

ENERGY & ENVIRONMENT: A NATIONAL CONTEXT

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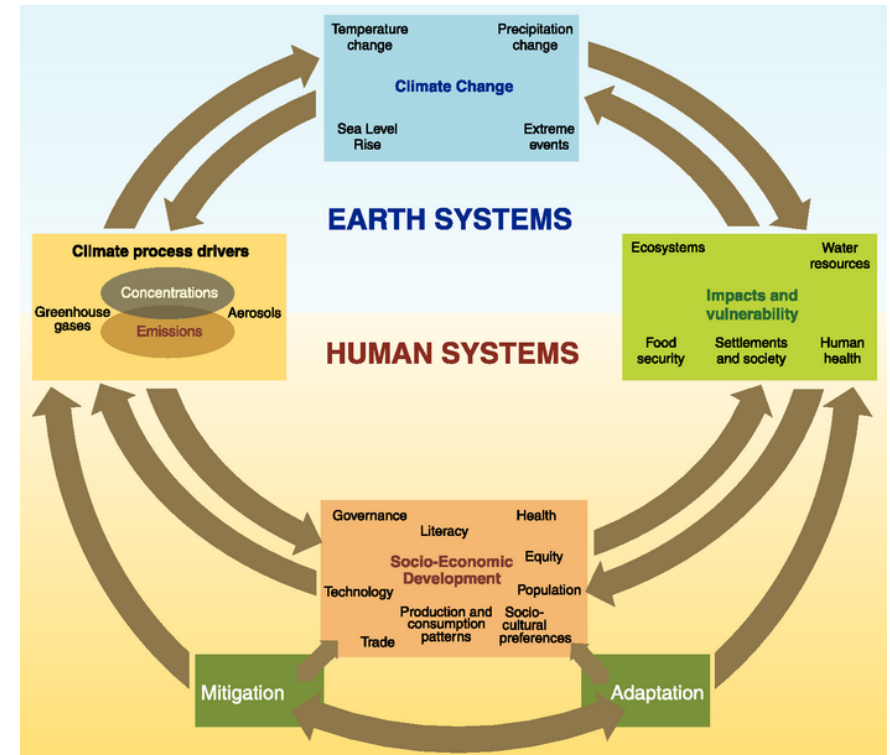
ENVIRONMENT

