



Energy Fact and Fiction: Hydrocarbons, Renewables, and Alternative Vehicles

Steve Goreham



Our Energy Journey Today

Energy and Modern Society

Fact and Fiction about
Pollution and
Climate Change



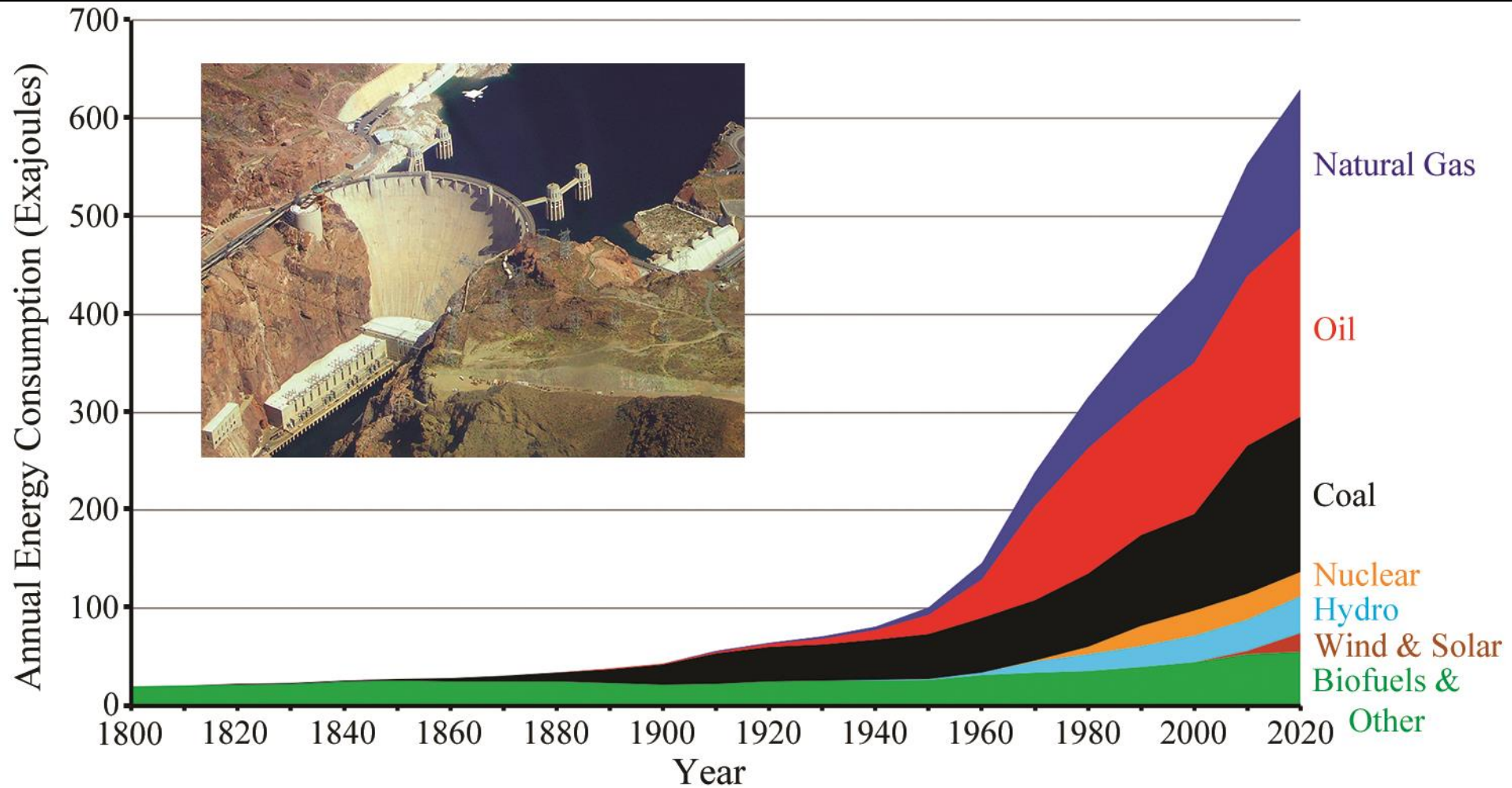
