

Understanding fossil fuel consumption growth: why history matters

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Agenda

Introduction

- 1. Some themes for interdisciplinary research**
- 2. Putting political history (of the international climate negotiations) into context**
- 3. Chronologies (1950 to now)**

Conclusions

Introduction

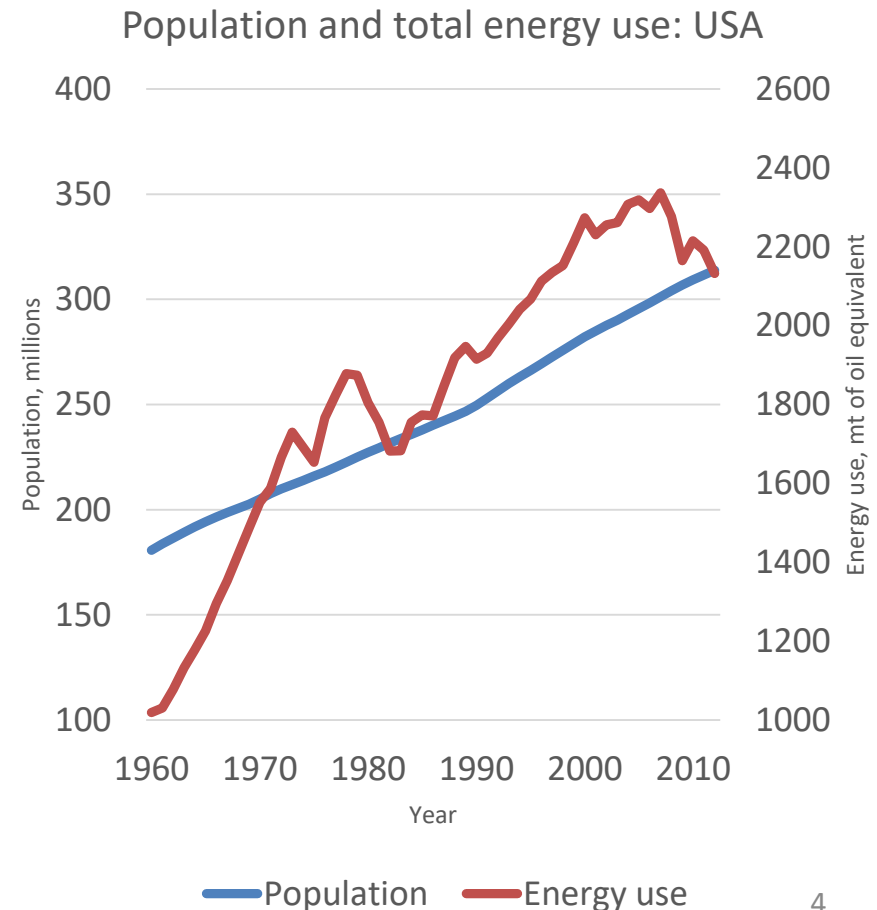
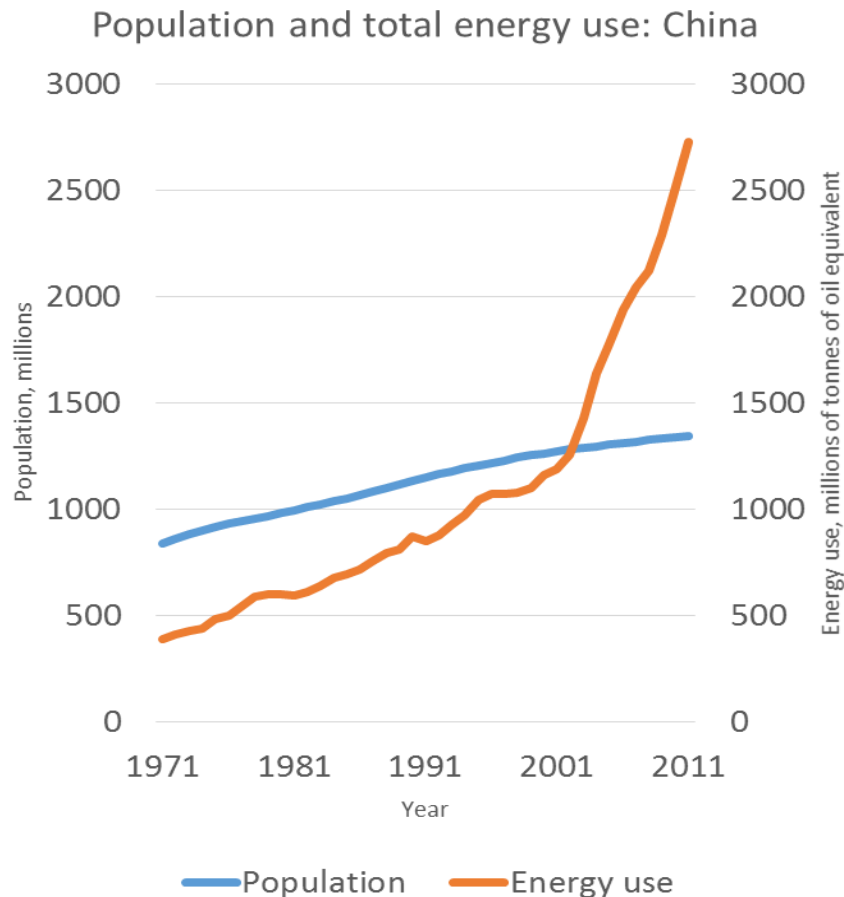
- Fossil fuel consumption growth from the mid 20th century is part of the “great acceleration”
- Greenhouse gas emissions, and hence global warming, are caused by humans – but not by undifferentiated humanity. Fuel is used by people living in specific sets of social relations



