

Environmental SuperConference

Austin, TX

July, 2023

A RISING TIDE RAISES ALL SHIPS

A Look Back

Environmental SuperConference, 2015

“A majority of the public do not know how electricity is made or where gasoline really comes from, nor do they understand the broad and deep human and environmental benefits of secure energy.

Energy ignorance provides and inordinate amount of freedom to special interest groups—across the board—to influence politicians to develop policy framed in morals rather than markets.”

-- Scott W. Tinker



John Bellany, artist

**“Now is no time to think
of what you do not have.**

**Think of what you can
do with what there is.”**

**-- Ernest Hemmingway
*The Old Man and the Sea***

Rising Tide

- **Energy is vital for human flourishing**
- **All forms of energy have pros and cons**
- **Energy security drives decision makers**

Energy “Grains”

- **There are trade offs between energy, economy and environment**
- **Energy poverty is real, global, and must be addressed**
- **The World needs Electricity and Molecules**
- **All forms of energy are increasing, and impact the environment**
- **Industry needs secure energy**
- **Coal and EVs are an Asian story and China controls critical minerals**
- **Markets favor energy optionality over mandates**

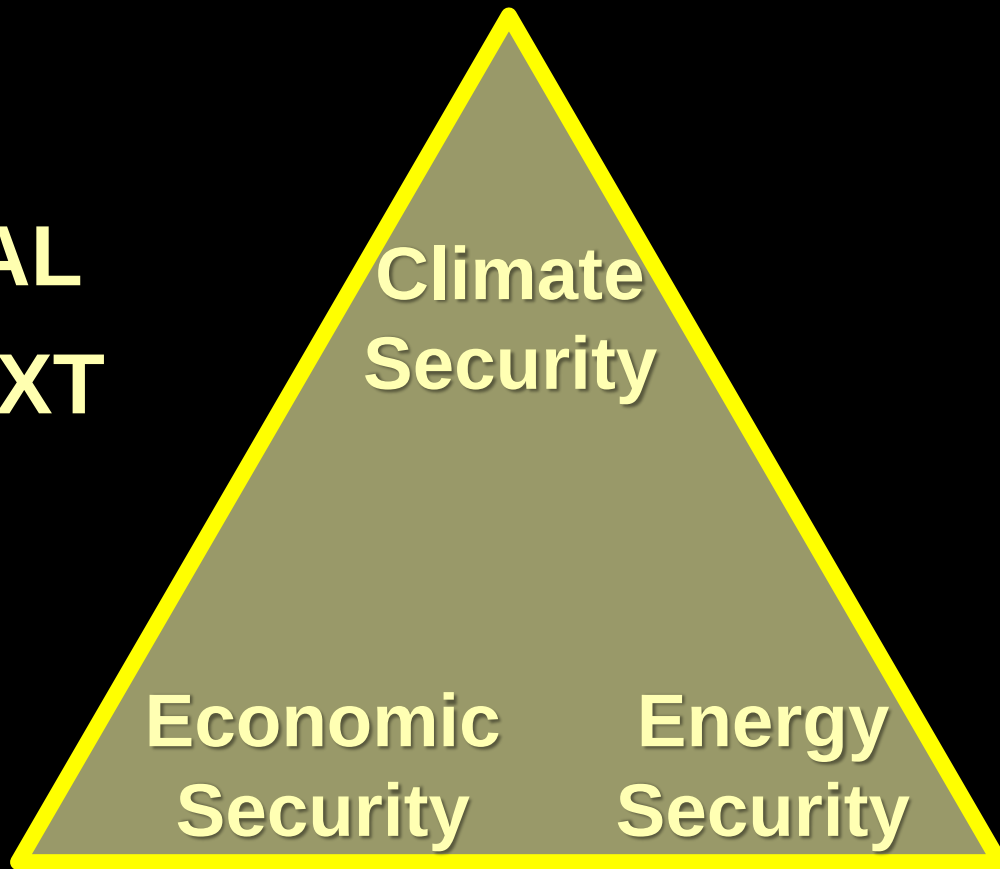
Energy “Grains”



I can *sea* clearly now

**There are trade offs between
energy, economy and environment**

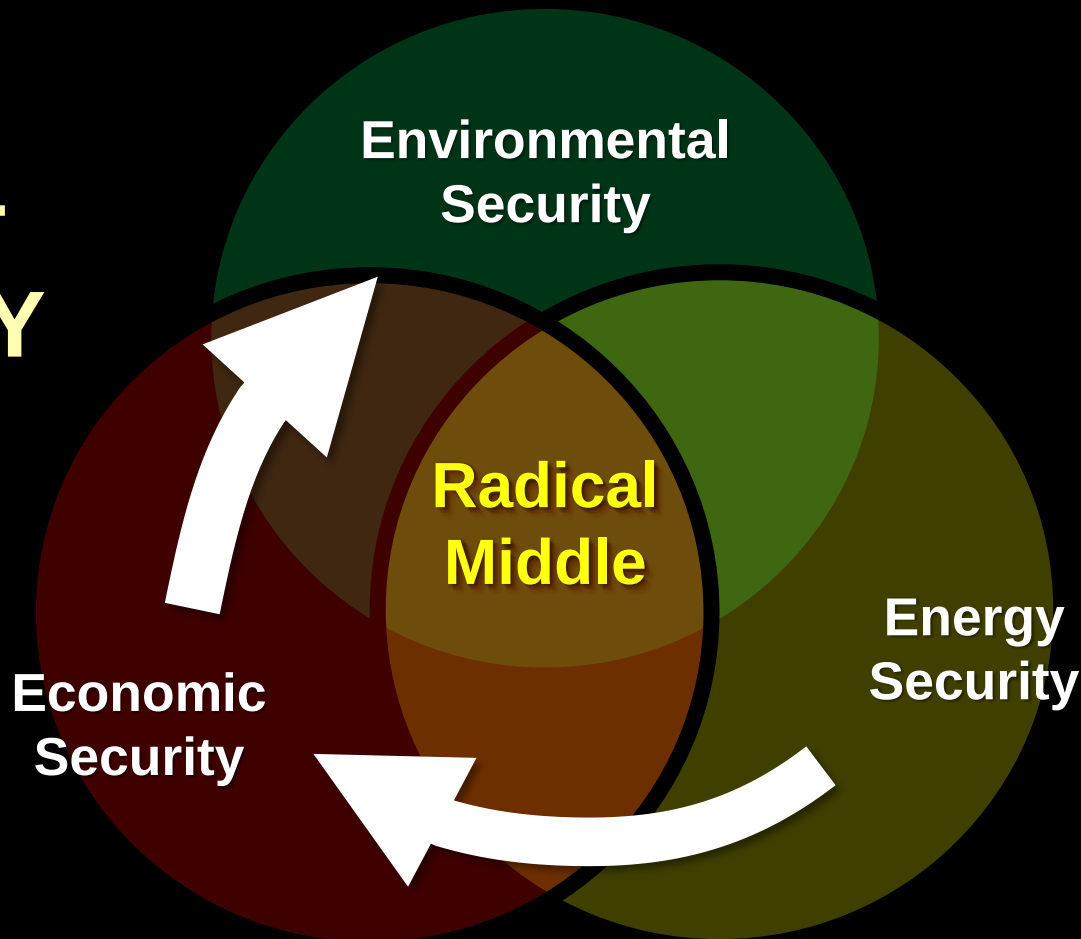
GLOBAL CONTEXT



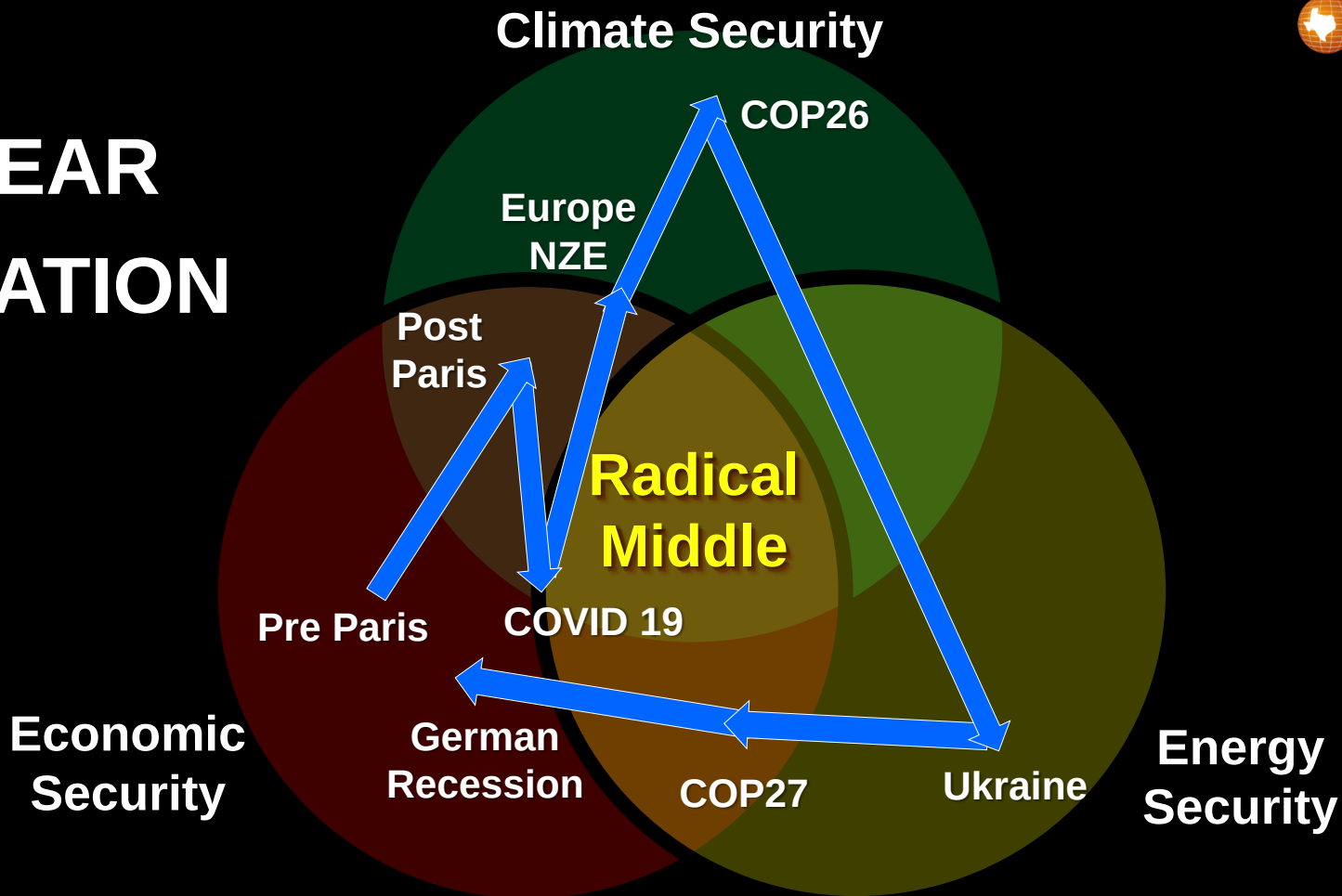
**GLOBAL
CONTEXT**



GLOBAL SECURITY



8-YEAR MIGRATION



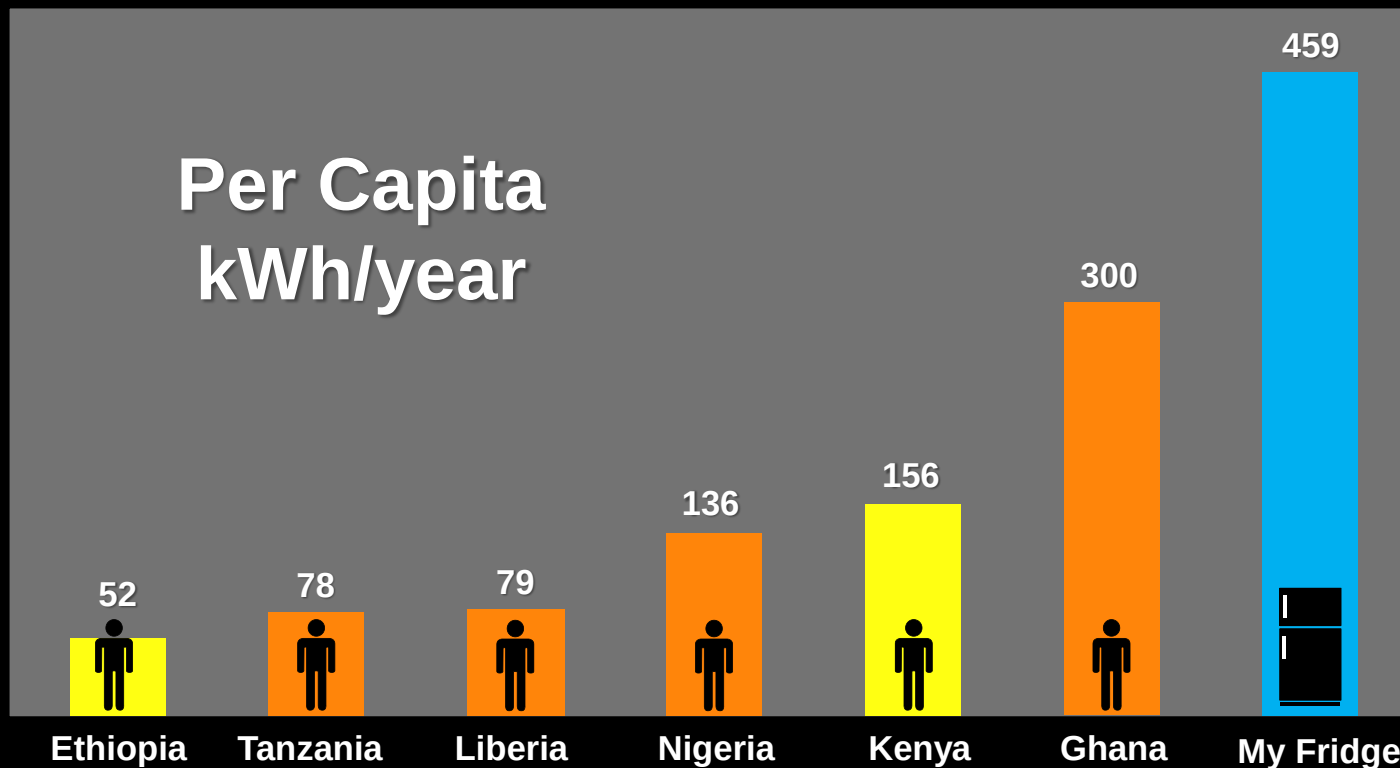
Energy “Grains”

