

Chart of the Week #2025-02

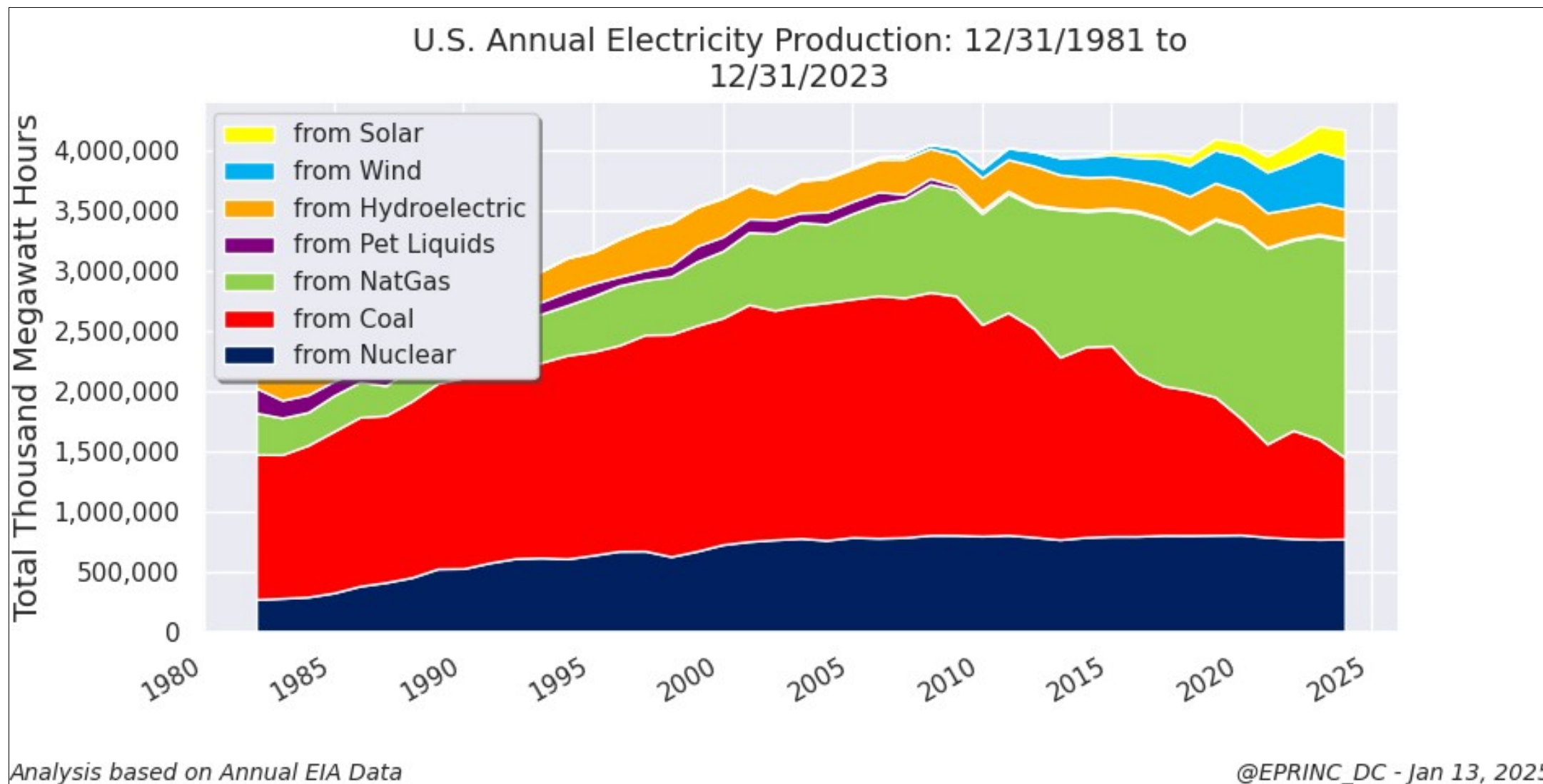
U.S. Electricity Production and Prices The Long View