- Most fuel use is by and through big technological systems. Focus on these, and their place in social and economic systems

1. Themes for interdisciplinary research

a. Consumption is correlated with economic growth, but not with population growth





b. Technological systems have developed in certain ways, and not others, because of the social and economic, and to some extent political, contexts

c. The history of fuel-consuming technologies is also the history of “roads not taken”

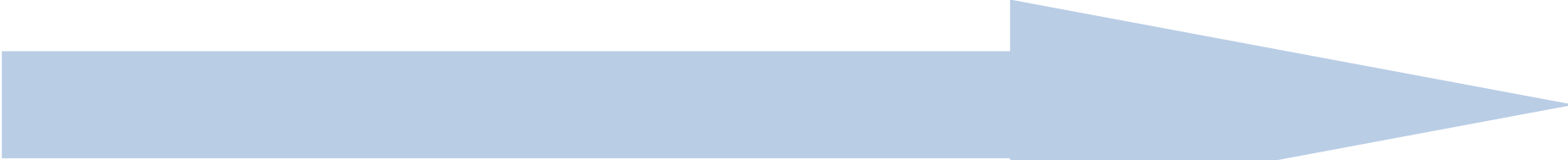
1962: model changes to cars since 1949 cost \$5 billion/year in the US, for bigger cars, extra petrol, retooling, etc. (Fisher et al, “The Cost of Automobile Model Changes Since 1949”, *Journal of Political Economy* 70:5)

1977: centralised electricity generation to supply residential heating is “like cutting butter with a chainsaw” (Amory Lovins, *Soft Energy Paths*, p. 40)

1988: “the overzealous belief in growth [...] leads directly to a large waste of resources”, such as building unneeded industrial production capacity (Daniel Spreng, *Net-Energy Analysis*, pp. 61-62)

2012: “It is indeed a supreme irony that computers, sensors and computational ability have transformed every major industry except power-generation. [...] The electricity meter [...] holds retail consumers hostage [...] Technology is available to break down this iron curtain meter [but has not been deployed]” (Johannsen et al, *Global Energy Assessment*, pp. 1159-1161)

