Energy Literacy & The Future

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Humanity and Energy

Growing Demand

People want to climb the Energy Ladder

Energy use: Vital → Advanced

Income: Low → High

~2 BLN people

Purpose	Fuel
Cooking & Heating	Biomass
Lighting	Candles

Majority of World

Purpose	Fuel
Lighting	Kerosene Candles
Refrigeration & Basic Appliances	Electricity Batteries
Transport	Oil

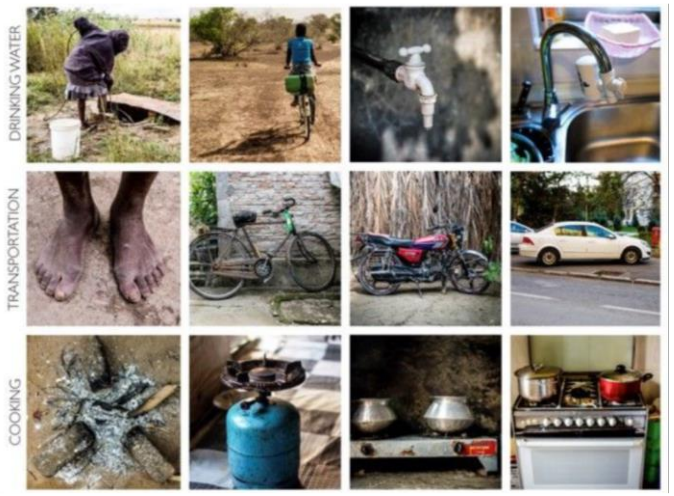
Purpose	Fuel
Cooking	Biomass Kerosene LPG Biogas
Heating	Biomass Coal

Developed World

Purpose	Fuel
ICT, Cooking Appliances	Electricity

Purpose	Fuel
Lighting	Electricity
Refrigeration & Basic Appliances	Electricity
Transport	Oil

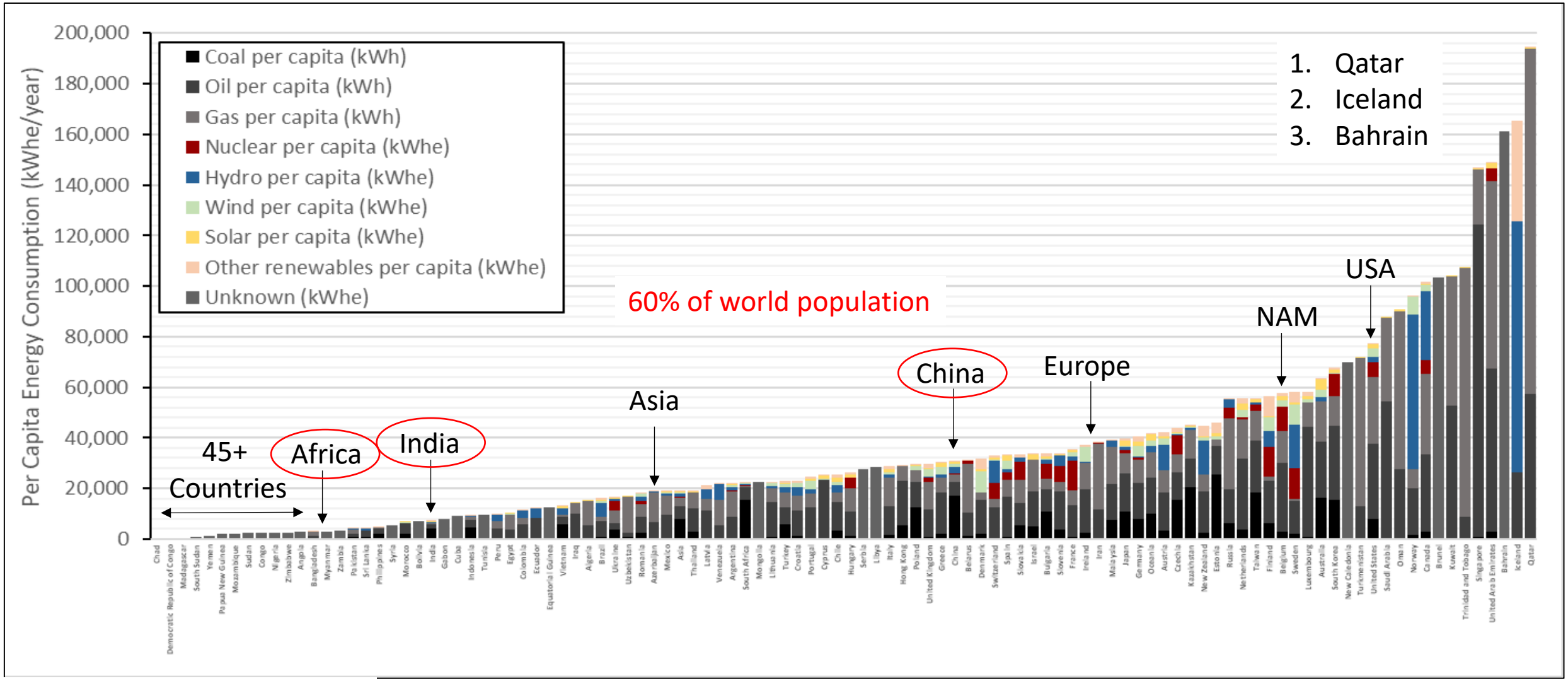
Purpose	Fuel
Cooking	Gas Electricity
Heating	Gas Coal



Sources: *Factfulness,* Hans Roeling

I. Phillips, SPE DL 2022

Primary *Per Capita* Energy Use (2022)