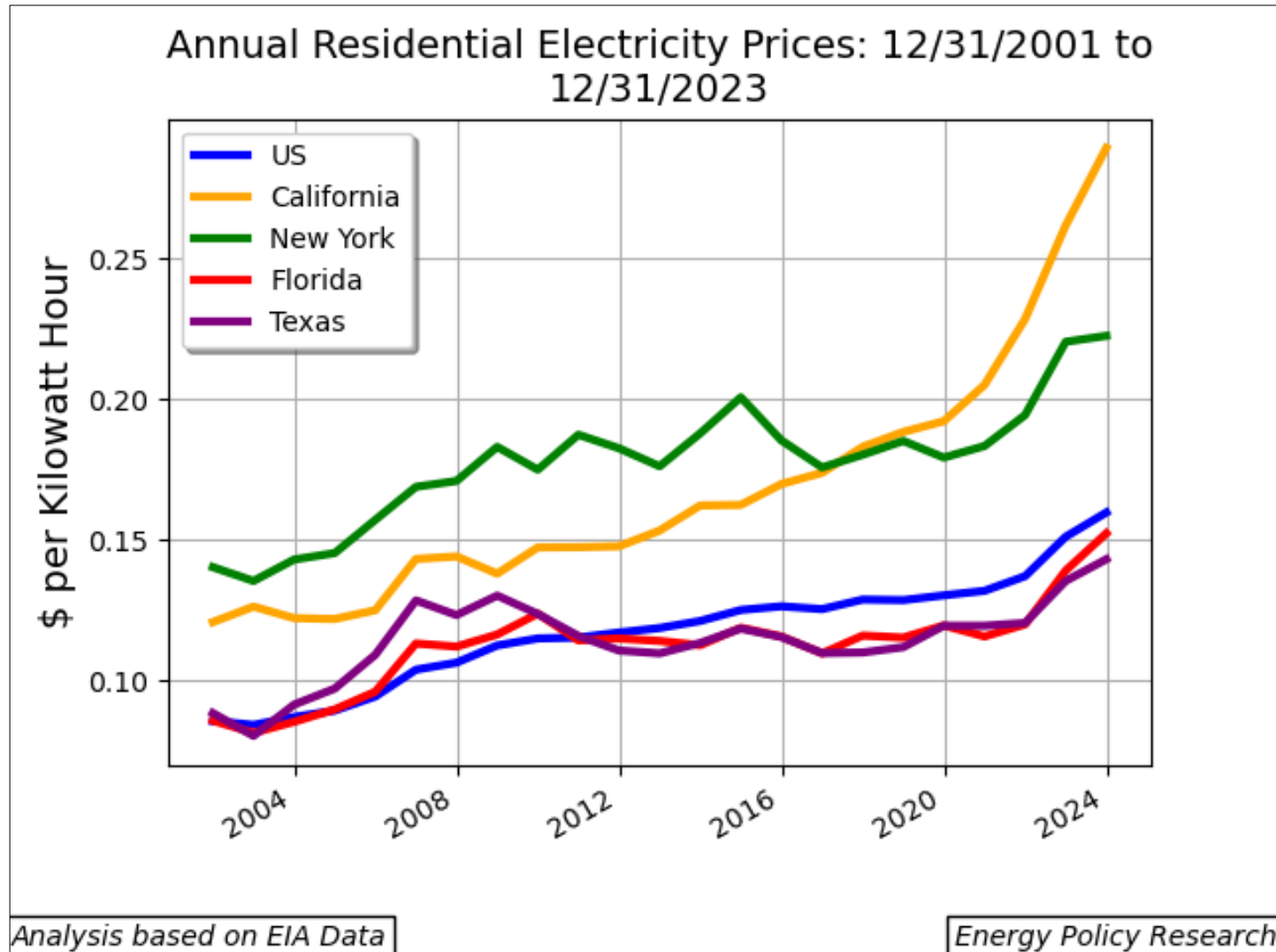
**Max Pyziur
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U.S. Annual Electricity Production



U.S. Annual Residential Electricity Prices



U.S. Electricity Production and Prices

The Long View



- Since 1981, U.S. electricity production has gone through two distinct epochs: during the first period, from 1981 to 2002, total electricity production grew at an annual rate of 2.4%, from 2.3 trillion kilowatt hours (kWh) to 3.76 trillion kWh. During the second, from 2003 to 2023, U.S. annual electricity production growth plateaued to a rate of 0.5%, reaching 4.17 trillion kWh in 2023.
- With relatively stable prices, electricity demand grew during the first period. Beginning in 1992 EPA and other U.S. agencies began enacting numerous energy efficiency mandates and incentives, the most notable program being Energy Star. With a multitude of appliances, lighting systems, and other electrical and electronic systems vying for the Energy Star label, consumers have increased utilization but electricity requirements remained flat.
- Through 2003, coal was the dominant energy resource making up over 52% of total generation; nuclear-powered and natural gas-fired generation were distant seconds at 17.5% and 14.1%, respectively, of total power.
- New extraction technologies (hydraulic fracturing combined with lateral drilling, generally known as fracking) that came into full use in the late 2000s led to a bounty of inexpensive natural gas. Coupled with this there have been increasing greenhouse gas (GHG) reduction mandates (also known as renewable portfolio standards, or RPS). Combined, they have led to the reduction (or even elimination in some jurisdictions) of coal-fired power. Coal is now 16.2% of total generation while natural gas has risen to 43.3%.
- In addition, many of these RPS have motivated the development of solar and wind power. During 2023, they accounted for 5.7% and 10%, respectively, of total power.

U.S. Electricity Production and Prices

The Long View



- While power demand has been flat overall since 2003, prices in different jurisdictions have shown variability. Notably, California, with the most aggressive state-wide renewable portfolio standards, has seen the largest increases in U.S. residential electricity prices
- Texas has also enacted an RPS that began in 1999. However, the state's residential power prices have been generally flat and low. Texas, in particular, makes extensive use of production tax credits that favor the development of wind generation. While the state's power authorities have generally managed to integrate wind's intermittency with dispatchable generation, Texas has run into challenges during extreme cold and hot weather; some of these cases have led to extensive blackouts.
- Despite the efficiency gains that have been achieved in the last few decades, forecasters are anticipating the need for more power. Demand is expected to come from the increased number of electric motor vehicles, residential and commercial heating electrification, and especially from the rise in the use of power-intensive generative artificial intelligence (AI). There is considerable uncertainty as to how much, but all forecasts indicate show the expectation of a distinct upward shift from the last twenty years.
- This slide deck is available at: <https://eprinc.org/chart-of-the-week/>
- For more information on these charts, please contact Max Pyziur (maxp@eprinc.org).