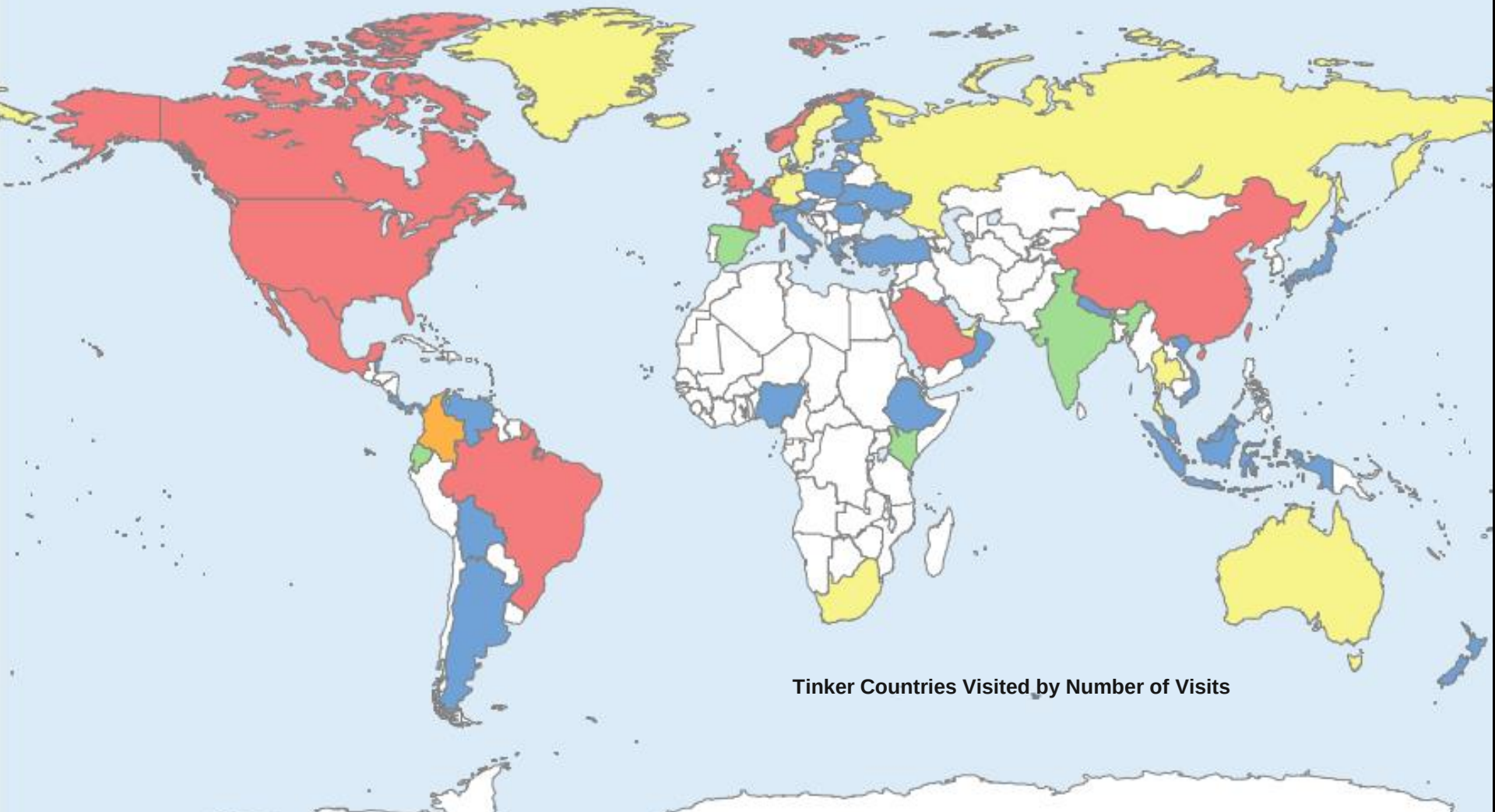


Where there's a will
there's a **wave**

**Energy poverty is real, global,
and must be addressed**

Annual Energy Consumption





Tinker Countries Visited by Number of Visits

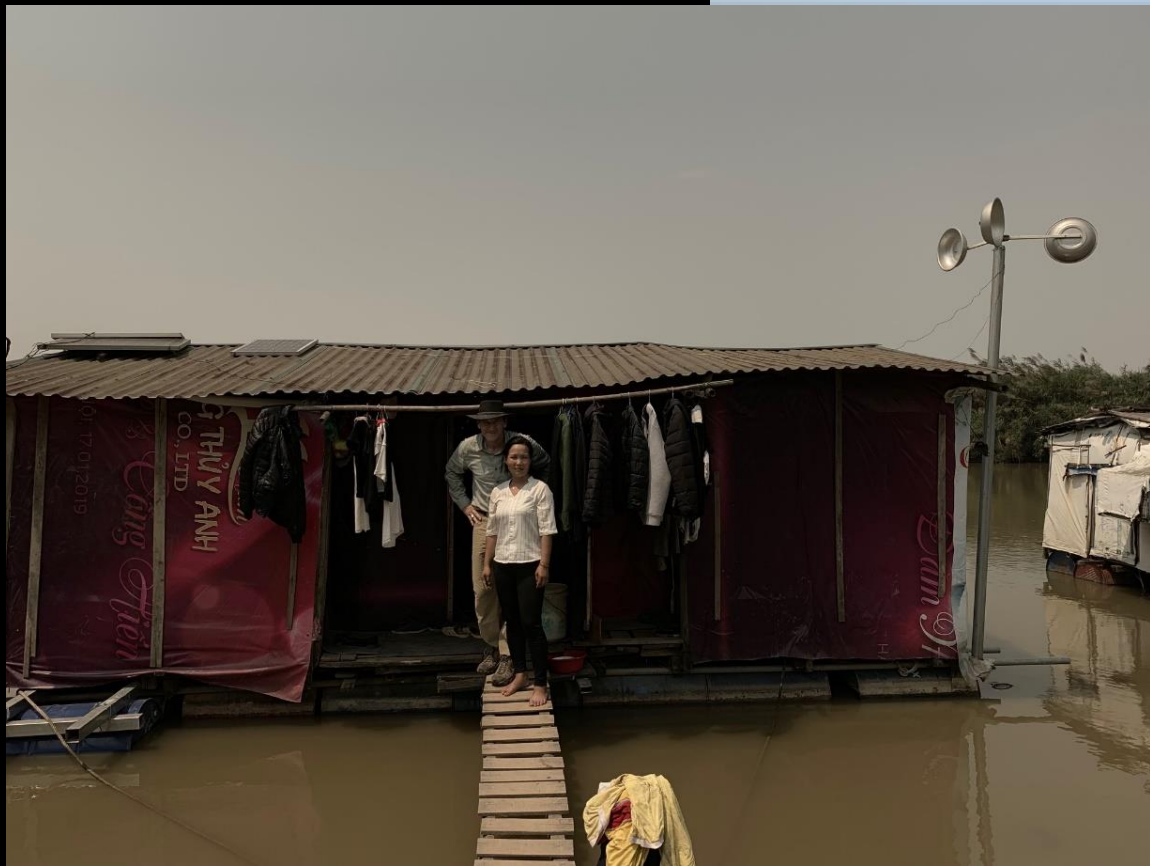


Ecuador



Ethiopia

Vietnam





Kenya

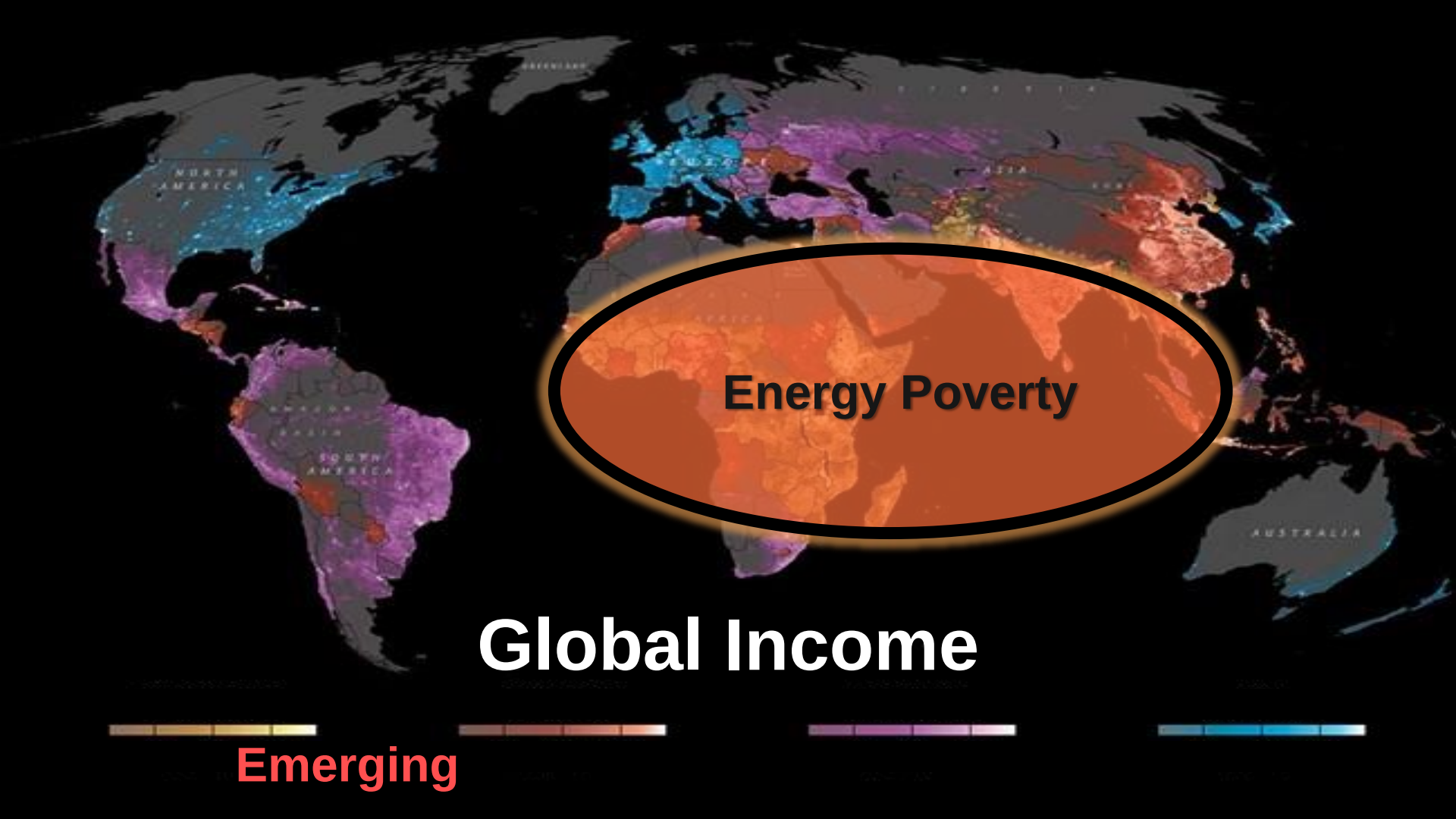
Nepal



***Smoke kills
~ 3 million
people/year***



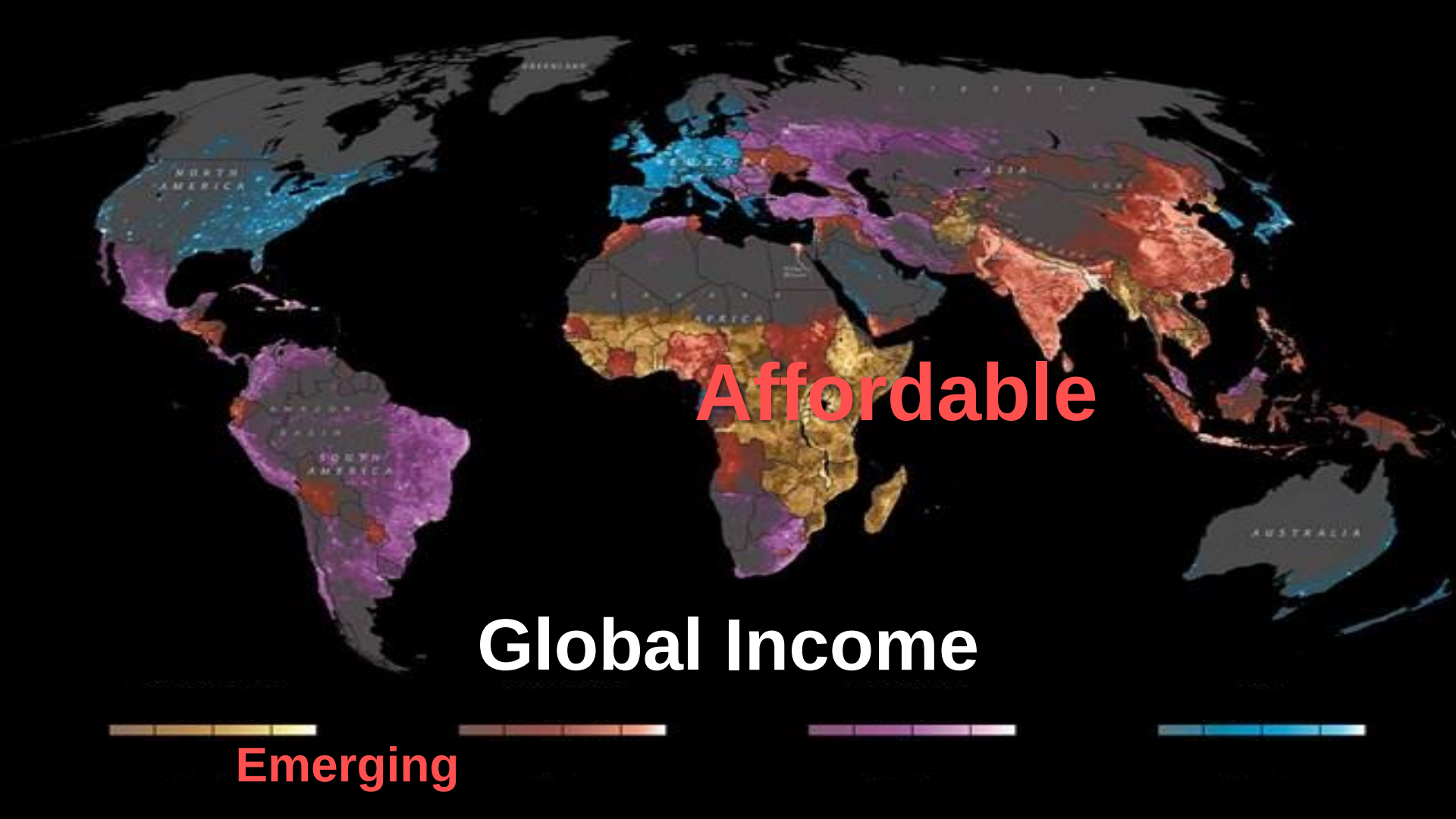
Colombia

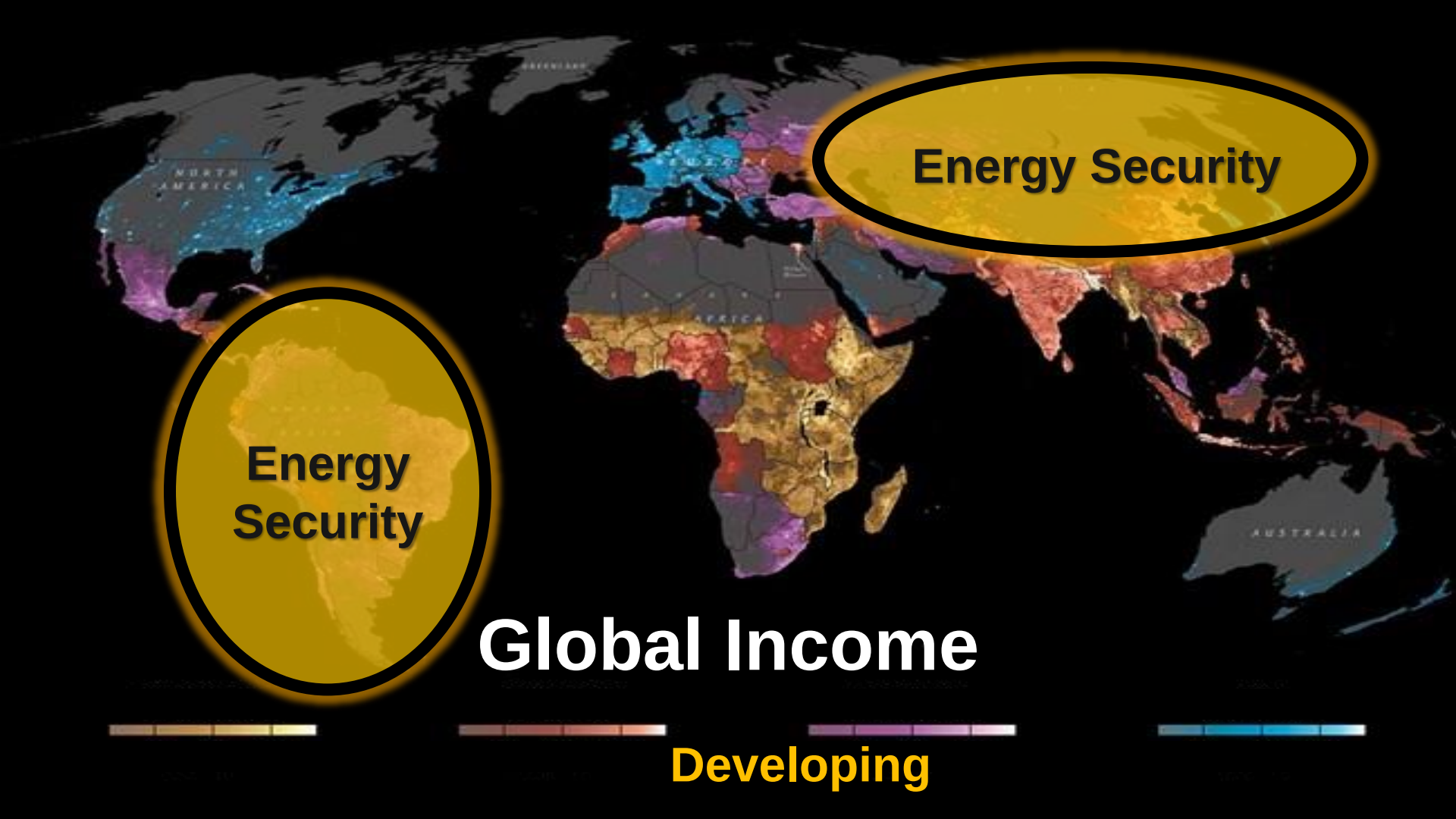


Energy Poverty

Global Income

Emerging



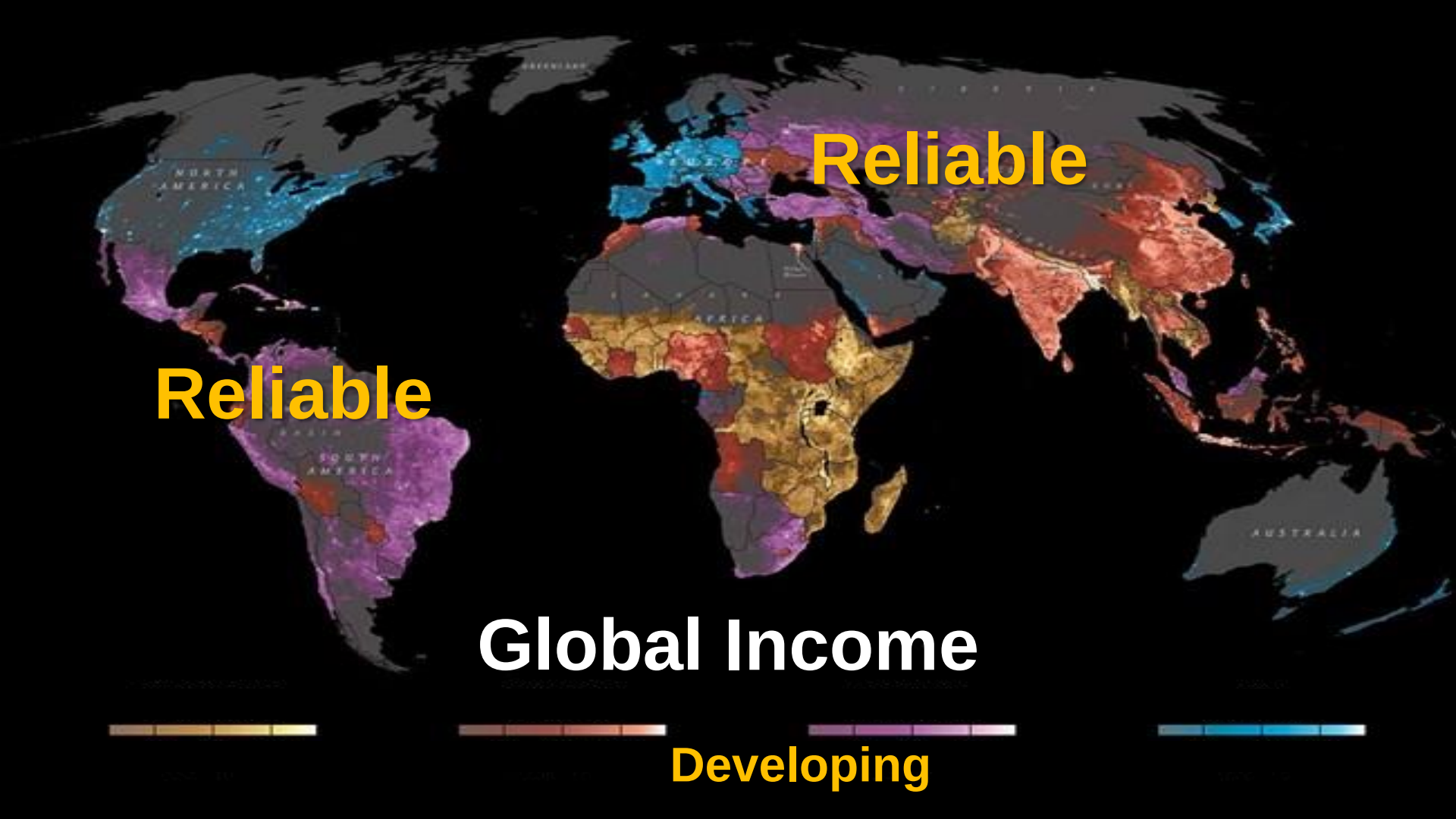


**Energy
Security**

Energy Security

Global Income

Developing

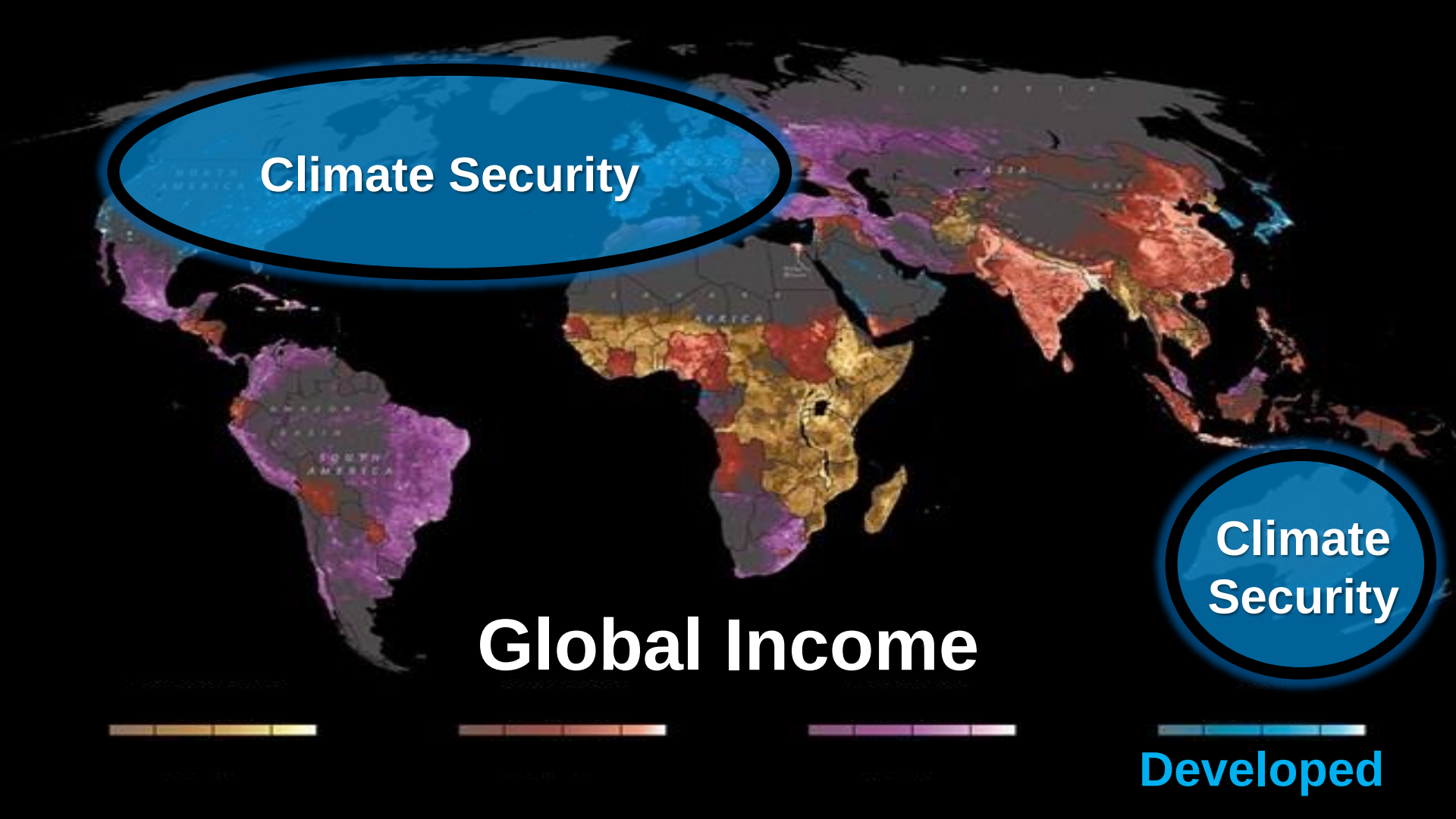


Reliable

Reliable

Global Income

Developing

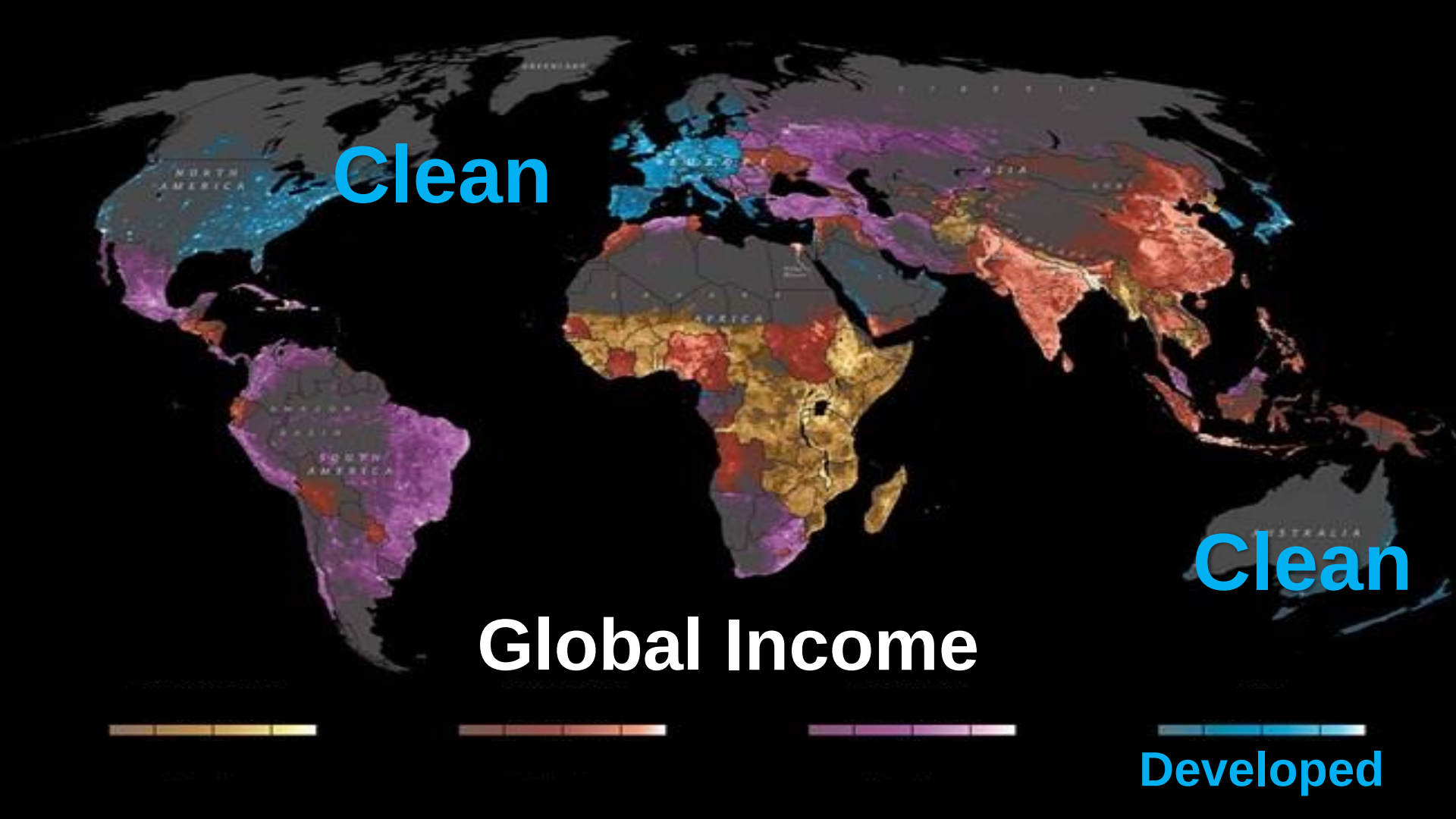
A world map with a color gradient from purple to yellow. A blue oval with a black border is positioned over the North Atlantic and Europe, containing the text 'Climate Security'. A smaller blue oval with a black border is in the bottom right corner, also containing 'Climate Security'. The text 'Global Income' is centered at the bottom. Four horizontal color bars are at the bottom, with the rightmost one labeled 'Developed' in blue. The map shows a gradient from purple in the Americas and Africa to yellow in Europe and Asia.