Climate Change and Emissions Statistics

Climate Change

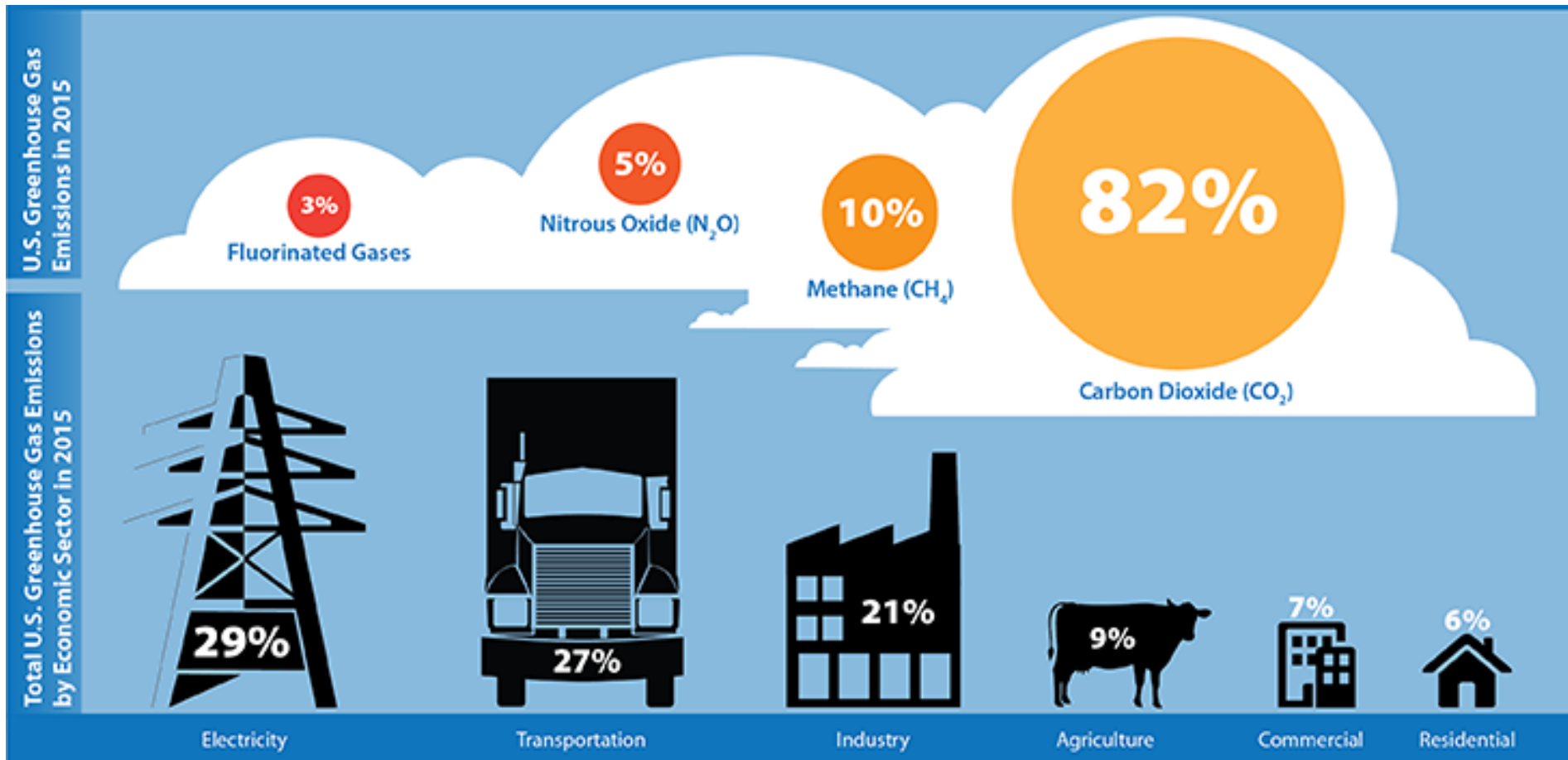
Highlights from the 2013 IPCC Report:

- “Warming in the climate system is unequivocal.”
- “Human influence on the climate system is clear.”
- “Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.”



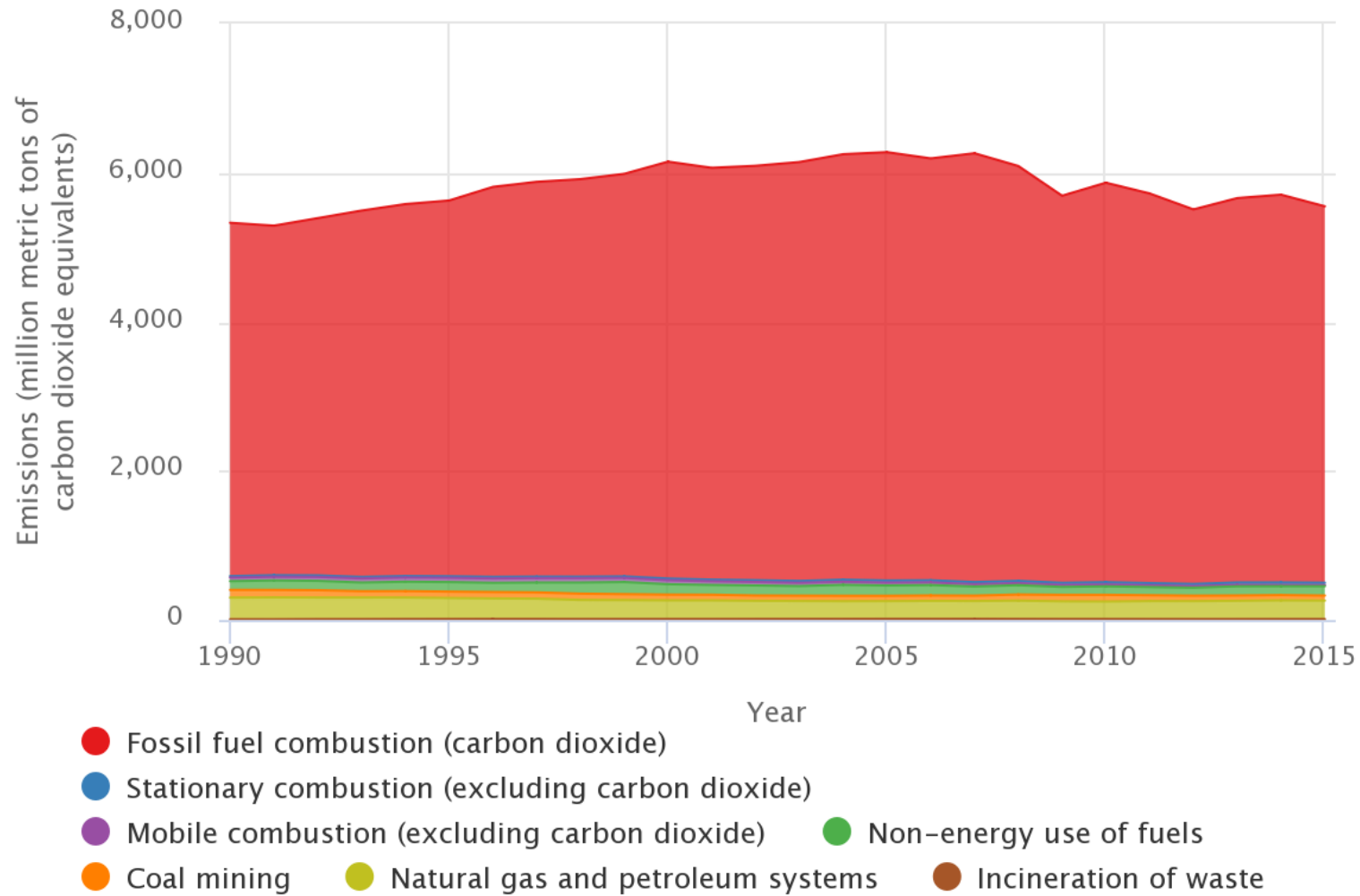
Source: http://www.ipcc.ch/pdf/presentations/ar5/wg1/plattner13geneva_gen.pdf