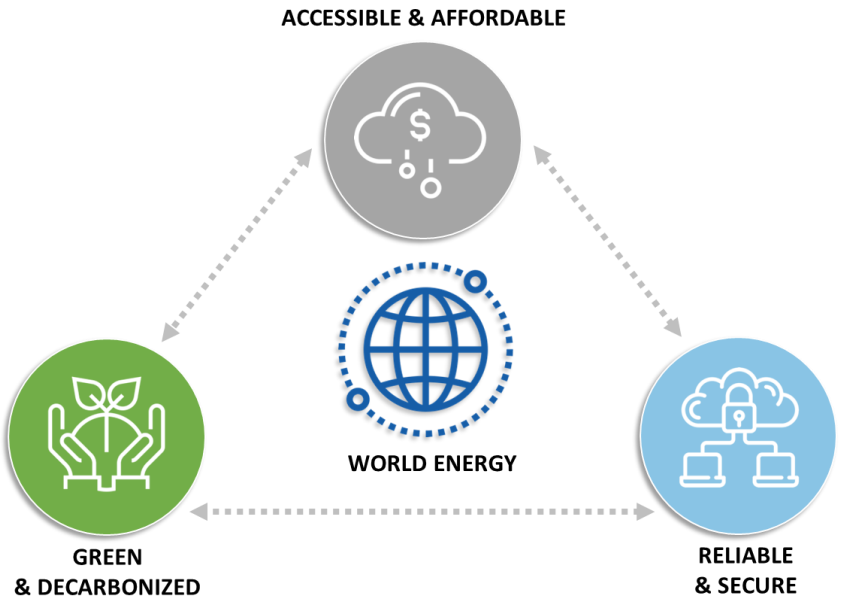


Adapted from OurWorldInData

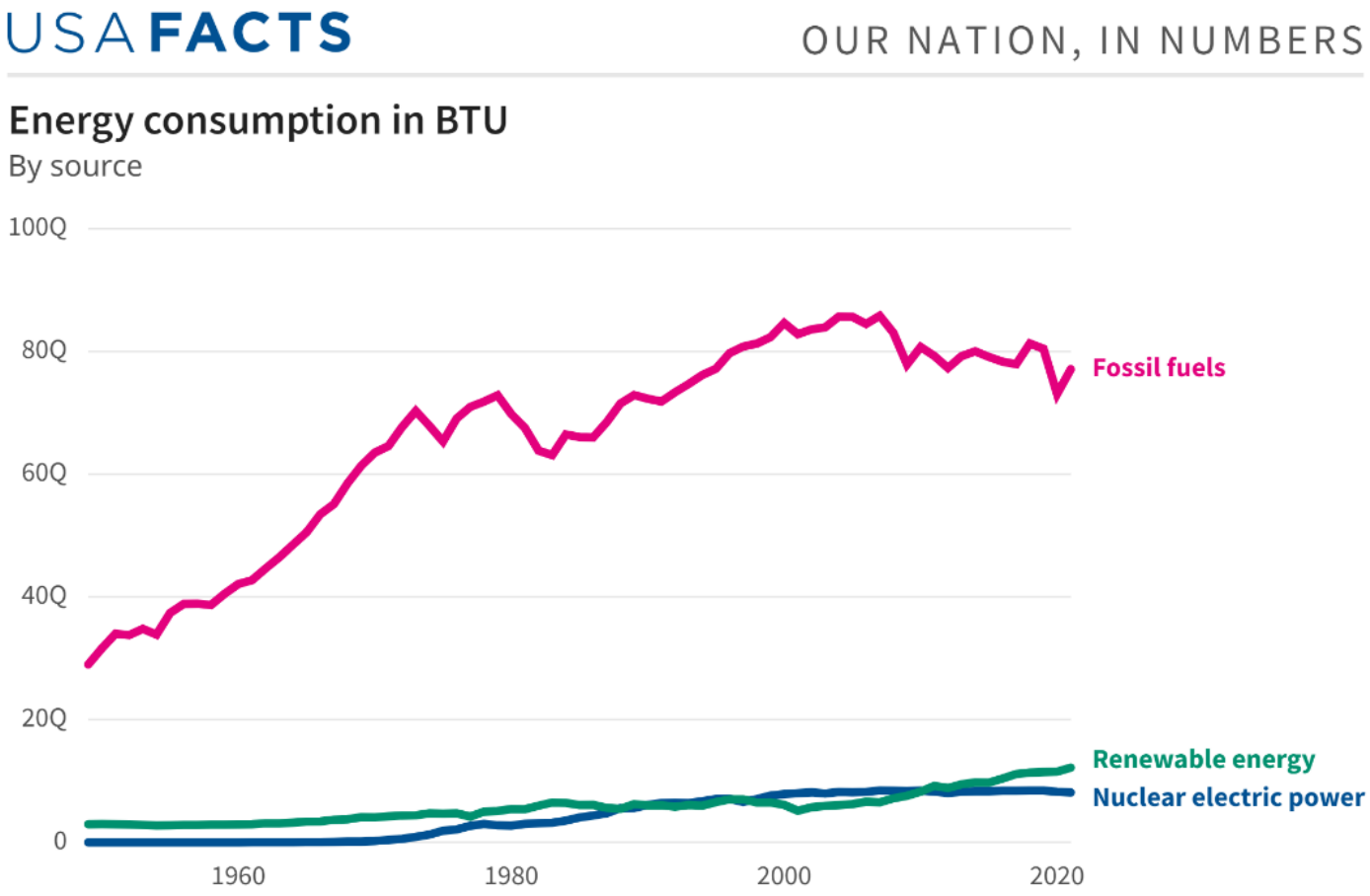
Energy Opportunity

- All forms of energy needed to meet challenge
  - Accessible & Affordable
  - Secure & Reliable
  - Green and Decarbonized
- It will take energy to solve challenge
  - Develop technologies
  - Energy efficiencies
  - AI
- The US is uniquely positioned to solve today's problems and lead the world forward