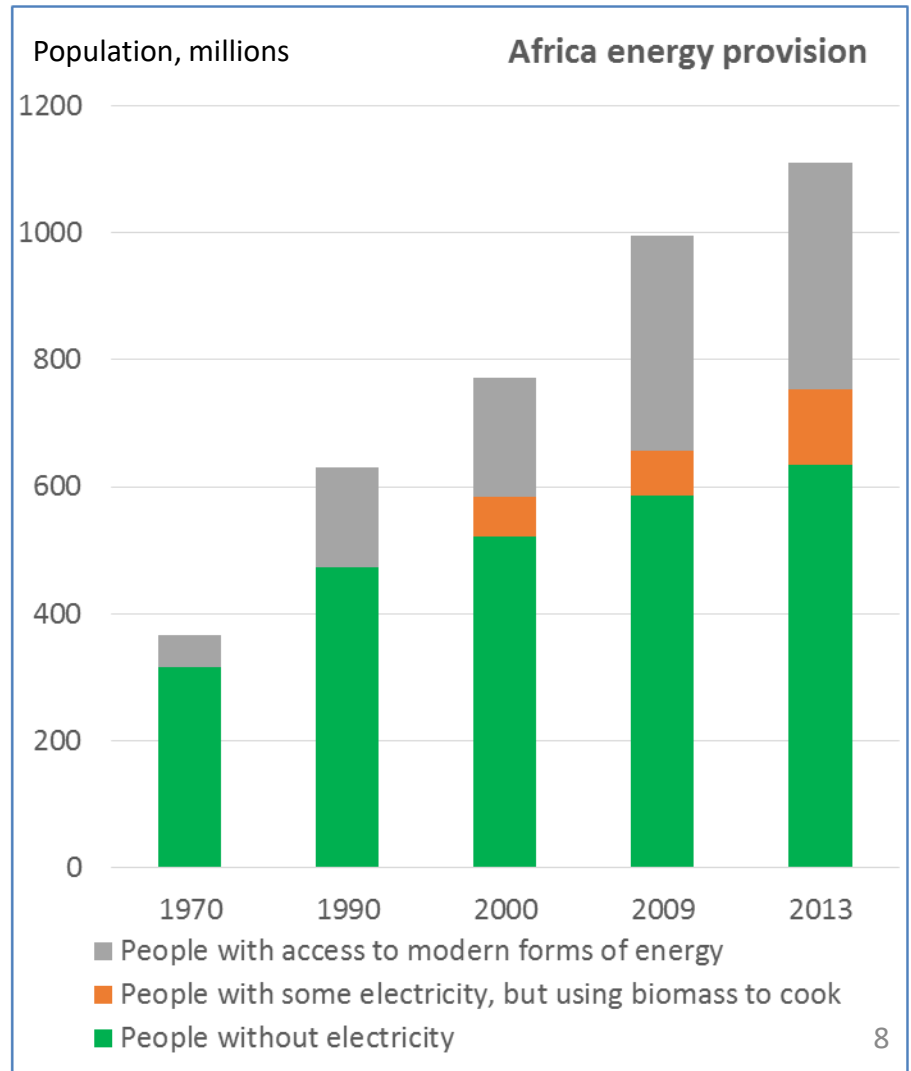
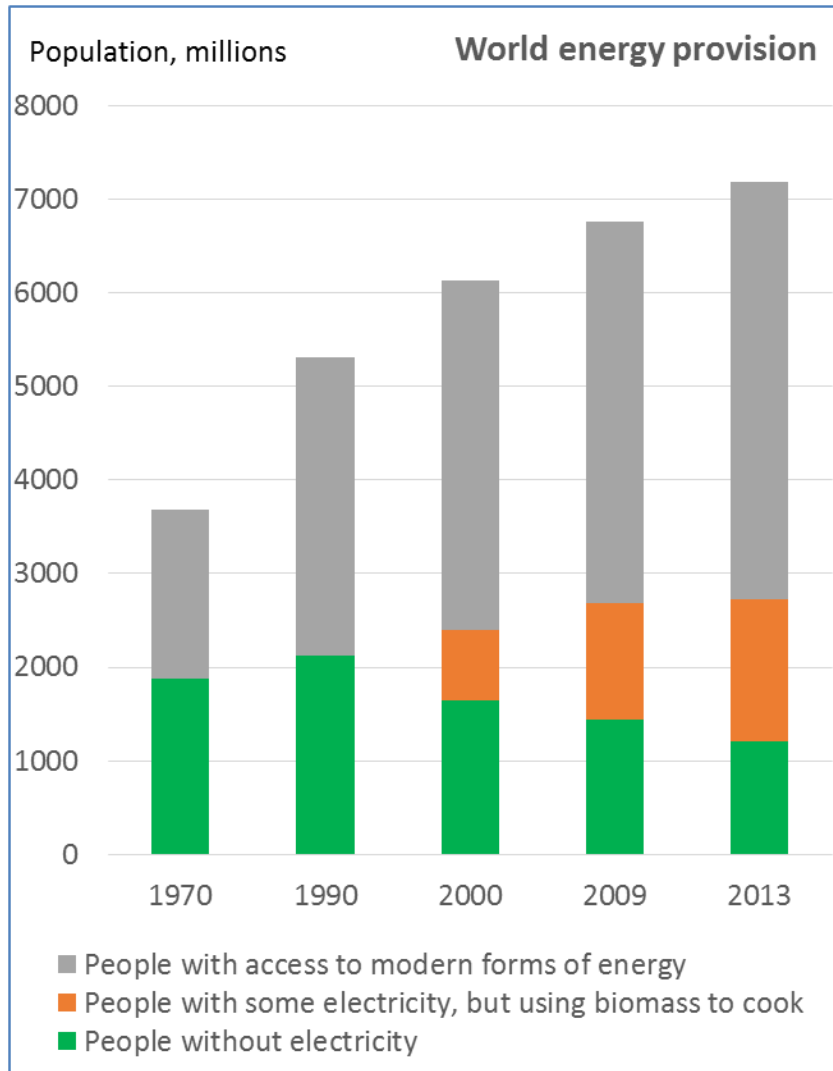
d. A focus on systems, both technological and social, is necessary for understanding individual consumption