Greenhouse Gas Emissions



Source: <https://www3.epa.gov/climatechange/ghgemissions/inventoryexplorer/>

U.S. Greenhouse Gas Emissions from Energy Production and Use, 1990-2015



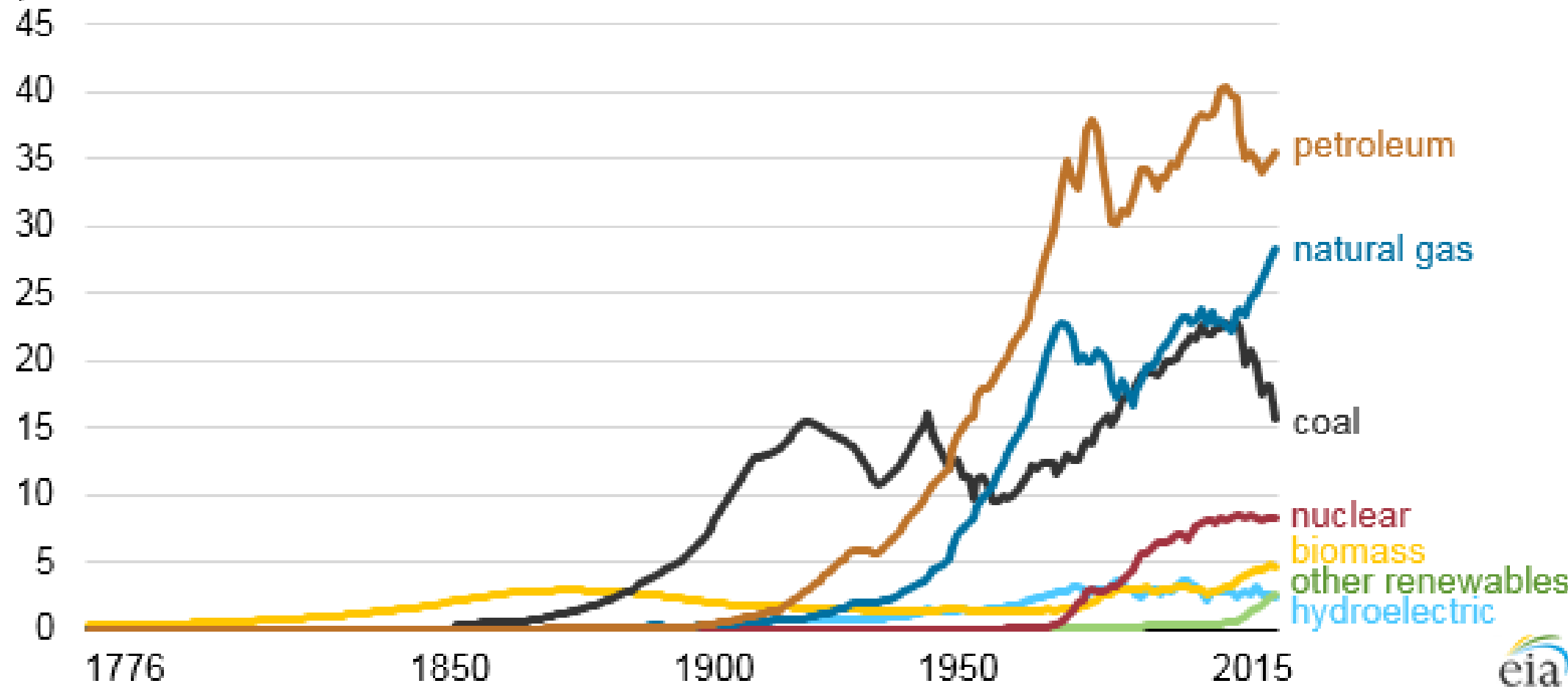
Source: U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015.
<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