Climate Security

**Climate
Security**

Global Income

Developed



Clean

Clean

Global Income

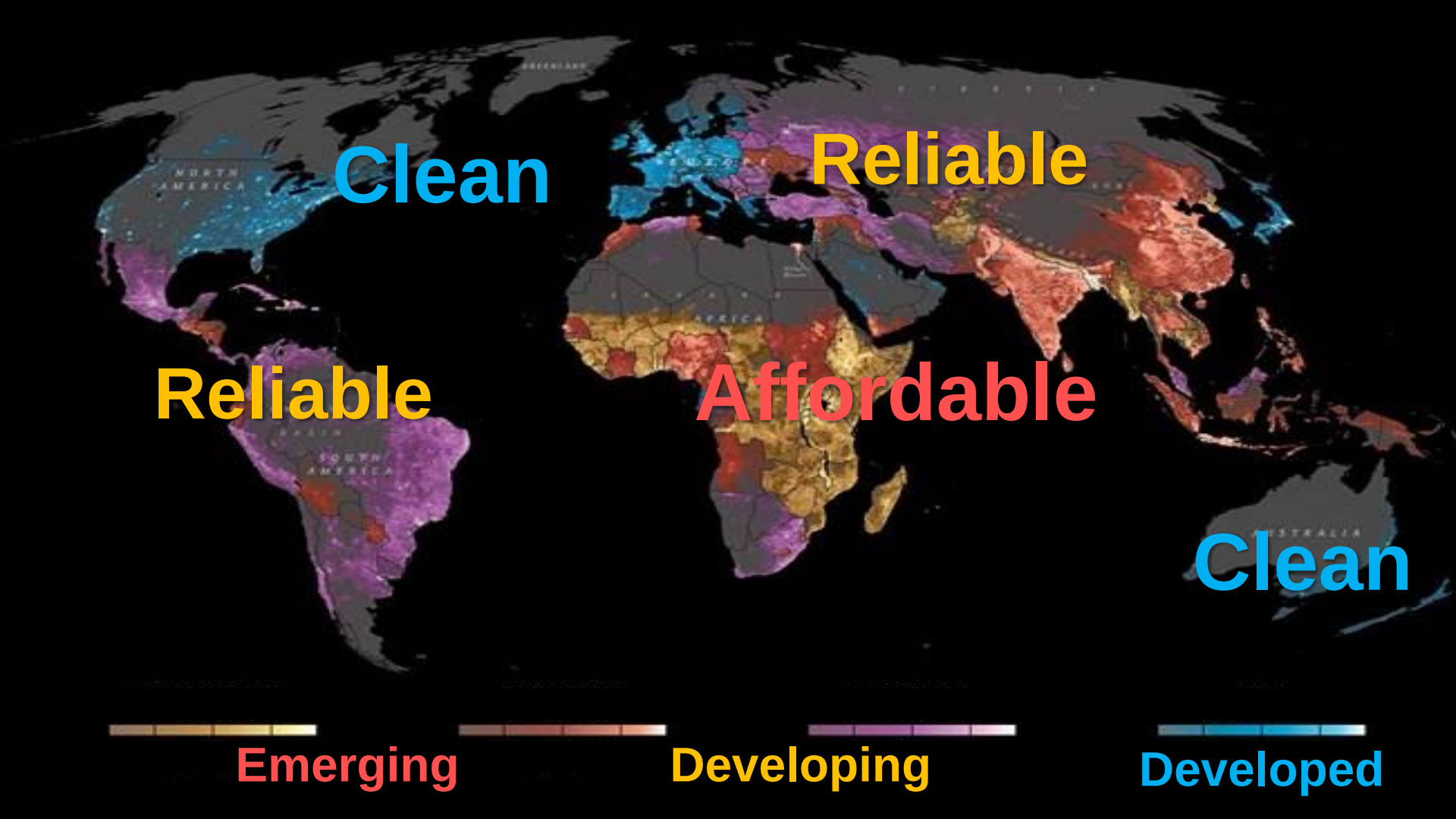
Developed

**Clean
Air**



Particulate (PM2.5) Levels

Source:: World Health Organization





OPINION > ENERGY AND ENVIRONMENT

THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

World's road out of poverty is paved by energy — and plenty of it

BY SCOTT TINKER, OPINION CONTRIBUTOR - 04/07/23 1:30 PM ET



SHARE



TWEET



Emerging



Developing



Developed

Energy “Grains”



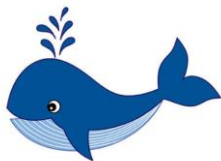
Talk to the *sand*.



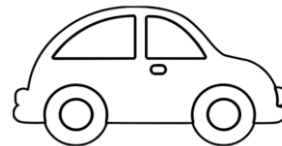
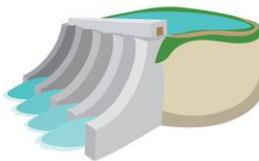
**The World needs
Electricity *and* Molecules**

ENERGY TRANSITION

~1000 AD



~1500 AD

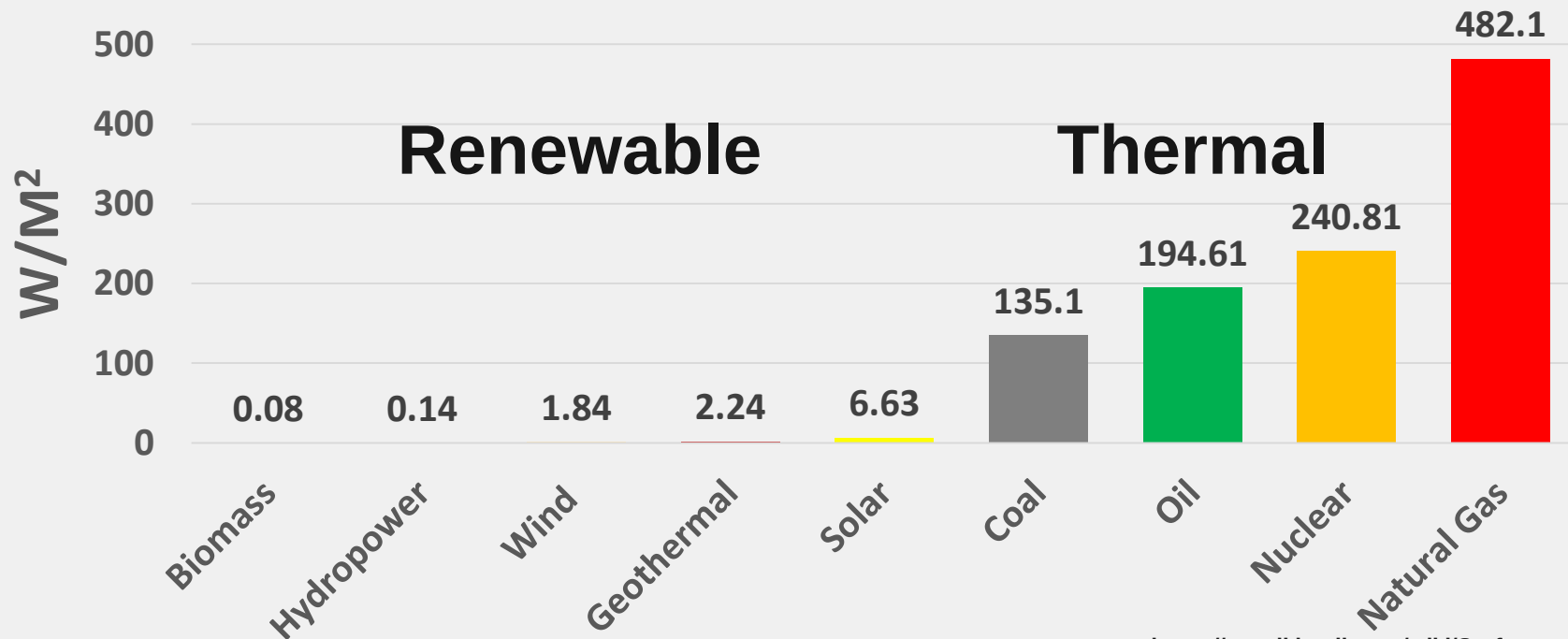


~2000 AD



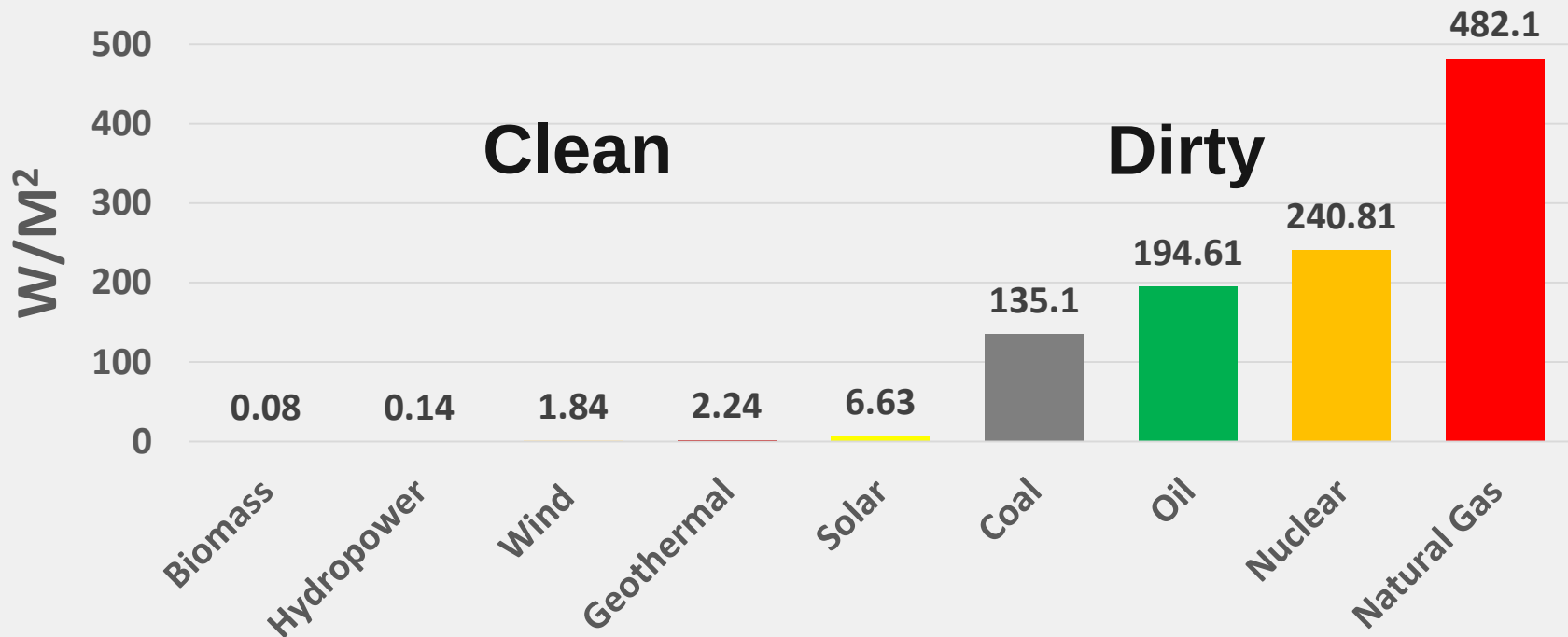
ENERGY TRANSITION

Surface Power Density



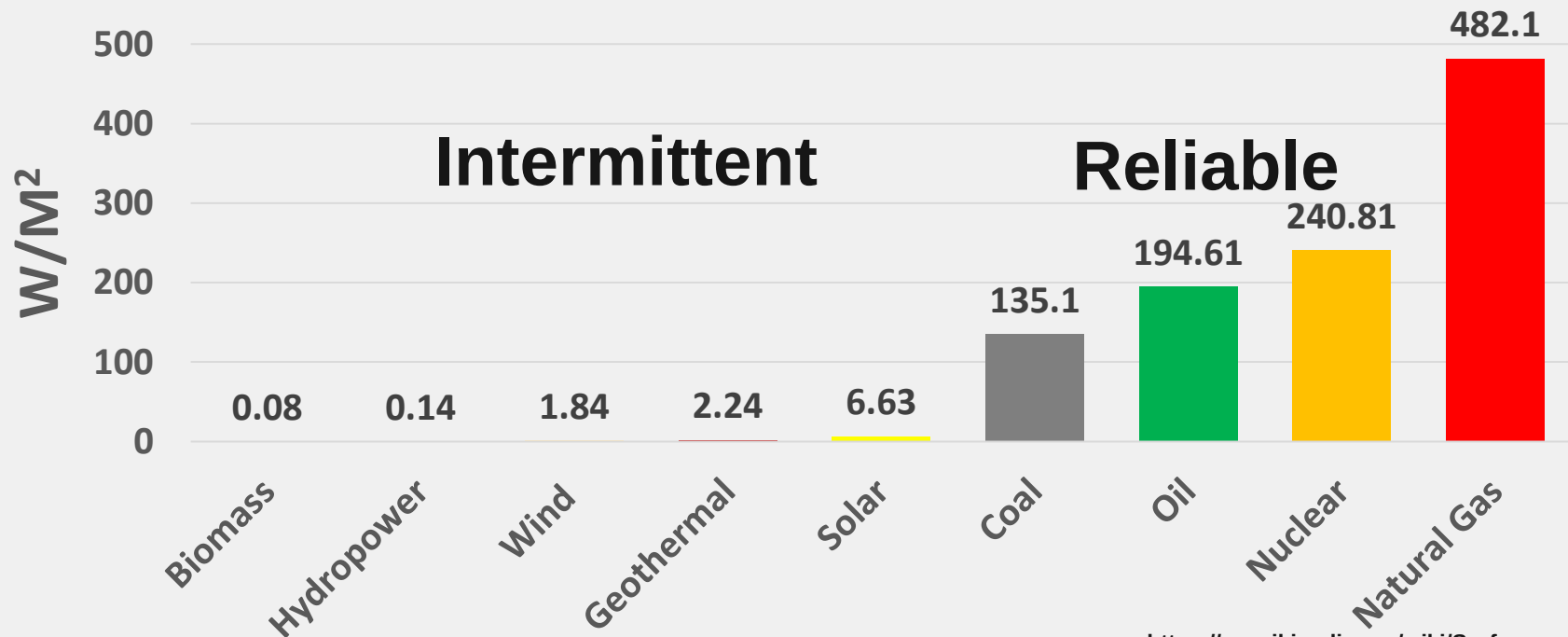
ENERGY TRANSITION

Surface Power Density



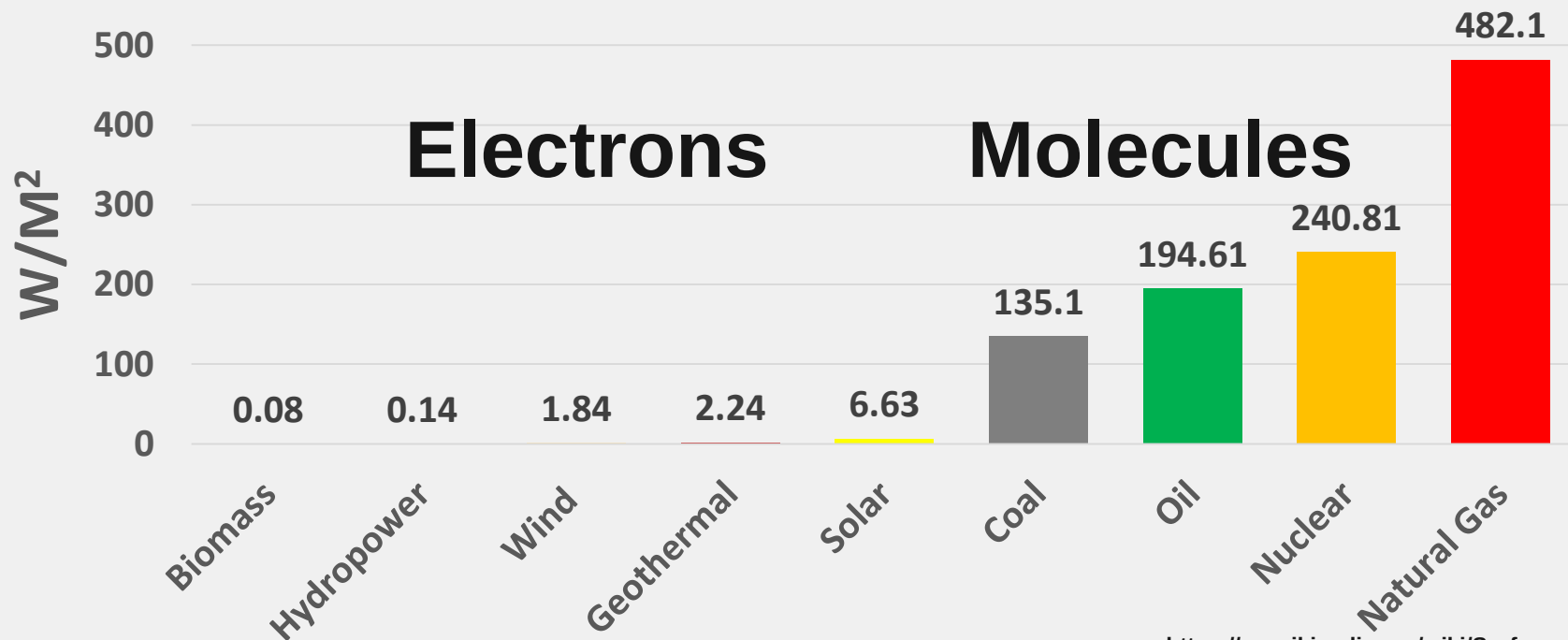
ENERGY TRANSITION

Surface Power Density



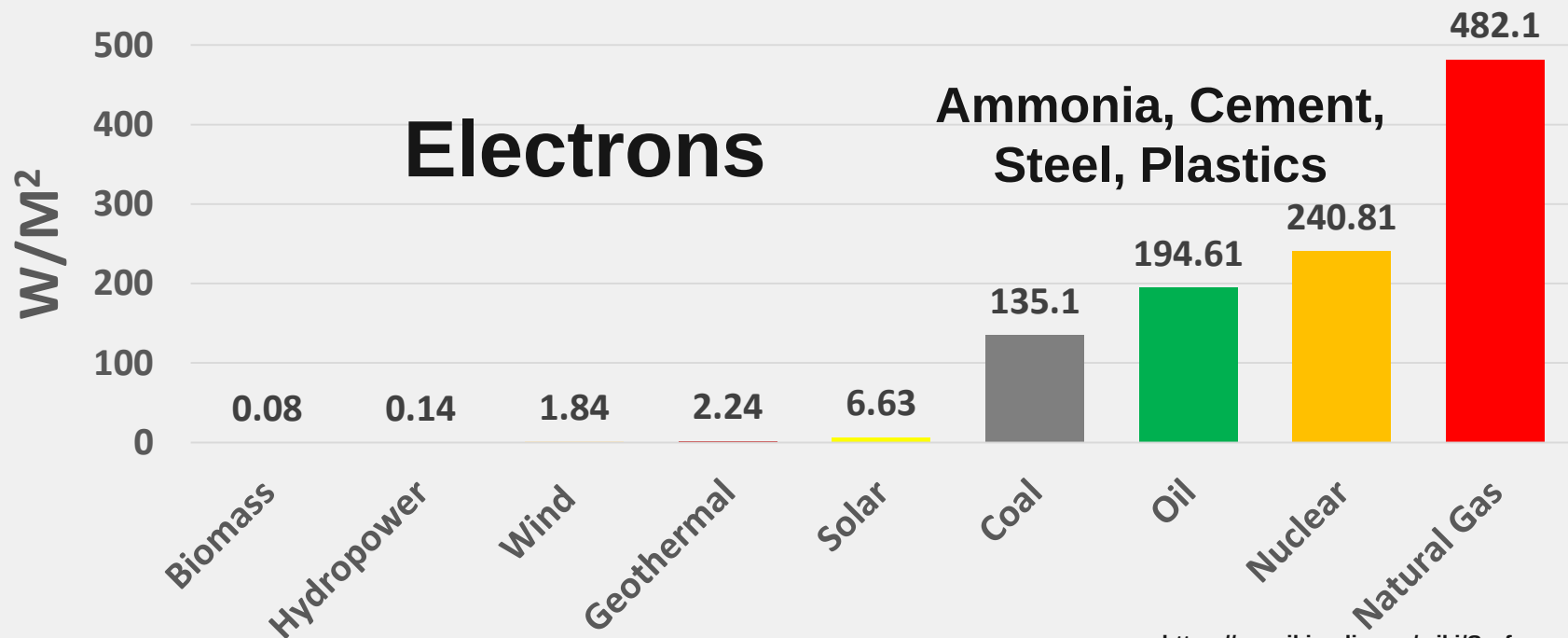
ENERGY TRANSITION

Surface Power Density

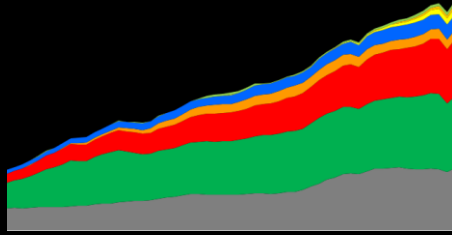


ENERGY TRANSITION

Surface Power Density



Energy “Grains”



