



COAL TRANSITIONS: UNITED STATES

SYMPOSIUM ON A JUST COAL TRANSITION FOR SOUTH AFRICA

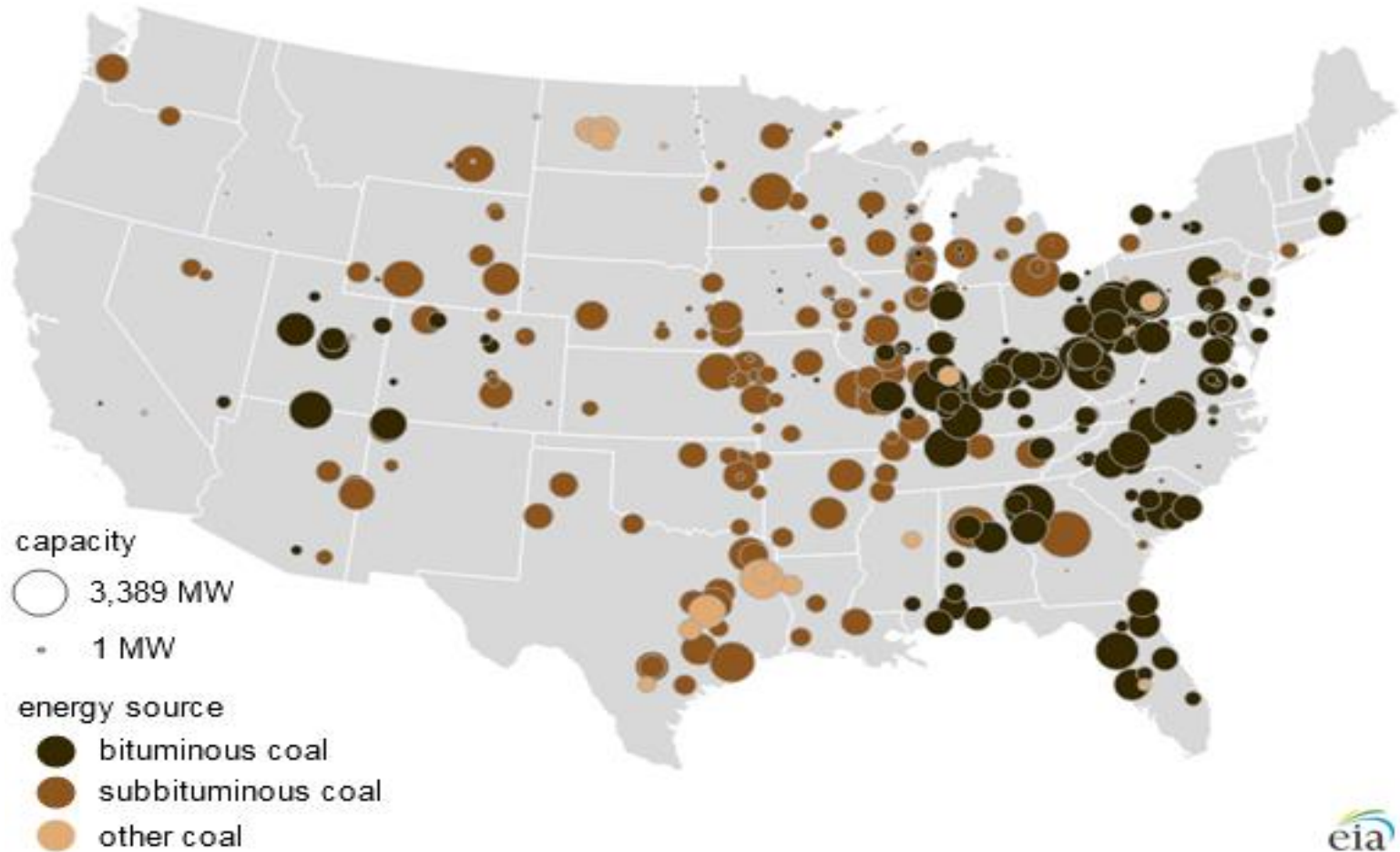
Jeff Waller | February 27, 2019



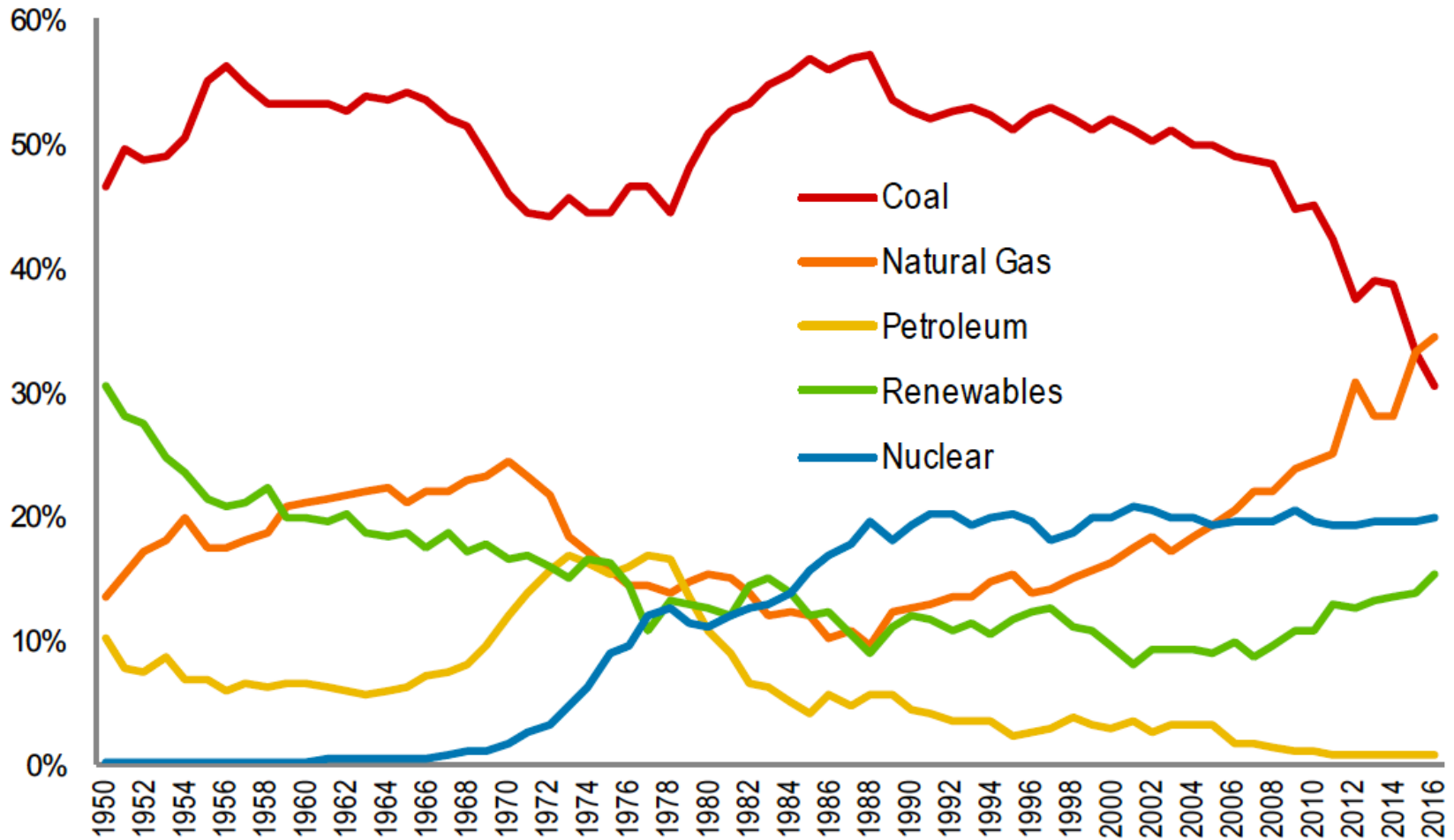
Transforming global energy use to create a clean, prosperous, and secure low-carbon future.

Coal plants are not uniformly distributed across the U.S. – mainly in the Midwest and Eastern states

