

UT Energy Week
February, 2019

Energy Poverty
and the
Real Energy Transition



Scott W. Tinker





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ECONOMIC
GEOLOGY







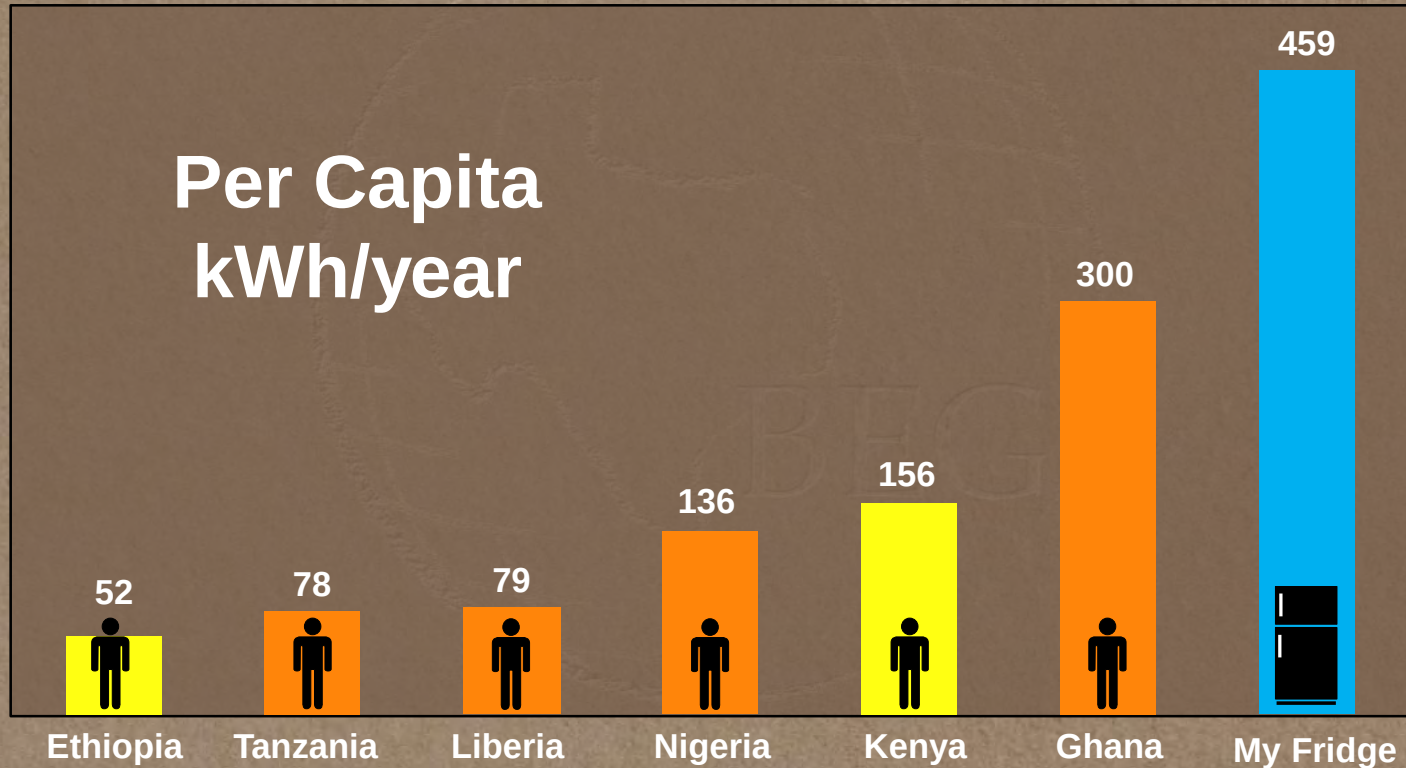


A world map at night, showing city lights and illuminated landmasses against a dark blue background.

What does
“little to no energy”
really mean?



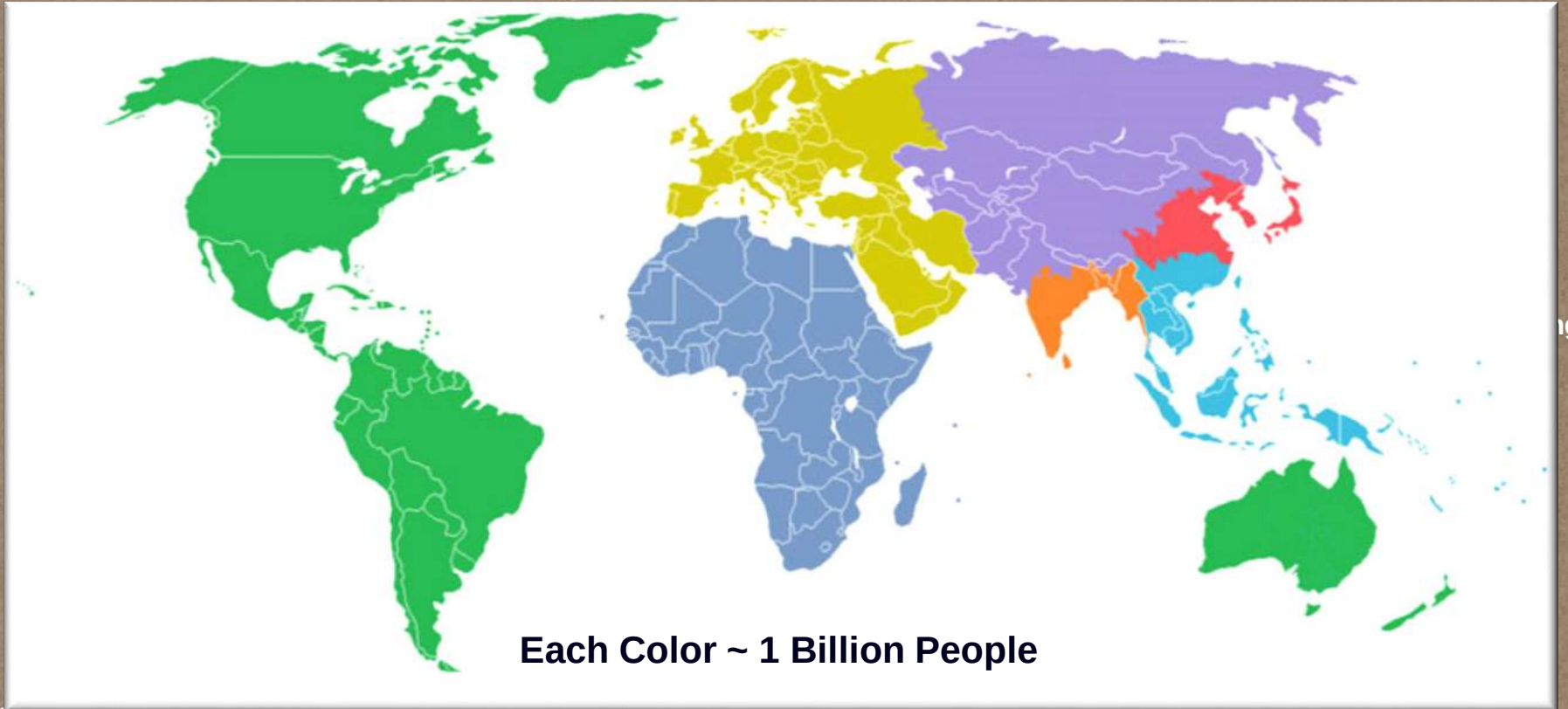
Annual Energy Consumption



How Prevalent is Energy Poverty?



Electricity and Clean Cooking



Is Energy Poverty Tied to Economic Poverty?



Economic Poverty and Energy Poverty

Circles sized by
total population

● Africa

●

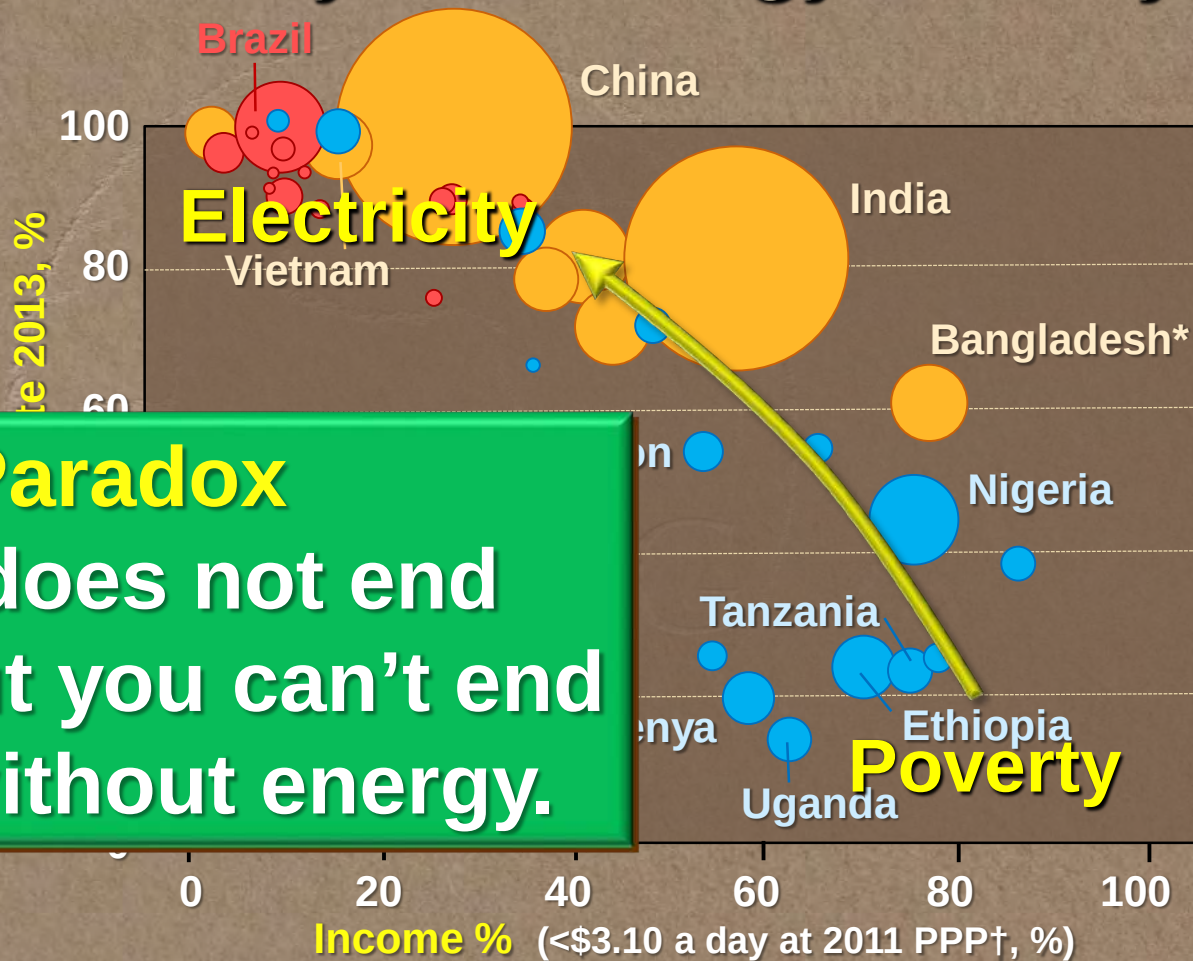
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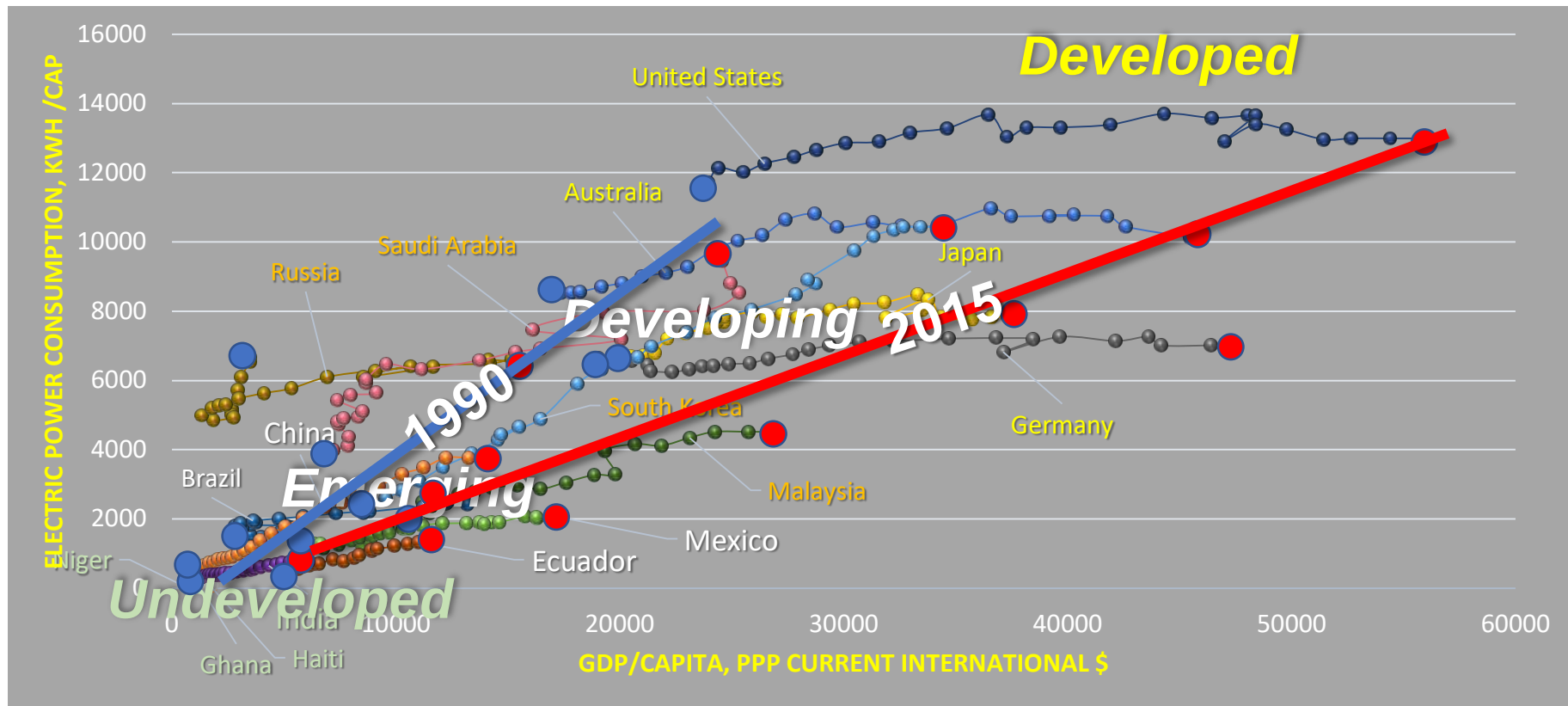
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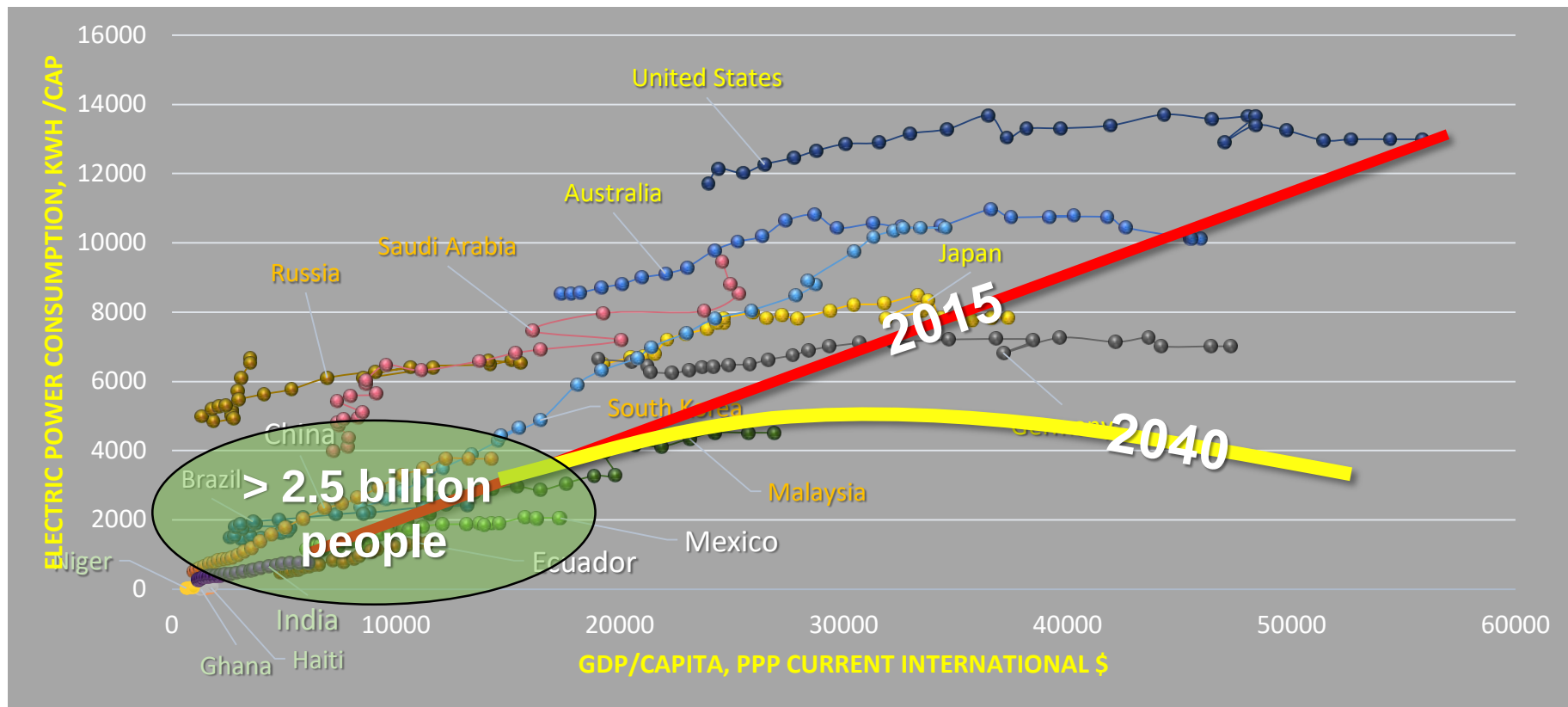


