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Faculty Summit
10
YEAR ANNIVERSARY

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Climate, Energy, and Economy

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- Human emissions of 9.0 GtC per year and growing
- About 12 GtC per year expected in 2030

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Half of what we emit stays in the atmosphere for centuries

The Source - "People engage in economic activity that uses energy from carbon-emitting generation" – R. Pielke, Jr.

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	Factor	Lever	Policy
P	Population	Fewer people	Population management
GDP/P	GDP/capita	Smaller economy	Limit generation of wealth
TE/GDP	Energy intensity	Increase efficiency	Do same or more with less energy
C/TE	Carbon intensity	Switch energy sources	Generate energy with less emissions

Carbon emissions = C = P*GDP/P *TE/GDP * C/TE

Decarbonization

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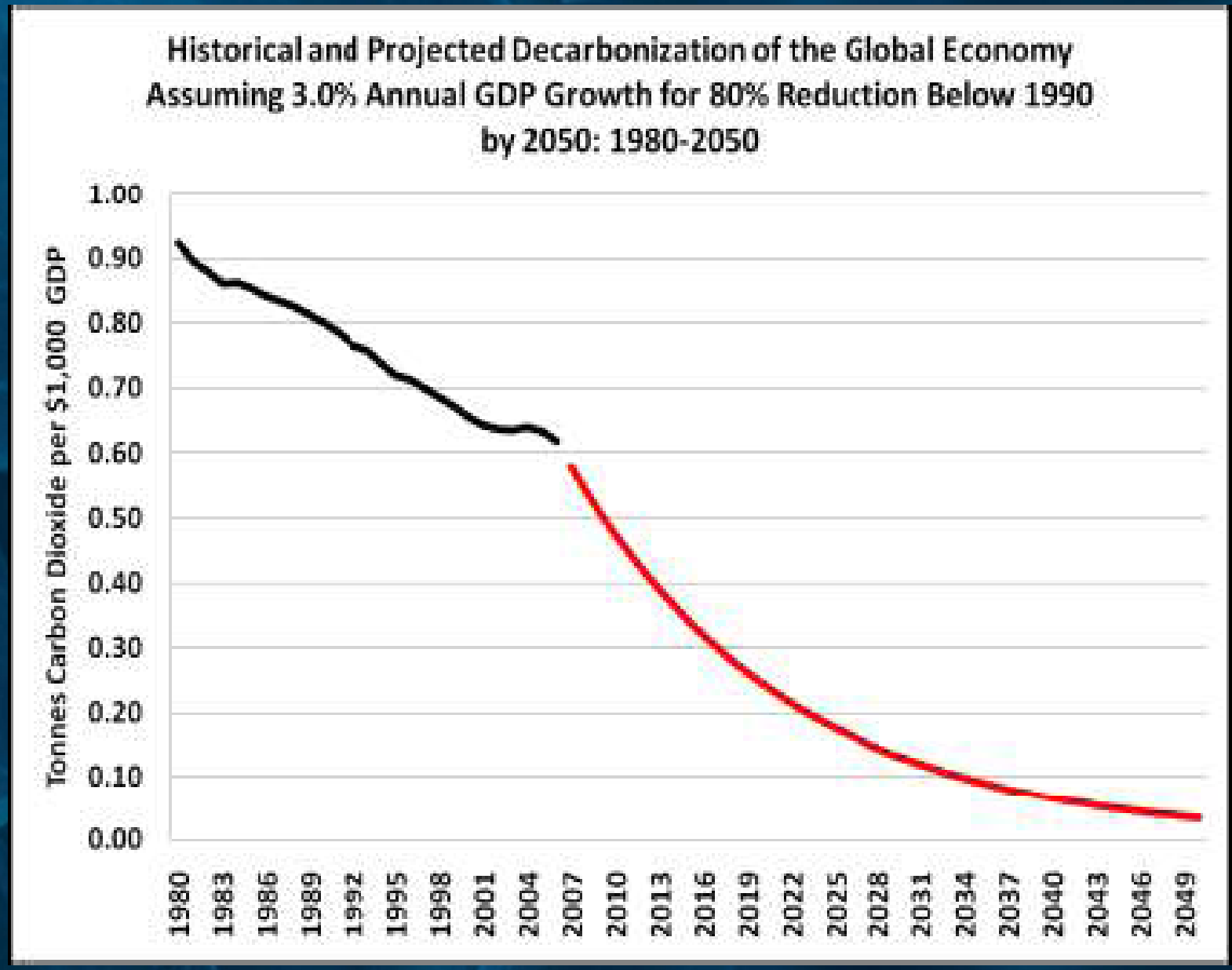
- Decrease in the ratio of CO_2 emissions to GDP
  - For 2006, ratio is about 0.62 tonnes CO_2 per $1000 GDP