Hydrocarbon and
Renewable Energy

Alternative Vehicles

Possible
Energy
Futures



Our Golden Age of Low-Cost Energy



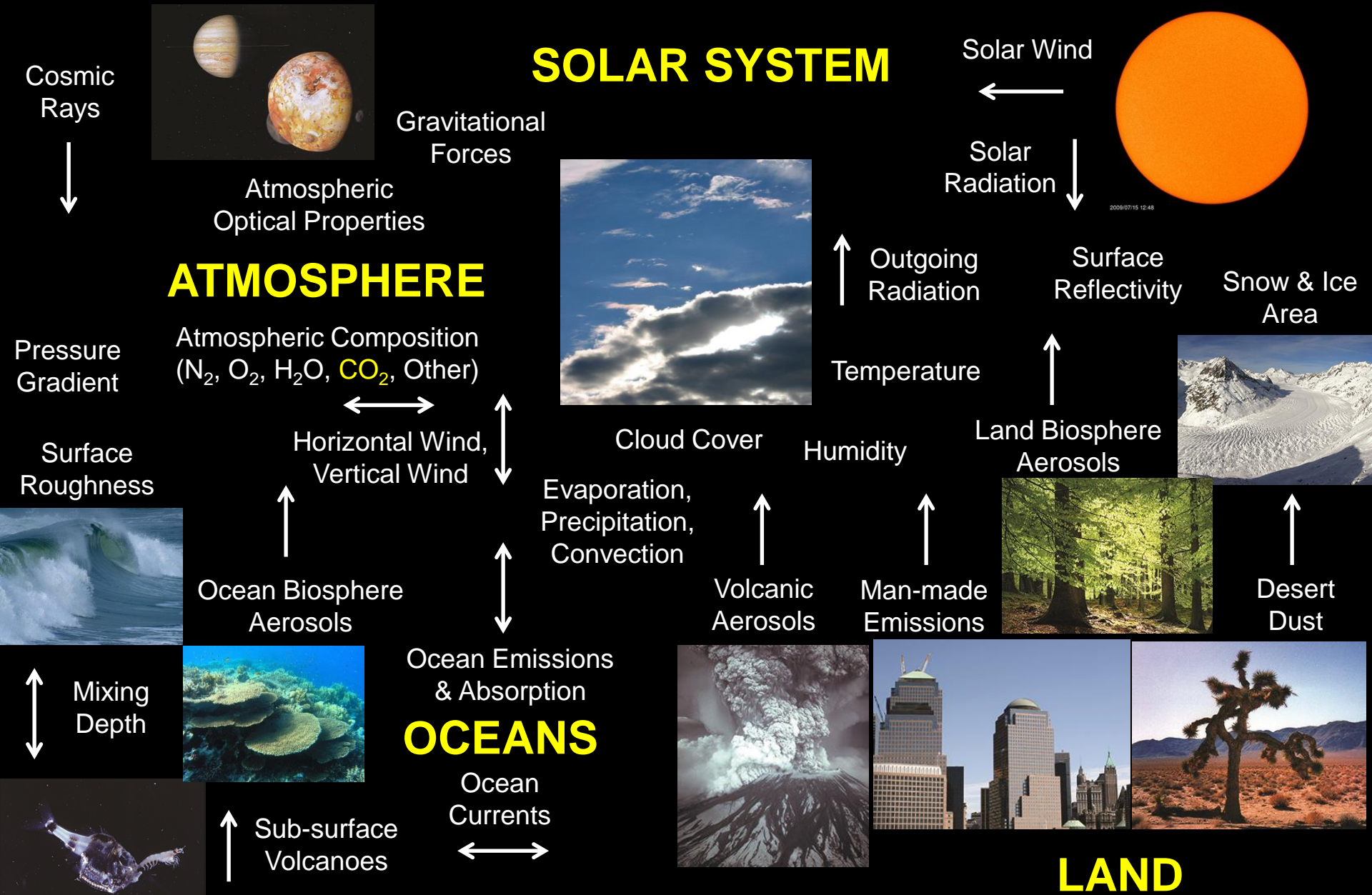
Smil (2010), BP (2020), IEA (2020)

Carbon Dioxide is NOT a Pollutant!