Distribution of coal plants in the Lower 48 states

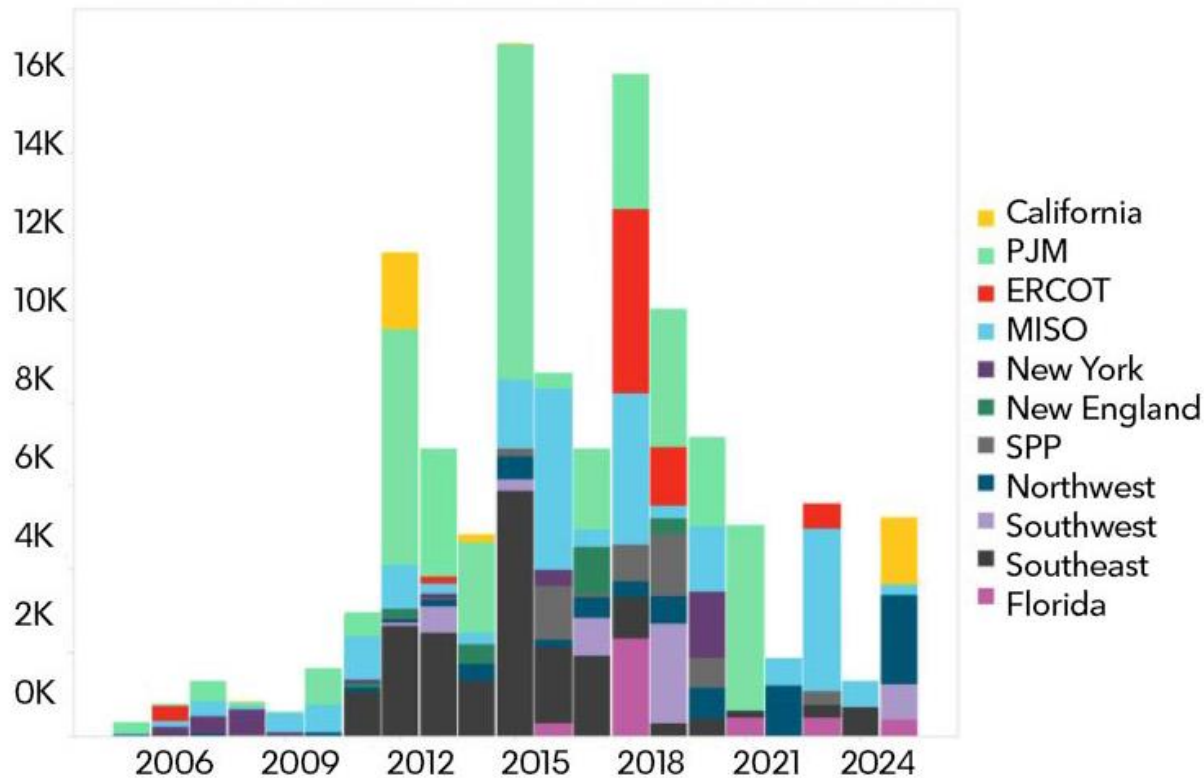


Coal-fired generation is falling as a share of total U.S. electricity production



This is reflected in an increase in coal plants closures and planned retirements

Historic and planned U.S. coal retirements (megawatts)