The Energy Opportunity

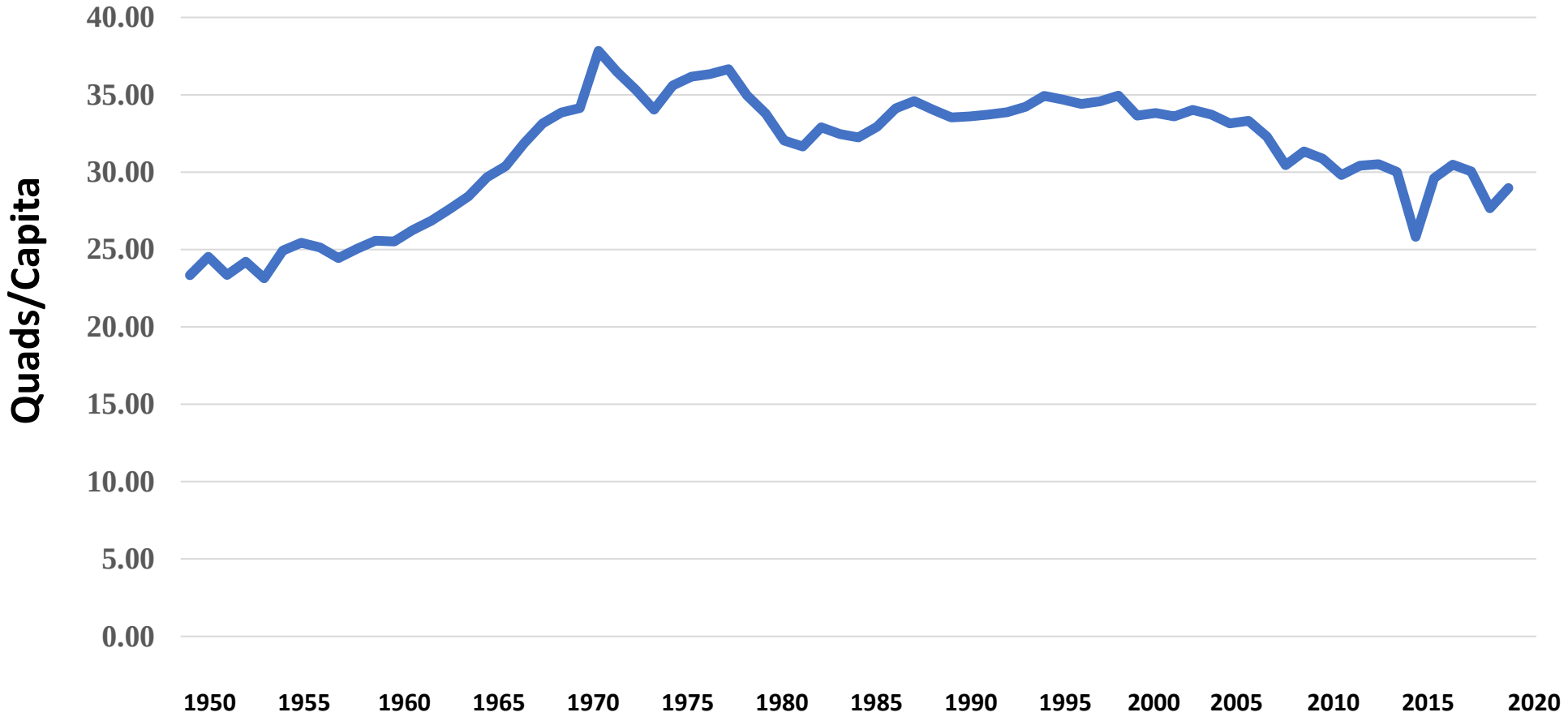


US Energy Consumption



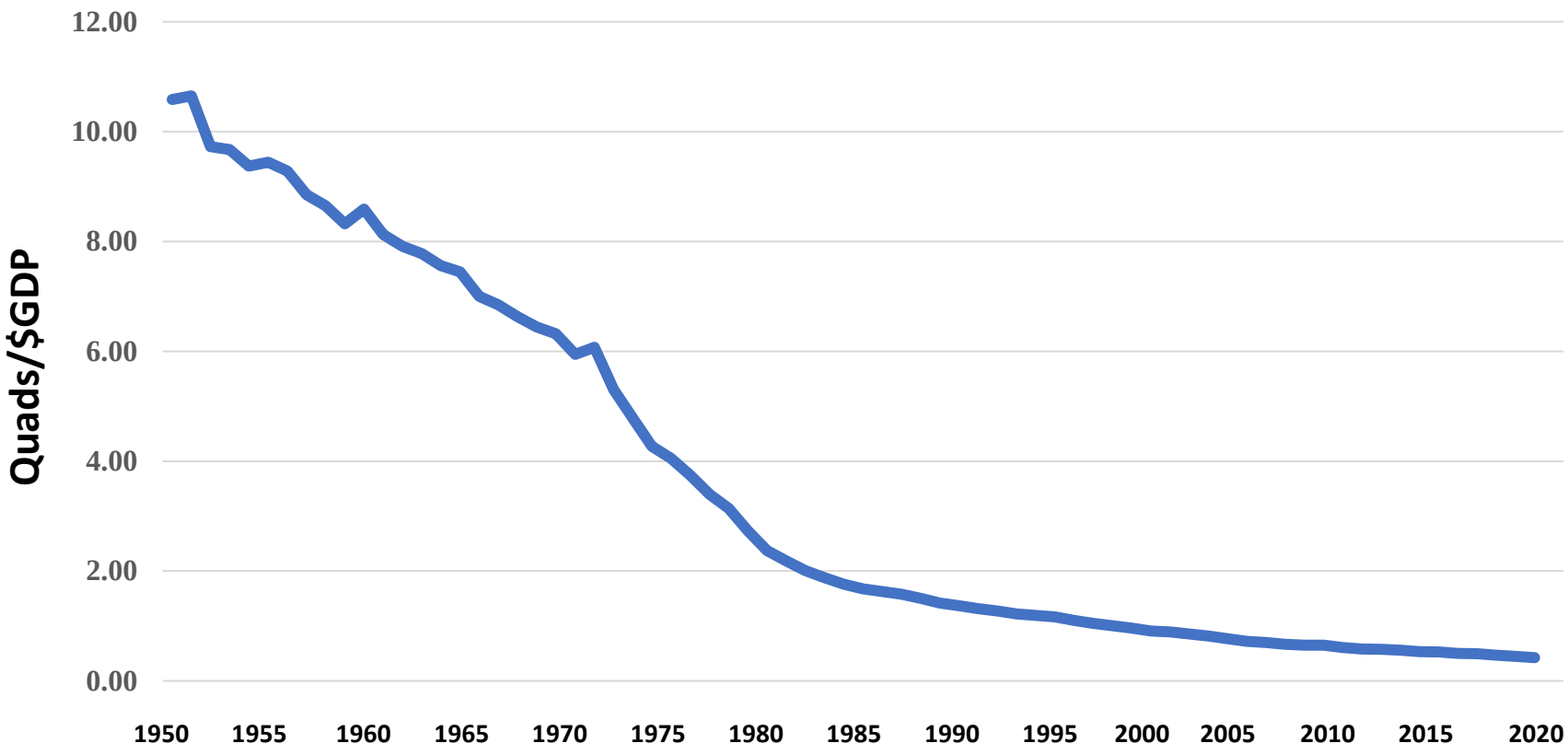
Impact of Abundant Energy