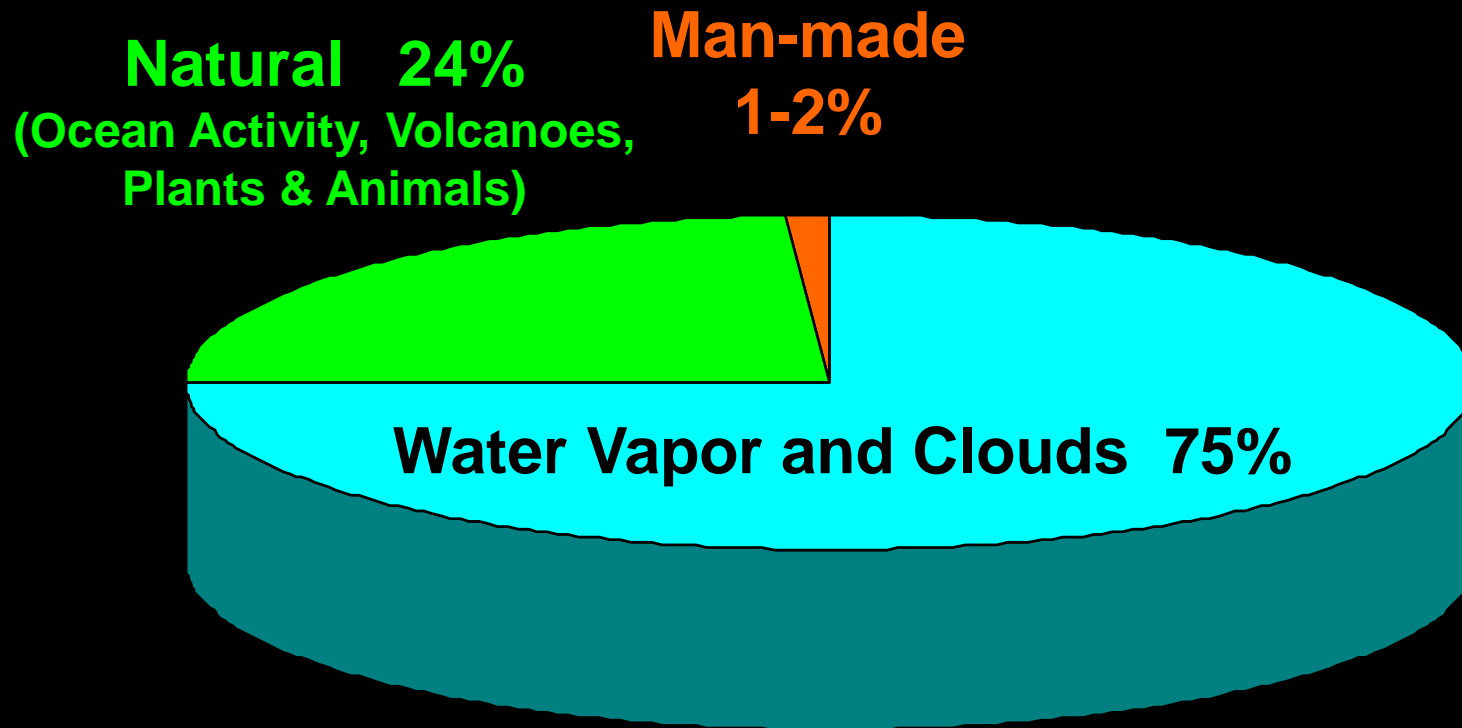
- CO_2 is an Odorless, Harmless, Invisible Gas
- We Inhale Air with Little CO_2 , but Breathe Out 4% CO_2