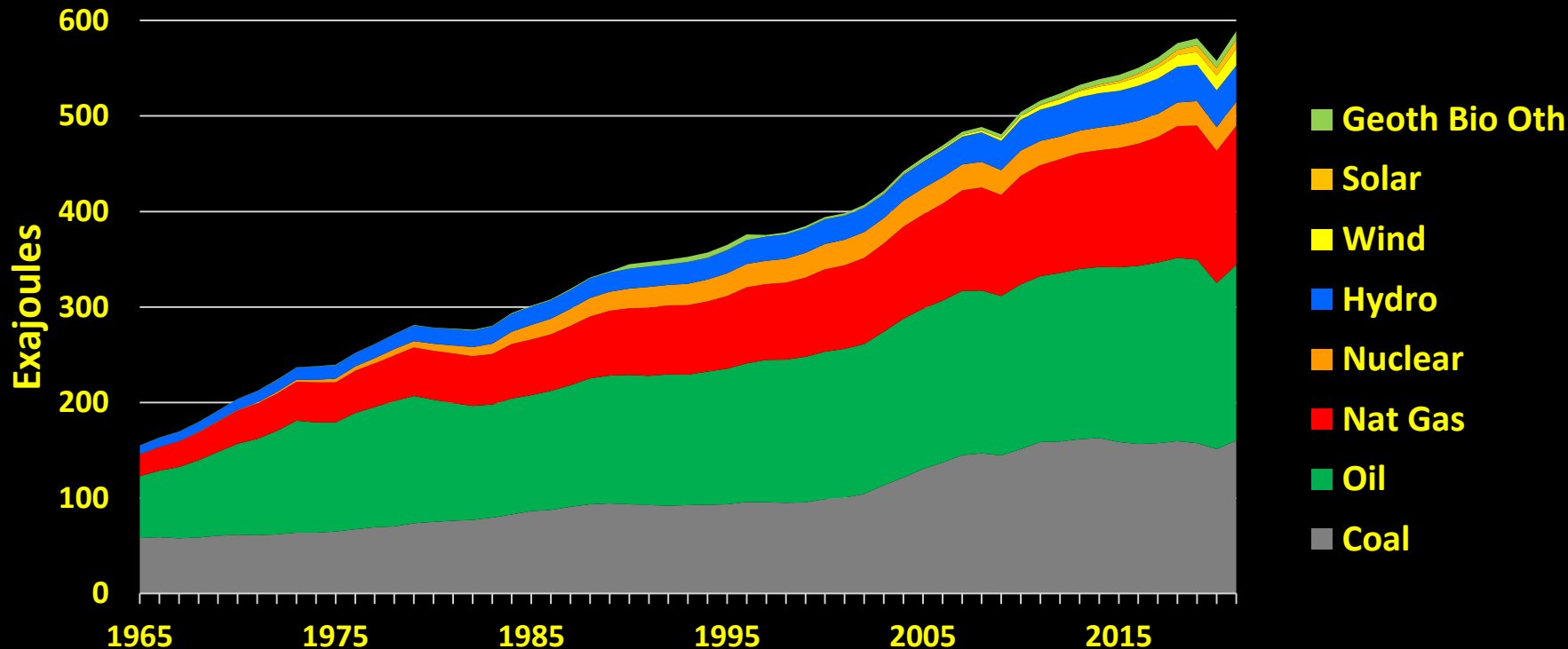
Sea la vie

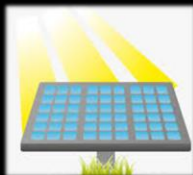
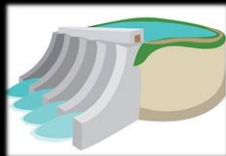
**All forms of energy are increasing,
and impact the environment**

We must strive to be both
completely factual, and
factually complete.

...Tinker
U. S. Senate Testimony

ANNUAL PRIMARY ENERGY CONSUMPTION BY ENERGY TYPE





- **Grow, Mine**
- **Manufacture, Process**
- **Drill, Deploy**
- **Refine**
- **Transport, Transmit**
- **Combust, Landfill Disposal**

Life Cycle Impacts

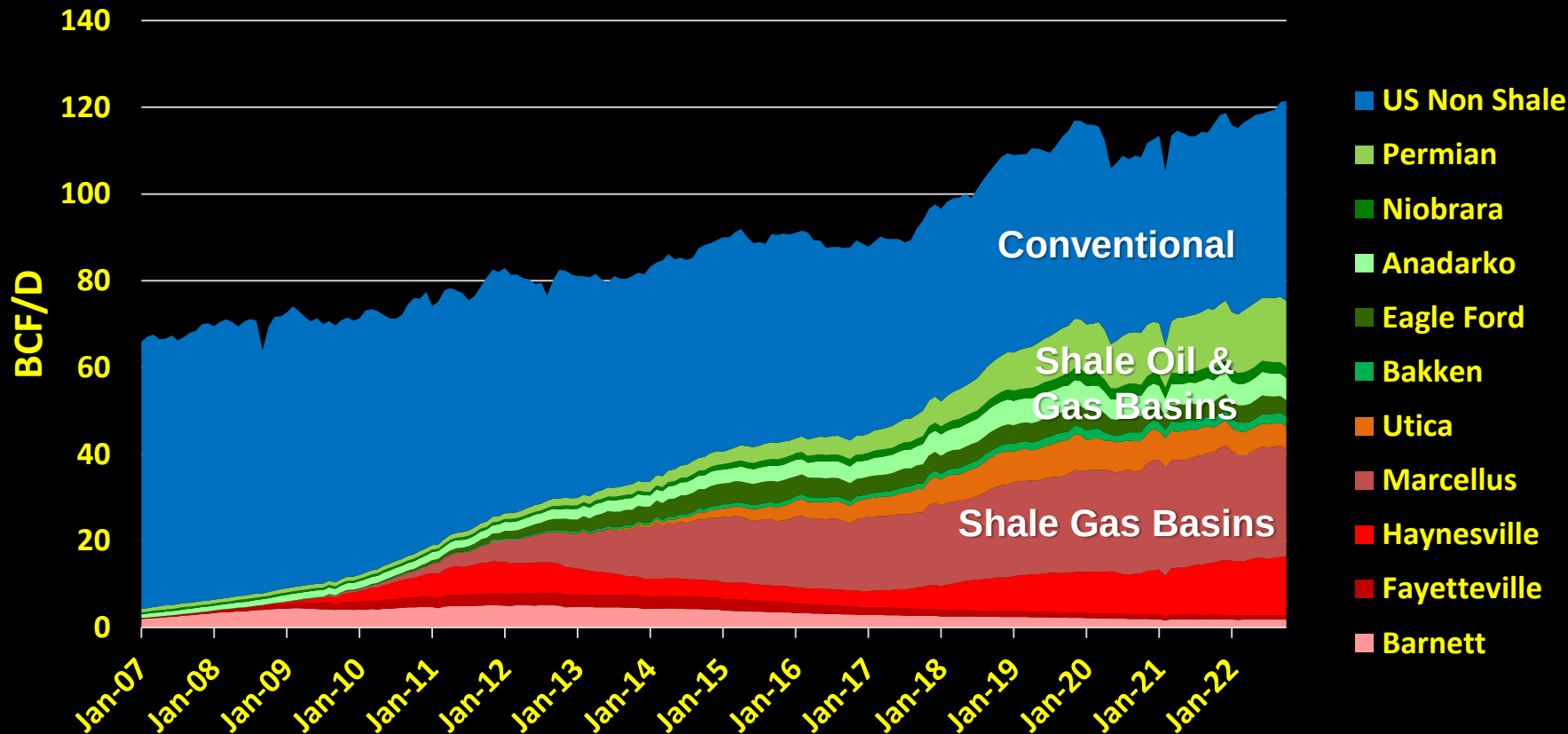
Energy “Grains”



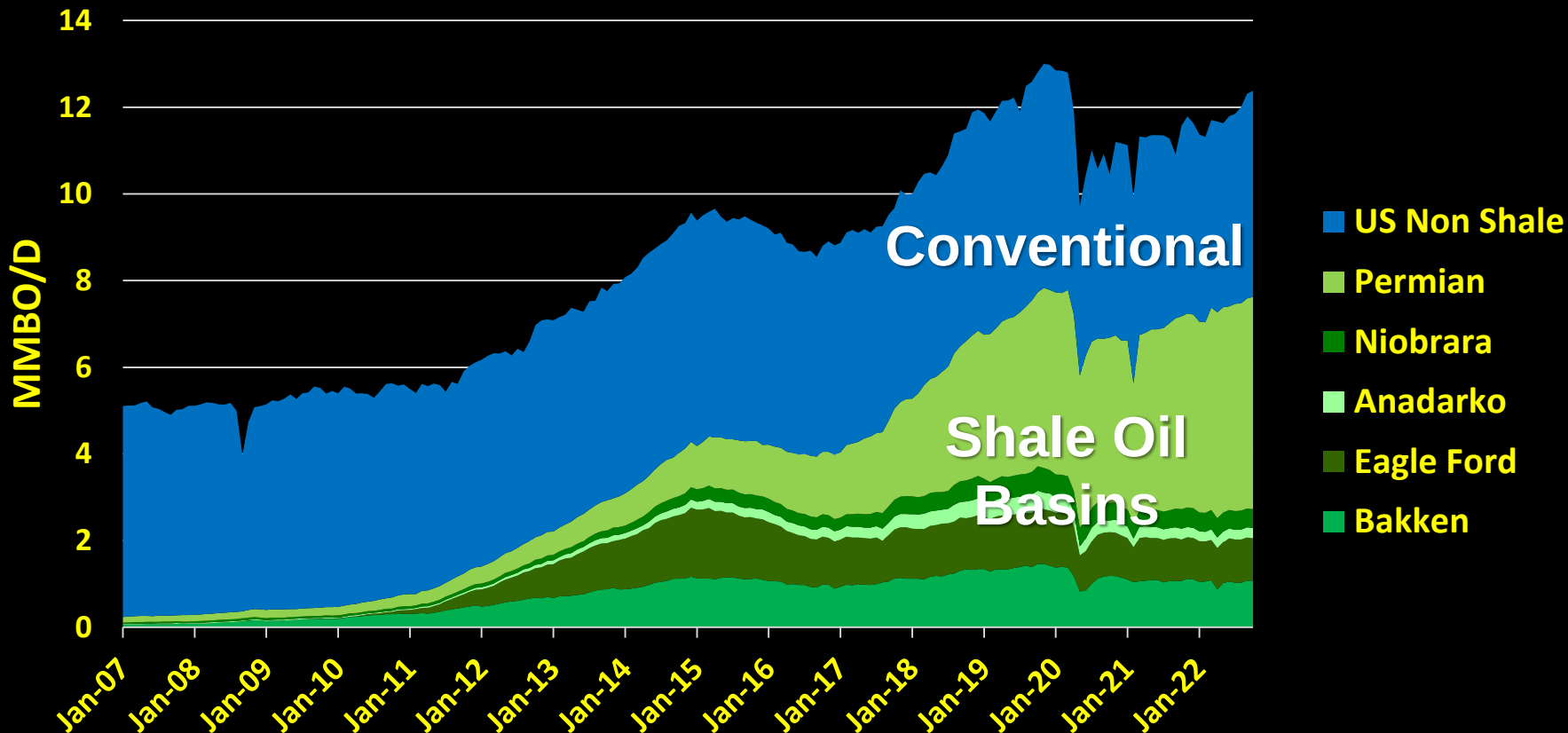
All you need is a good
dose of vitamin **sea**.