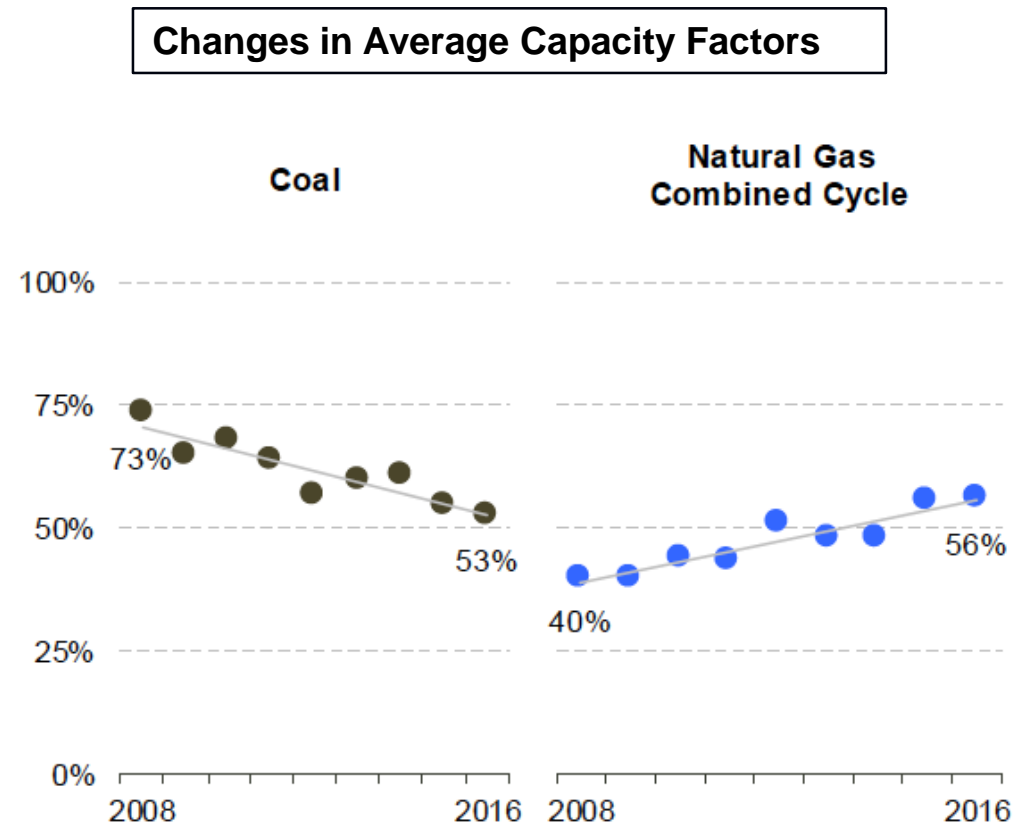
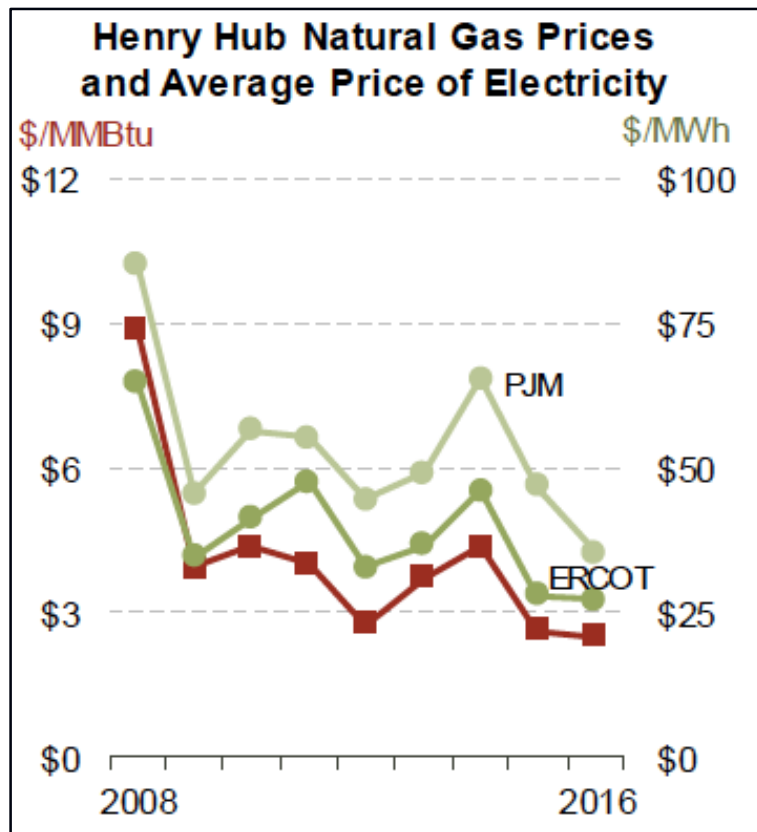


Source: BloombergNEF

- In 2017, there were 359 coal power plants in the U.S., down from 606 in 2007.
- In 2017, aggregate coal plant capacity was 257 GW, down from 312 MW in 2007.
- About 15 GW of coal-fired capacity closed in 2018, with another 37 GW (25% of today's fleet) scheduled to close by 2025.