CO₂: A Small Part of Earth's Climate System



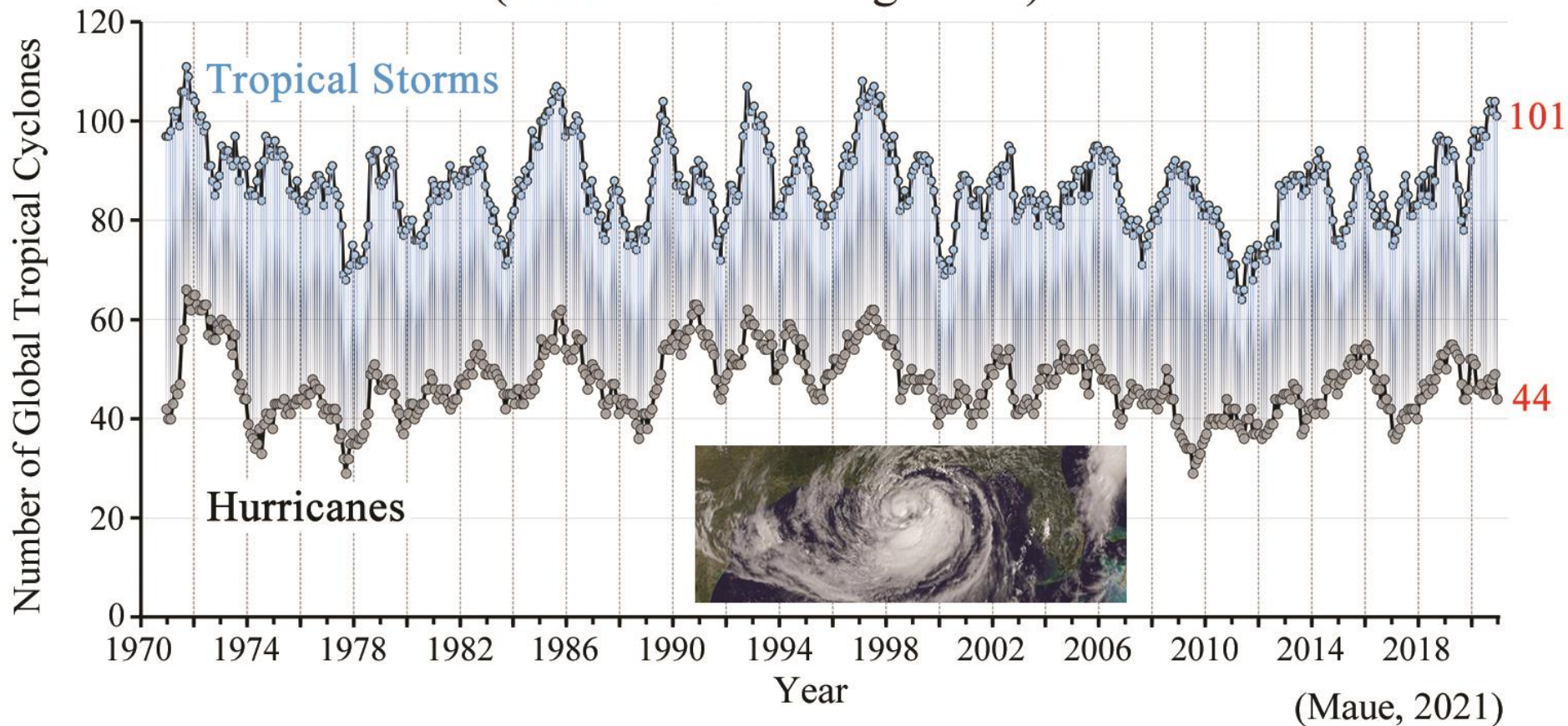
Human Contribution to Greenhouse Effect



Mankind Responsible for about 1 or 2 Parts in 100!

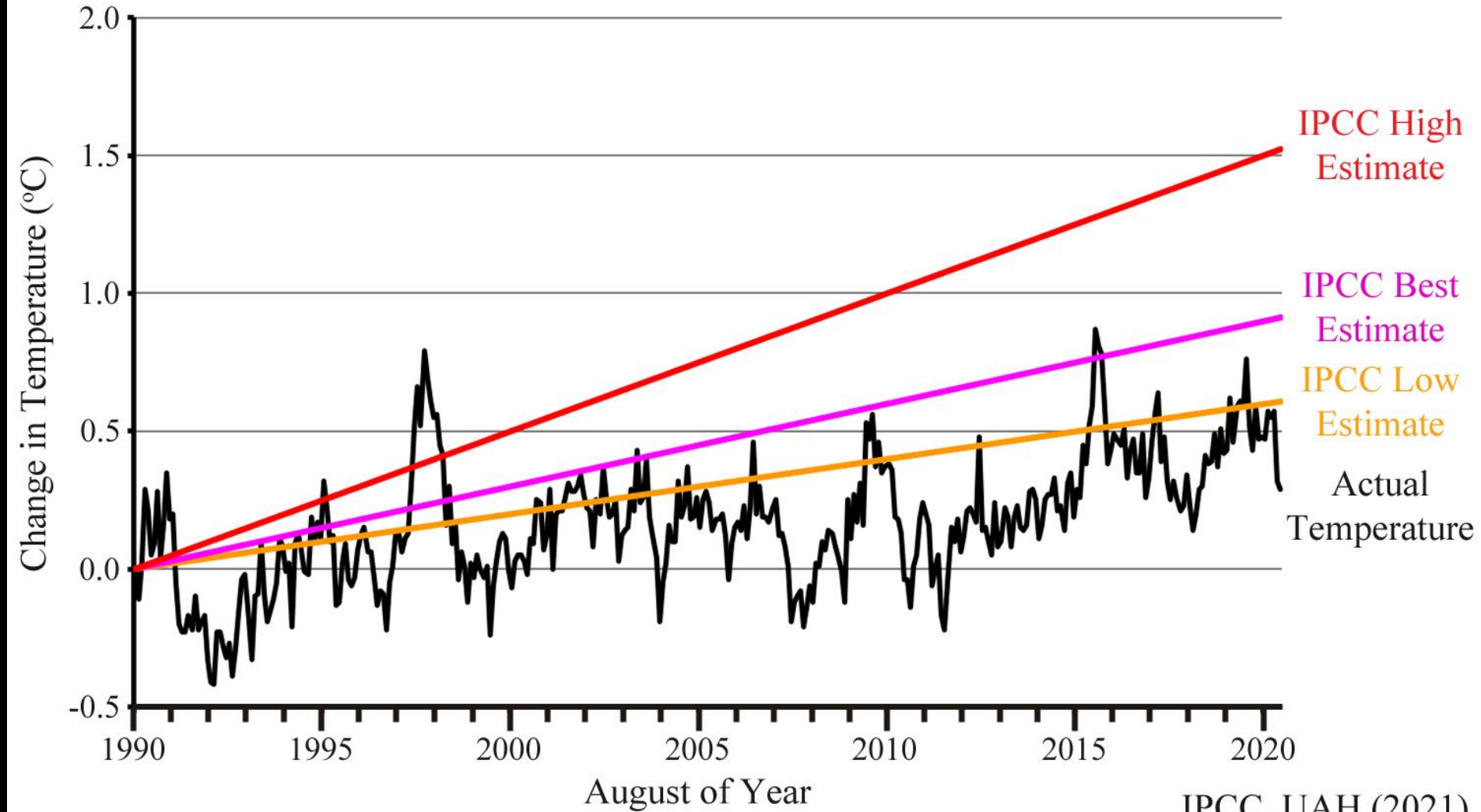
No Increase in Global Cyclone Frequency Or Intensity