Limited Access to Electricity Restricts Standard of Living



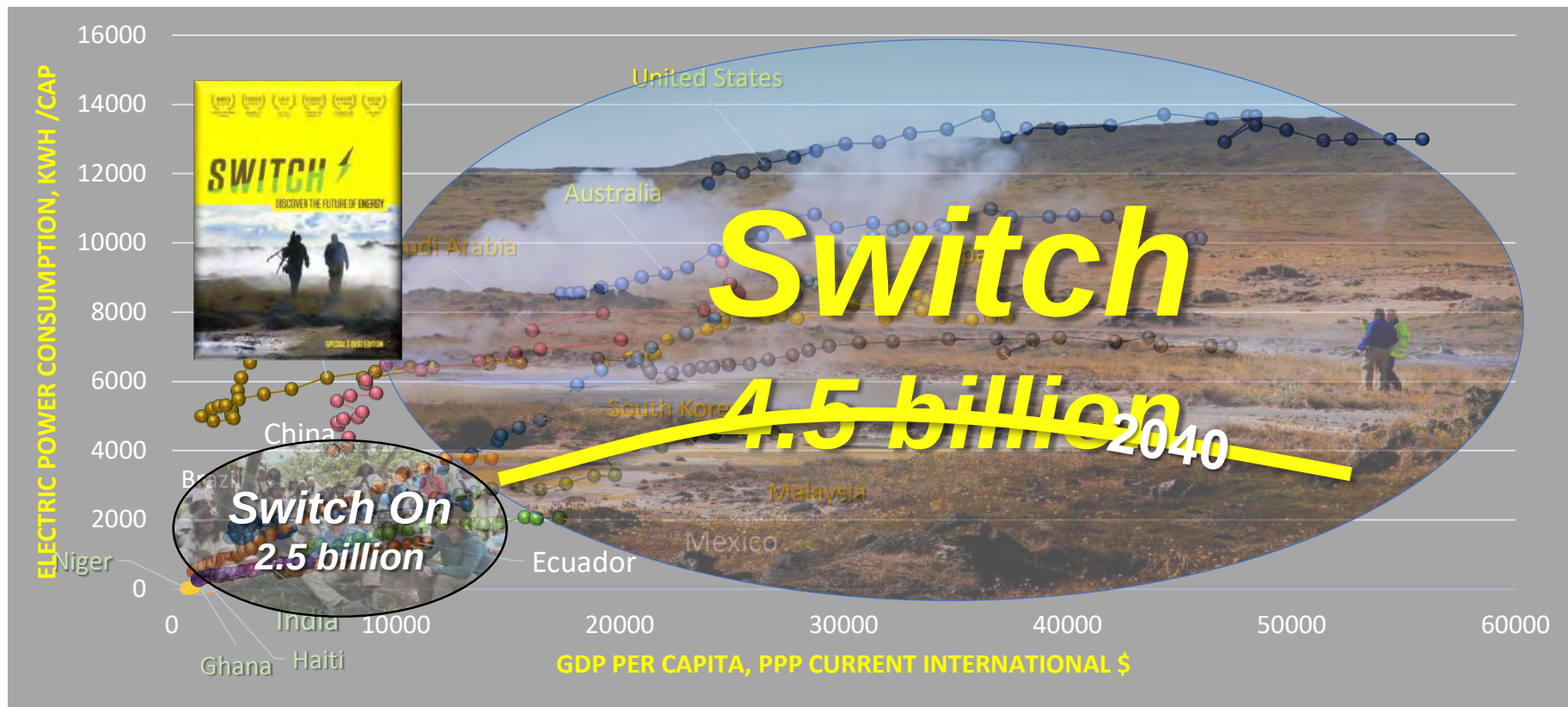
Source: World Bank Databank

Limited Access to Electricity Restricts Standard of Living



Source: World Bank Databank

Limited Access to Electricity Propagates Inequality



Source: World Bank Databank

It's Time to Power the People

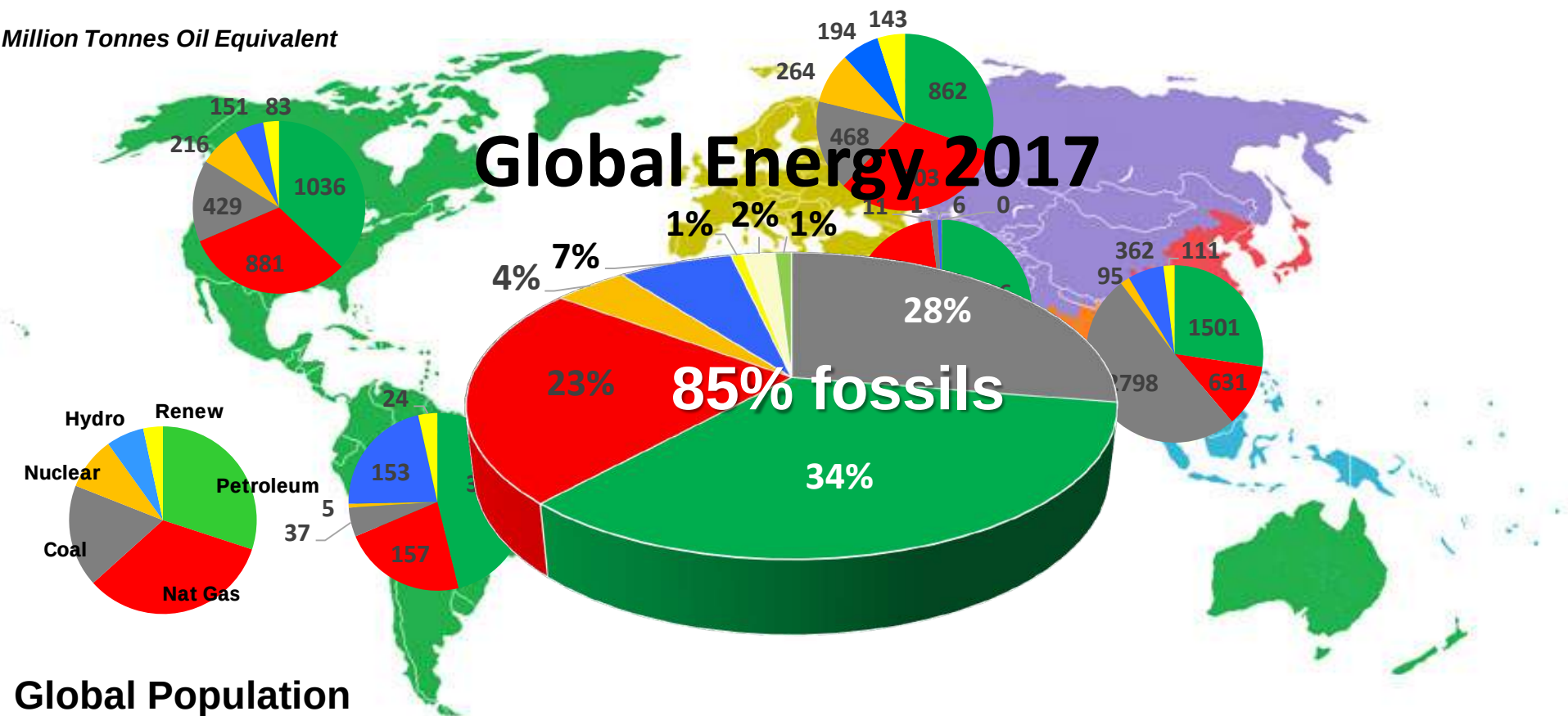


What Will it Take to Power the People?