US ENERGY CONSUMPTION

Statistics

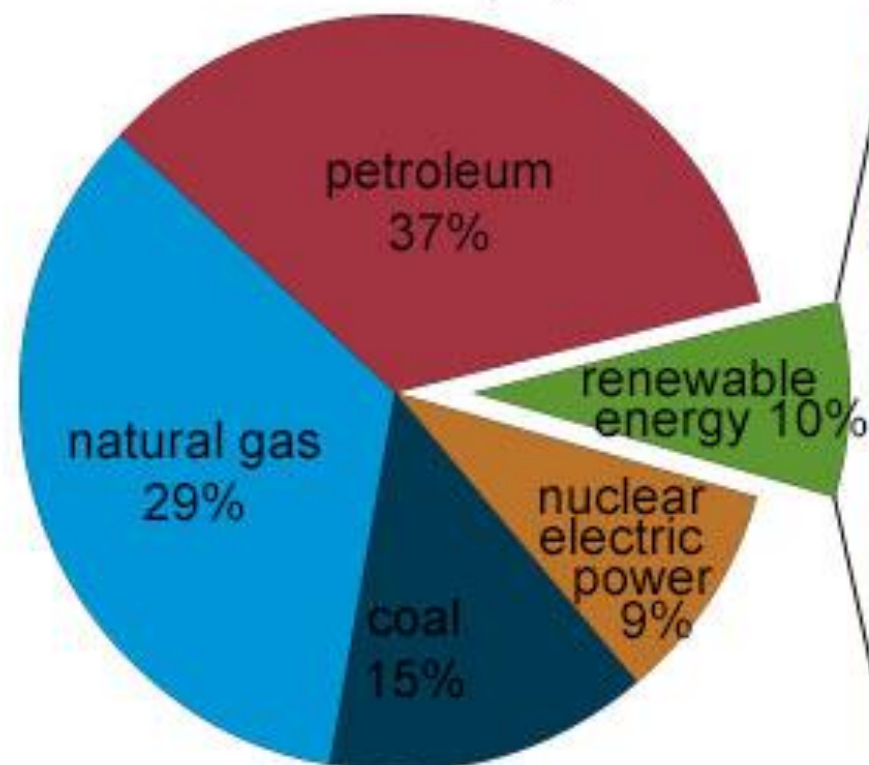
Energy consumption in the United States (1776-2015)