Number of Global Cyclones 1971-2020
(12 Month Running Sums)



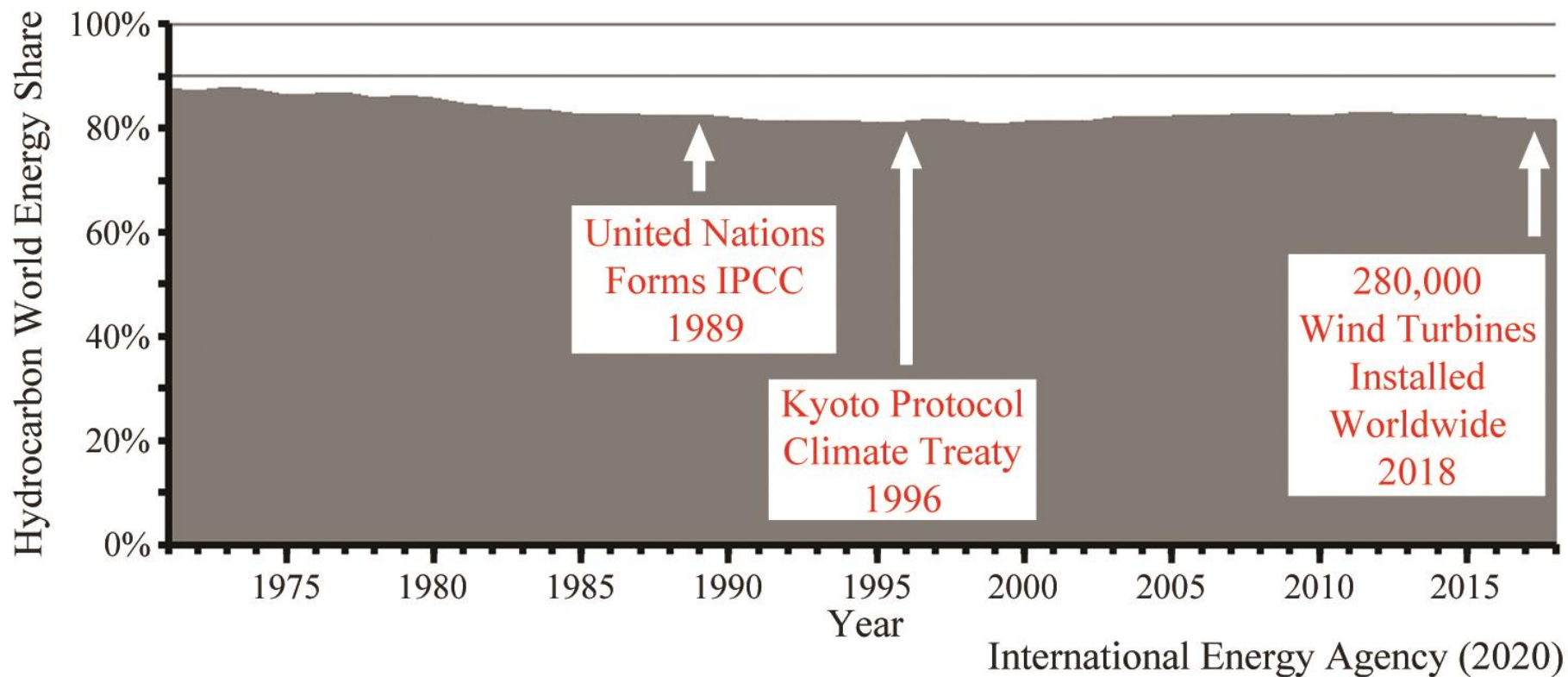
Global Temperatures Below Model Projections