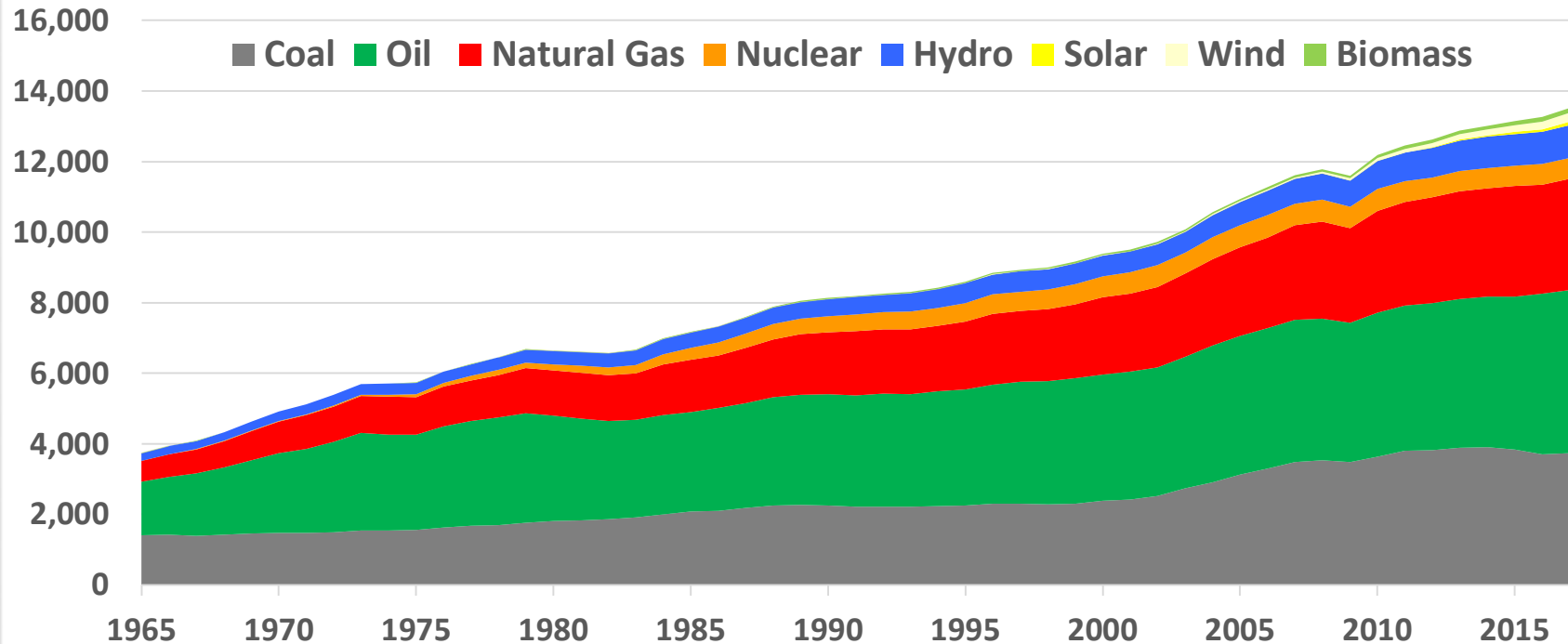
The Global Energy Mix

Million Tonnes Oil Equivalent



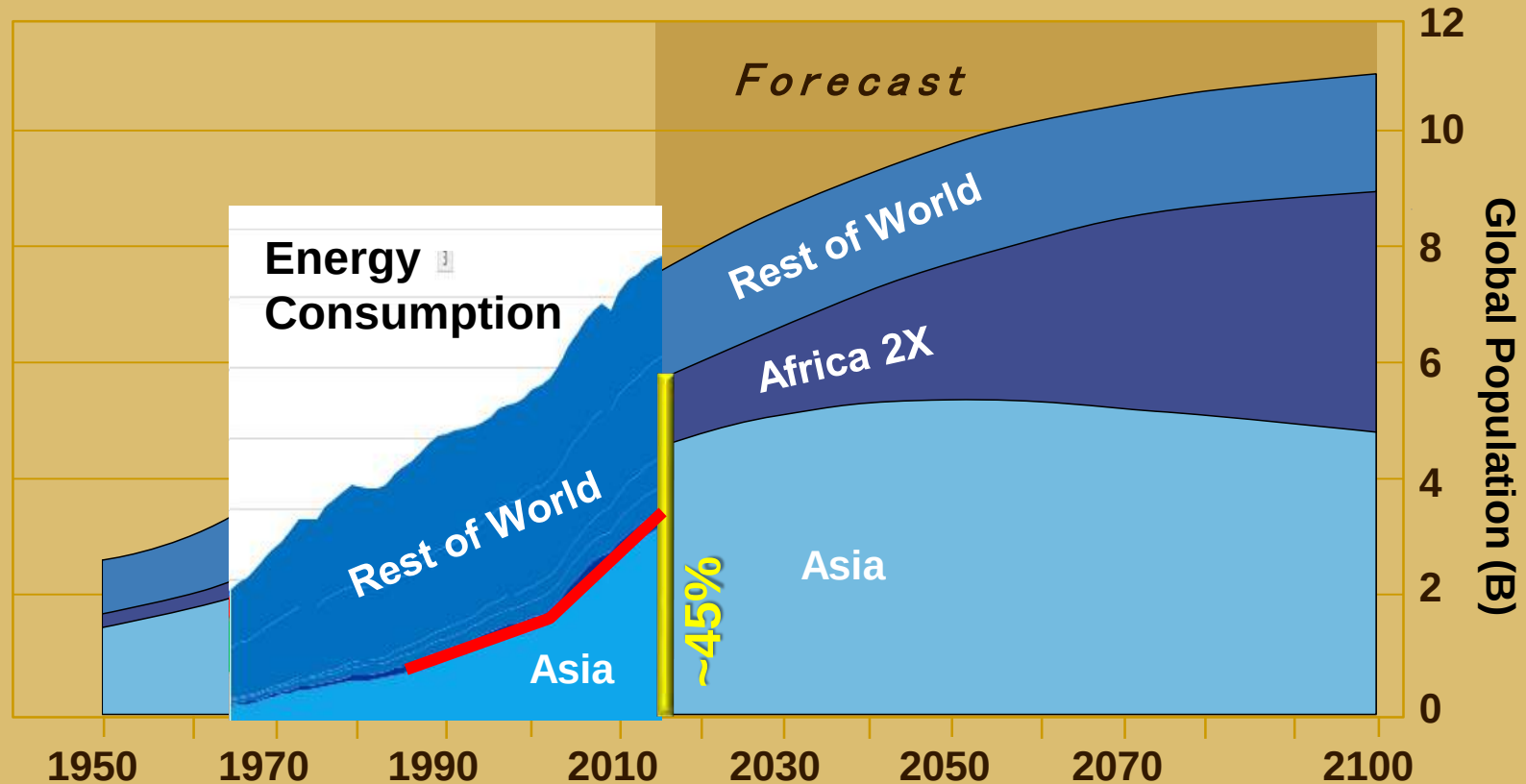
Global Energy

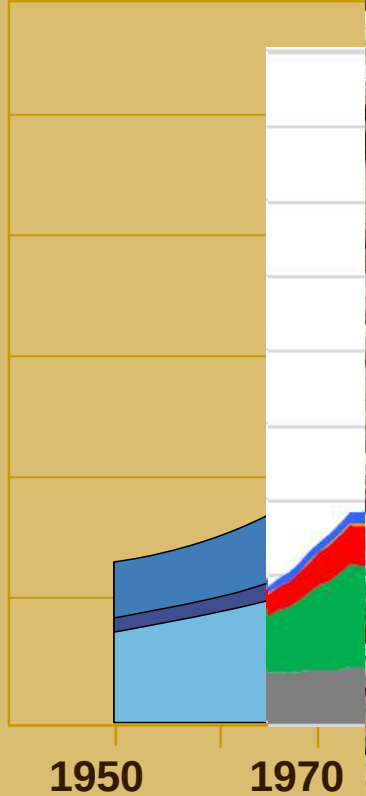
Global Energy (MTOE)



Data: BP Statistical View of World Energy (2018)

Population and Energy





Data: BP Statistical View

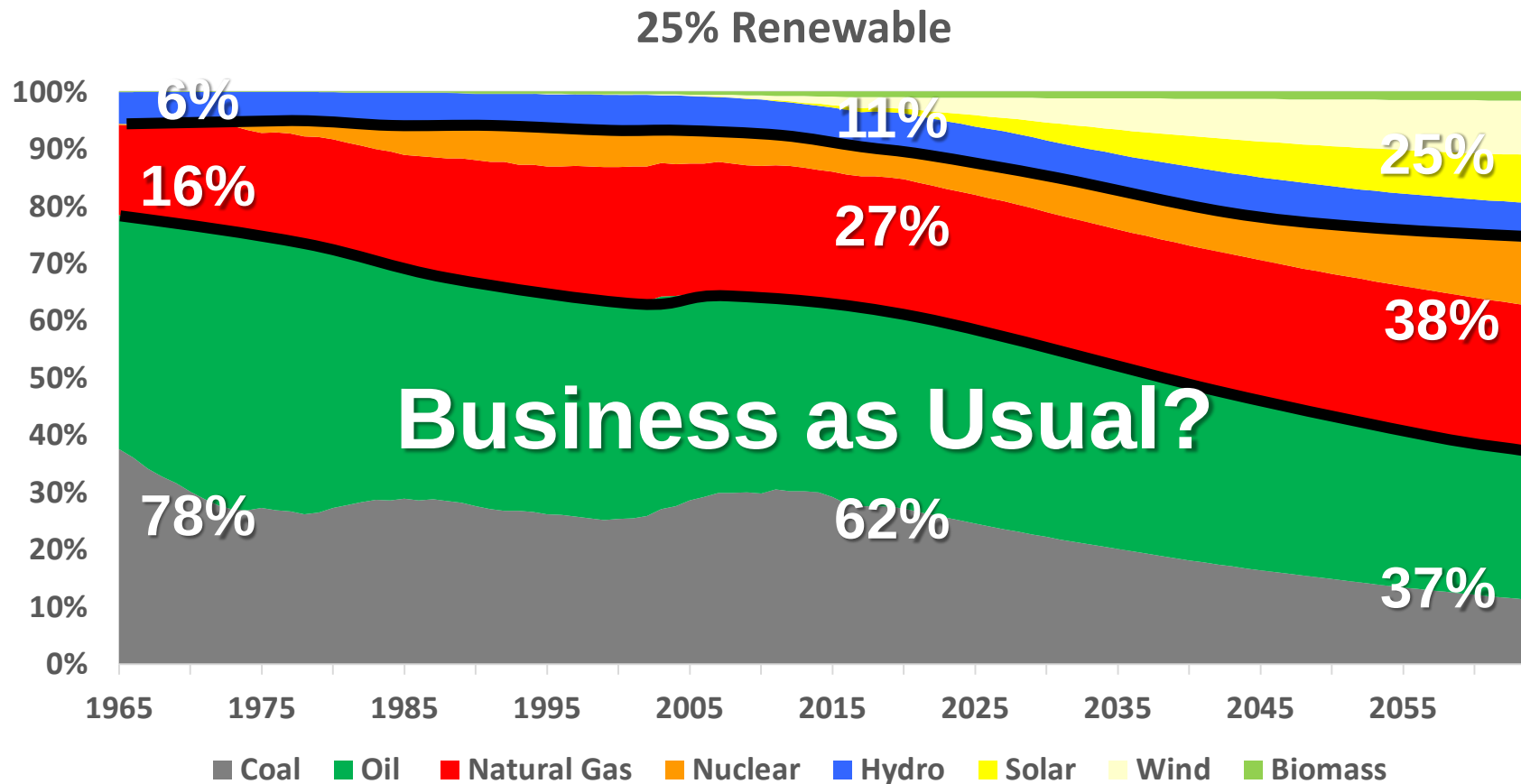


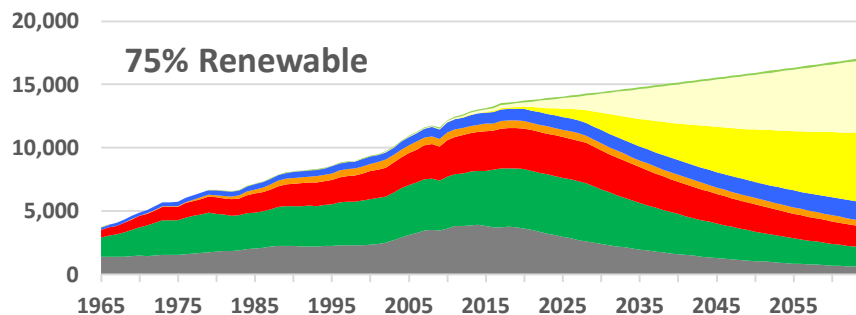
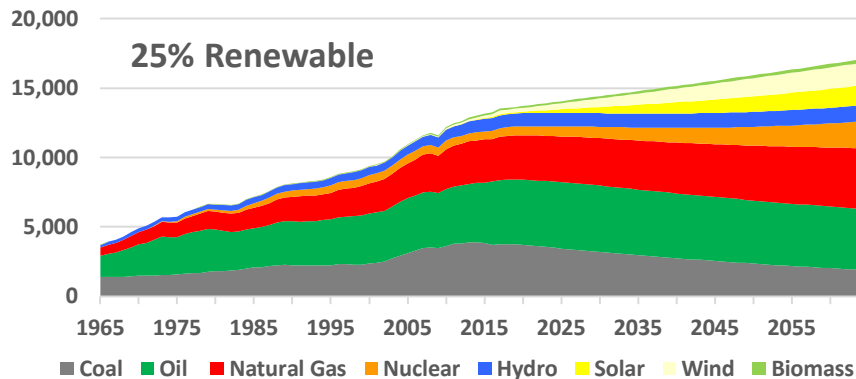
The world could be wind, water and solar in 50 years if just for political will...