Total Energy Consumption
BTU / Capita since 1950

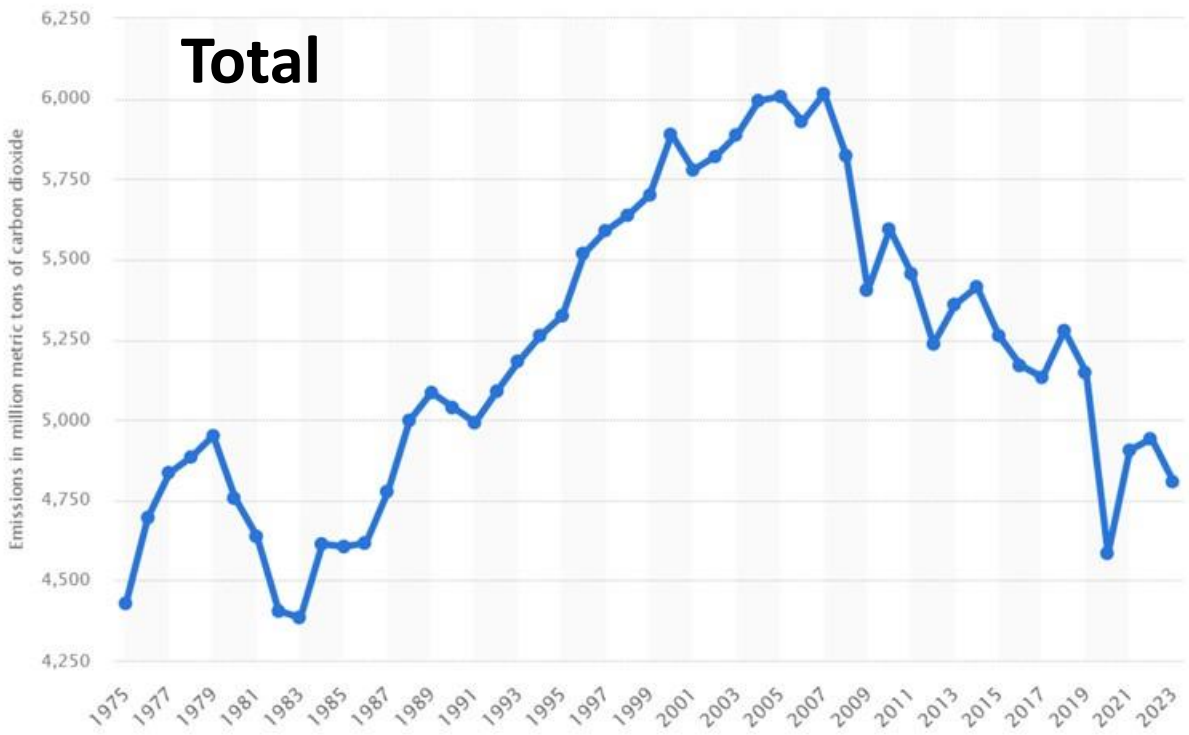


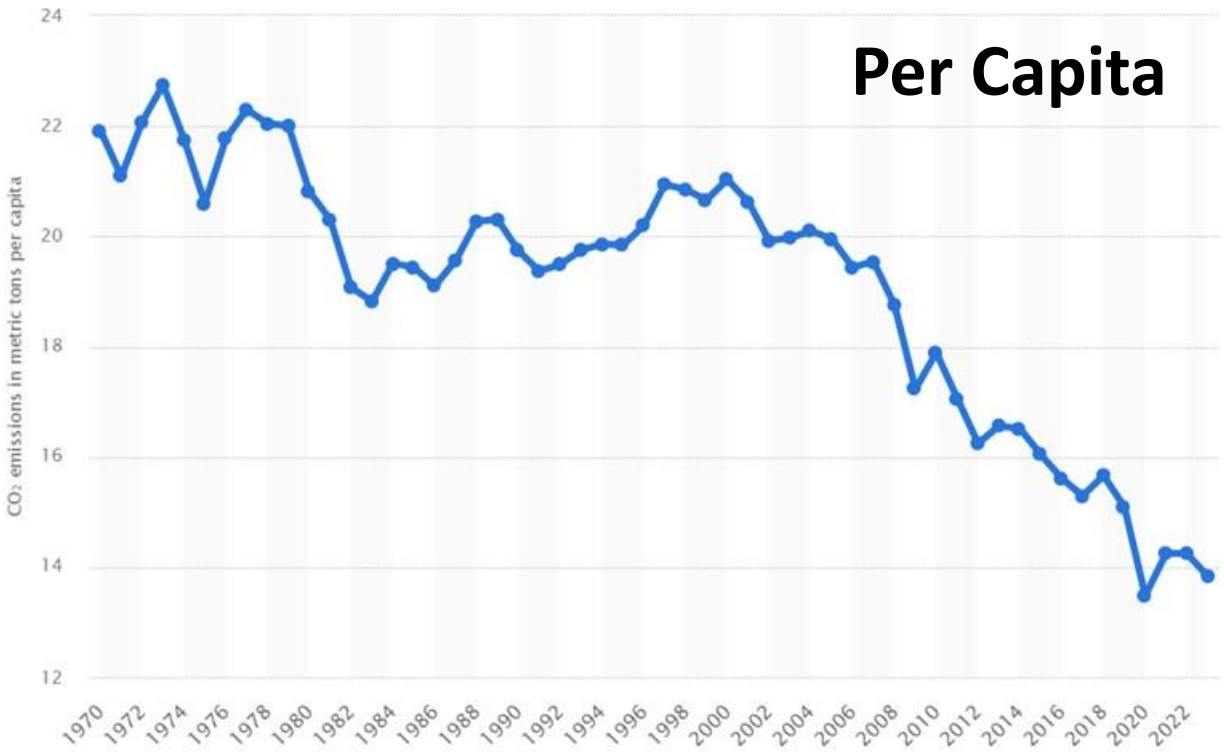
Impact of Affordable [Cheap] Energy