Industry needs secure energy

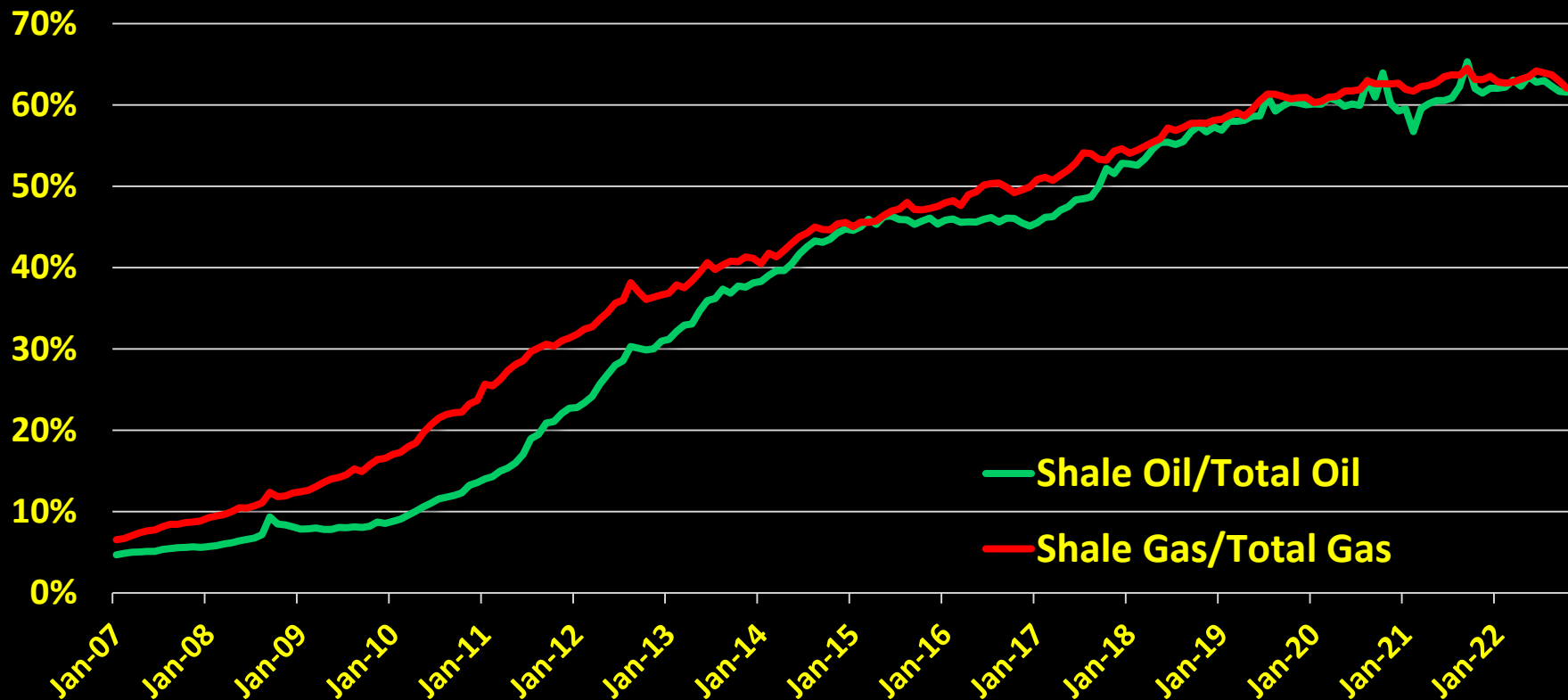
U.S. Natural Gas Production



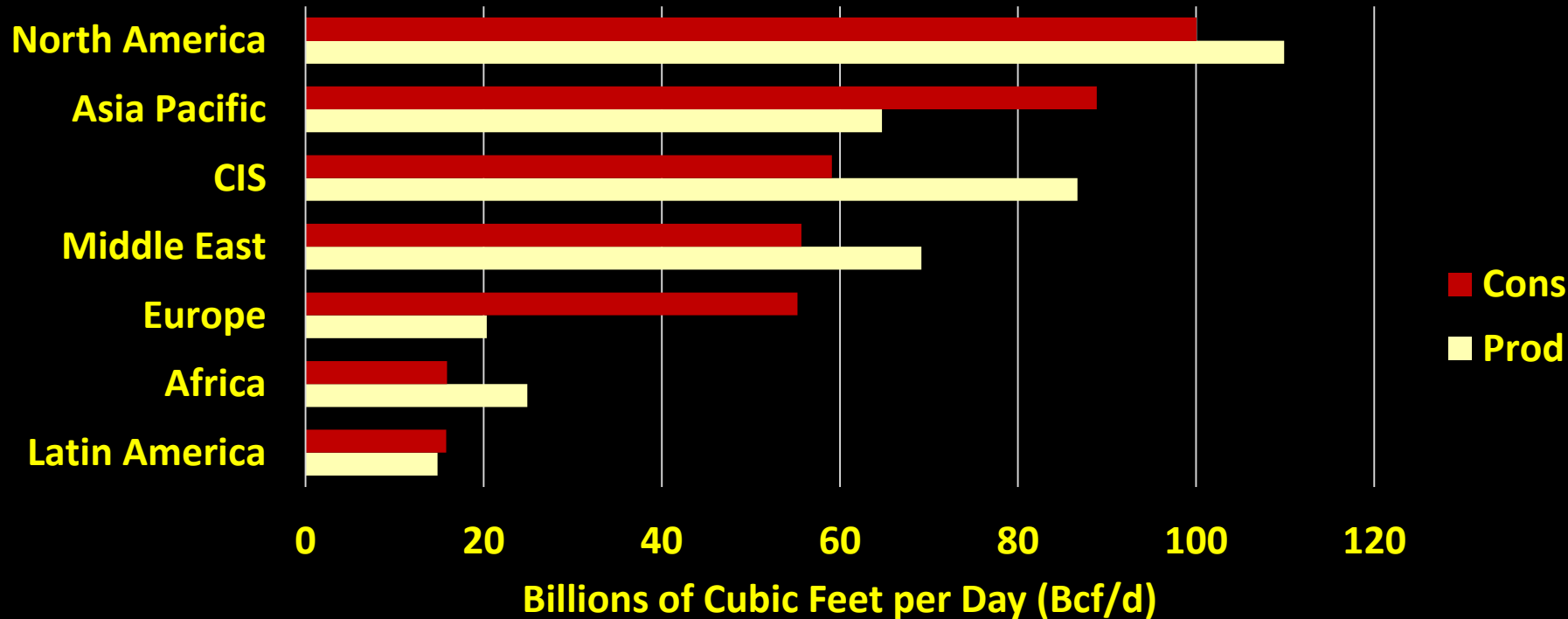
U.S. Oil Production



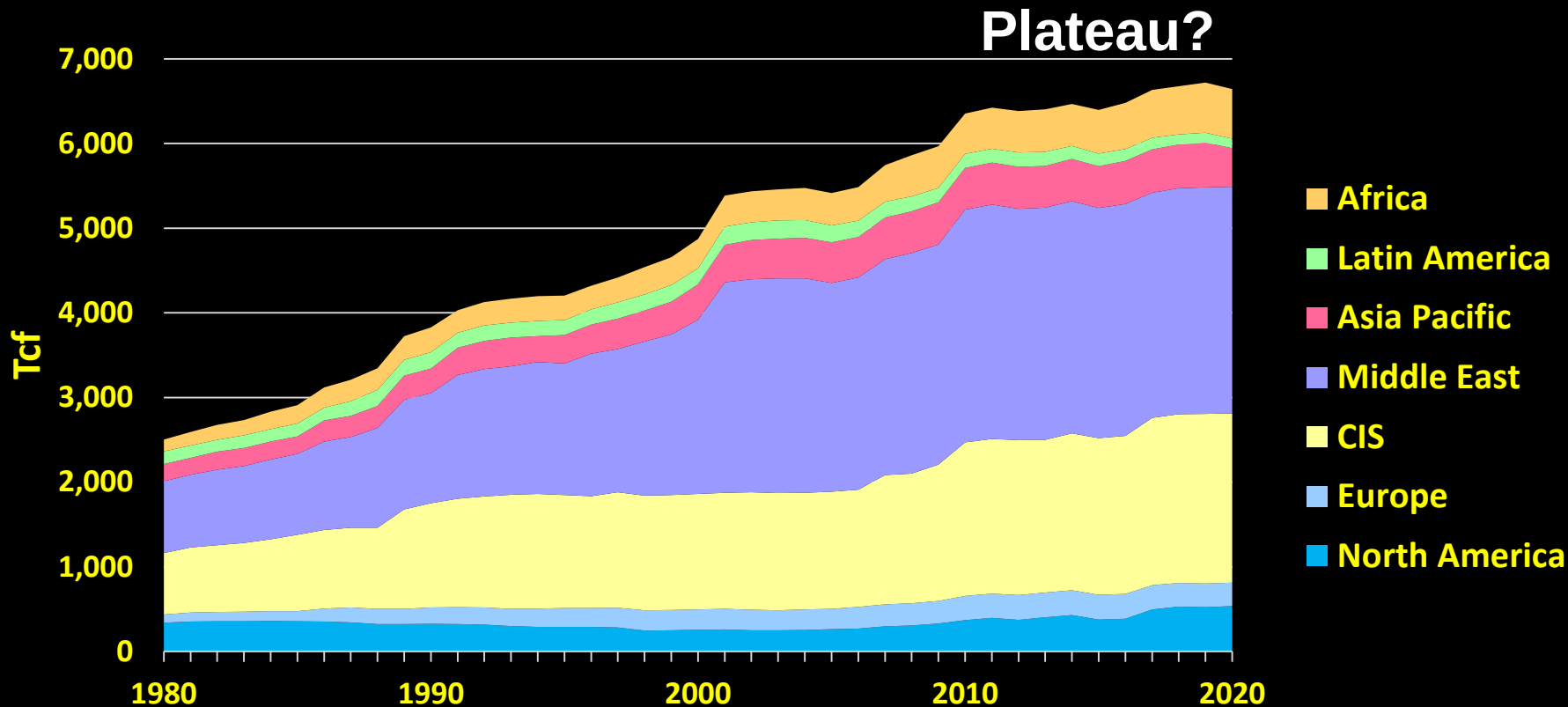
U.S. Shale/Total Production



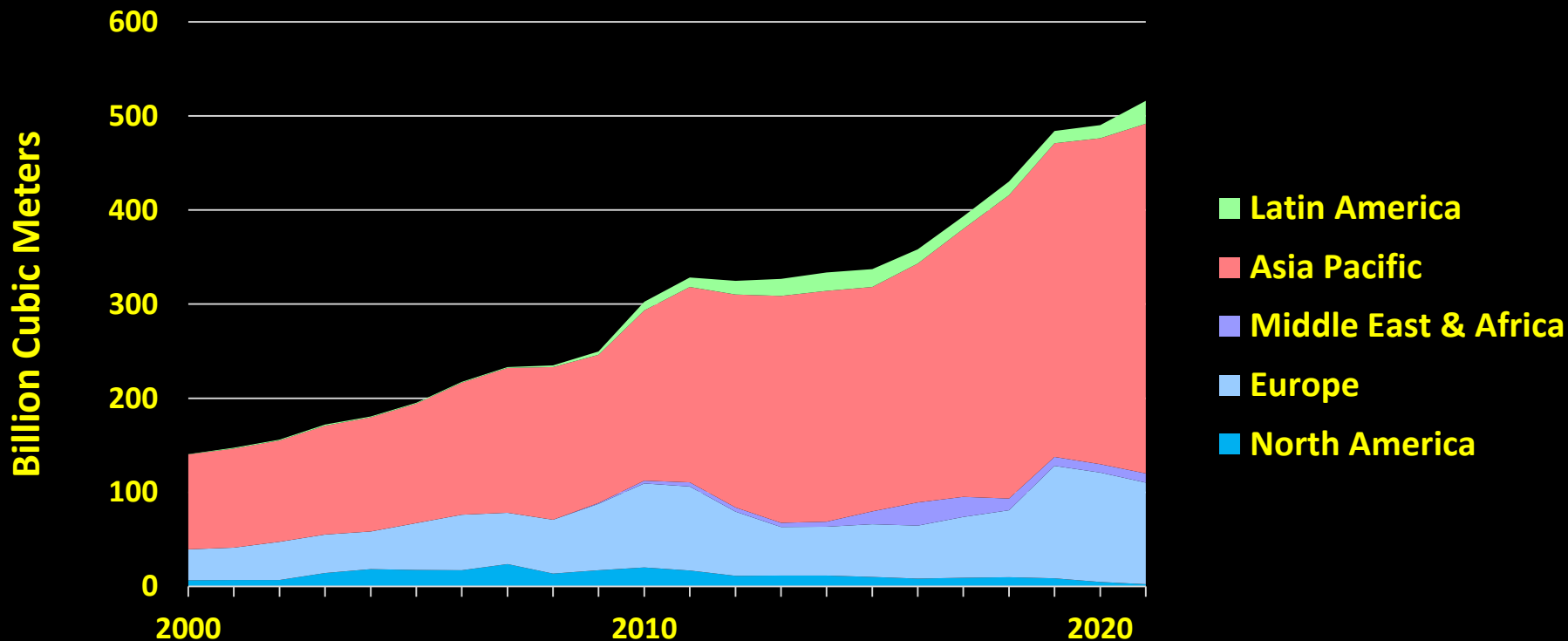
Gas Consumption v. Production



Natural Gas Reserves

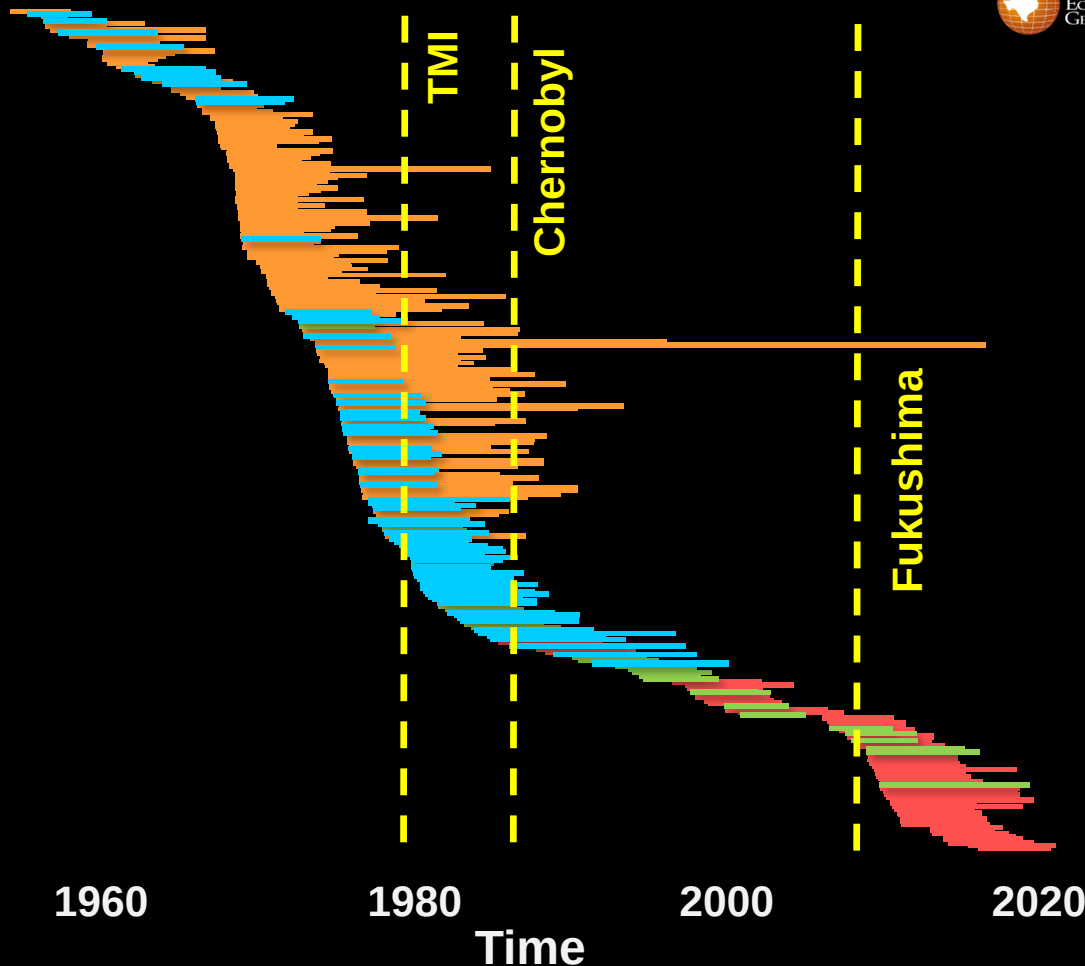


Annual LNG Imports



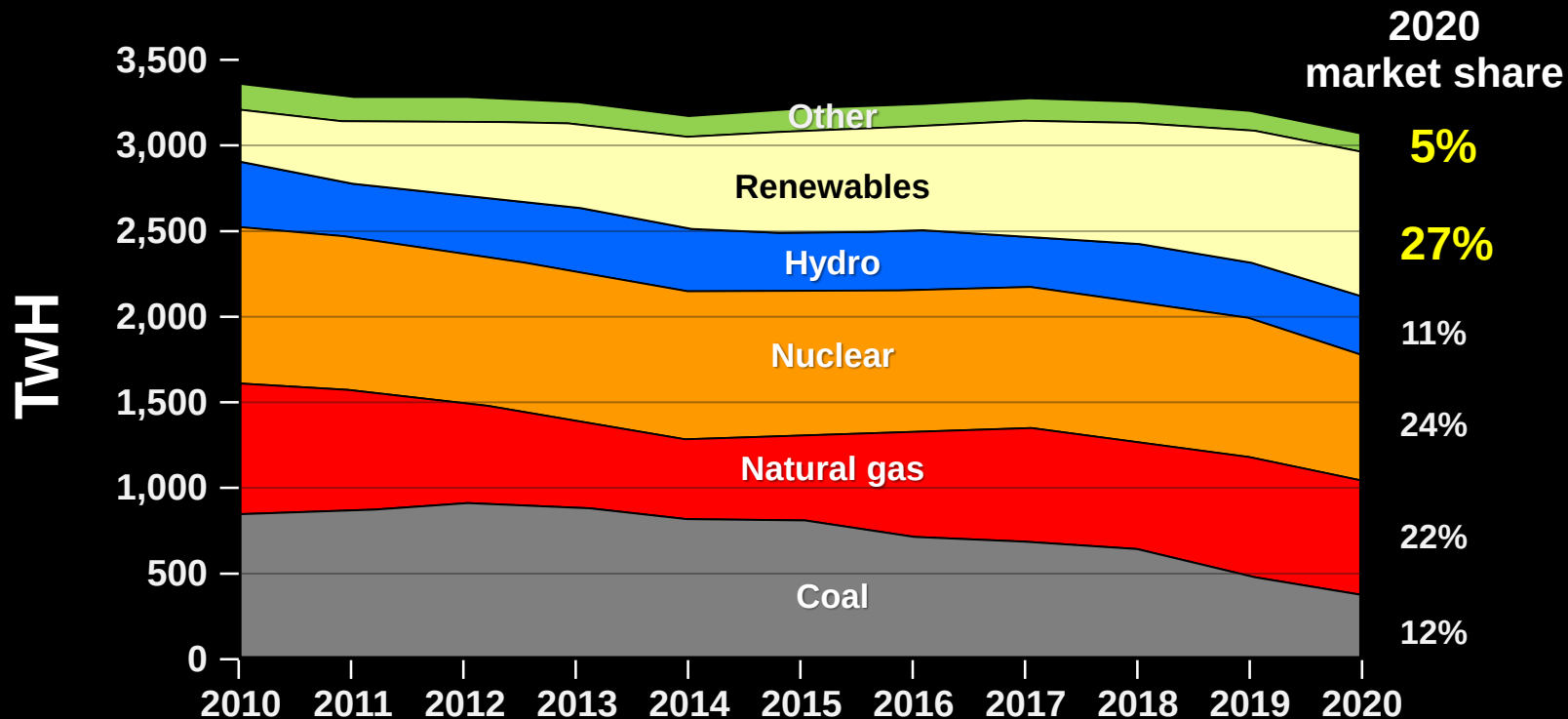
NUCLEAR GLOBAL BUILDS

- United States
- France
- Republic of Korea
- China

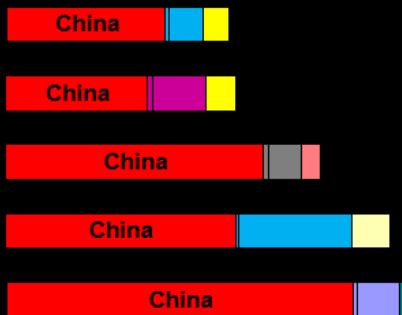


EUROPEAN UNION AND UK

ANNUAL NET POWER GENERATION BY FUEL TYPE



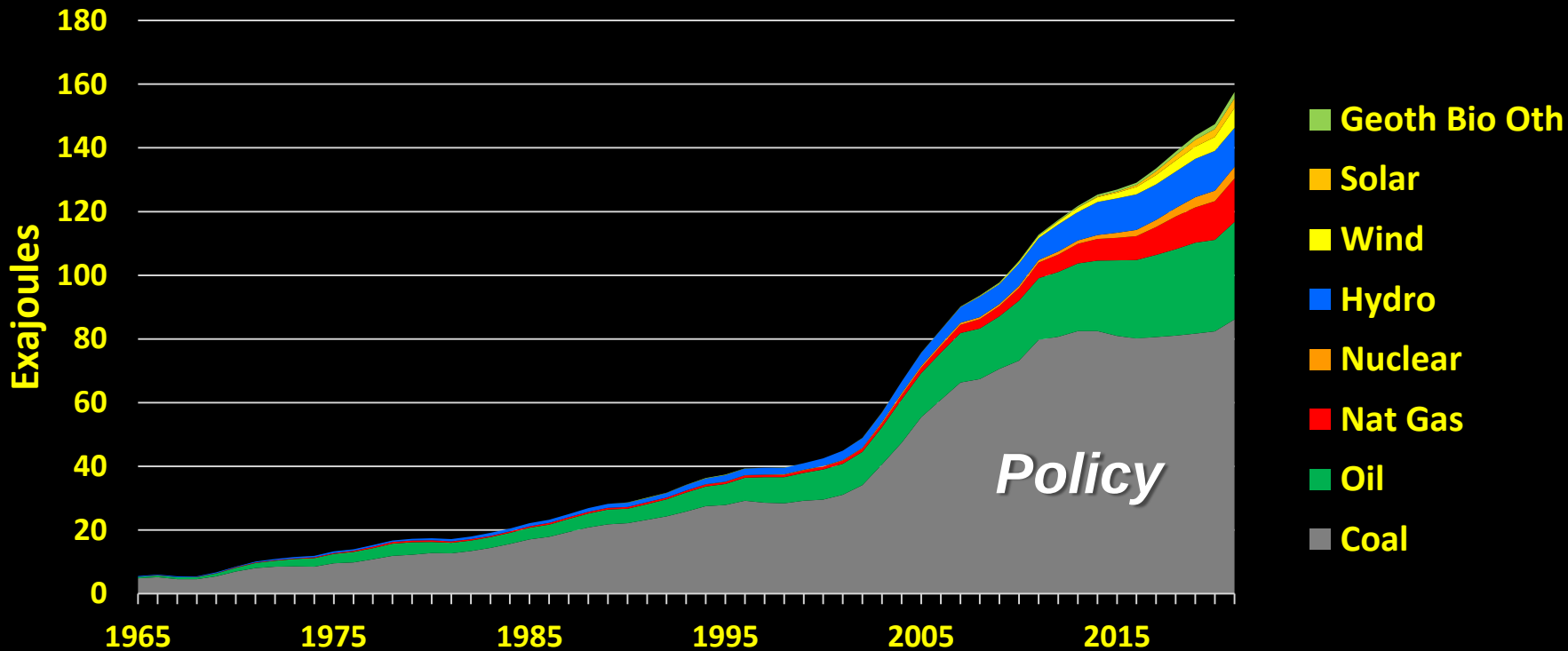
Energy “Grains”

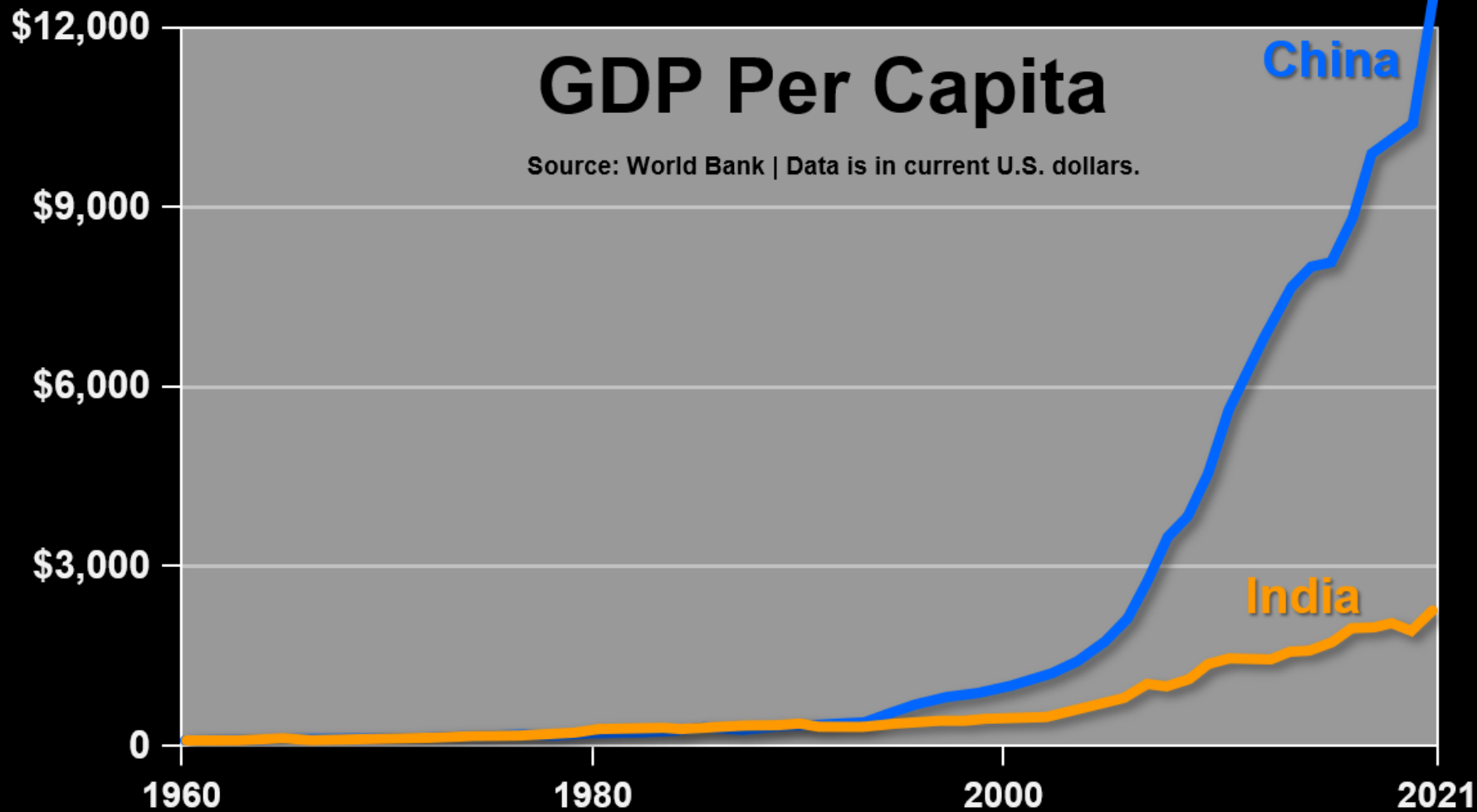


Sun of a *beach!*

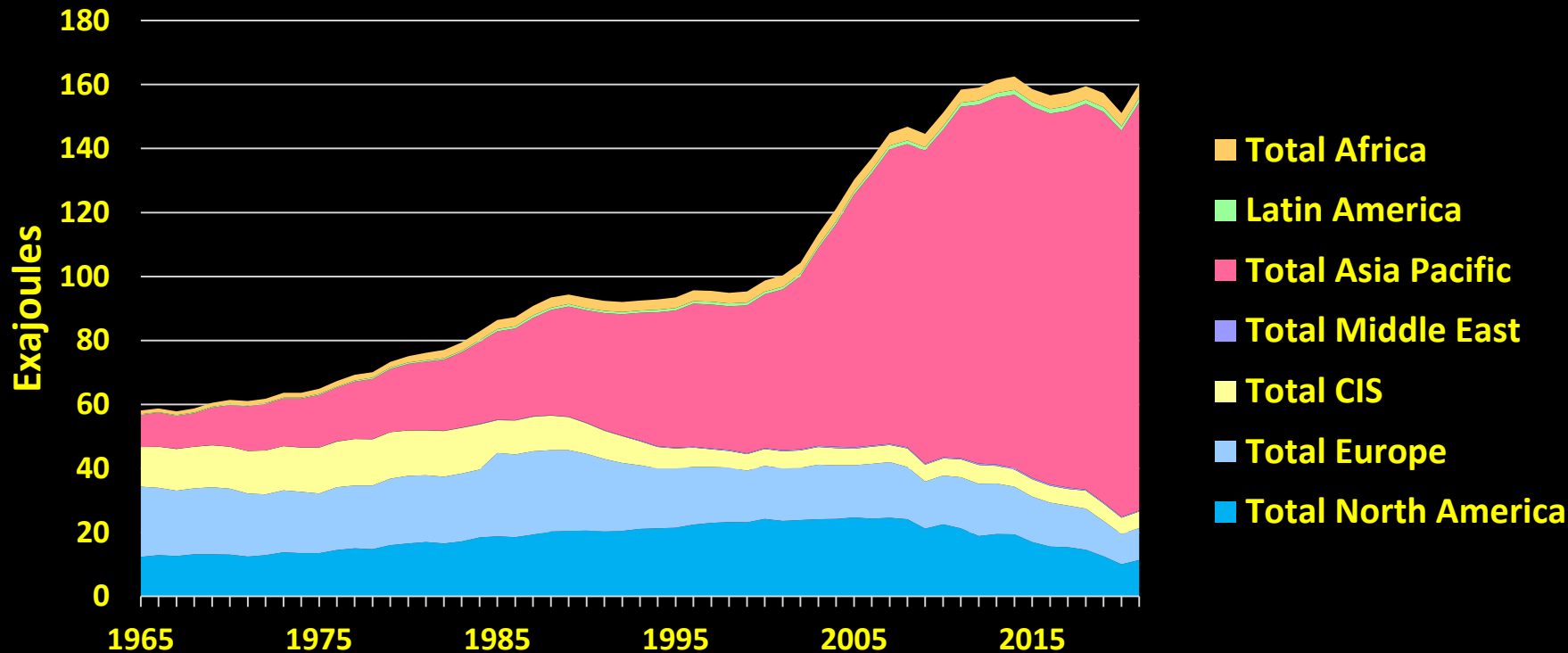
**Coal and EVs are an Asian story and
China controls critical minerals**