IPCC Projections and Actual Global Temperature 1990-2020



Renewable Spending 2004–2020: \$4 Trillion

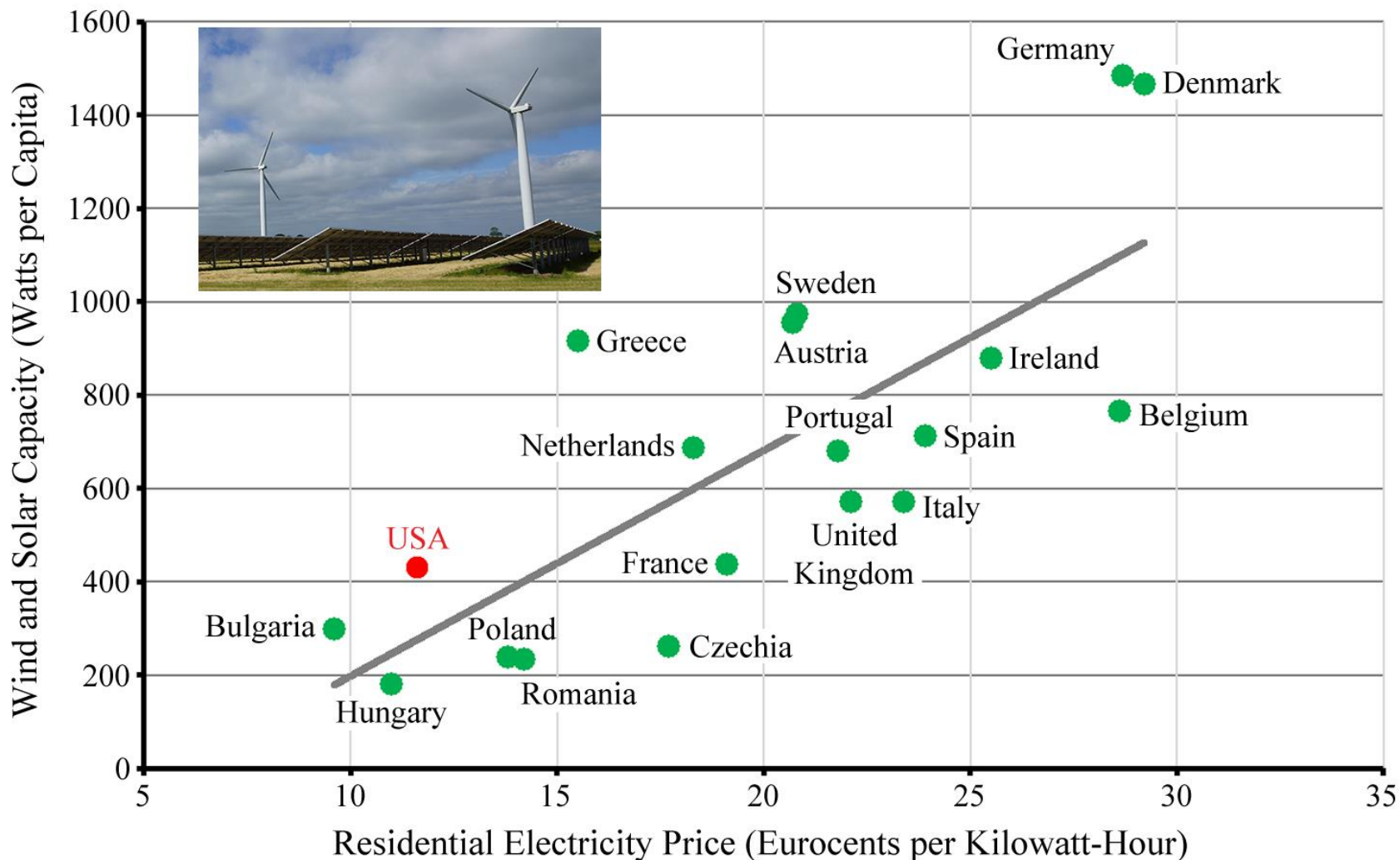
Coal, Oil, and Gas Share of World Total Primary Energy Supply 1971-2018



81% Hydrocarbon Share in 2018 — Same as 1991

Strike Two — Renewables are **Costly**

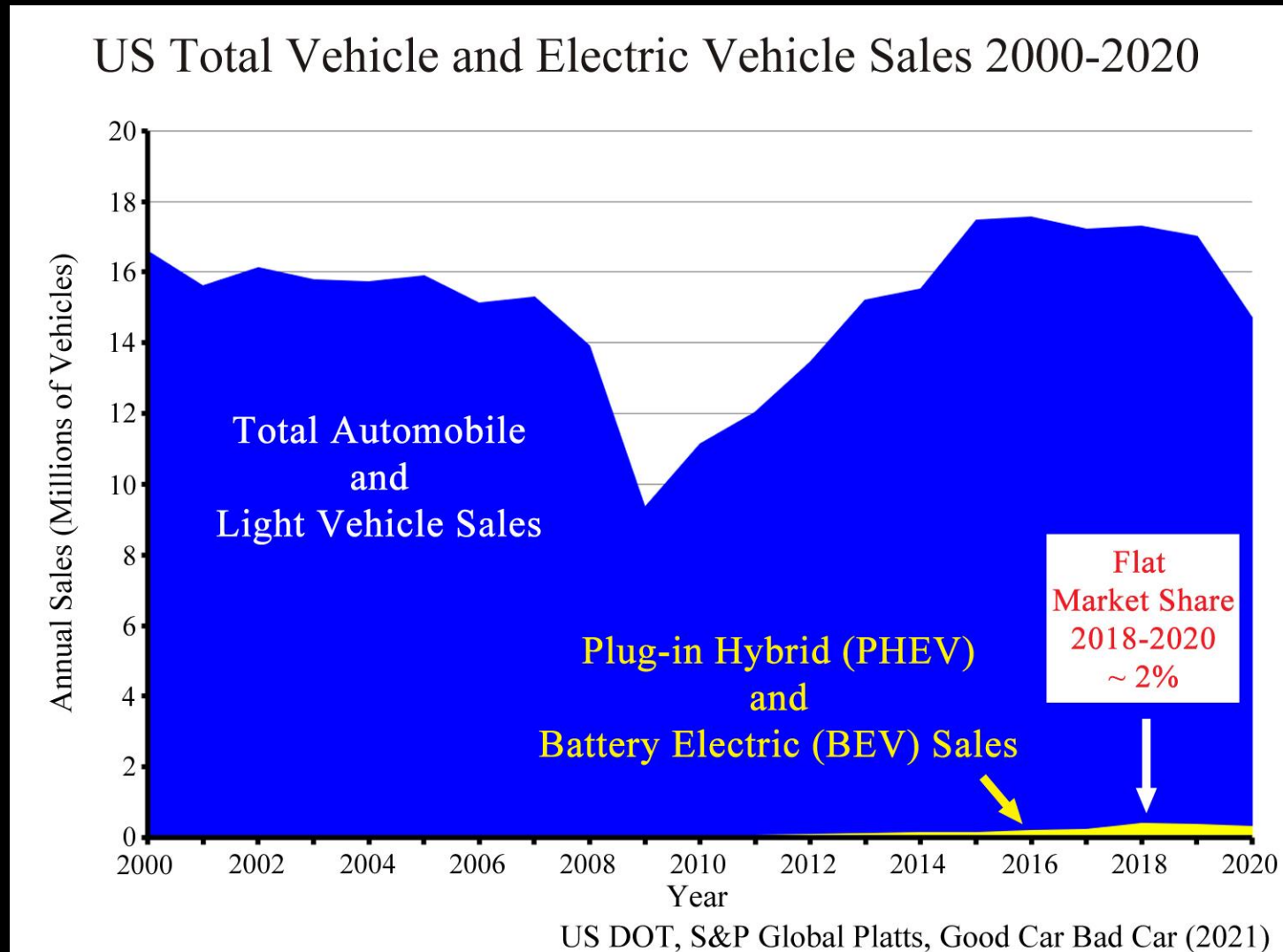
Wind, Solar, and Electricity Prices in Europe