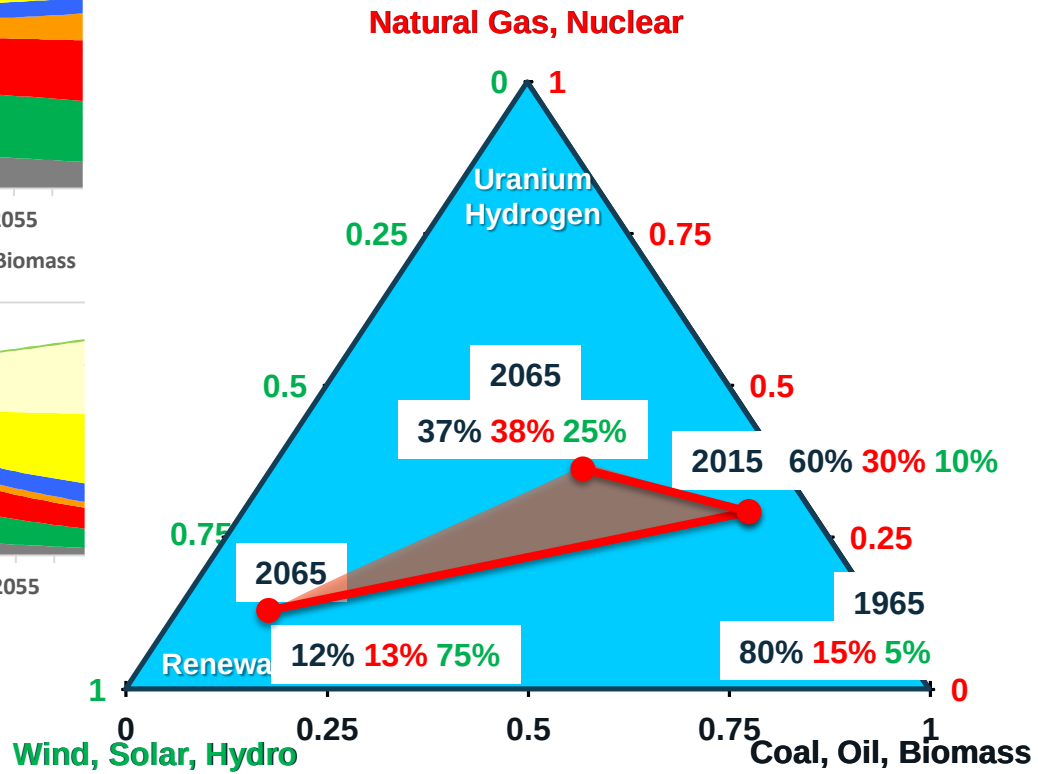
ist, August 23, 2014

Global Energy 2065





Global Primary Energy

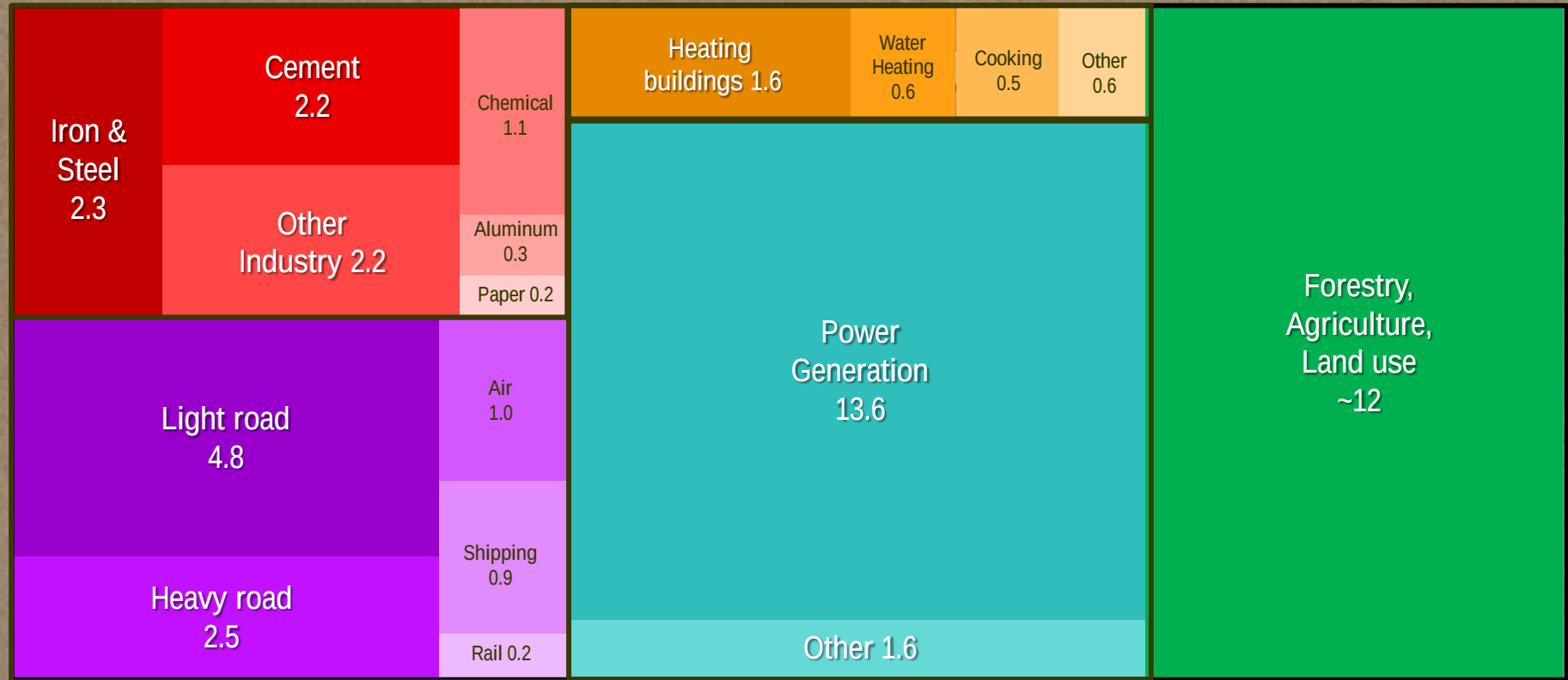


What About CO₂?



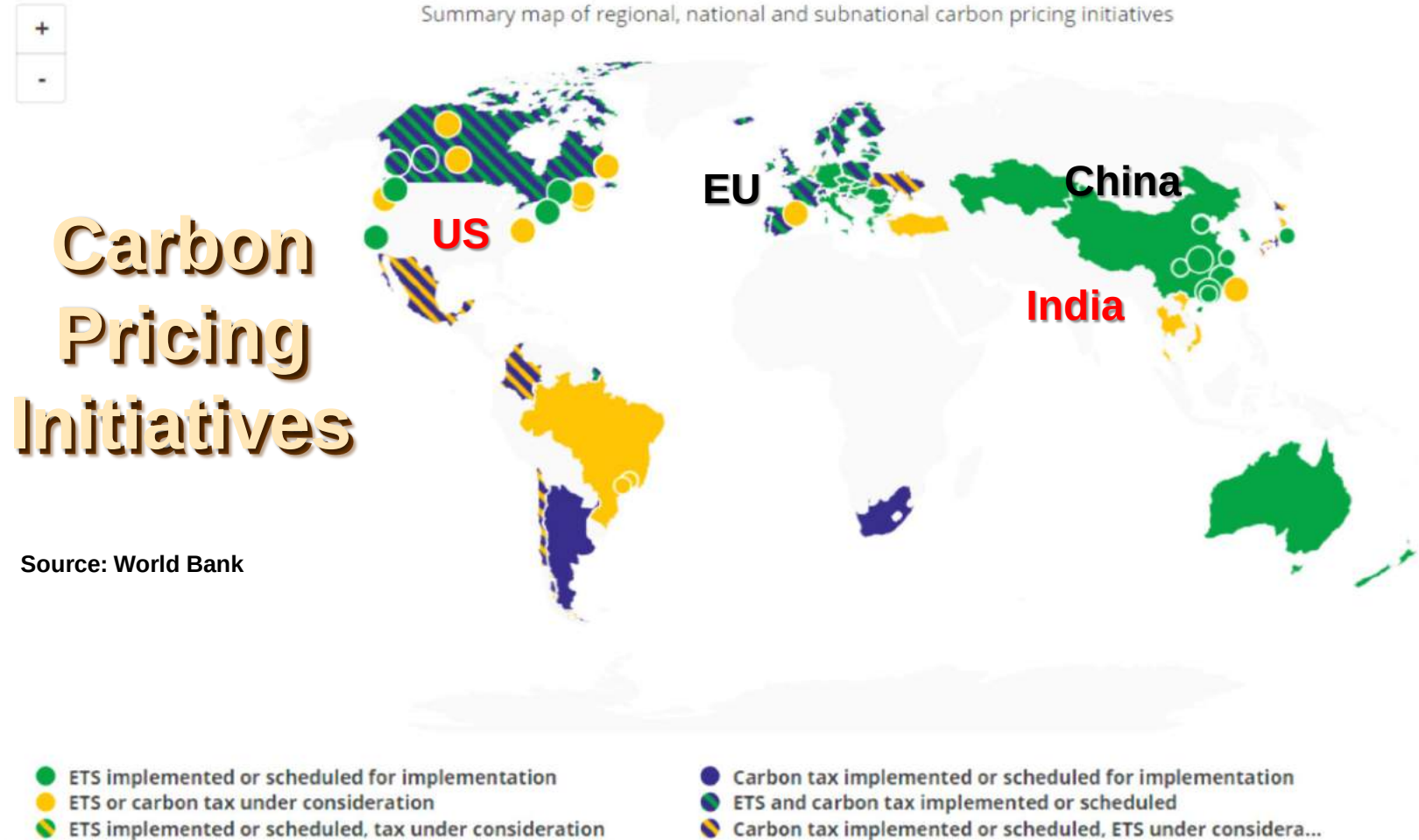
Global Anthropogenic CO₂ Emissions

2014, Total 48 Billion Tonnes



CO₂ Emissions



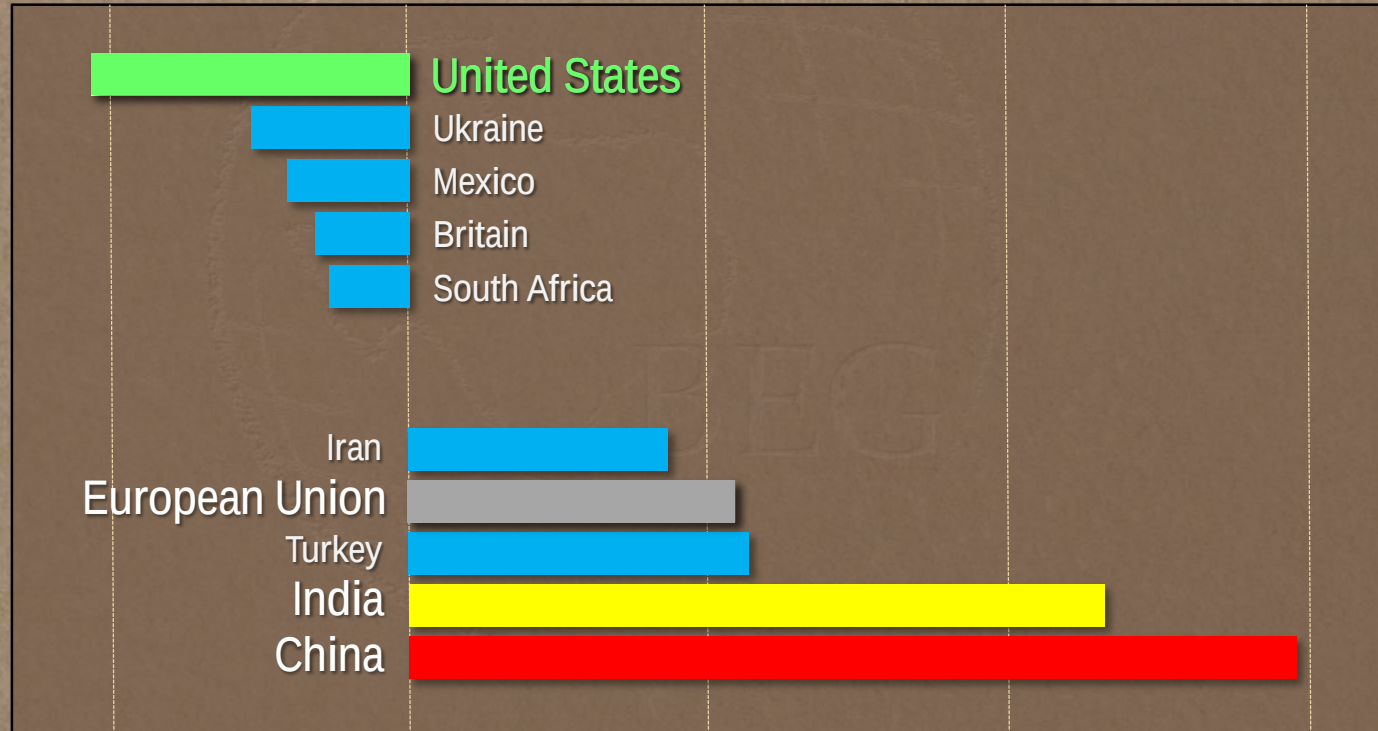


Change in CO₂ Emissions

2017, million tonnes

Largest Reductions

-40 0 40 80 120



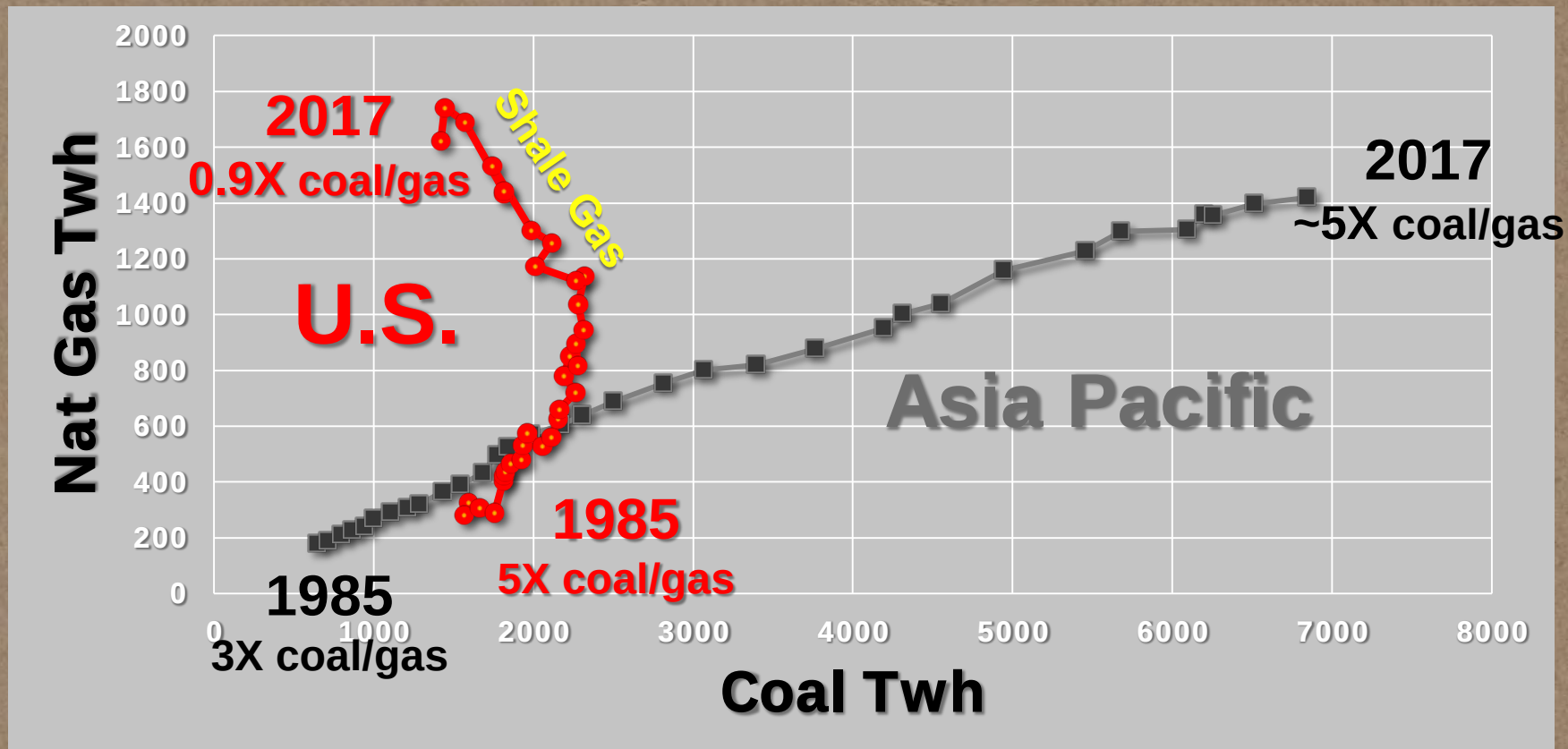
Largest Increases

How the Heck Did This Happen?