quadrillion Btu

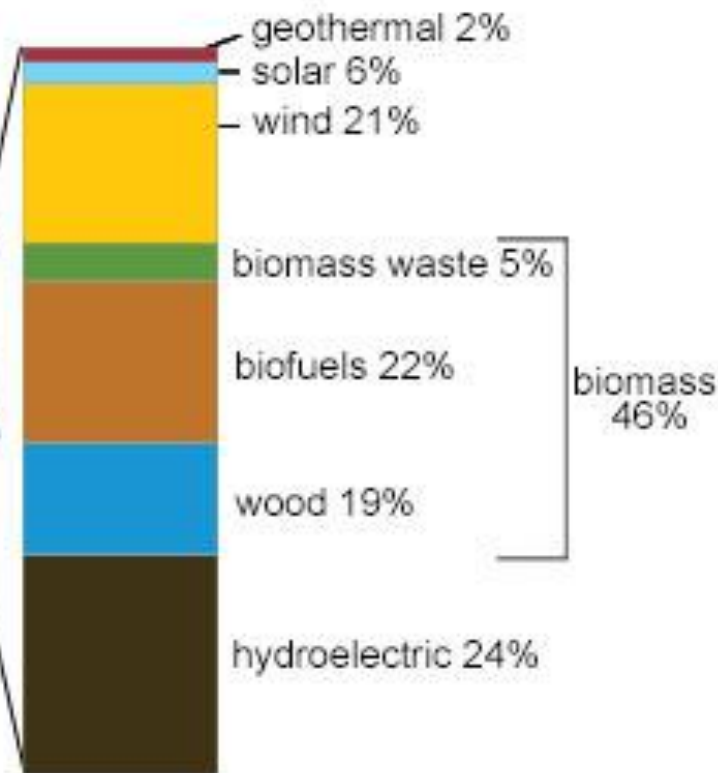


U.S. energy consumption by energy source, 2016

Total = 97.4 quadrillion
British thermal units (Btu)