The key driver of coal plants closures is economics

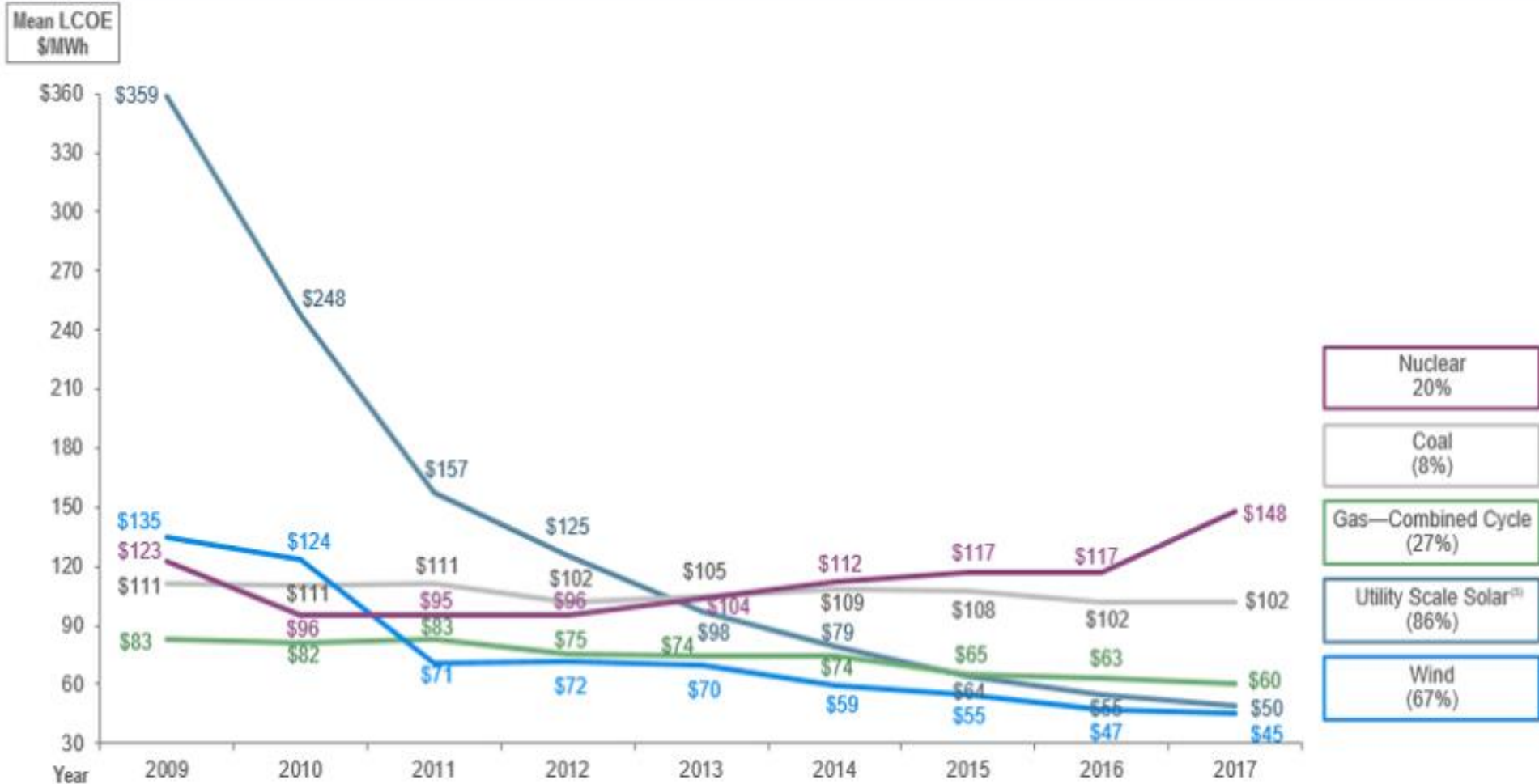
- **Natural gas** prices have fallen dramatically as fracking technologies have unlocked shale gas reserves.
- In competitive markets, **electricity prices have fallen in tandem with gas prices**, making it harder for coal plants to compete.



The key driver of coal plants closures is economics (cont'd)

The cost of **renewable energy** has also fallen precipitously, beating out coal in many markets.