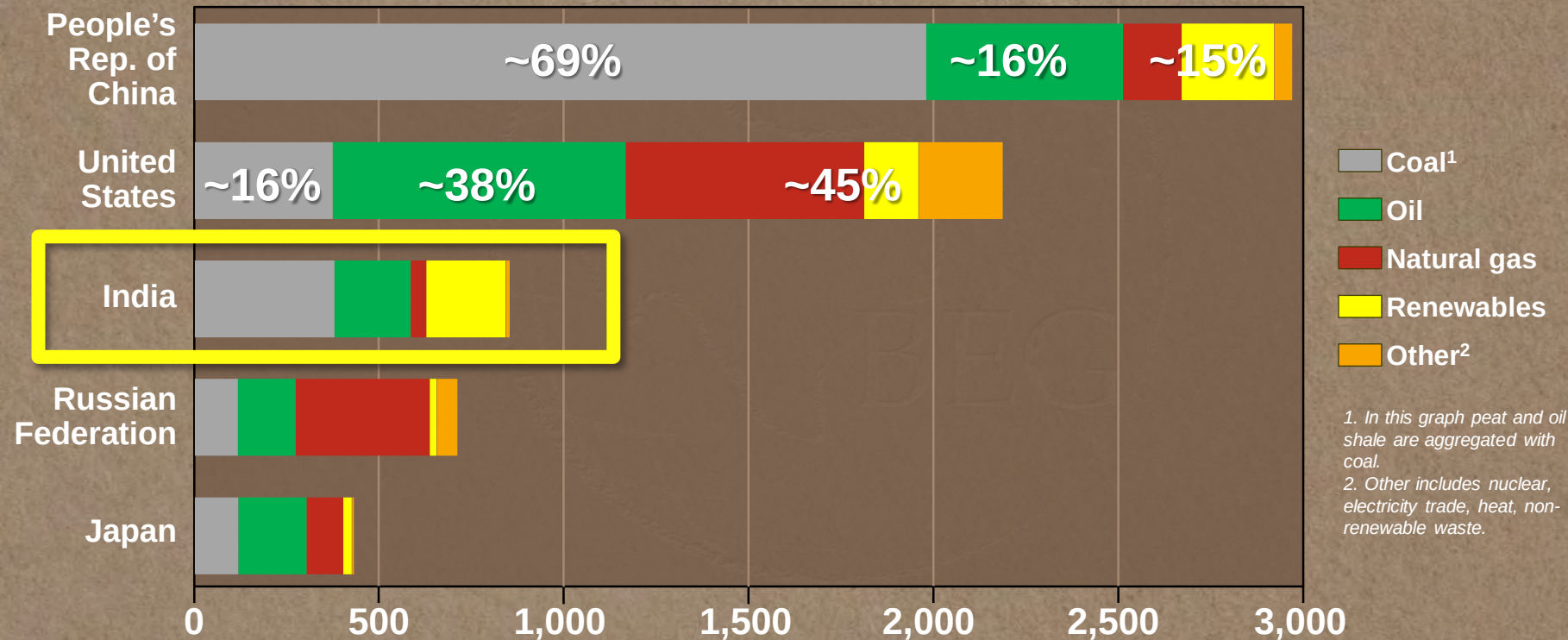
Electricity Generation

Natural Gas v. Coal 1985-2017

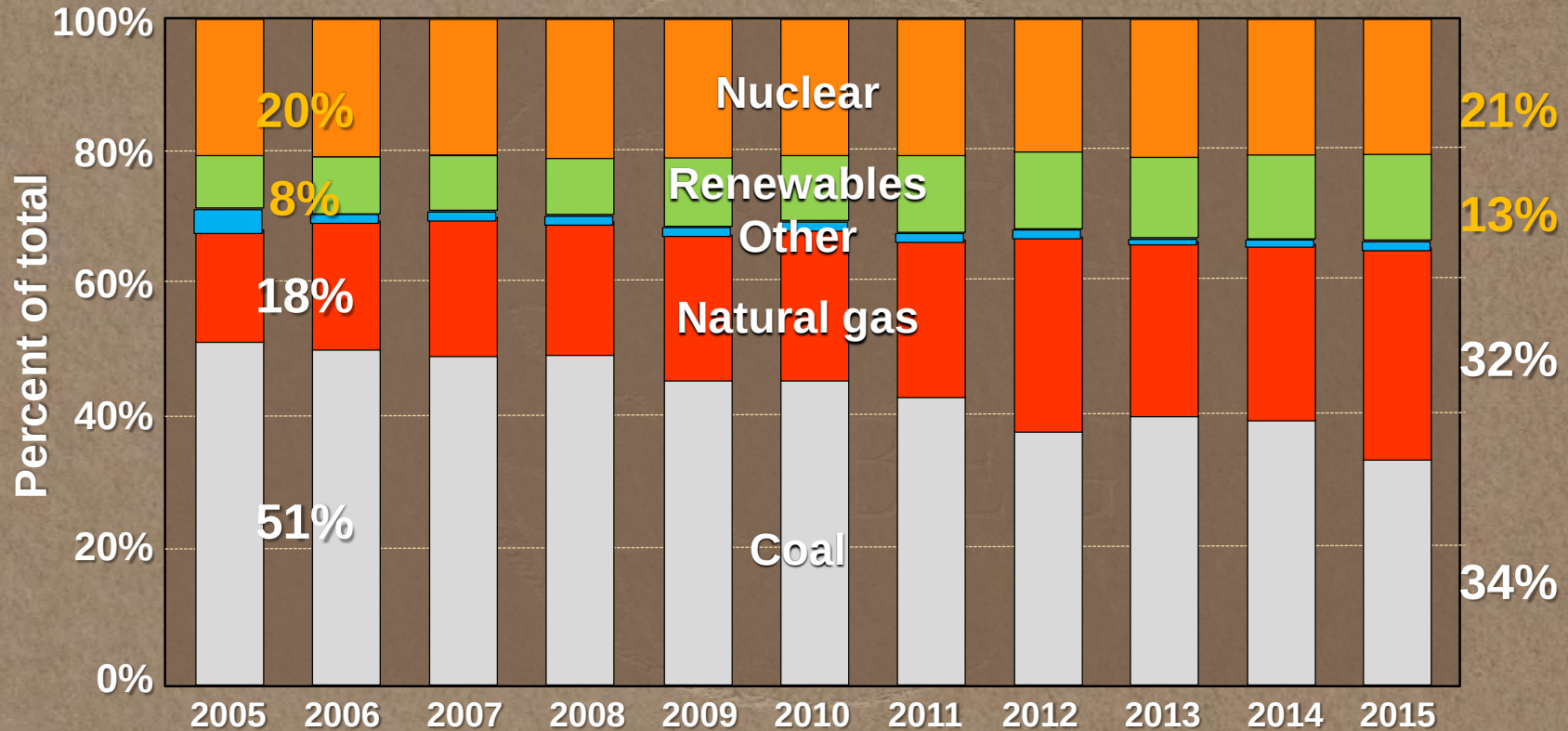


Total Primary Energy Supply (TPES)

2017 Energy Source (Mtoe)



U.S. Electric Generation Shares (2005-15)



Electric Power Sector U.S. CO₂ Emissions



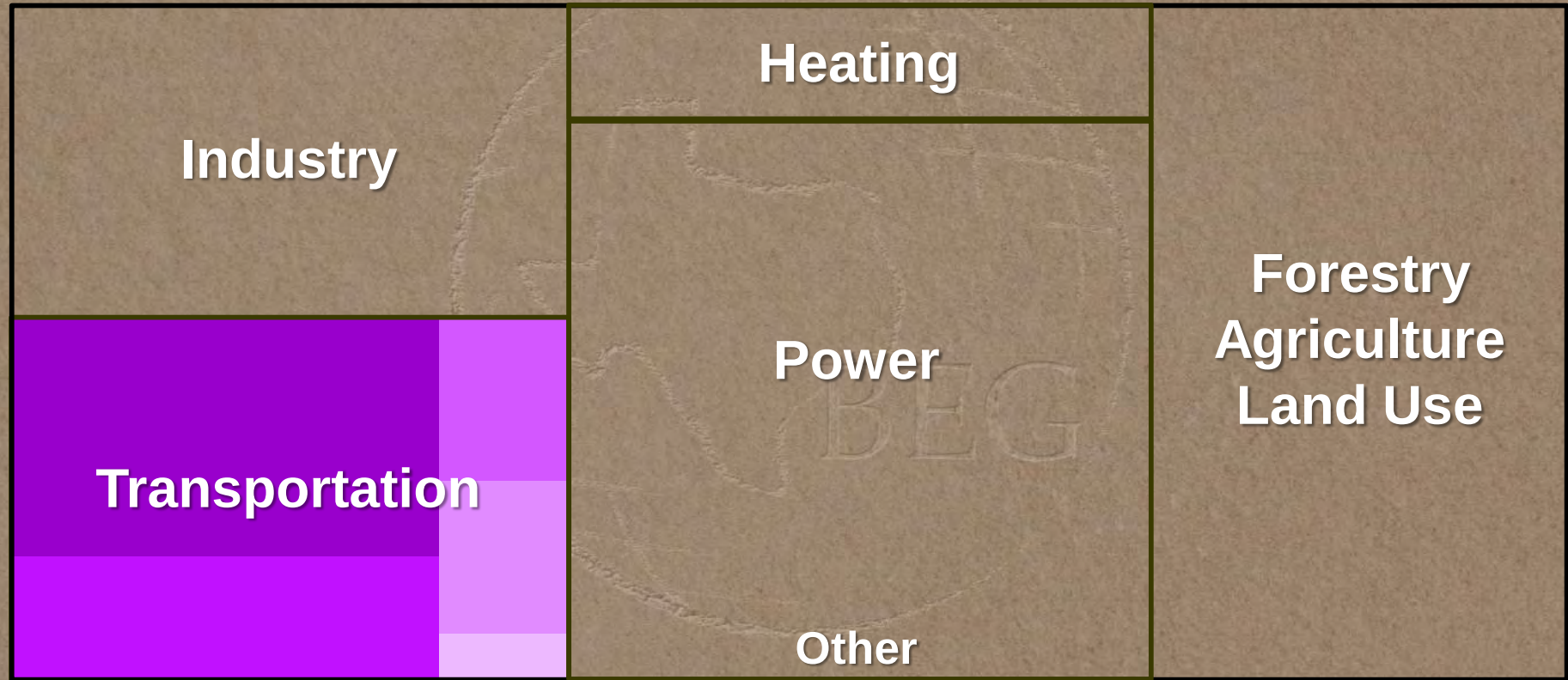


But What About Cars?



Global Anthropogenic CO₂ Emissions

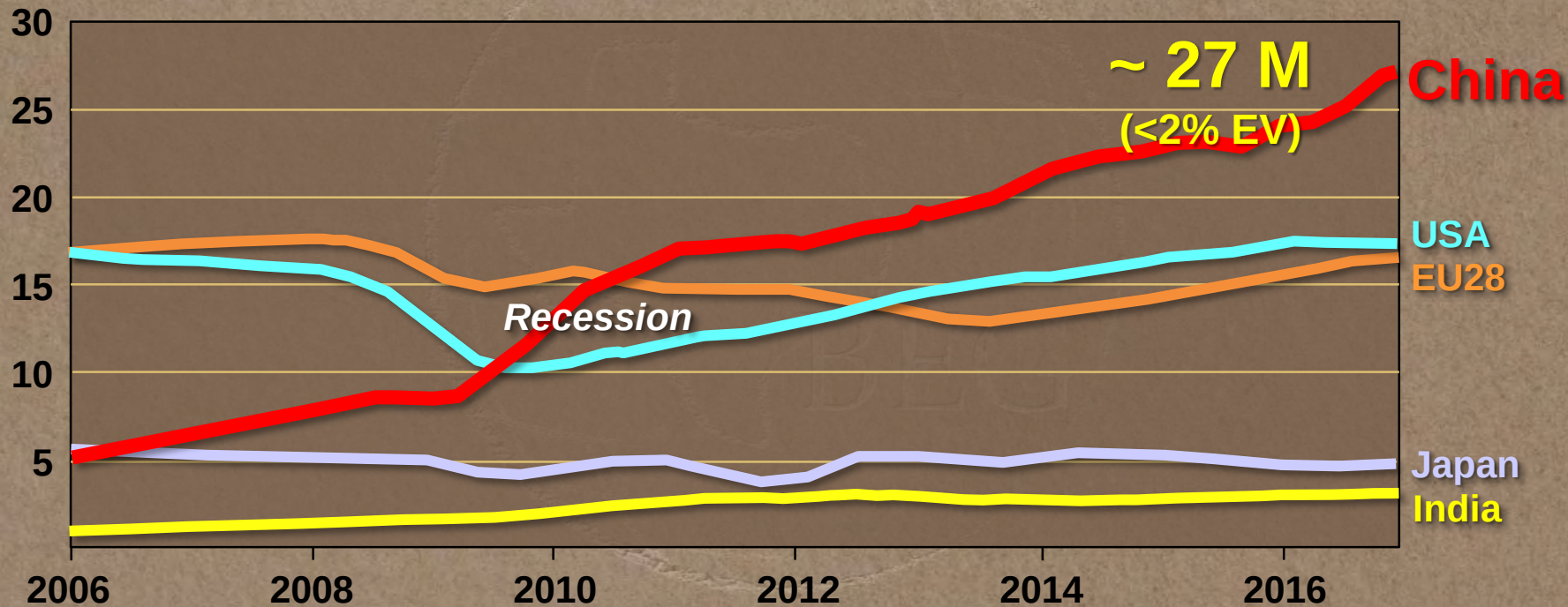
2014, Total 48 Billion Tonnes





Auto Sales Developed Nations

Rolling 12-month (million)



Cumulative Electric-Vehicle Forecasts

I DIDN'T HAVE ANY
ACCURATE NUMBERS
SO I JUST MADE UP
THIS ONE.

\$4,629,873

www.dilbert.com scottadams@aol.com

STUDIES HAVE SHOWN
THAT ACCURATE
NUMBERS AREN'T ANY
MORE USEFUL THAN THE
ONES YOU MAKE UP.

5808 © 2008 Scott Adams, Inc./Dist. by UFS, Inc.

HOW
MANY
STUDIES
SHOWED
THAT?

EIGHTY-
SEVEN.