US Total Energy Expenditure
BTU / GDP since 1950

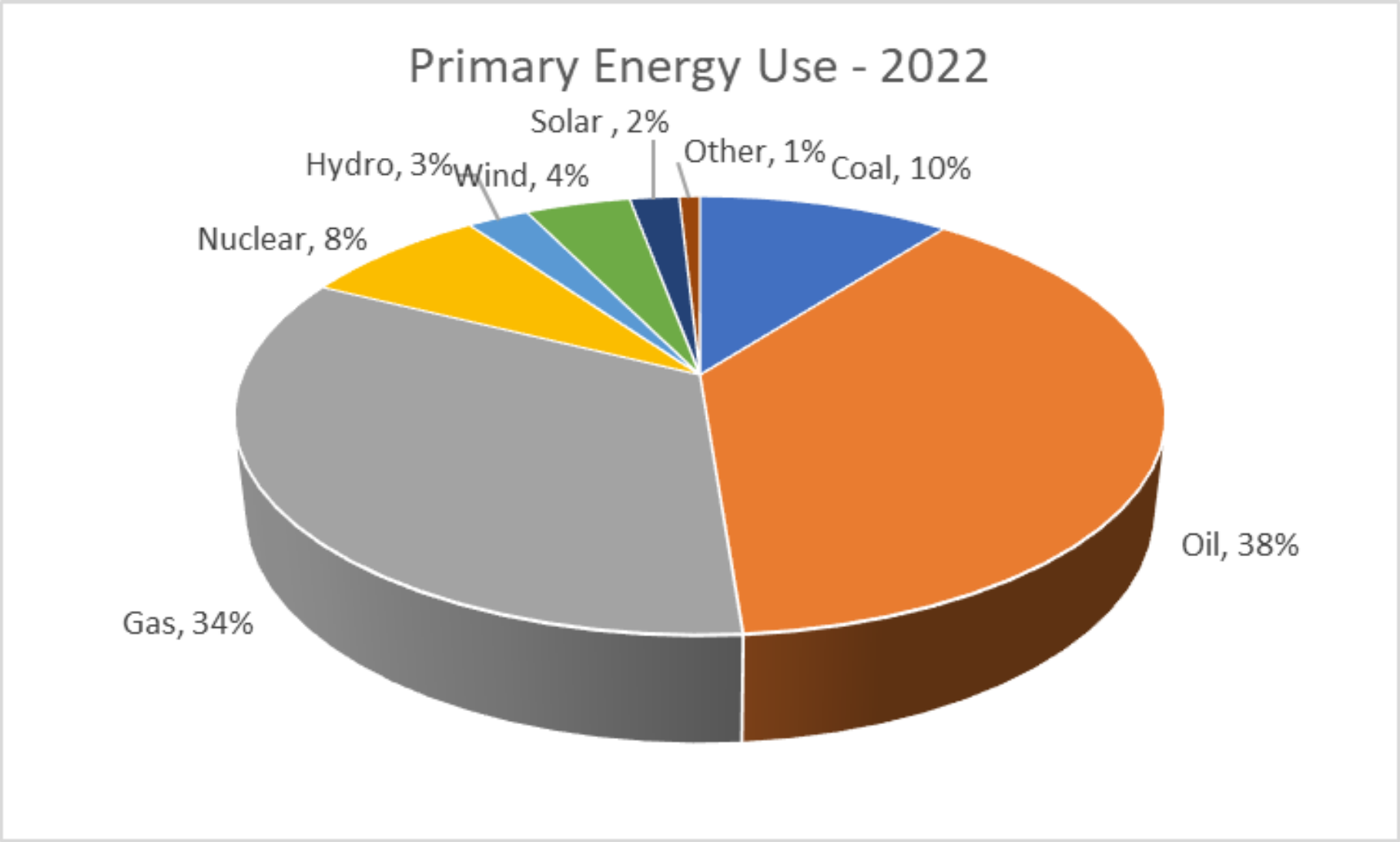


Impact on CO2 Emissions (1970 – present)