CHINA ANNUAL ENERGY CONSUMPTION

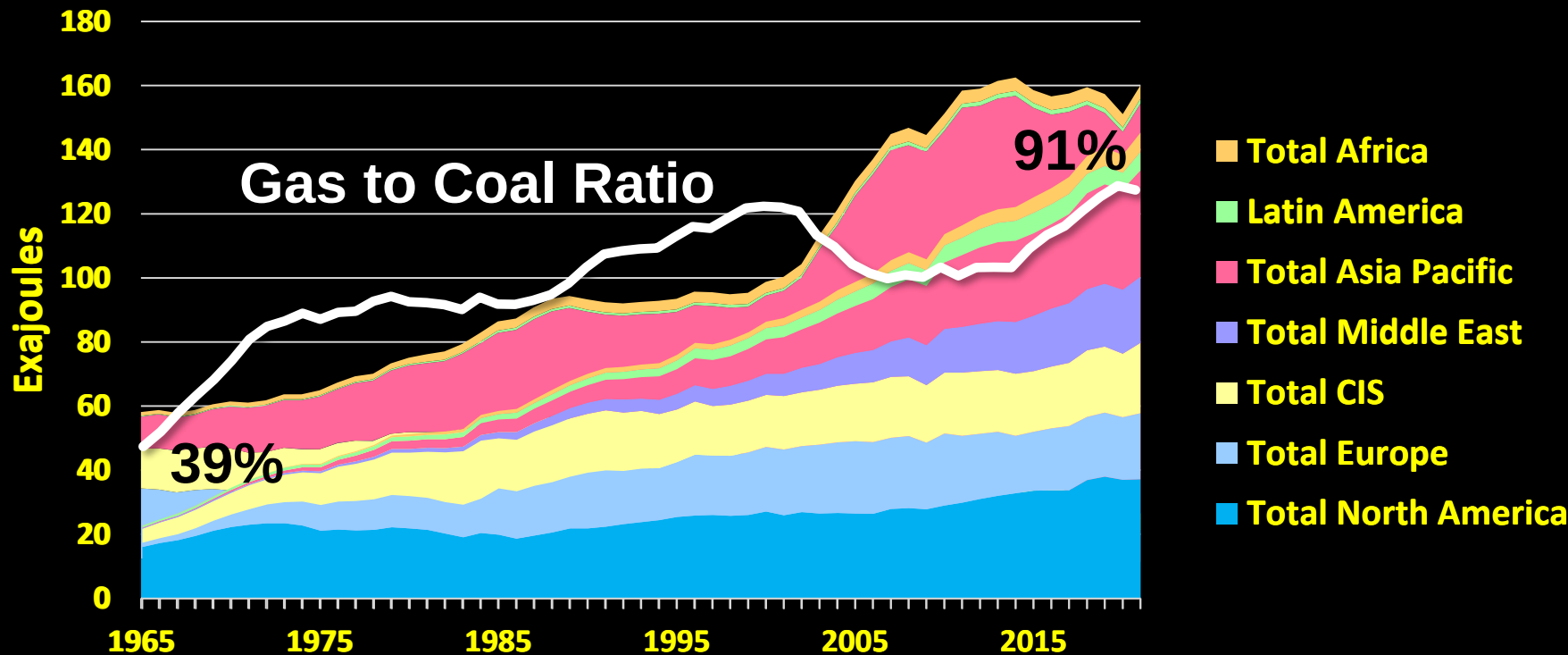




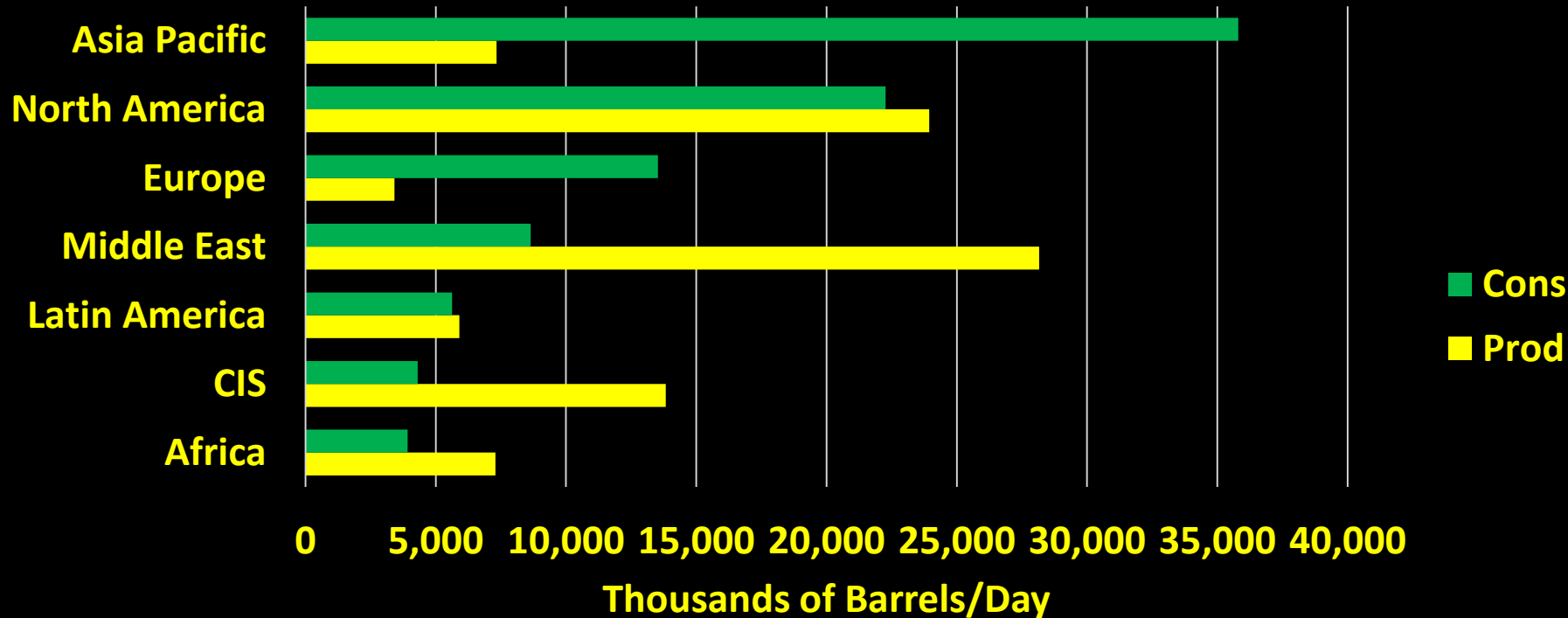
ANNUAL COAL CONSUMPTION



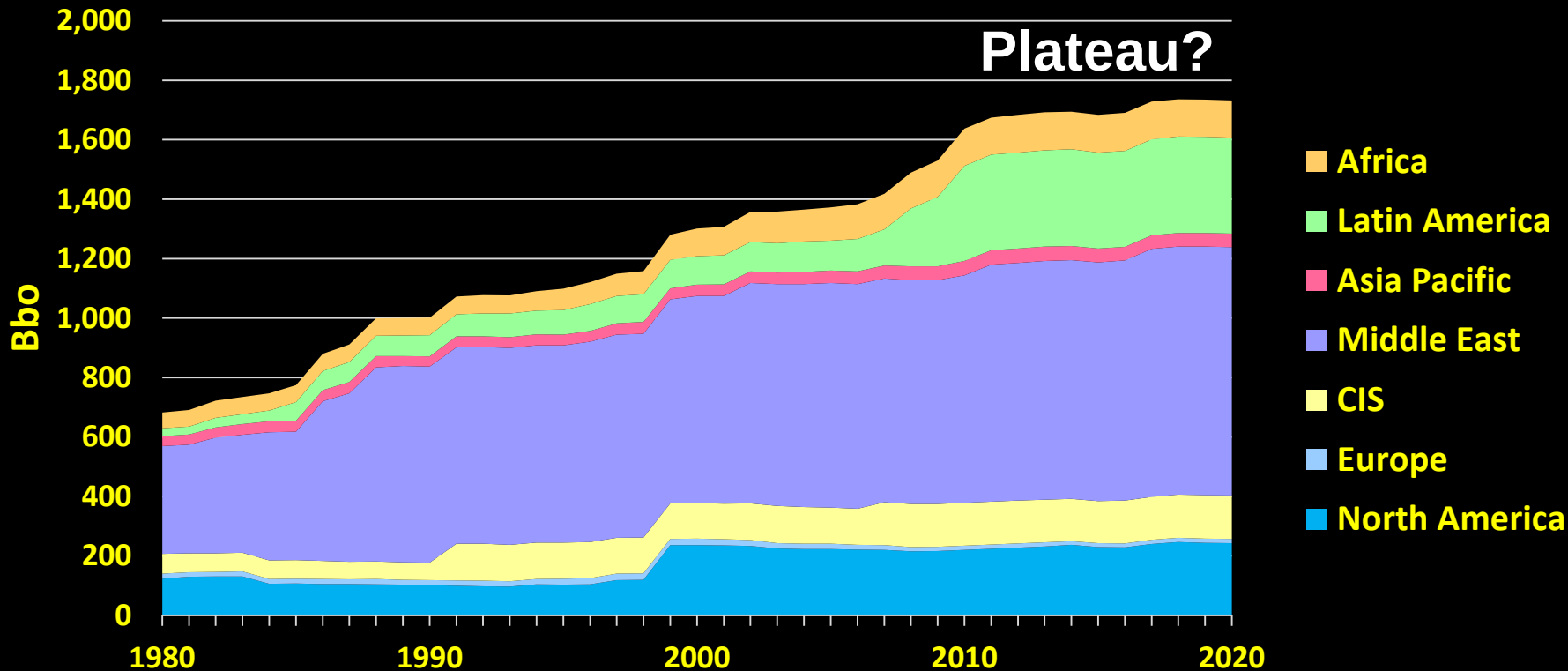
ANNUAL NATURAL GAS & COAL CONSUMPTION



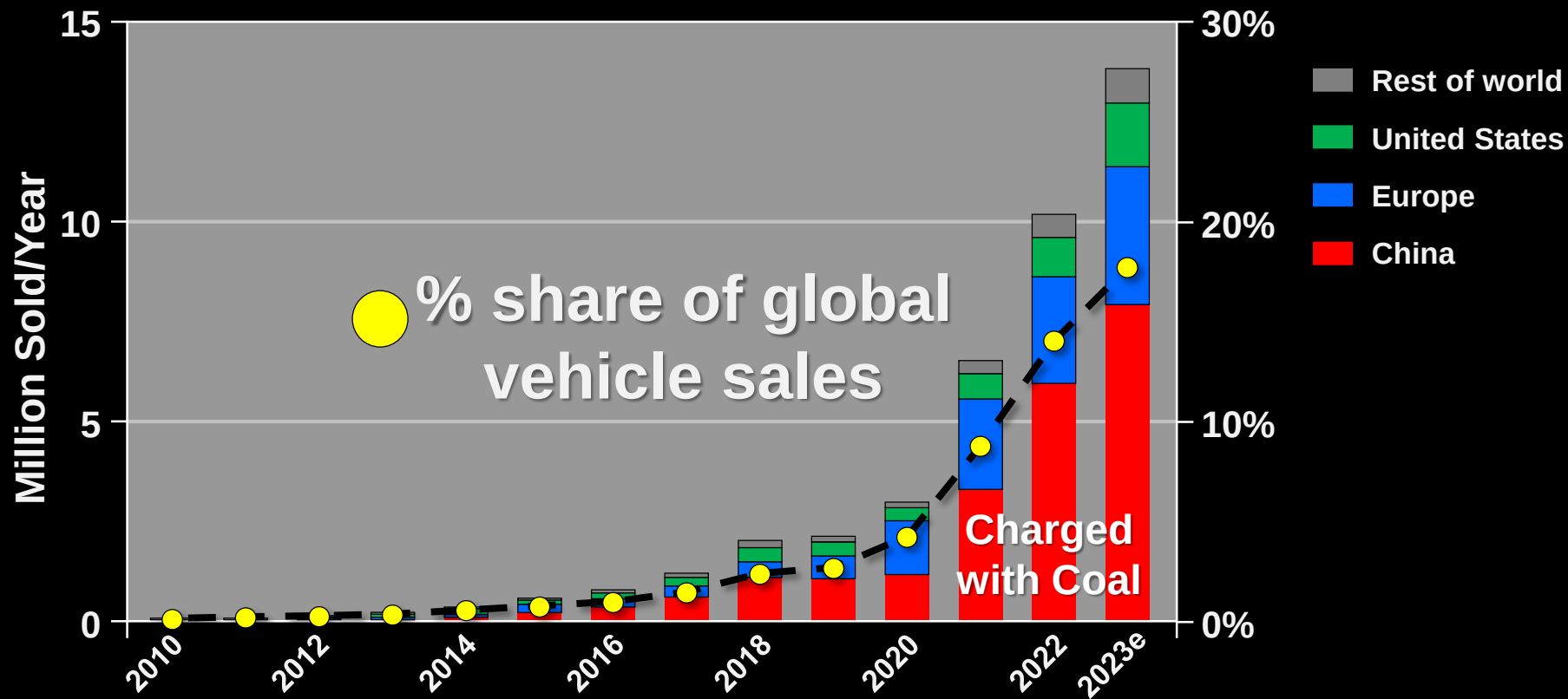
OIL CONSUMPTION V. PRODUCTION



Oil Reserves



EV Sales

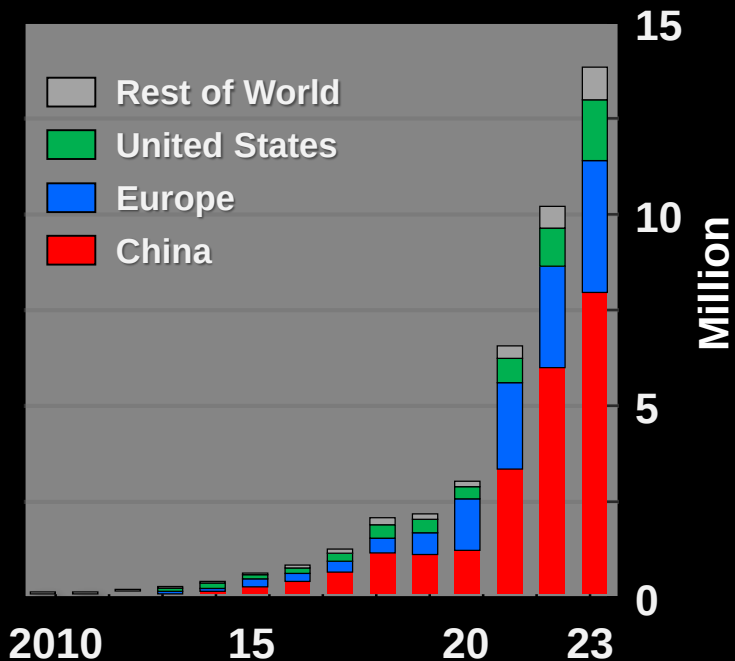


Note: e = estimated

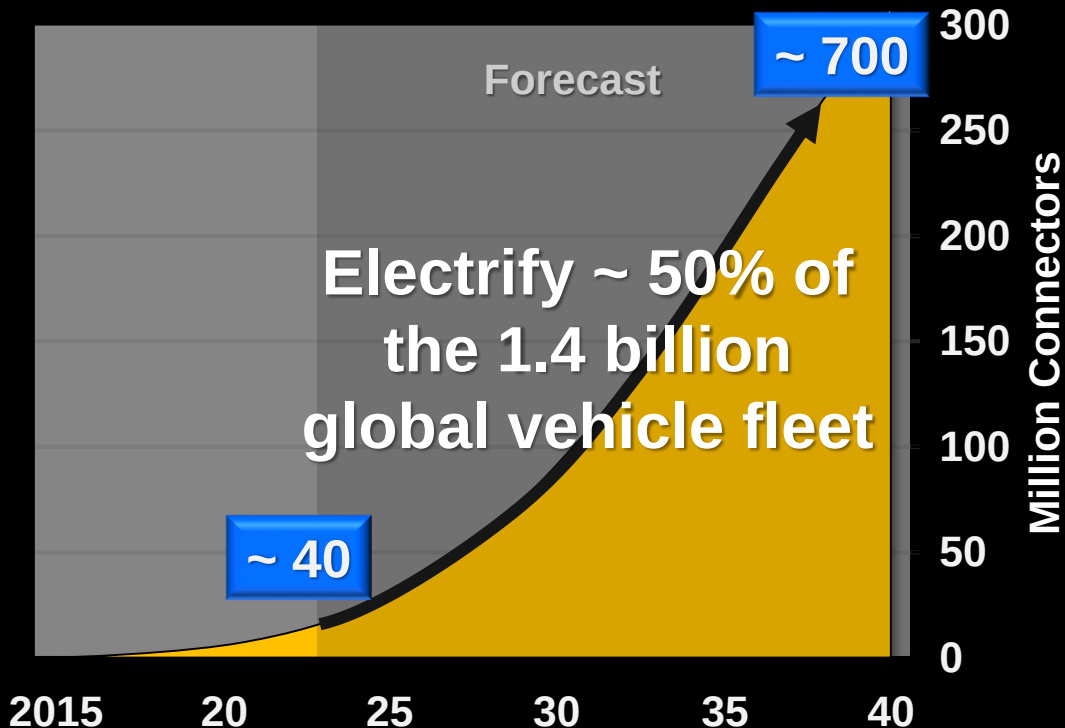
Tinker 2023

Electric Vehicles

Annual EVs Sold

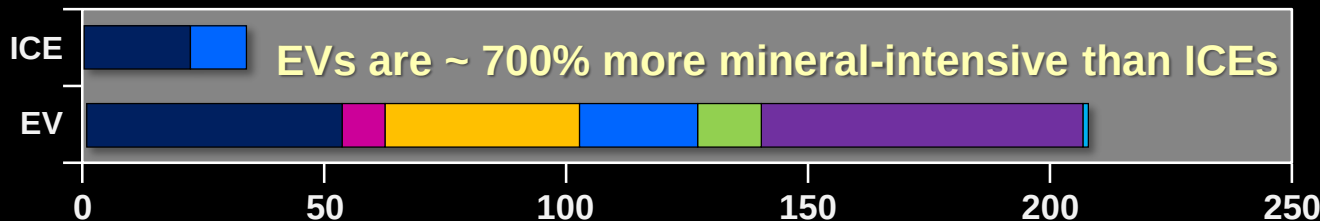


Global # of Charging Connectors



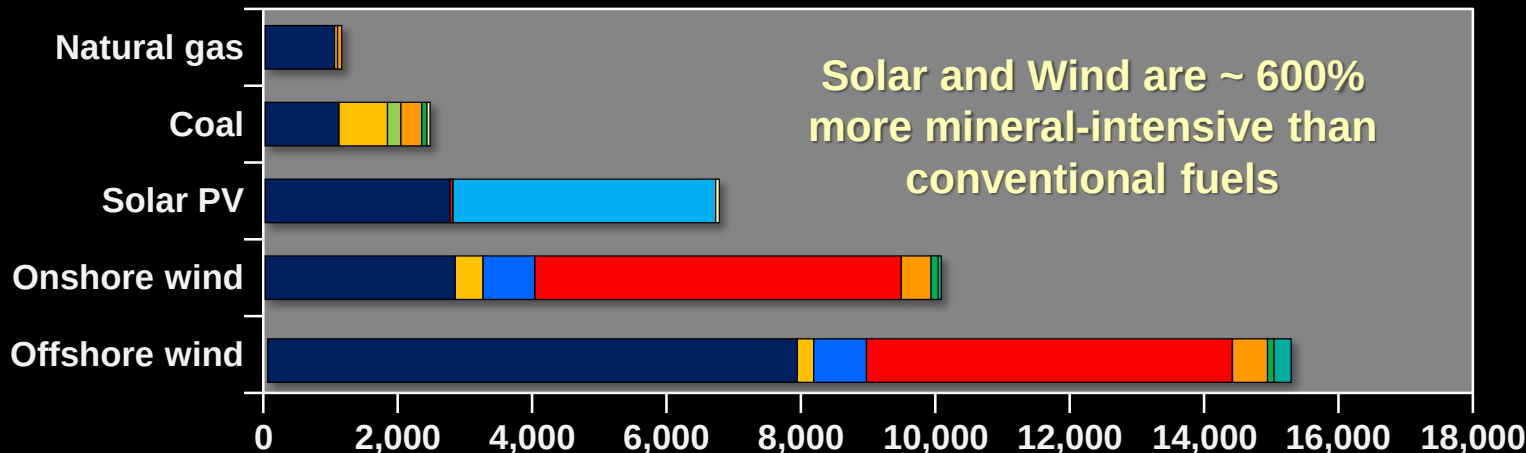
Transportation

KG/VEHICLE



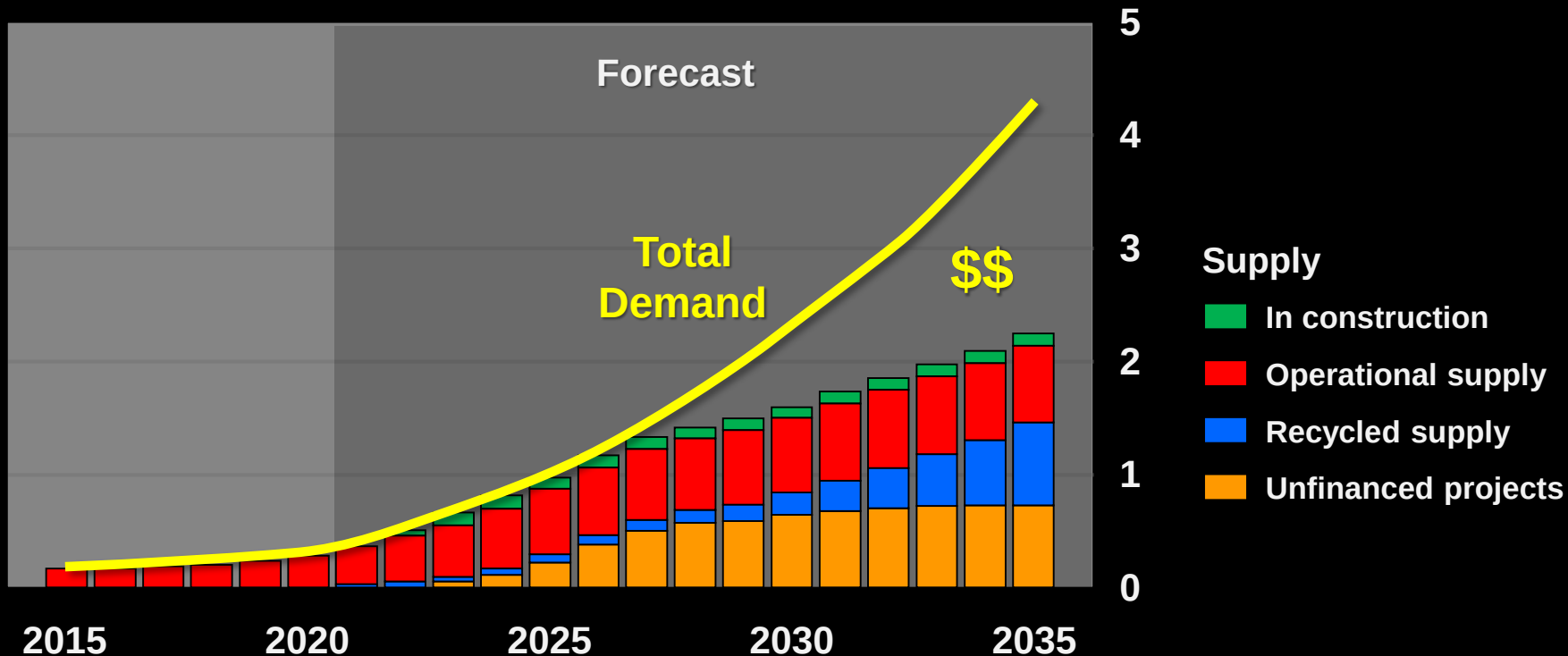
Power Generation

KG/MW

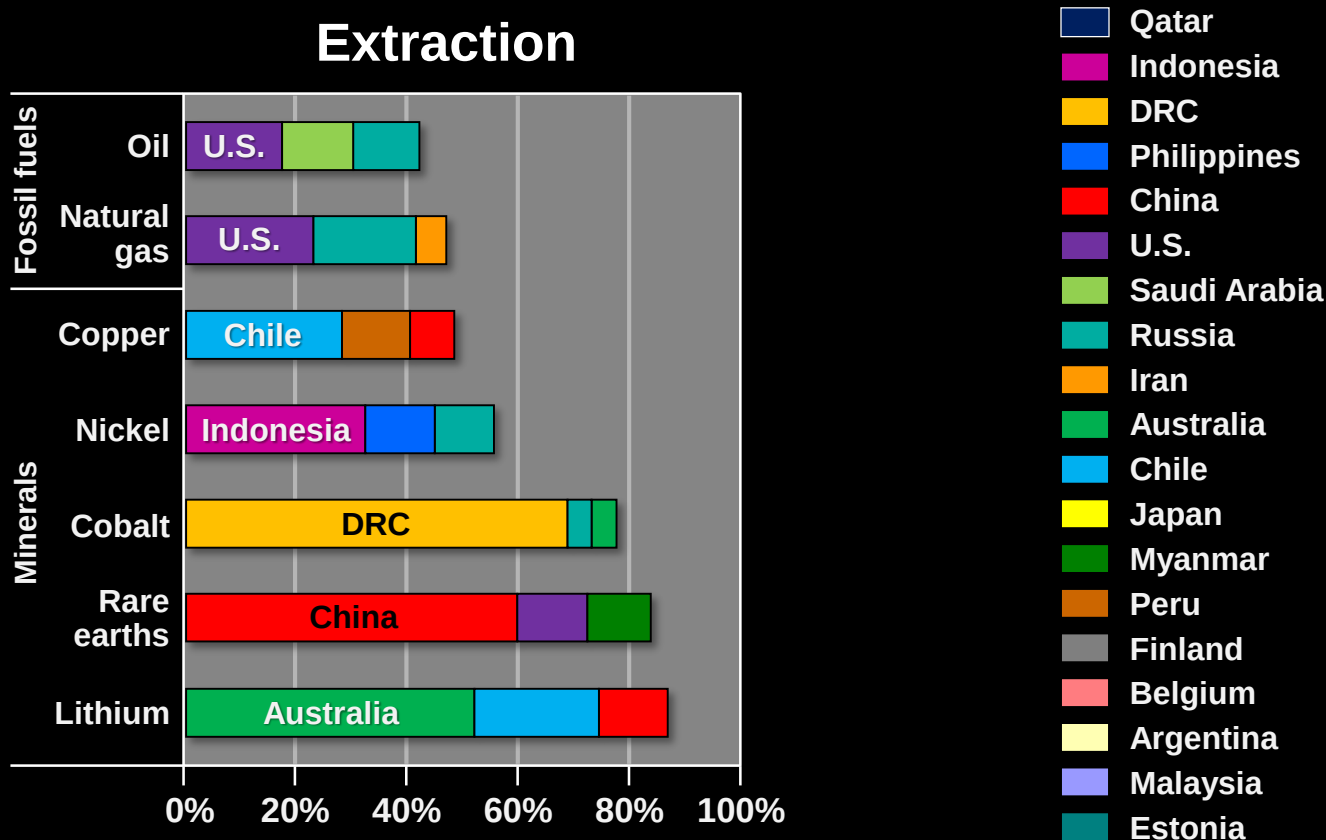


WORLDWIDE LITHIUM DEMAND AND SUPPLY

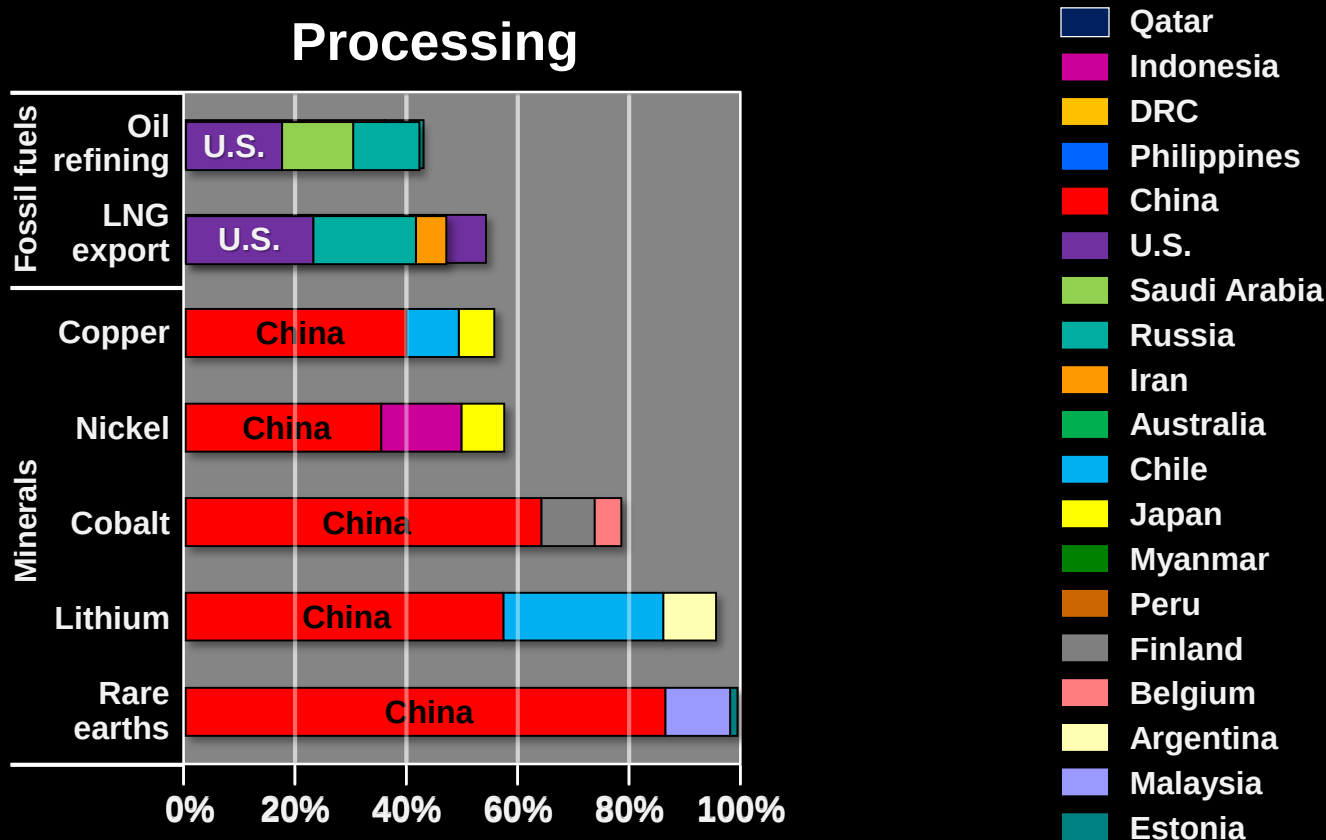
ANNUAL MILLIONS OF TONNES OF LITHIUM CARBONATE EQUIVALENT



RESOURCE EXTRACTION AND PROCESSING



RESOURCE EXTRACTION AND PROCESSING



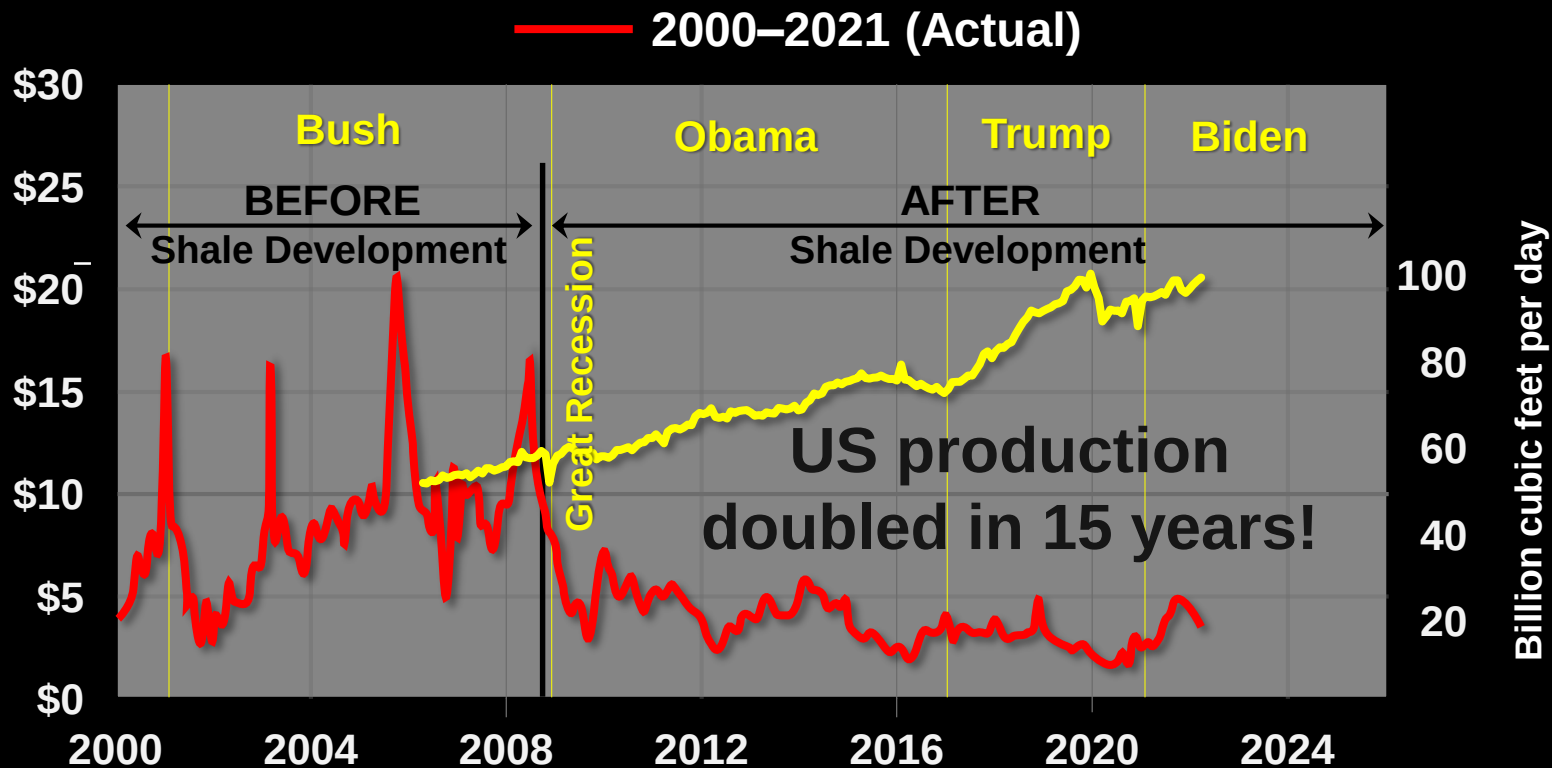
Energy “Grains”