2020

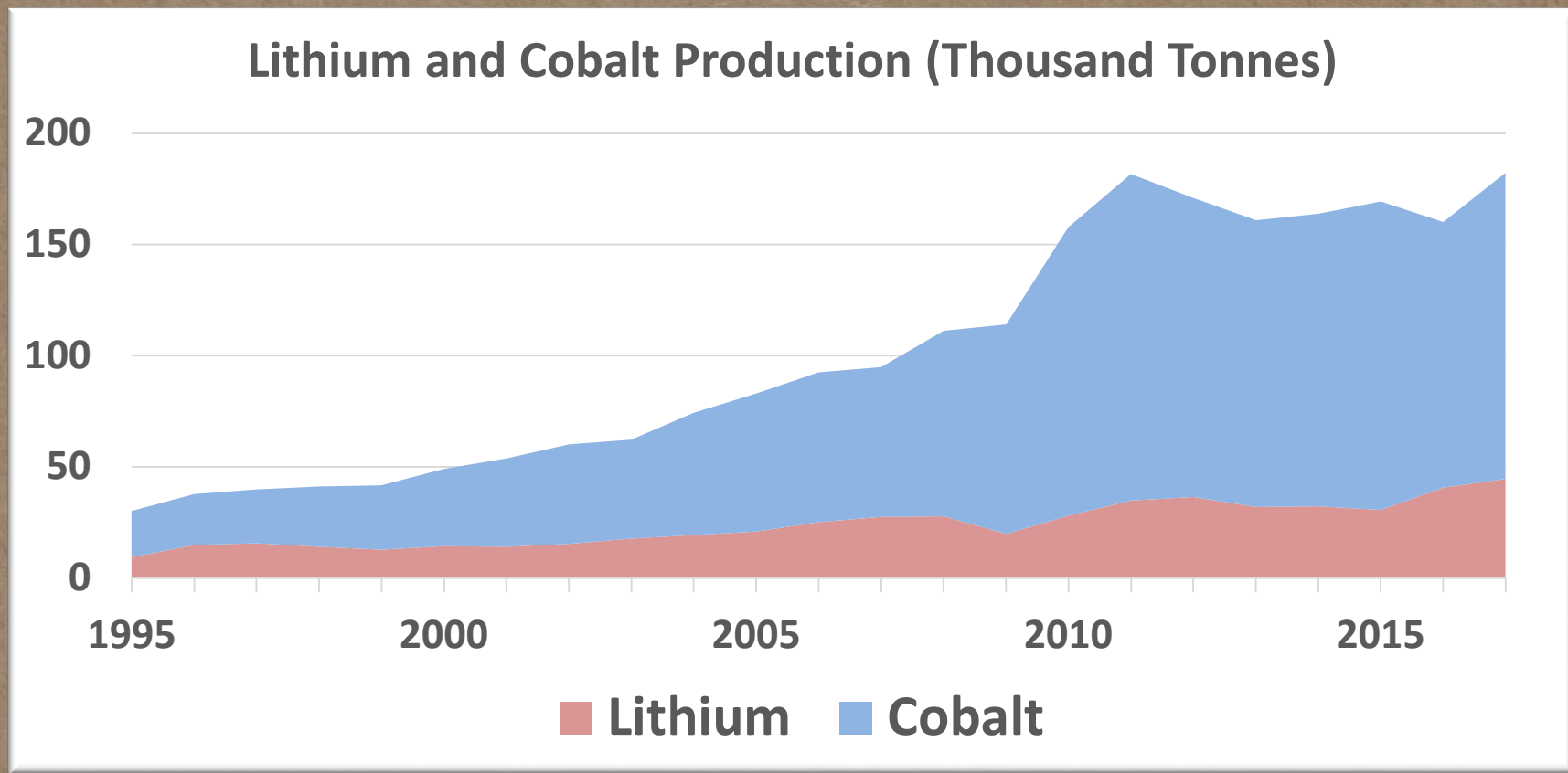
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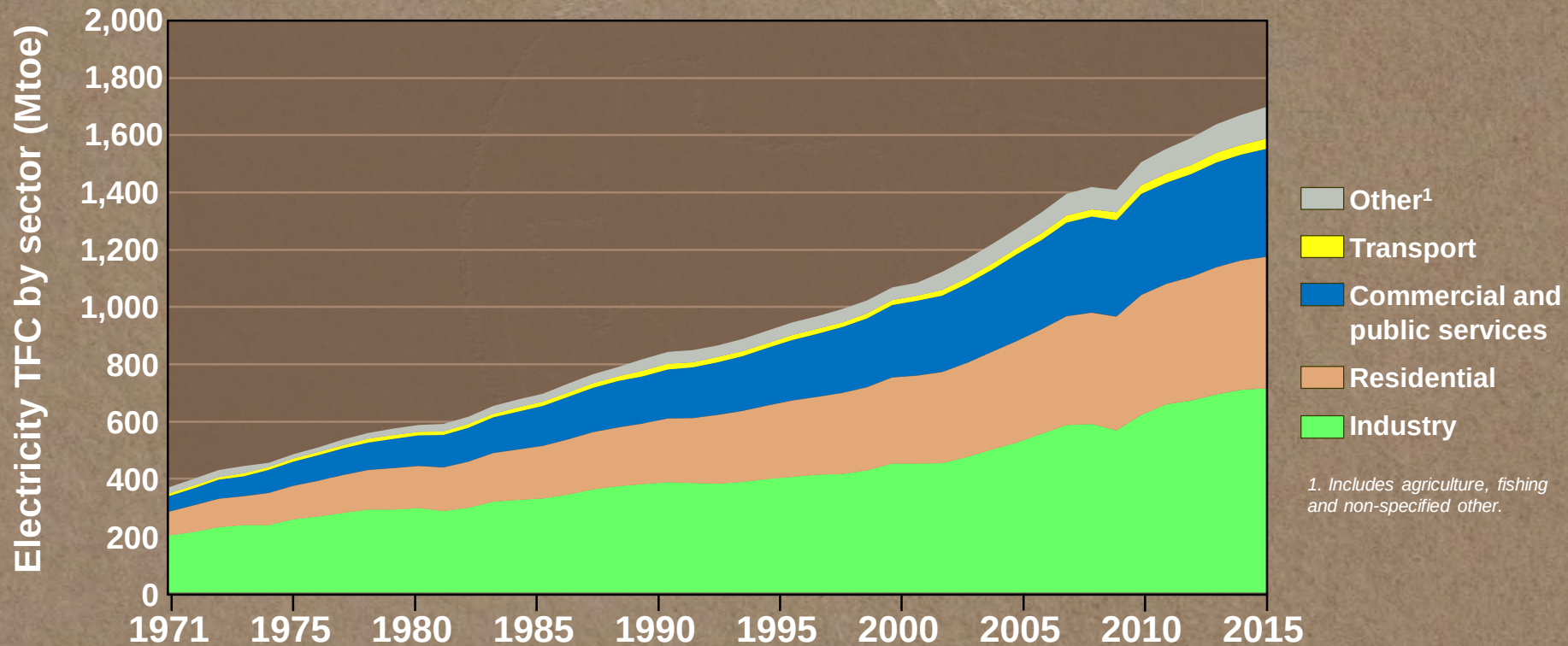
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Battery Mining



Global Final Consumption by Sector Electricity

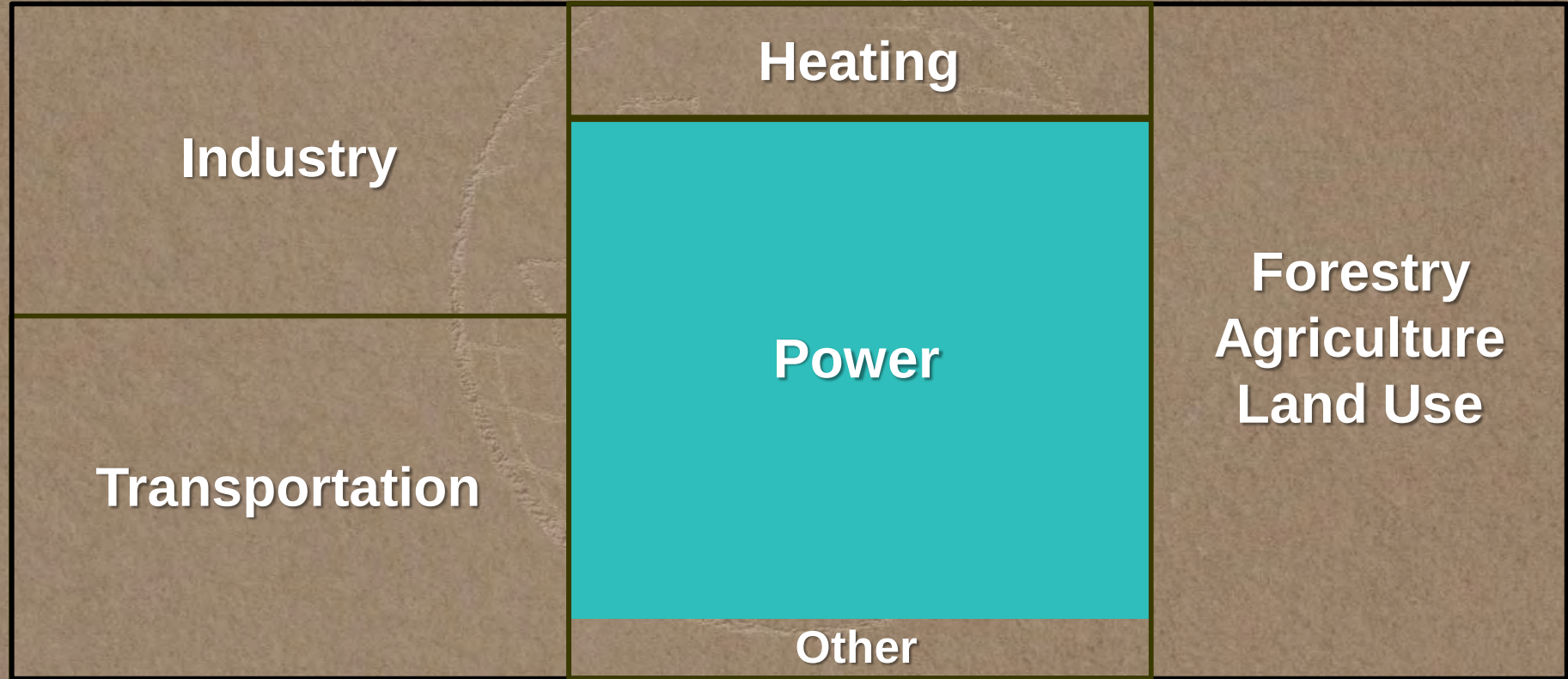


Where Will We Get the Electricity for EVs and Growing Global Demand?



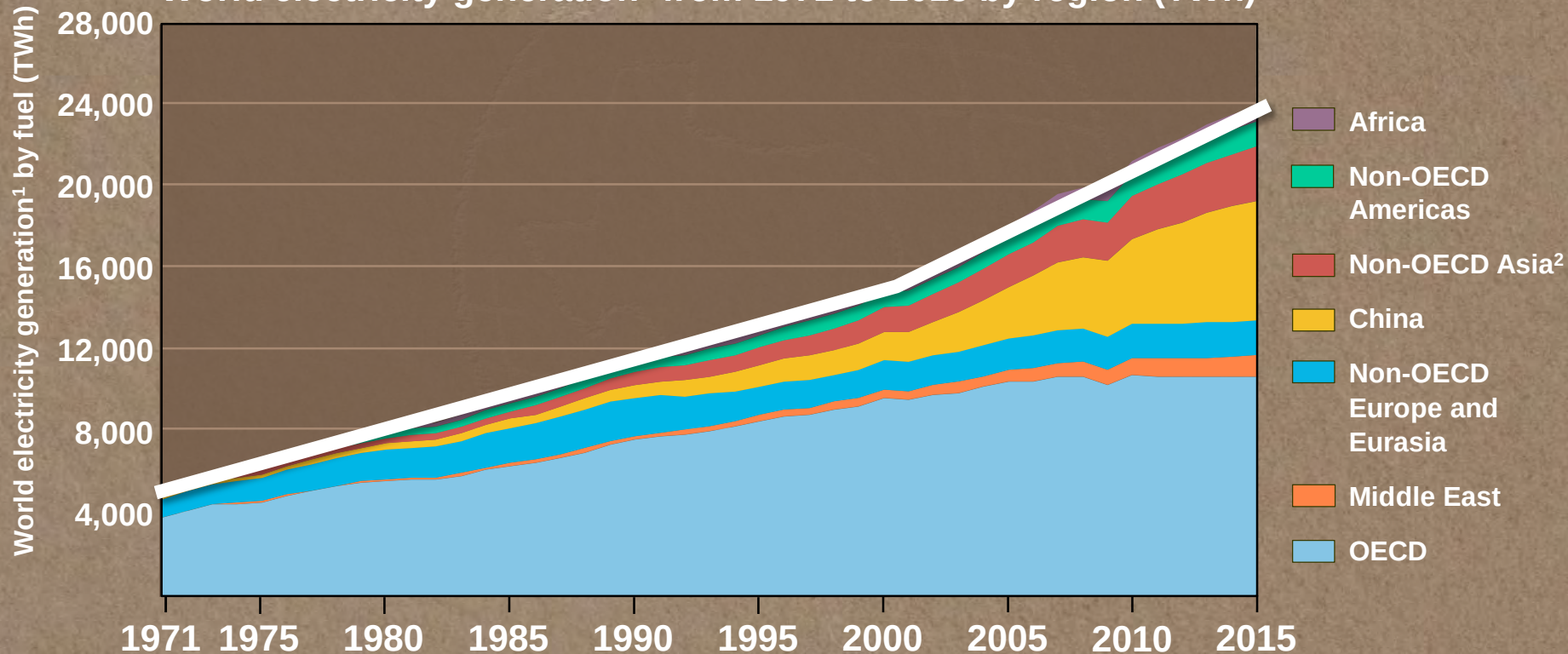
Global Anthropogenic CO₂ Emissions

2014, Total 48 Billion Tonnes



Global Electricity Generation By Region

World electricity generation¹ from 1971 to 2015 by region (TWh)