Total = 10.2 quadrillion Btu

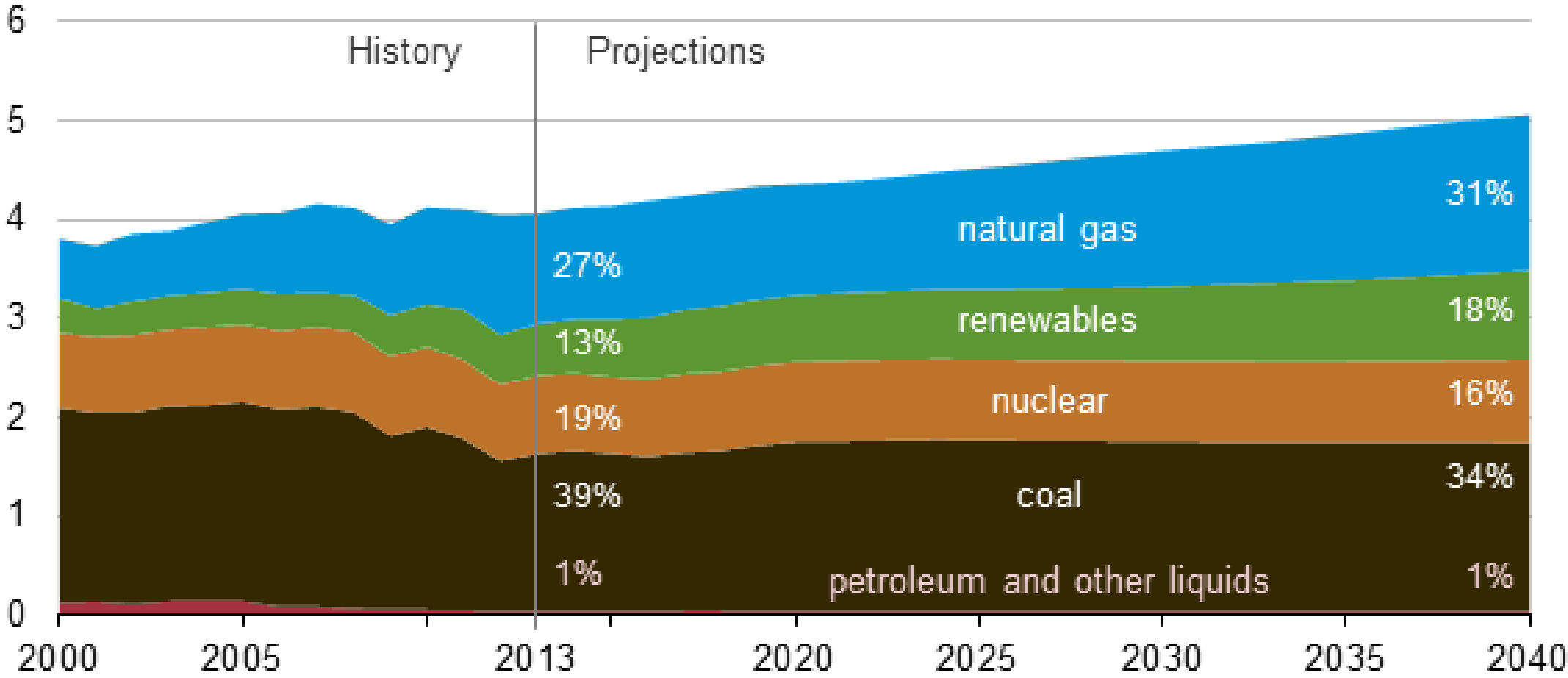


Note: Sum of components may not equal 100% because of independent rounding.

Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1, April 2017, preliminary data