Seas the day

**Markets favor energy optionality
over mandates**

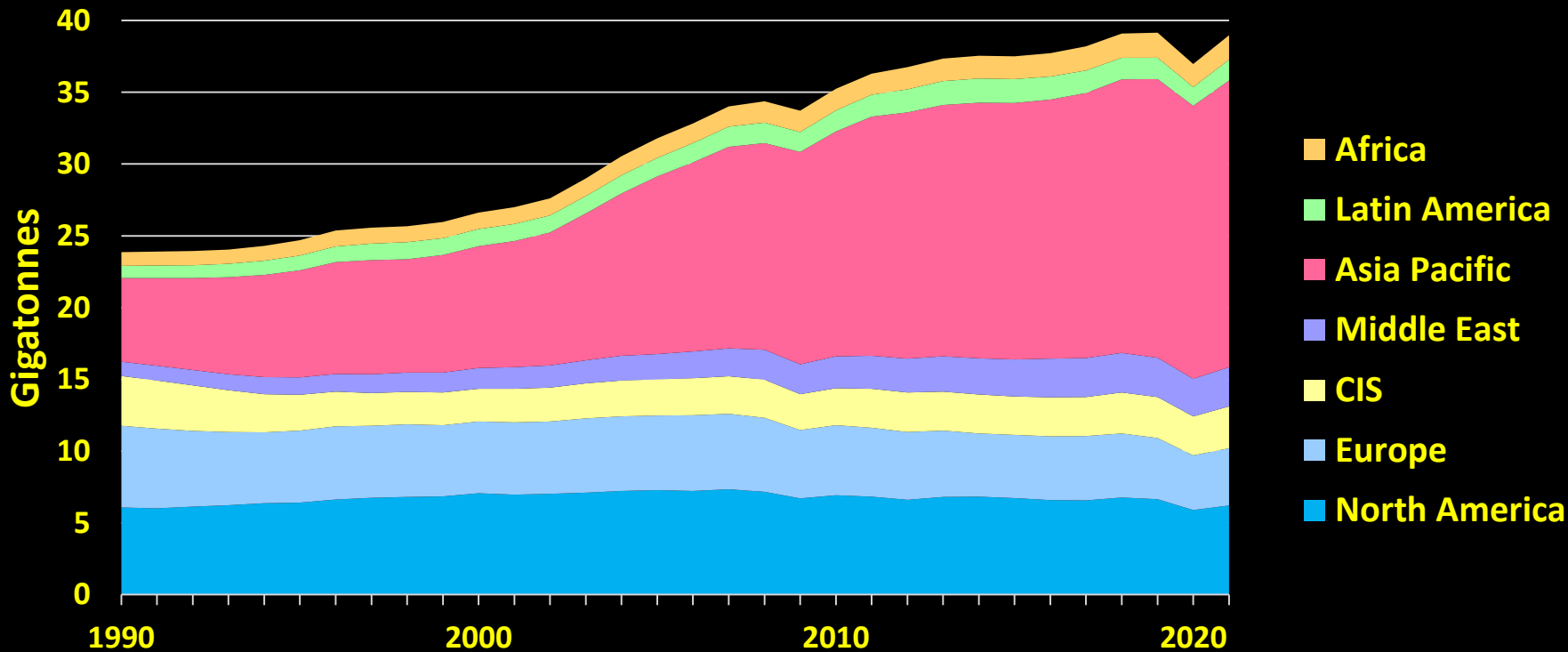
U.S. NATURAL GAS PRICES & PRODUCTION



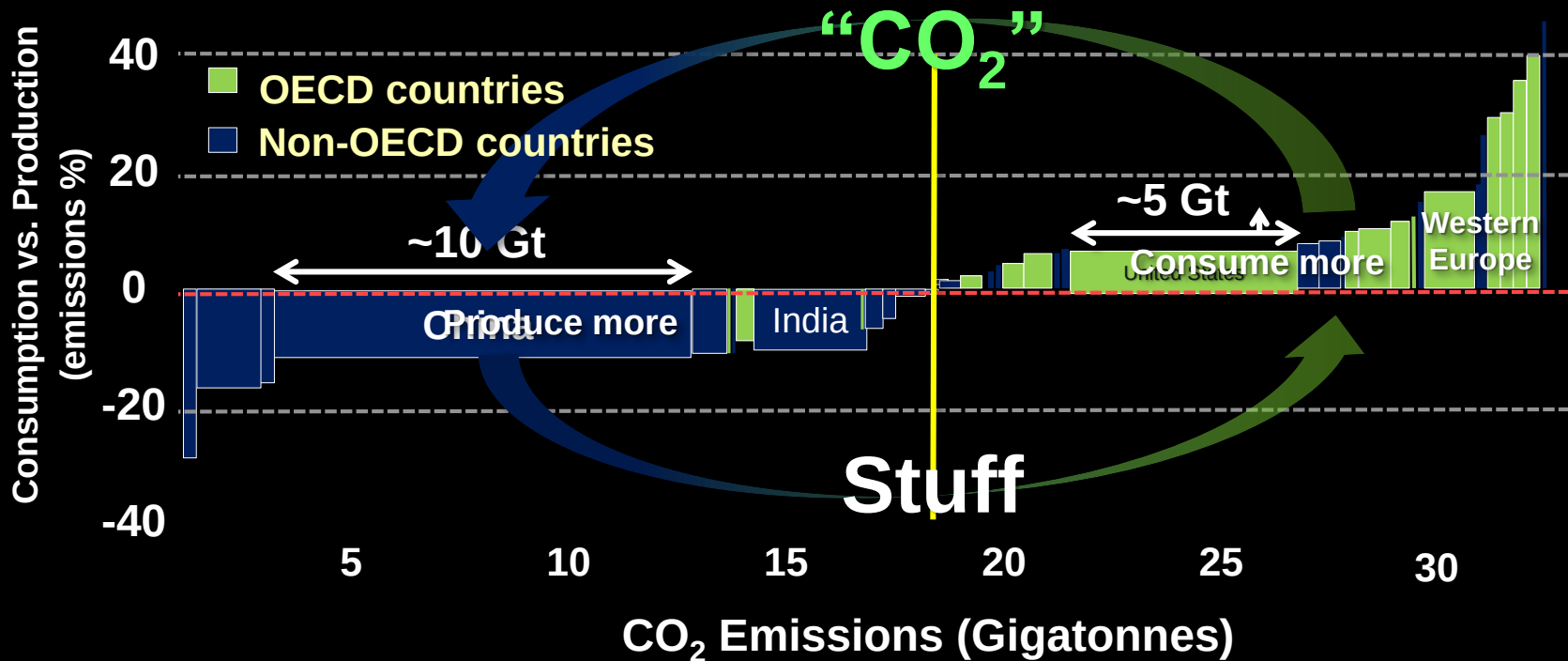
TRANSPORTATION OPTIONALITY

- **Smaller Vehicles: Hybrid and Electric**
- **Mid-Sized Vehicles: Fuel Cells (H₂), CNG**
- **Large Vehicles: Gasoline, Diesel, Jet Fuel**

ANNUAL CO₂ EQUIVALENT EMISSIONS



ANNUAL CO₂ EMISSIONS CONSUMPTION VS. PRODUCTION



EMISSION REDUCTION SOLUTIONS

- **Technology**
- **Cost**
- **Scale**
- **Timeframe**

EMISSION REDUCTION SOLUTIONS

- **Natural Gas & Nuclear Replacing Coal**
- **Hydrogen, Geothermal, Hydro**
- **CCUS, DAC, Nature Solutions**
- **Solar, Wind, Batteries**
- **Efficiency and Conservation**

EMISSION REDUCTION SOLUTIONS

FORTUNE

RANKINGS ▾

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COMMENTARY · ENERGY PRICES

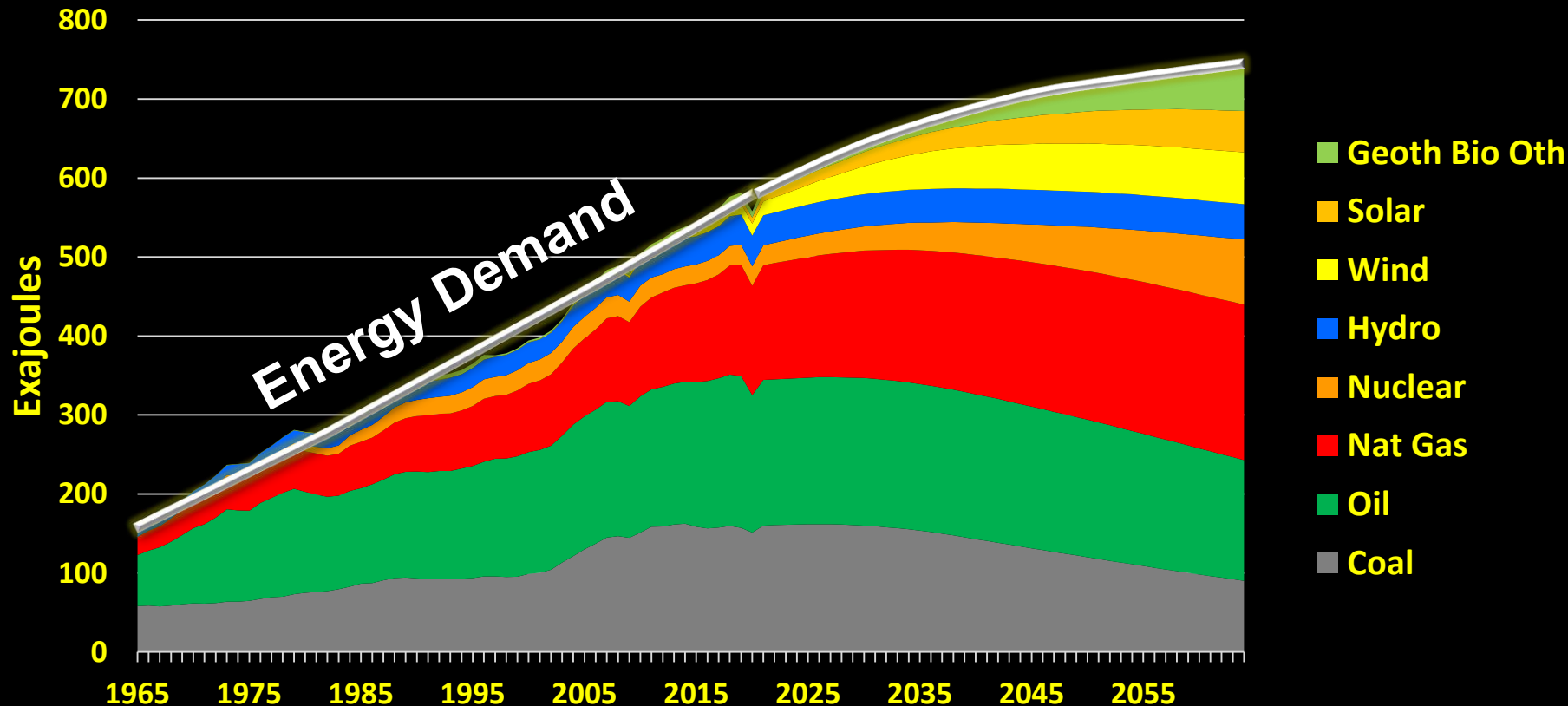
Reducing energy options doesn't work. Just ask Europe—and the U.S. states where gas prices are rising