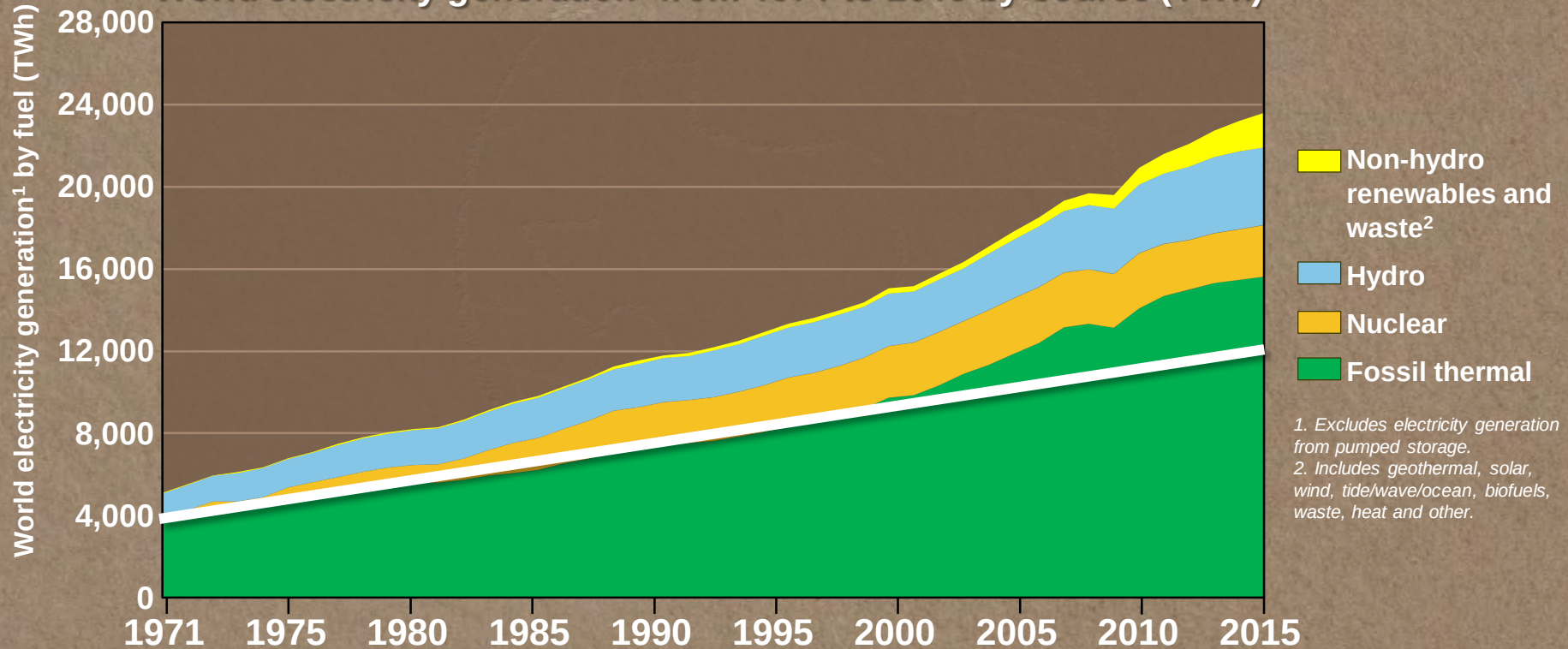




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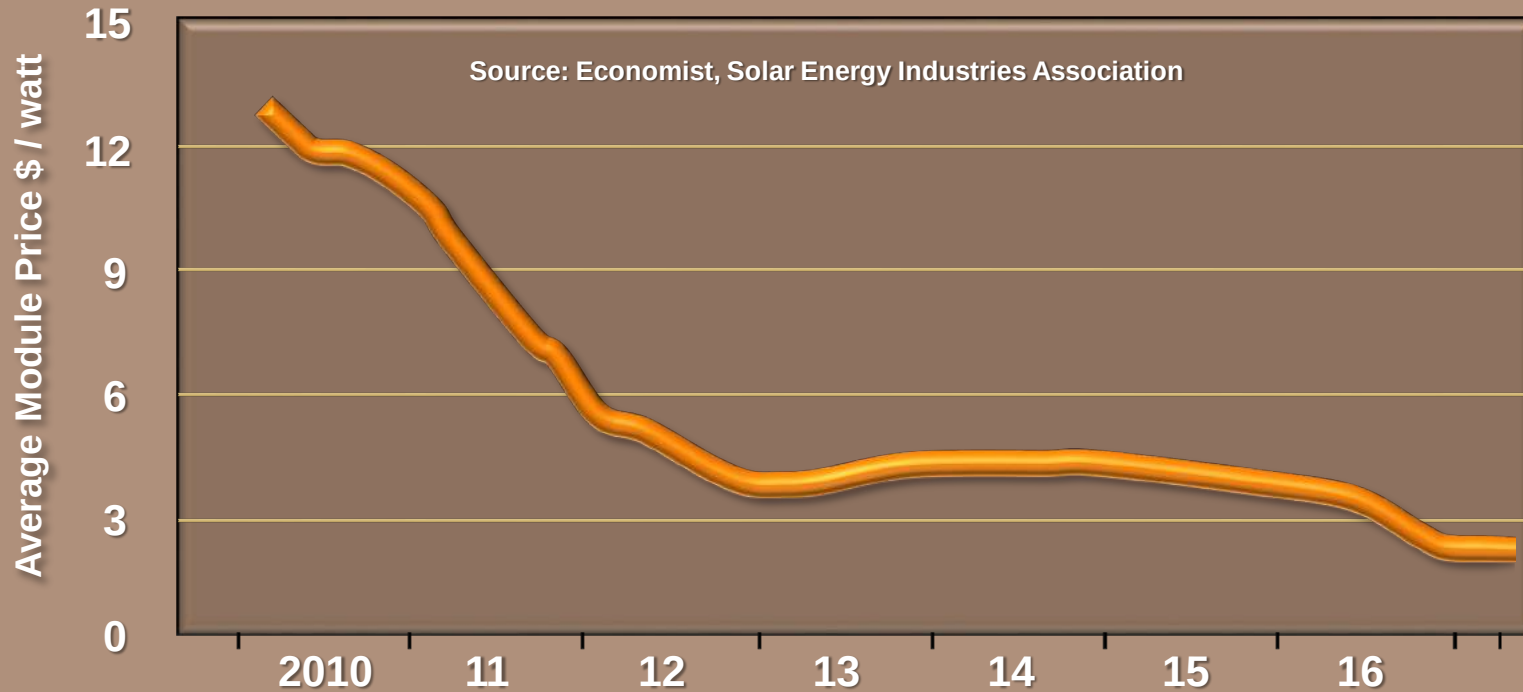
Global Electricity Generation by Source

World electricity generation¹ from 1971 to 2015 by source (TWh)



Global Solar Photovoltaic Electricity

United States Solar photovoltaics



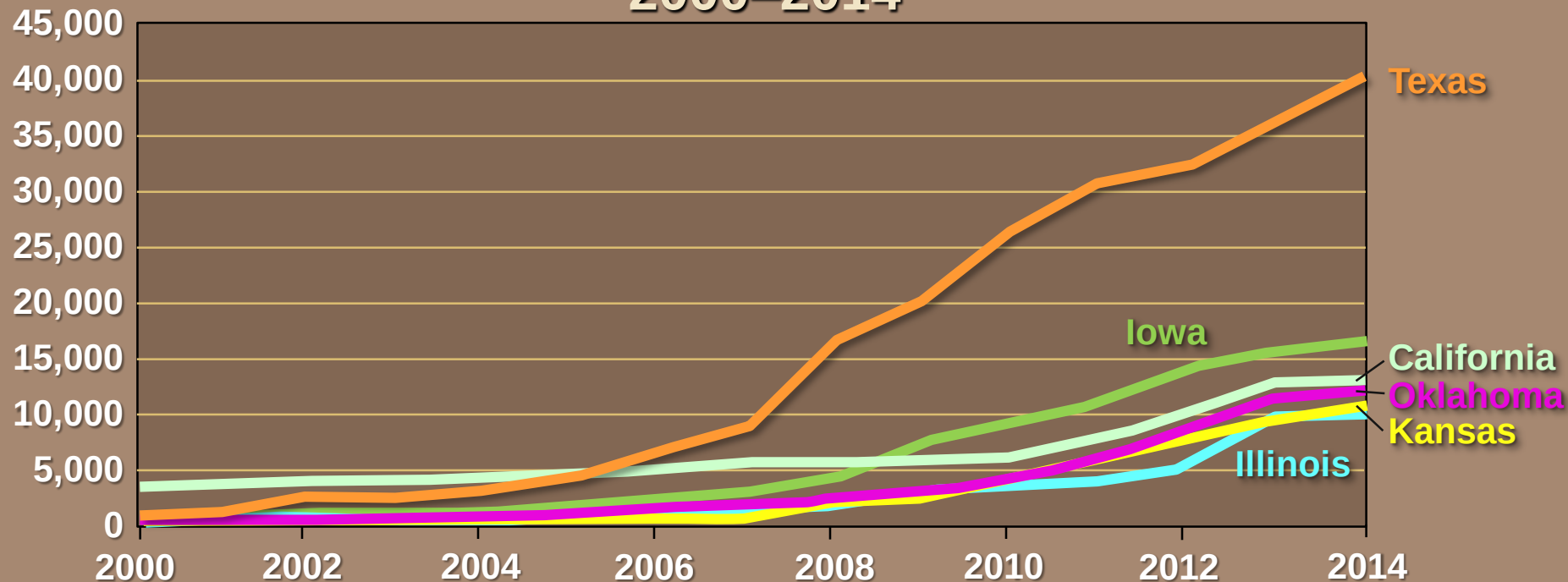
QAe5833

a¹

Global Wind Electricity

Growth in U.S. Wind Generation
2000–2014

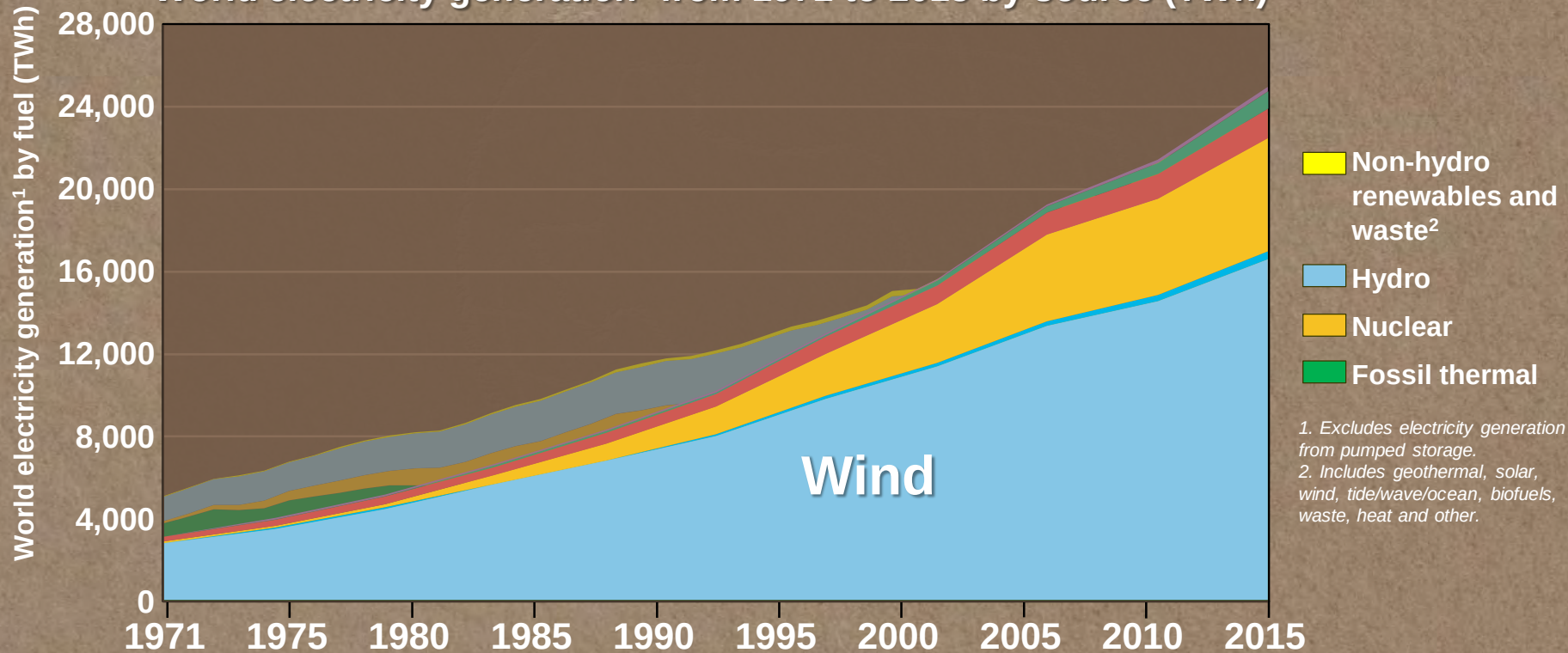
Million Kwh



QAe5771

Global Electricity Generation by Source

World electricity generation¹ from 1971 to 2015 by source (TWh)



Should Electricity be Distributed Renewable or Centralized Grid?