Electricity generation by fuel type in the AEO2015 Reference case, 2000-2040

trillion kilowatthours



US ENERGY PRODUCTION

Statistics

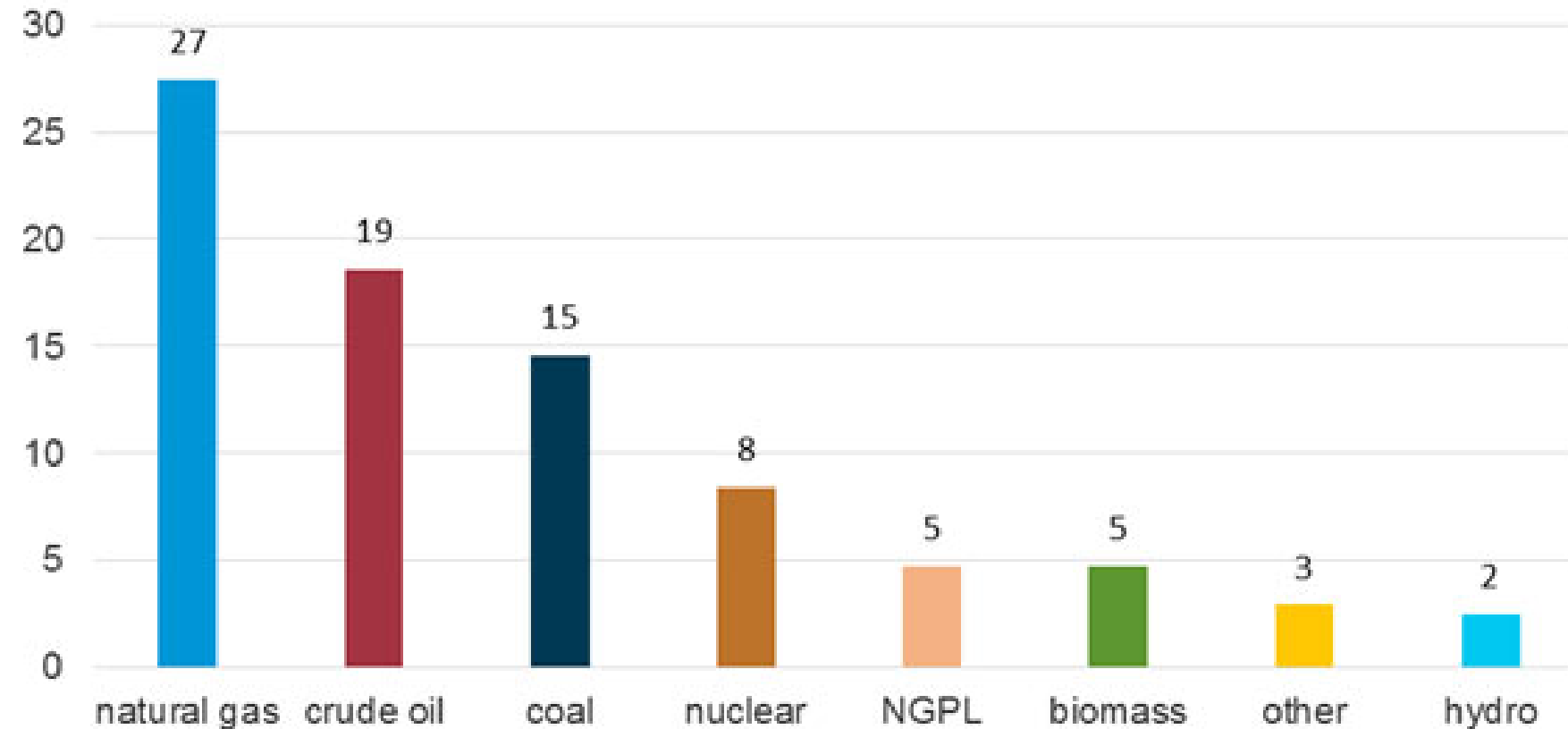
US Energy Production: 2016 Numbers

- US energy production addressed about 86% of US energy consumption
- Dominant US energy sources: petroleum, natural gas, and coal
- Recent changes to US energy production:
 - Coal production has decreased since 2008 due to decreases in its use for electricity generation
 - Natural gas production reached a record high in 2015 due to more efficient and cost-effective drilling and production techniques from shale formations, dipping only slightly in 2016
 - Crude oil production was decreasing until 2009 when it started to increase again due to more cost-effective drilling and production technologies
 - Natural gas plant liquids production has increased, reaching a record high in 2016
 - 2016 was a record high for renewable energy production and consumption (varies by type)

Source: https://www.eia.gov/energyexplained/?page=us_energy_home

U.S. primary energy production by major sources, 2016

quadrillion British thermal units



Note: Natural gas is dry gas, NGPL is natural gas plant liquids, other is geothermal, solar, and wind, and hydro is conventional hydroelectric.

Source: U.S. Energy Information Administration, *Monthly Energy Review*, April 2017, preliminary data



Energy Sources: No Silver Bullet

- Scale and cost of infrastructure
 - Maintenance
 - New construction
 - Retrofitting
- Consistent vs. intermittent production
- Level of government involvement
 - Research and development
 - Regulatory oversight
 - Economic incentives and/or disincentives
- Trust of industry
- Access to different sources and ability to choose/influence sources
- Cradle to grave process
- Geographic and geologic characteristics impacting production
- Community identity, values and experiences
 - Production
 - Consumption
- Environmental and environmental justice impacts
 - Emissions impacting climate change
 - Other air, water and soil pollution considerations
 - Habitat fragmentation

POLITICAL CONTEXTS UNDER BUSH, OBAMA AND TRUMP

Three Presidents; 2001 to Present

Bush Administration

- Energy
 - Encouraged energy security
 - Encouraged new technologies to access hydrocarbons (fossil fuels)
 - Offshore exploration
 - Oil shale
 - Encouraged renewables through tax credits (wind and solar)
- Climate change
 - Pulled the US out of the Kyoto Protocol which was signed by former VP Al Gore, but was never ratified by the Senate
 - Initiated climate change mitigation measures (e.g., carbon sequestration projects by the US Department of Energy)

Obama Administration

- Energy
 - Clean Energy Plan
 - Cut carbon pollution
 - Prepare US for climate change
 - Lead international efforts on climate change
 - Encouraged stricter regulations impacting the fossil fuel and motor vehicle industries
 - Encouraged efficiency standards, renewables, and the implementation of smart grid technologies
- Climate change
 - Integral part of Obama Administration's energy plan
 - Involved US in the UNFCCC Paris Climate Accord

Trump Administration

- Energy
 - America First Energy Plan
 - Encourages deregulation of the energy sector
 - Eliminate the Climate Action Plan
 - Eliminate the Waters of the U.S. rule
 - Would like to tap nation's oil reserves
 - Supports shale oil and gas extraction as well as reviving the coal industry
 - Encourages energy independence
- Climate Change
 - Pulling US out of the UNFCCC Paris Climate Accord
 - Reducing funds to agencies involved in climate research and regulation
 - E.g.: wants to refocus the EPA on its "essential mission of protecting our air and water"

Final Thoughts

- Climate change and other environmental issues are a major factor in considering our energy infrastructure
- Our energy infrastructure is diversifying, be it slowly and with many challenges
- Our energy sources have multiple sociopolitical considerations at play
- Our political leadership has swung the pendulum back and forth multiple times on support for:
 - International climate efforts
 - Various energy sources and their related infrastructure

Thank You!