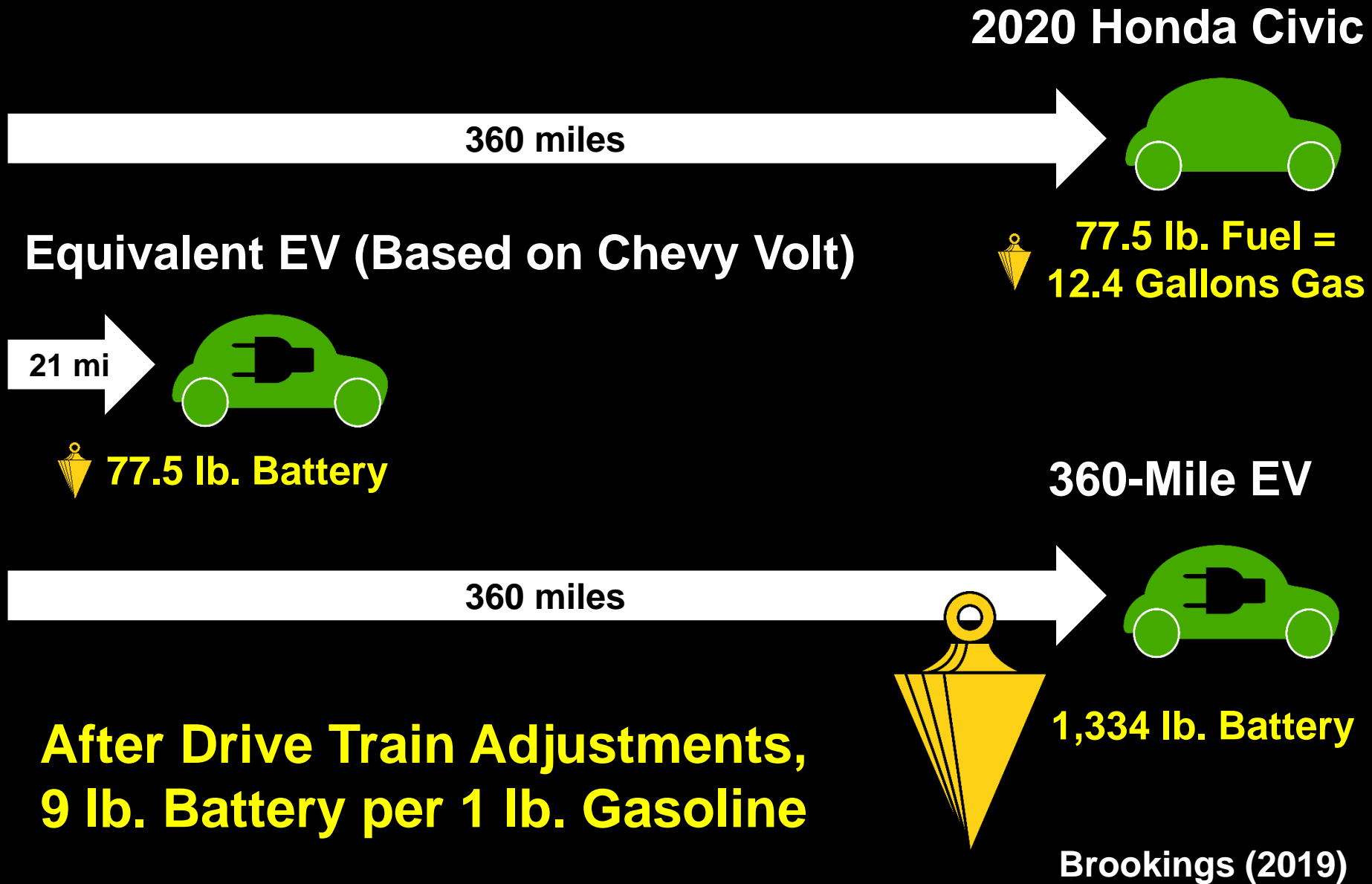
Eurostat, EurObserver, World Bank, EIA (2021)

