energy to perform

Water Consumption



2010 withdrawals by category,
in million gallons per day

	Public supply	42,000
	Self-supplied domestic	3,600
	Irrigation	115,000
	Livestock	2,000
	Aquaculture	9,420
	Self-supplied industrial	15,900
	Mining	5,320
	Thermolectric power	161,000

Values do not sum to 355,000
Mgal/d because of independent
rounding

Fights over water

Ashurbanipal of Assyria vs.
Arabia
7 Century BC



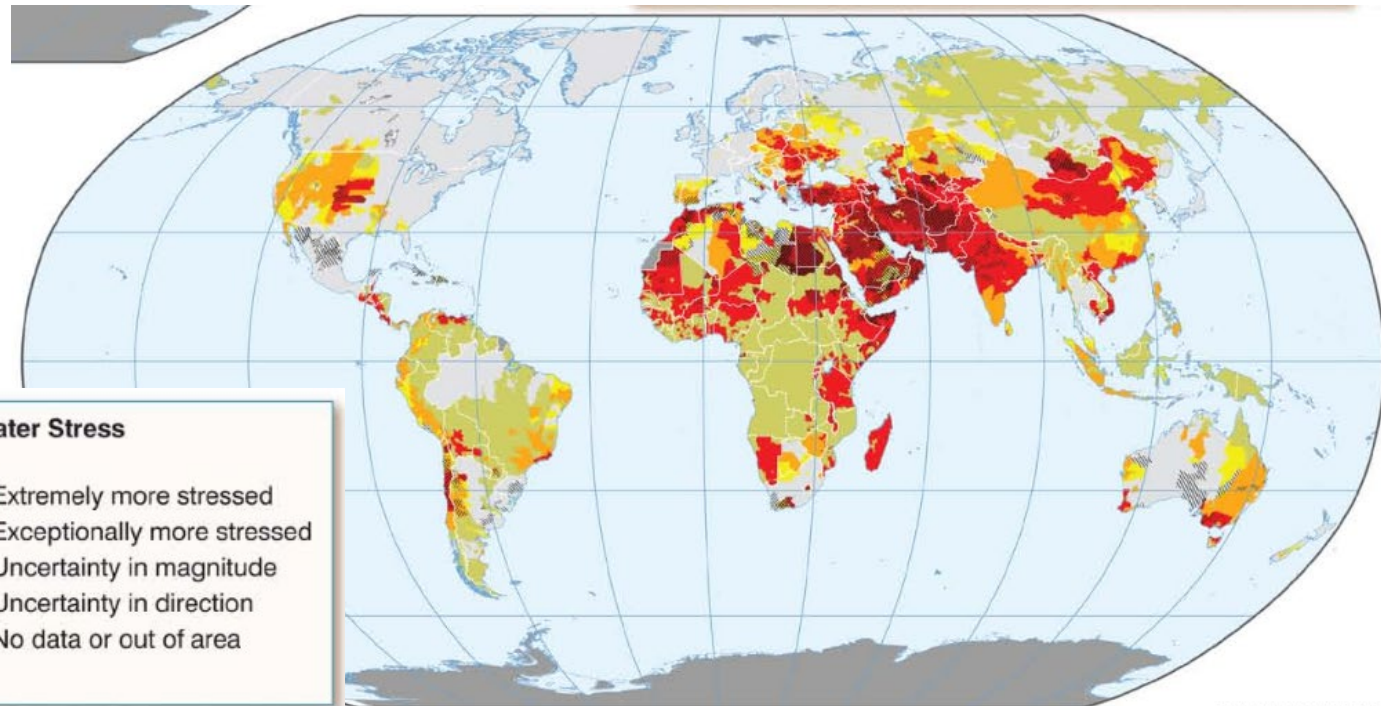
Battle of Mosul Dam,
August 7 – 19 2014,
ISIS vs. Kurdish/Iraqi
forces



Global Water Security

INTELLIGENCE COMMUNITY ASSESSMENT 2012

- We assess that during the next 10 years, water problems will contribute to instability in states important to US national security interests.



2012 DNI Report

We assess that during the next 10 years, water problems will contribute to instability in states important to US national security interests.

Water shortages, poor water quality, and floods by themselves are unlikely to result in state failure.

However, water problems when combined with poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions contribute to social disruptions that can result in state failure.

How do we achieve *water security*?

- Water security is defined as the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability. (UN-Water, 2013)

Libya -

- Who “owns” the oil of state-run petroleum company when leadership of the state is under dispute? (2015)

Japan -

- Since the Fukushima disaster, there have been no nuclear reactors running in Japan and we were spending up to an extra \$40 billion a year on importing oil, gas and coal

Saudi Arabia

Current demand stands at approximately 2.5 million barrels of oil equivalent per day (Mboe/d). Domestic demand is expected to exceed 8.0 Mboe/d ...

According the BP Statistical Review of World Energy, Saudi Arabia produced 11.16 Mboe/d in 2011.

Middle East

MASDAR – Abu Dhabi



KAUST – Saudi Arabia



Just a US issue? Or global issue?



Thank you