Distributed Renewable



Centralized Grid



Sustainable

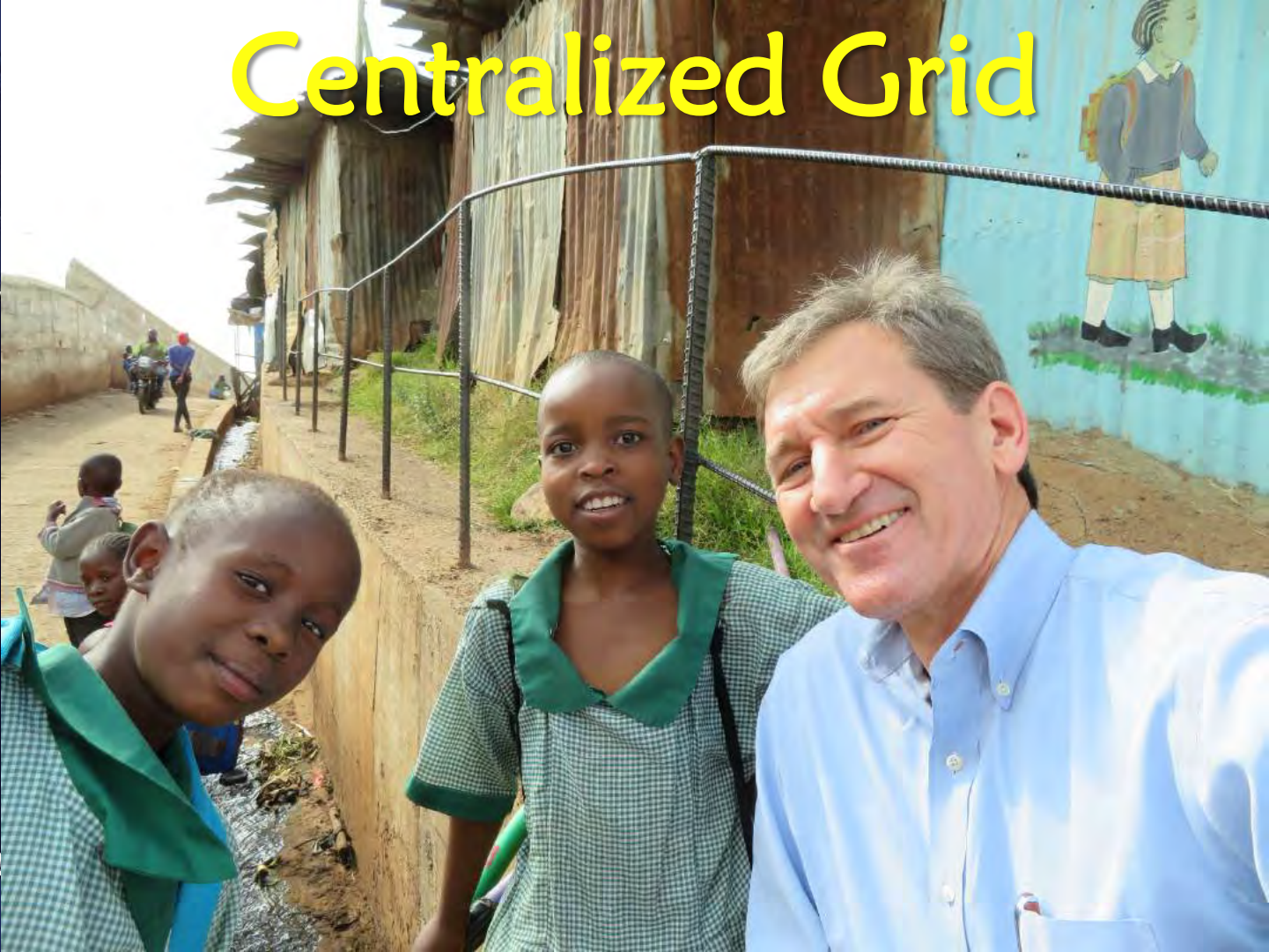
SCHOOL OF
ECONOMIC
SCIENCE

Centralized and Distributed



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GEOLOGY

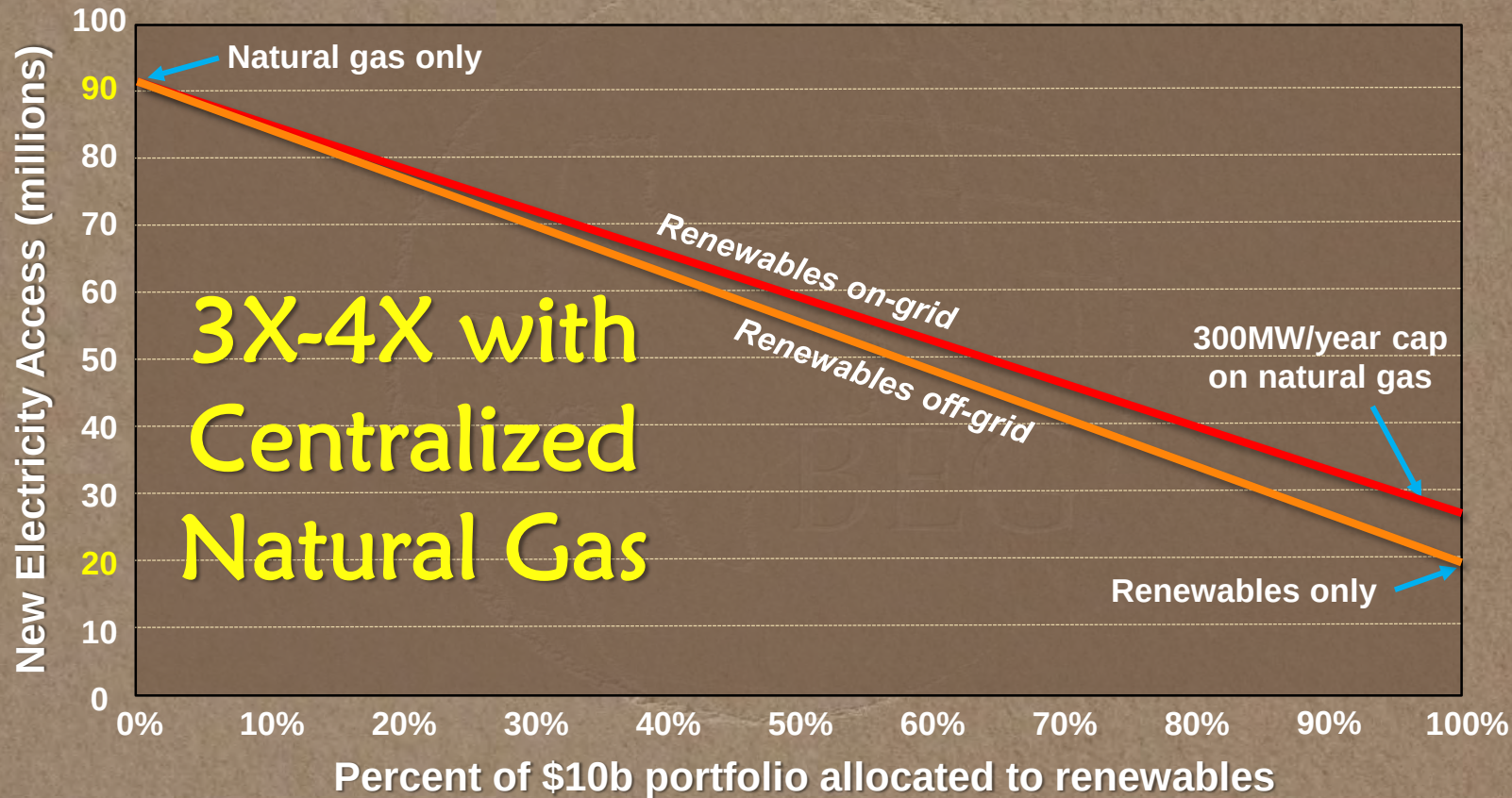
Centralized Grid



Distributed Renewable

Electricity Access per Dollar

Overseas Private Investment Corporation (OPIC)



What About the Environment?







Real Energy Education is Vital

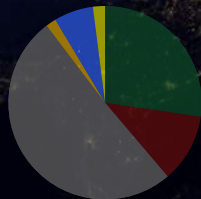
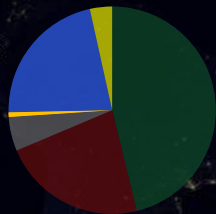
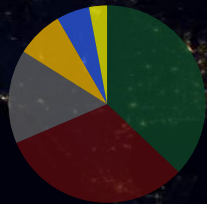


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GEOLOGY

Ali Al-Naimi







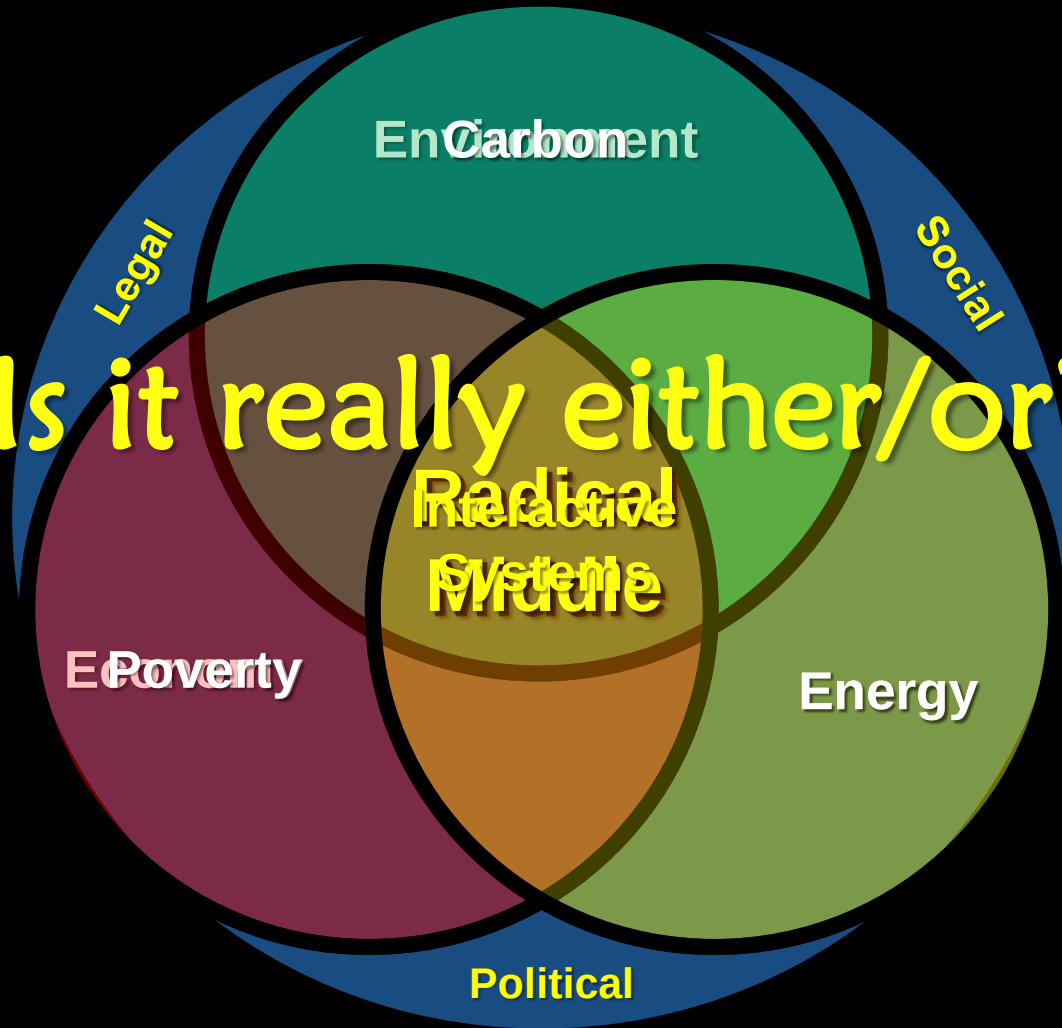
Green New Deal. Keep *Them* in Poverty
Lift *Them* from Poverty



Can we Address Poverty *and* CO₂?



Is it really either/or?



Poverty is the major issue of our time, and **fossil fuels** are the solution

Climate Change is the major issue of our time, and **fossil fuels** are the problem

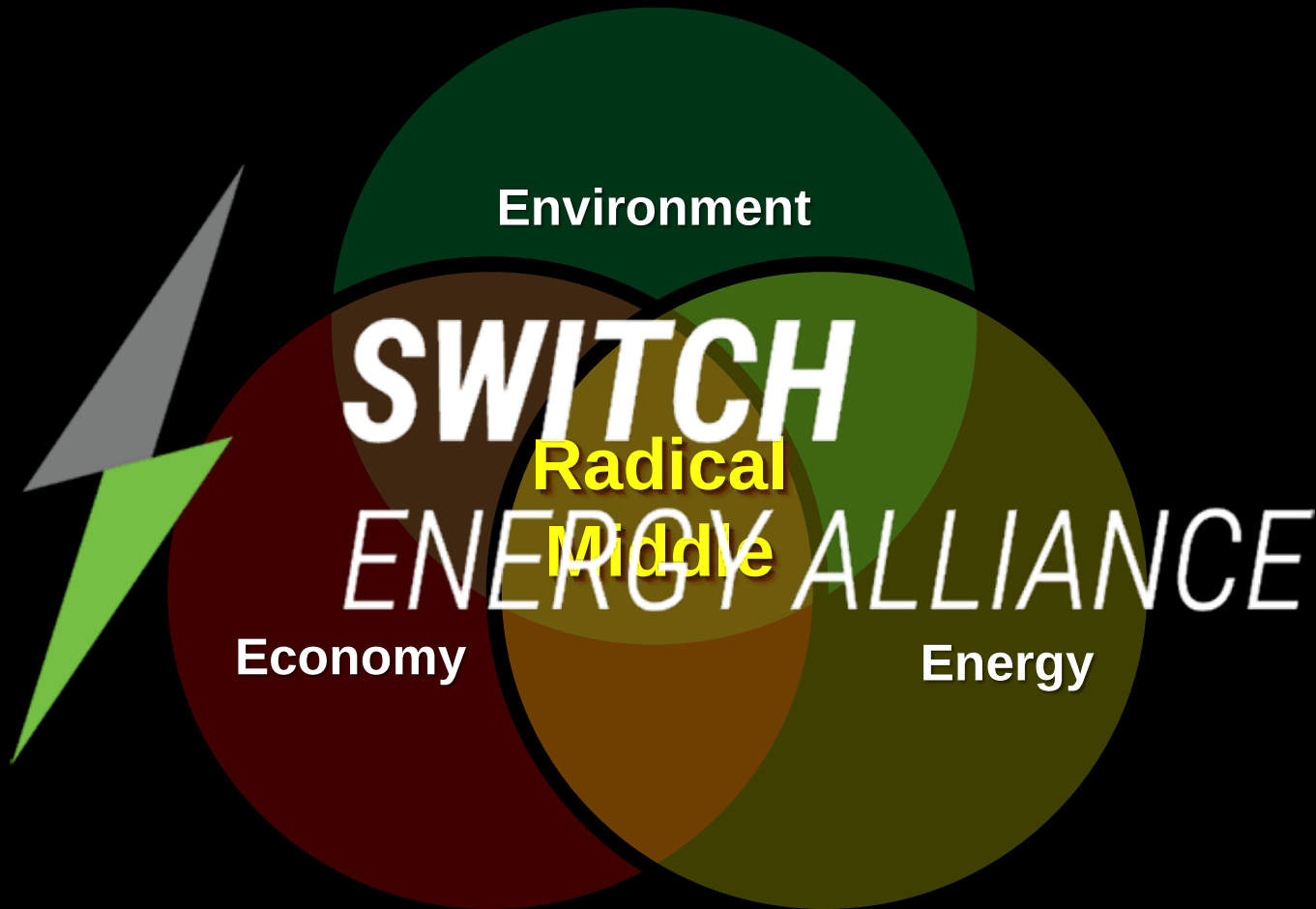
The Real Energy Transition

- ✓ Every person on earth is out of energy poverty, and
- ✓ Minimize energy impacts on land, water and air, and
- ✓ Global atmospheric emissions peak and roll over

This Requires Non-Partisan Energy Education

One Size Does Not Fit All
We Would Make an
Immediate and Substantial
Impact on Poverty and
Climate with a Fit-for-Purpose
Combination of...

- ❖ DRE, especially Solar, for poor and rural
- ❖ Centralized Wind for sparse, rural, and windy
- ❖ Centralized Nuclear for dense and urban
- ❖ Centralized Nat Gas, w/CCS, for urban and rural
- ❖ Small Modular Reactors (Nuclear and Nat Gas)
- ❖ Geothermal and Hydro, where available
- ❖ Coal w/CCS and Coal Phase Out
- ❖ EVs (battery impact) and ride sharing for urban
- ❖ ICE, CNG, LNG, and Fuel Cells for rural
- ❖ Centralized Solar and Biofuels as boutique only
- ❖ Continued drive towards Efficiency





Thanks!

Join the Switch Energy Alliance

SwitchOn.org

Inspire an Energy Educated Future



Photo Credit: Scott W. Tinker



Thanks!

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For financial interests of Scott Tinker see

<http://www.beg.utexas.edu/people/scott-tinker>



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