US Electric Vehicle Share Flat 2018-2020

Over 70% of 2020 US Sales Were Pickup Trucks and SUVs

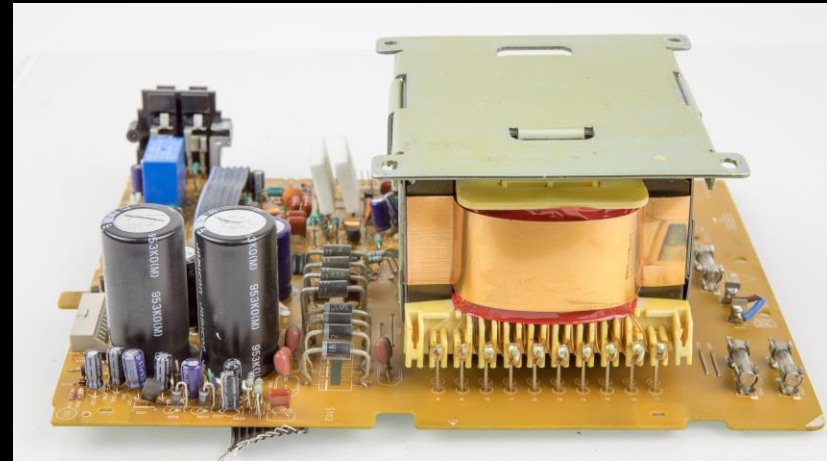


EV Disadvantage — Driving Range



Takeaways — Implications for Transformers

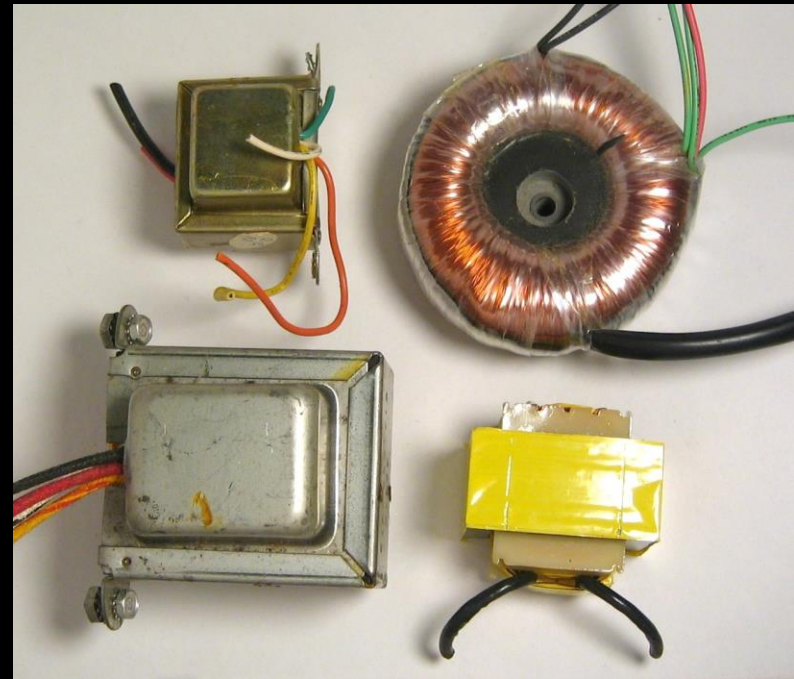
- **No Evidence for Rising Pollution from Energy Use**
- CO2 is Not Pollution
- **Copper, Lithium, Nickel, Cobalt Price Rises**
- **Expect a Coming Shake-Out in Electric Vehicles**
- **“Energy Transition” Will End in Shared Hydrocarbon/Renewable Future**



Corporate Policy: **Sensibly Green**

1. Comply with Environmental Regulations
2. Meet Expectations of Key Stakeholders
3. Conserve Energy Like Any Other Resource
4. Reduce Emissions of Real Air and Water Pollutants

**Green Energy,
Carbon Credits, and
Counting Emissions?**



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