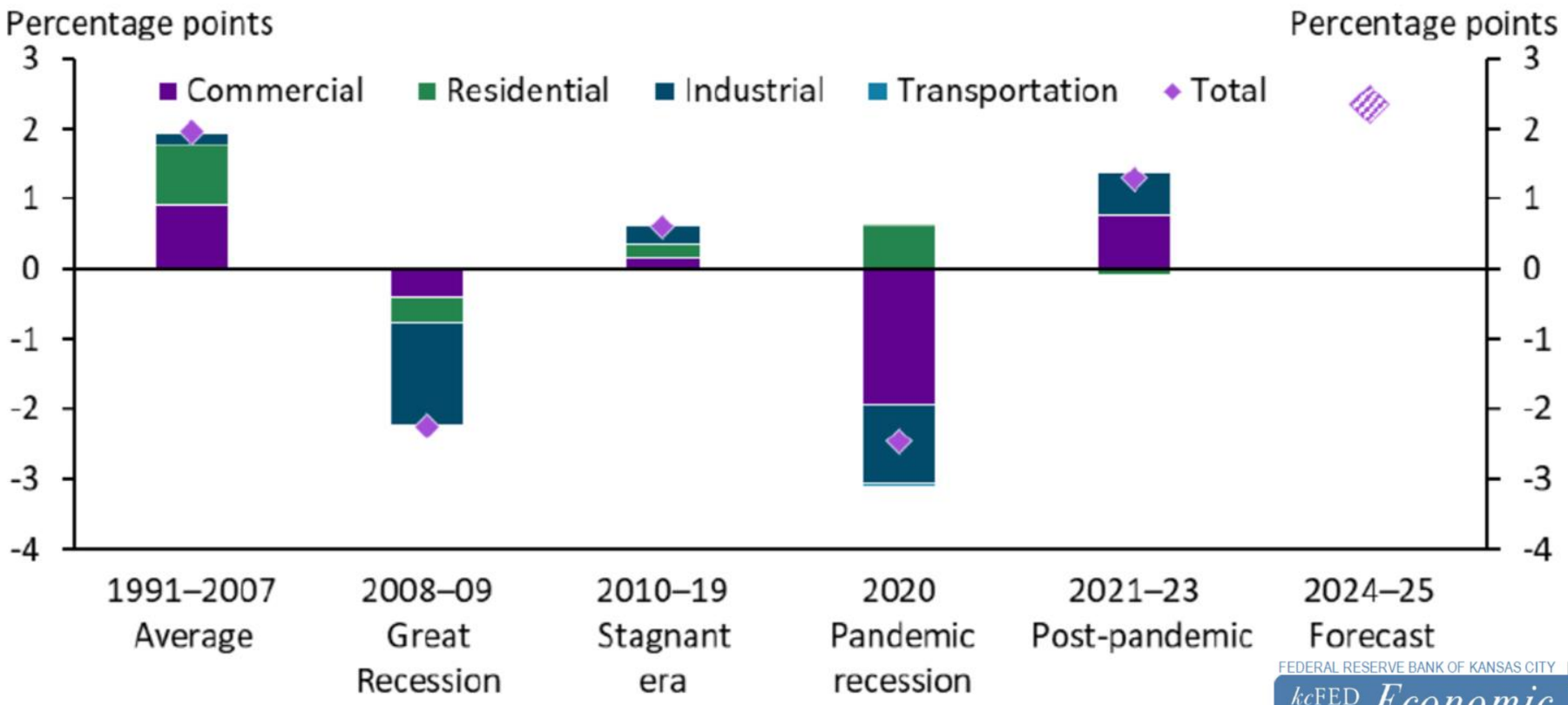
United States Primary Energy Sources (2022)



Electricity demand growing rapidly in US

=> Push to electrify everything

Chart 1: After a decade of stagnant growth, U.S. electricity demand has surged, driven largely by commercial demand



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kcFED Economic Bulletin

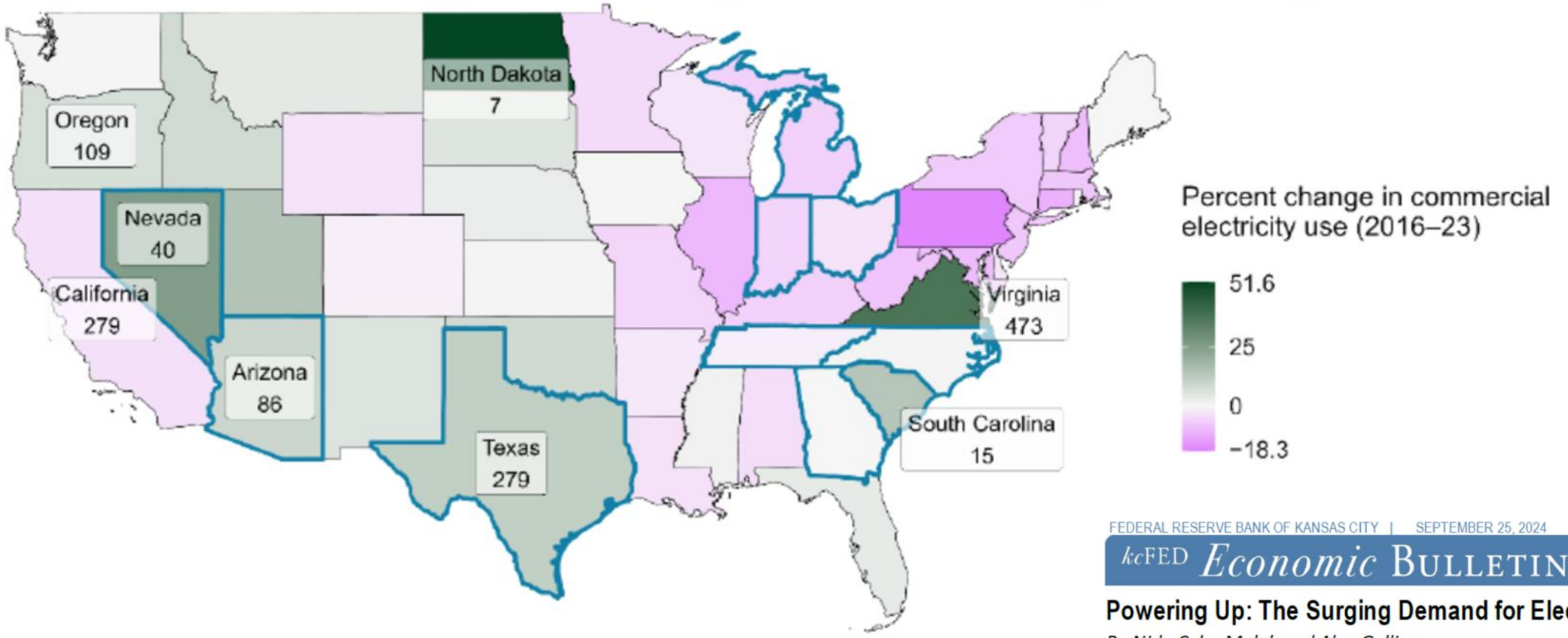
Powering Up: The Surging Demand for Electricity