Selected Historical Mean LCOE Values⁽²⁾



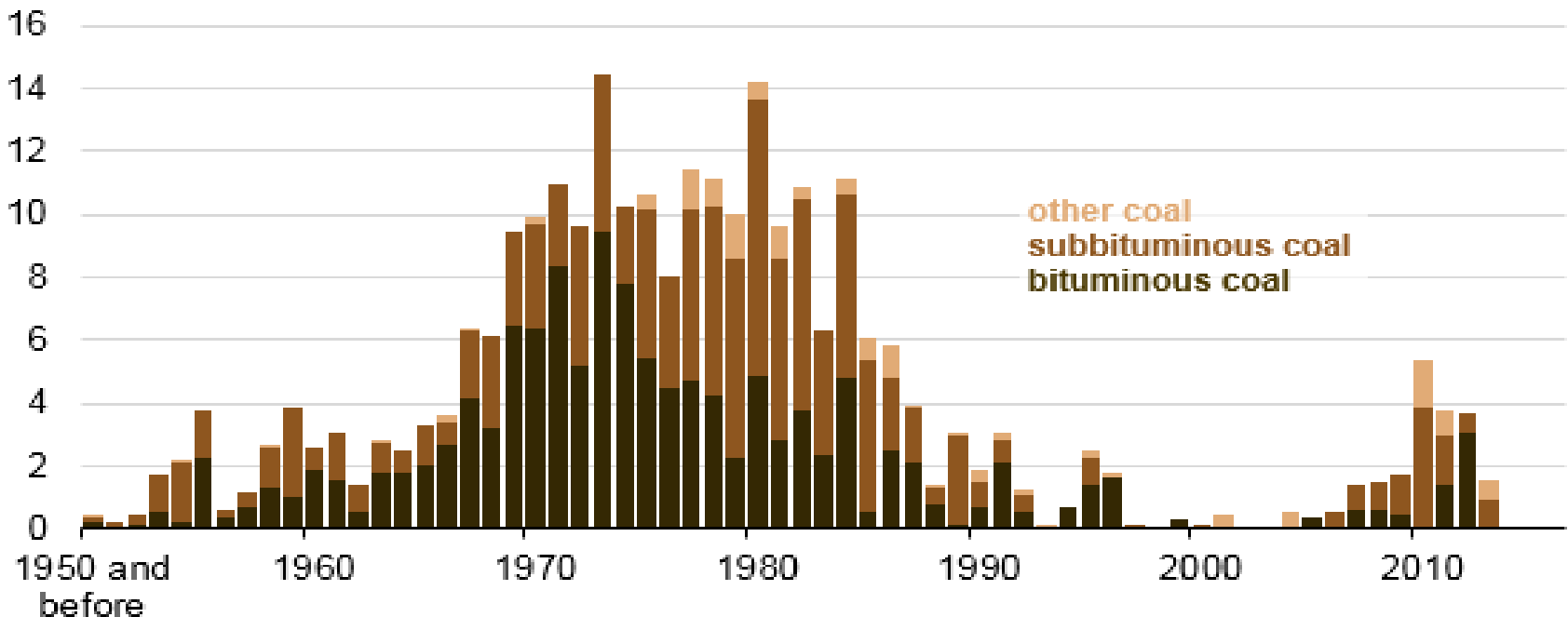
Regulation is a minor driver of coal plants closures

- In 2015, there was a spike of coal plant retirements – mainly older and smaller plants – when new regulations for mercury and other air toxins went into effect.
- Given the current administration's stance, and the legal defeat of Obama's Clean Power Plan, no meaningful regulations are likely to be enacted in the near term.
- Other environmental regulations enacted under the Obama administration to increase compliance costs are a small part of the story of coal retirements taking place.

Age of fleet is another consideration

- Most U.S. coal-fired capacity (88%) was built between 1950 and 1990, and the capacity-weighted average age of operating coal facilities is **39 years**.
- The age of a plant impacts retirement decisions. Investing in upgrades or compliance costs may not make economic sense in light of a shorter payback period. Also, older plants have less capital tied up in them to manage or write off than newer ones, making early retirement more palatable.

U.S. utility-scale coal-fired electric generating capacity by initial operating year
gigawatts



Coal retirements are not occurring uniformly across the country. Market structures play a key role.

Each of the 50 states regulates electricity generation and distribution in its jurisdiction. Broadly speaking, there are three relevant regulatory structures:

- “Regulated” states:
 - Vertically integrated, investor-owned utilities have a monopoly over electricity generation, transmission, and billing.
 - State regulatory authorities approve a utility’s investments and allow it a pre-determined rate of return over the asset’s life.
- “Restructured” states:
 - The monopoly system of electric utilities has been replaced with competing sellers. Investor-owned utilities can’t own generation.
 - Generators sell electricity either to utilities or to retail service providers via market mechanisms (such as power exchanges).
- Non-profit utilities in both regulated and restructured states:
 - No regulation by the state oversight authority. They own or purchase generation for their members or constituents.
 - E.g., rural electric cooperatives and municipally-owned utilities.

Impact of electricity market structures on coal retirements

- Owners of coal plants in restructured states are more likely to retire their plants due to market forces because they can't compete against other assets based on price alone.
- The story is more complicated with non-profit utilities and vertically-integrated utilities:
 - These utilities are, for the most part, insulated from market forces because they are able to recoup generation costs from their customers.
 - The higher cost associated with uneconomic coal plants are shifted to ratepayers in the form of higher electricity bills.
 - Still, these utilities are not insulated from ratepayer pressure so uneconomic coal plants are still vulnerable to retirement if they're seen as contributing to higher electricity bills.