R. Pielke, Jr.

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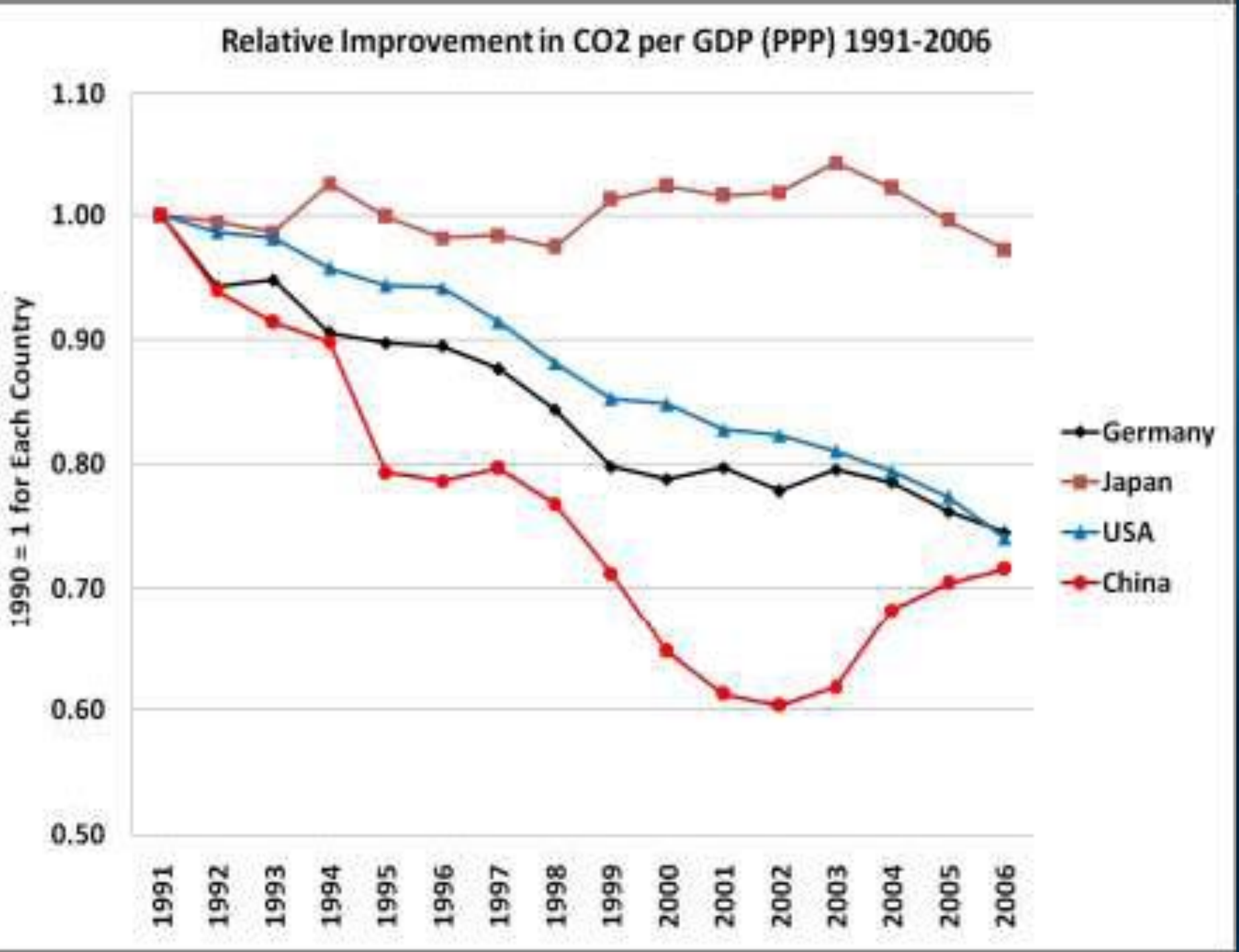

R. Pielke, Jr.

Stabilization in 2050

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- Assume:
  - 10 billion people
  - Per capita GDP grows about 1.6%/yr
  - Energy/GDP declines about 1%/yr
  - 12 TW today; 28 TW in 2050
- 550 ppm CO_2 in 2050
  - 20 TW of carbon-free energy
  - About a 4 C warming
  - Significant changes but could adapt

Implications for Energy Systems

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- Carbon sequestration may delay but ultimately not an option
- One 1 GW nuclear reactor every day until 2050
- Renewables
  - Capacity challenges
  - Mismatch between supply and demand requires efforts in storage
  - Need to match supply side with demand side
    - Transportation, home/light industry, manufacturing
- Geoengineering solutions to climate

Today's Session

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- No "silver bullets"
  - Complex, "whole systems" thinking is needed
  - This will be a centuries-long effort
- How to harness collective imagination and innovation
- New types of "knowledge-to-action" networks
  - Plausible scenarios and risk assessment
  - Dealing with uncertainty