By Nida Çakır Melek and Alex Gallin

Led by the growth in AI / Data Centers

=> 8% of demand in 2030 will be for Data Centers

Map 1: Data center boom appears to be an important factor in driving commercial power demand



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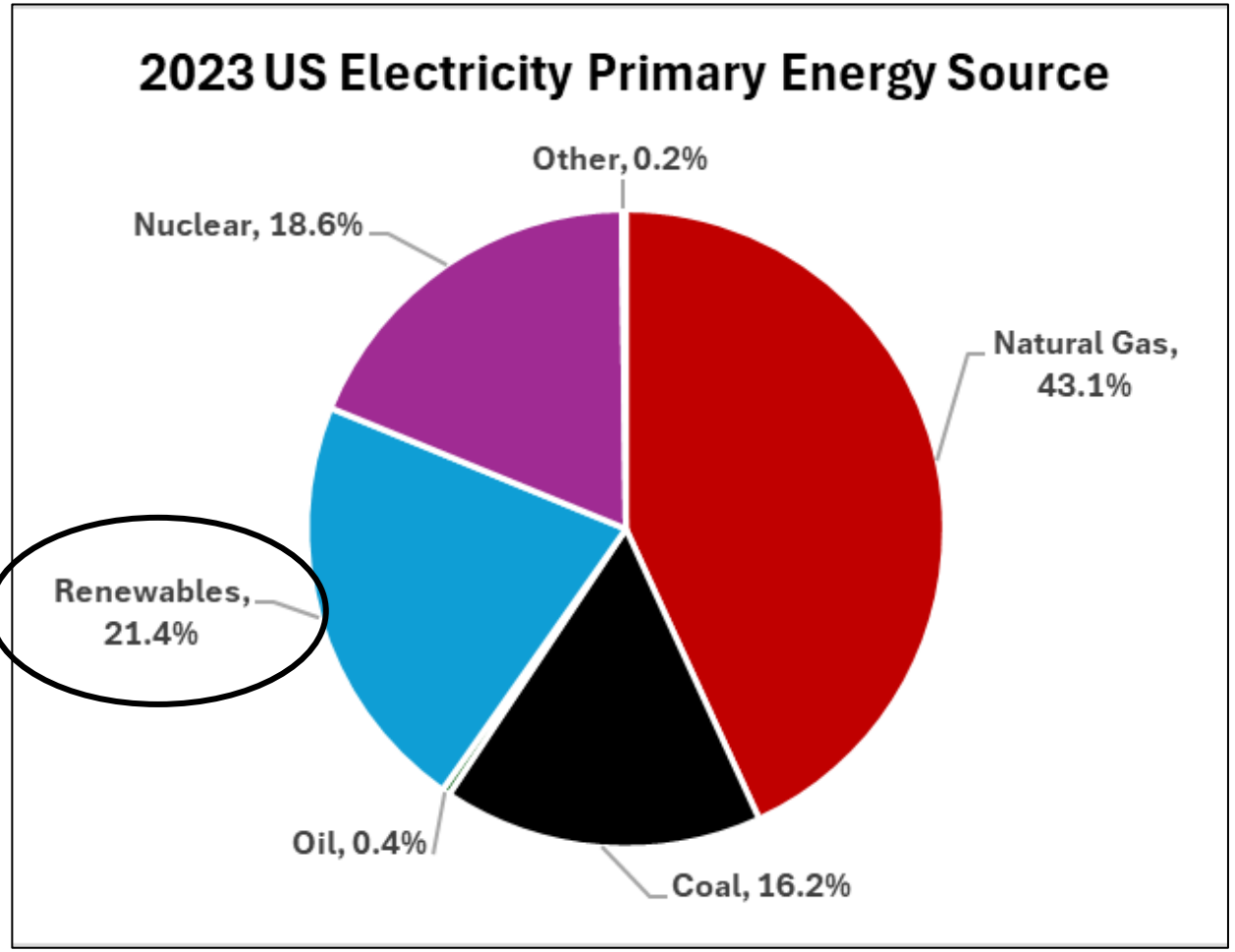
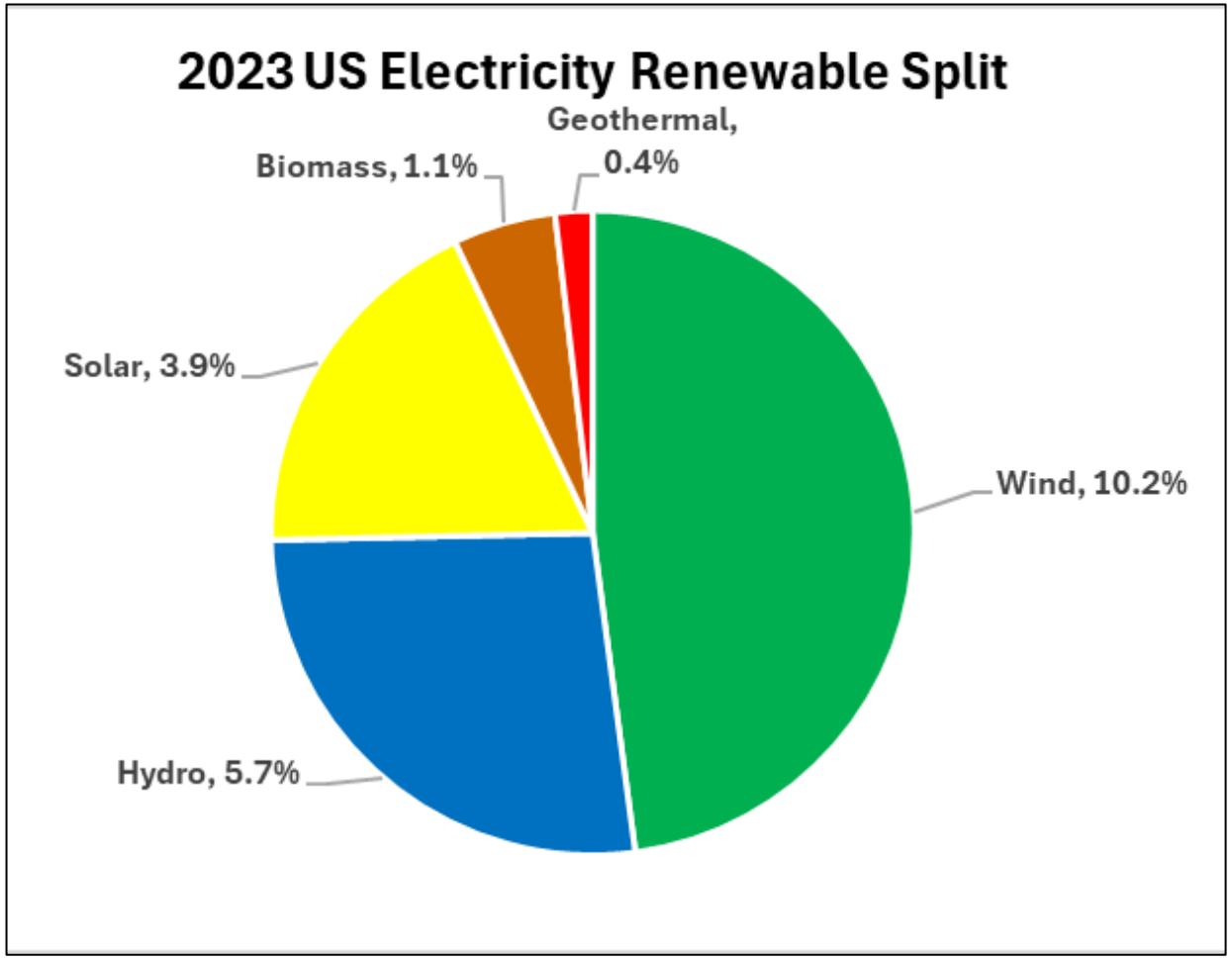
2023 US Electricity Primary Energy Source