BY SCOTT TINKER

October 18, 2022 at 4:44 AM CDT

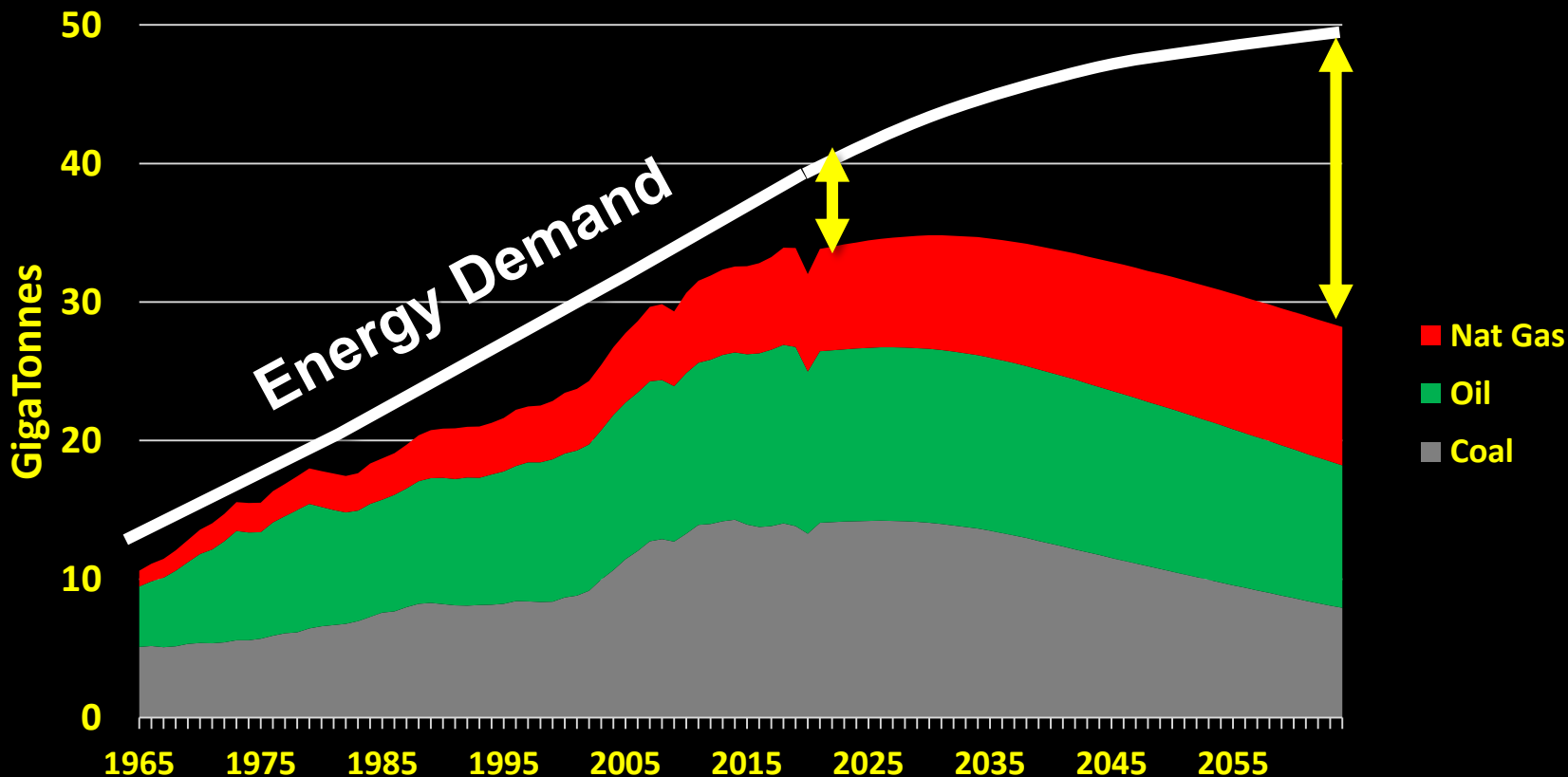
ANNUAL PRIMARY ENERGY CONSUMPTION

~30% "RENEWABLE" IN 2064



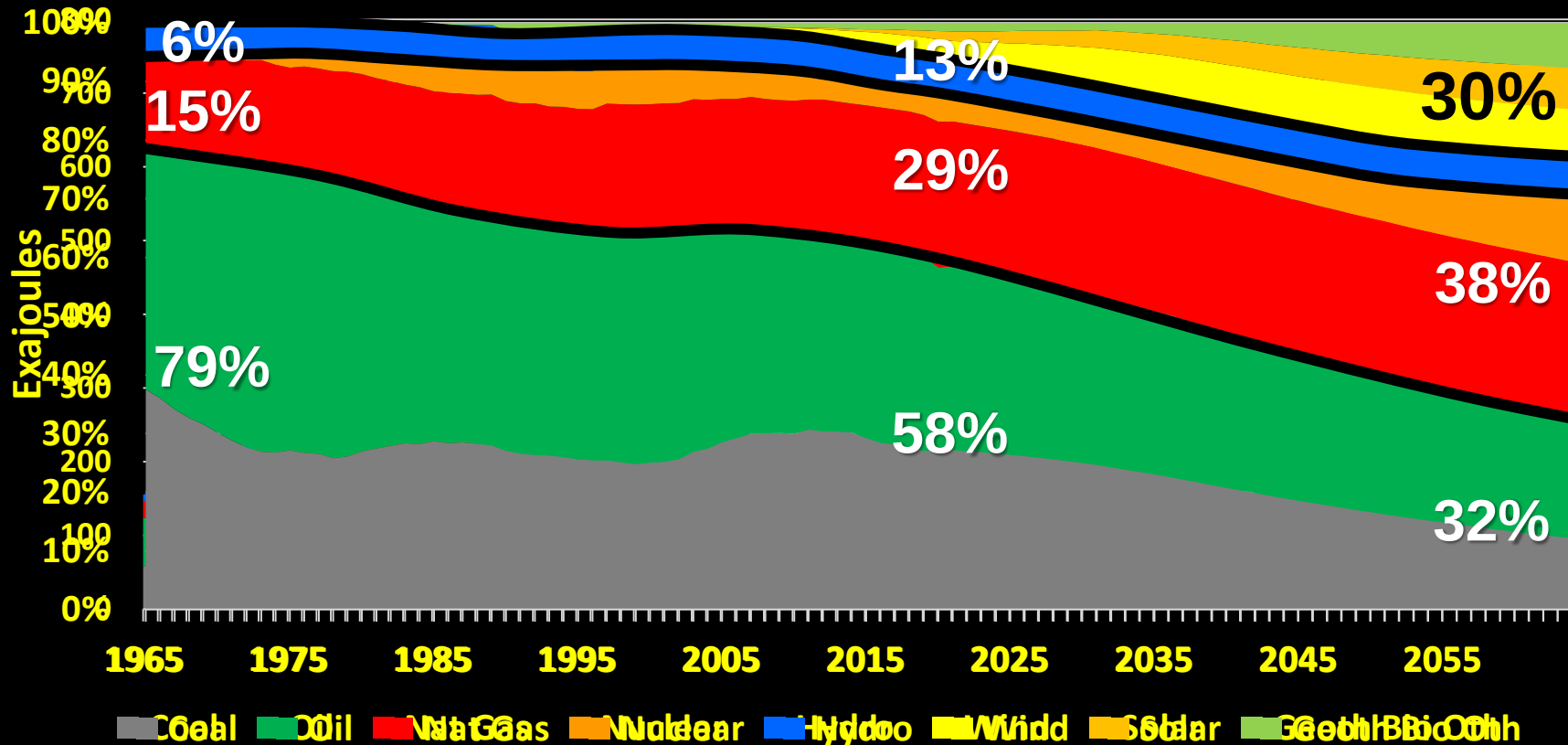
ANNUAL FOSSIL FUEL CO₂ EMISSIONS

~30% "RENEWABLE" IN 2064



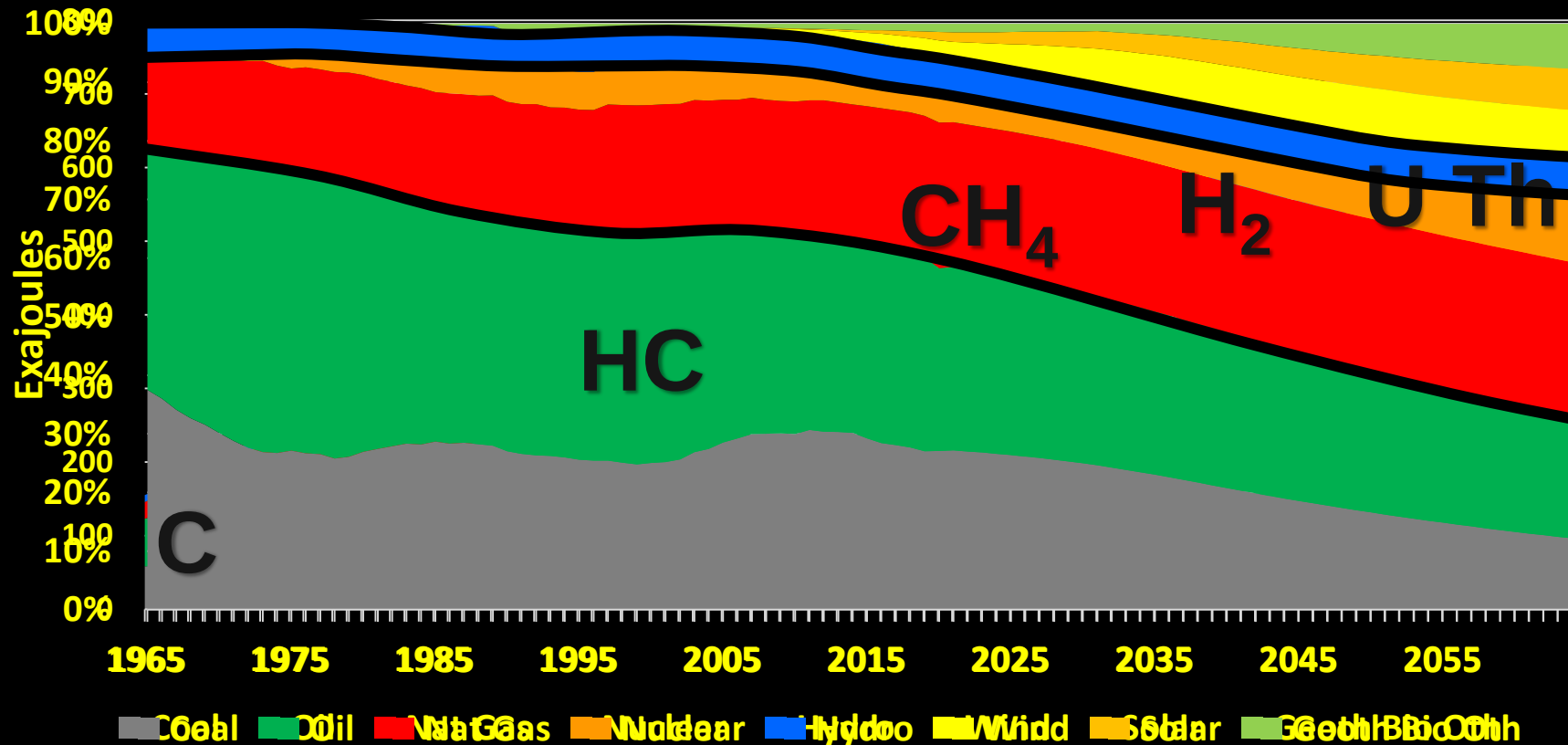
GLOBAL ENERGY MIX

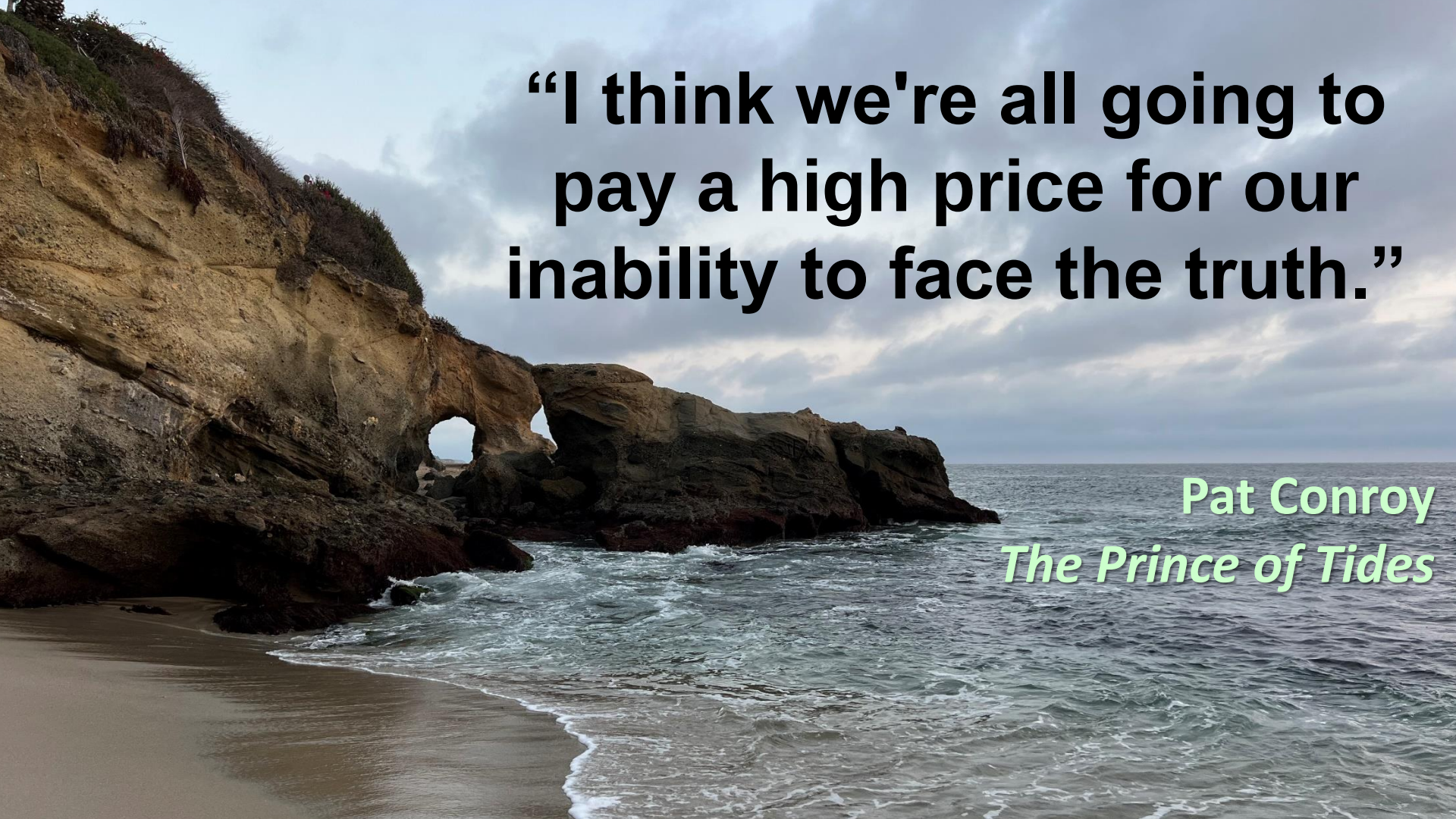
~30% "RENEWABLE" IN 2064



GLOBAL ENERGY MIX

~30% "RENEWABLE" IN 2064





**“I think we're all going to
pay a high price for our
inability to face the truth.”**

Pat Conroy
The Prince of Tides

ENERGY TRANSITION
=
ENERGY ADDITION
+
EMISSIONS REDUCTION



BUREAU OF
ECONOMIC
GEOLOGY

*Where Energy, Environment
and Economy Converge*

www.beg.utexas.edu

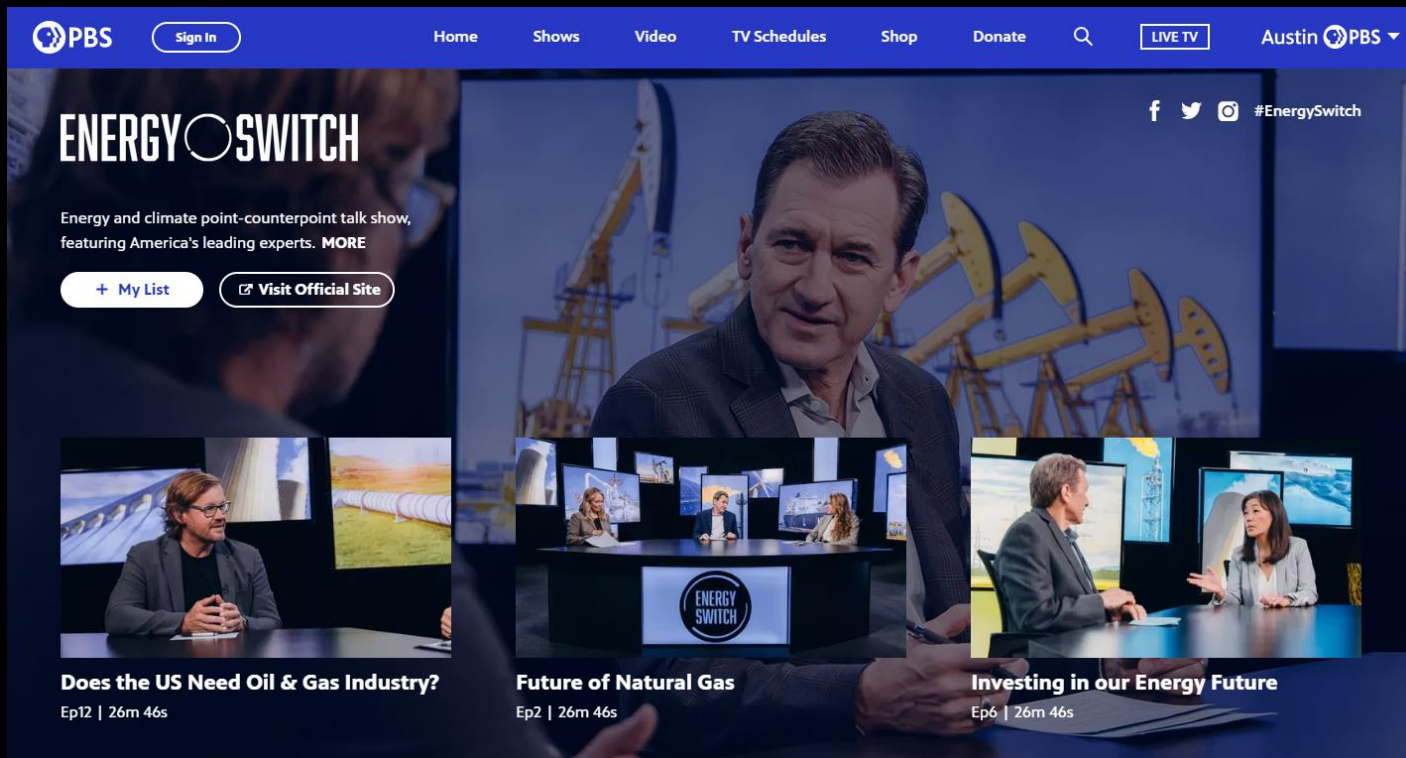
SWITCH ENERGY ALLIANCE

INSPIRE AN ENERGY EDUCATED FUTURE

<https://Switchon.org>

ENERGY SWITCH ON PBS

AN ENERGY AND CLIMATE TALK SHOW



The screenshot shows the PBS Energy Switch website. The top navigation bar is blue with the PBS logo, a 'Sign In' button, and links for Home, Shows, Video, TV Schedules, Shop, Donate, a search icon, a 'LIVE TV' button, and the Austin PBS affiliate. The main content area features the 'ENERGY SWITCH' logo, a description of the show as an energy and climate point-counterpoint talk show featuring America's leading experts, and buttons for '+ My List' and 'Visit Official Site'. A large background image shows a man in a suit in front of oil pumpjacks. Below this are three episode thumbnails: 'Does the US Need Oil & Gas Industry?' (Ep12 | 26m 46s), 'Future of Natural Gas' (Ep2 | 26m 46s), and 'Investing in our Energy Future' (Ep6 | 26m 46s). Social media icons for Facebook, Twitter, and Instagram, along with the hashtag #EnergySwitch, are also visible.

ENERGY SWITCH

Energy and climate point-counterpoint talk show, featuring America's leading experts. [MORE](#)

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Does the US Need Oil & Gas Industry?
Ep12 | 26m 46s

Future of Natural Gas
Ep2 | 26m 46s

Investing in our Energy Future
Ep6 | 26m 46s



Switch Energy Alliance

Inspiring an energy-educated future.



Download Dr. Tinker's Presentations

Switch Energy Alliance Website

Switch Classroom



FINAL MUSINGS



- The dual challenge isn't simple, but it's solvable
- No one owns the truth, we can only seek it
- Shaming is destructive; open, civil dialog is vital
- End the divisive competition between energy sources



Thank You