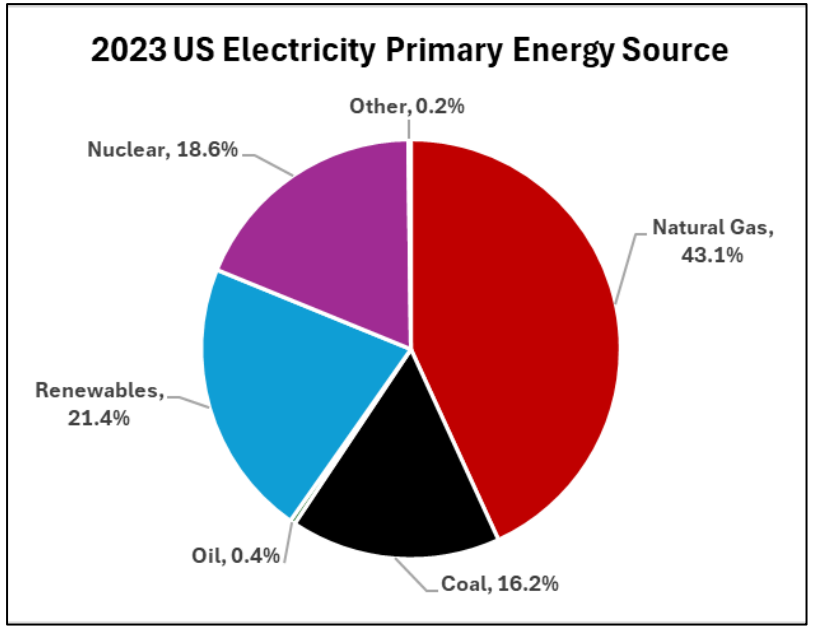




US EIA, Feb 2024

Key Enablers to Meet Demand

- Dispatchable/Accessible
- Affordable
- Constant (i.e. not intermittent)
- Sustainable



Promising Technologies

- Geothermal
  - Super hot rock
- Hydrogen
  - Cost, scale, storage, etc
- Nuclear (Fission)
  - Small Modular Reactors (SMRs)
- Nuclear (Fusion)
  - Mid to late century

➢ All have potential to provide sustainable baseload energy (electricity and power)

Thank You!

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