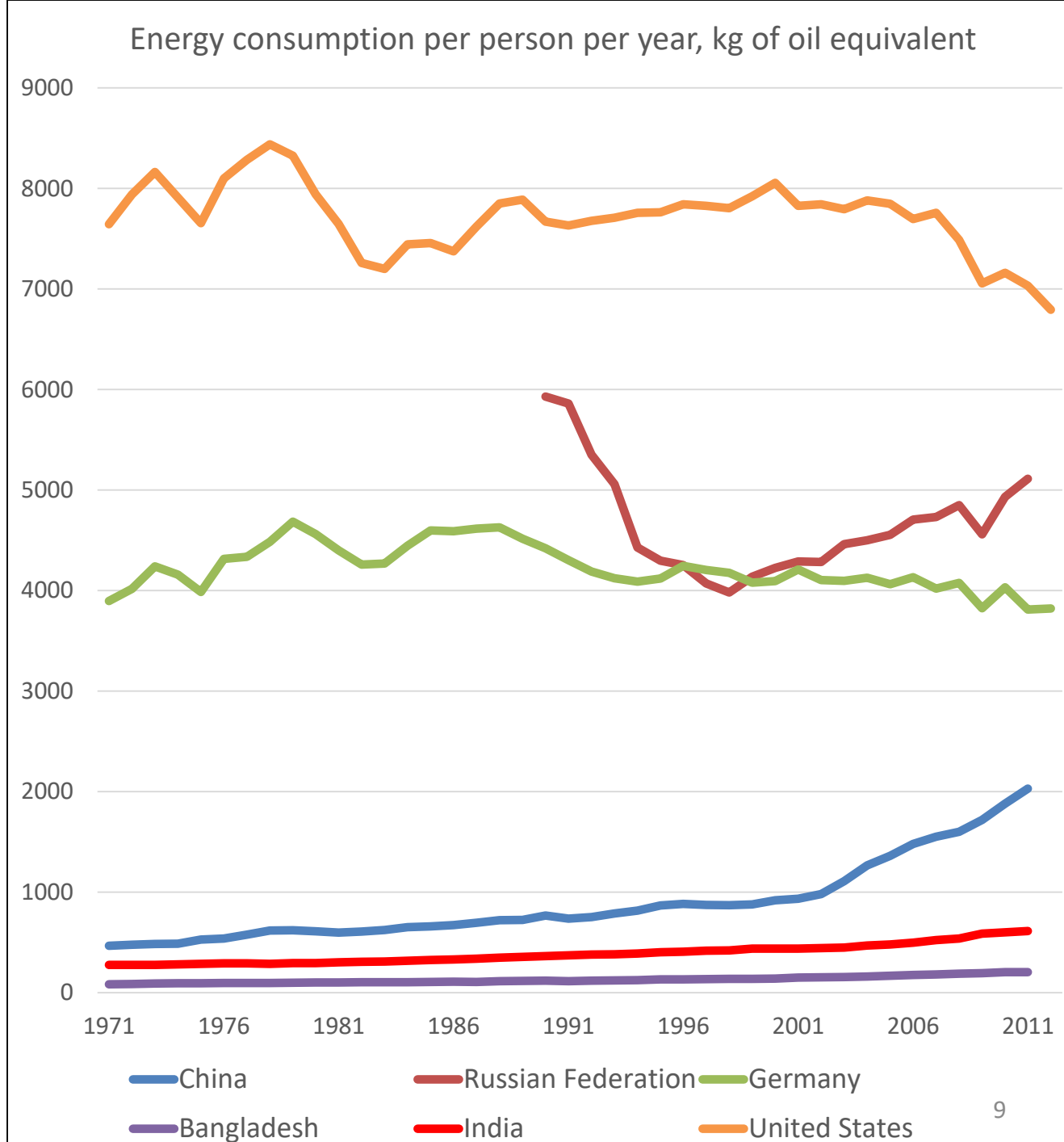
Primary energy	Final energy	Useful energy	Energy services
Oil	Petrol	Acceleration/ overcoming air resistance	Getting from place to place
<u>Technologies:</u> oil wells - refineries - car manufacture - cars, roads, parking spaces			
Coal	Electricity and heat	Light and heat emission	Illumination and warmth after dark
<u>Technologies:</u> mines - power stations - electricity and heat networks - light bulbs, radiators			

Energy is “consumed” throughout the system, not only at the end

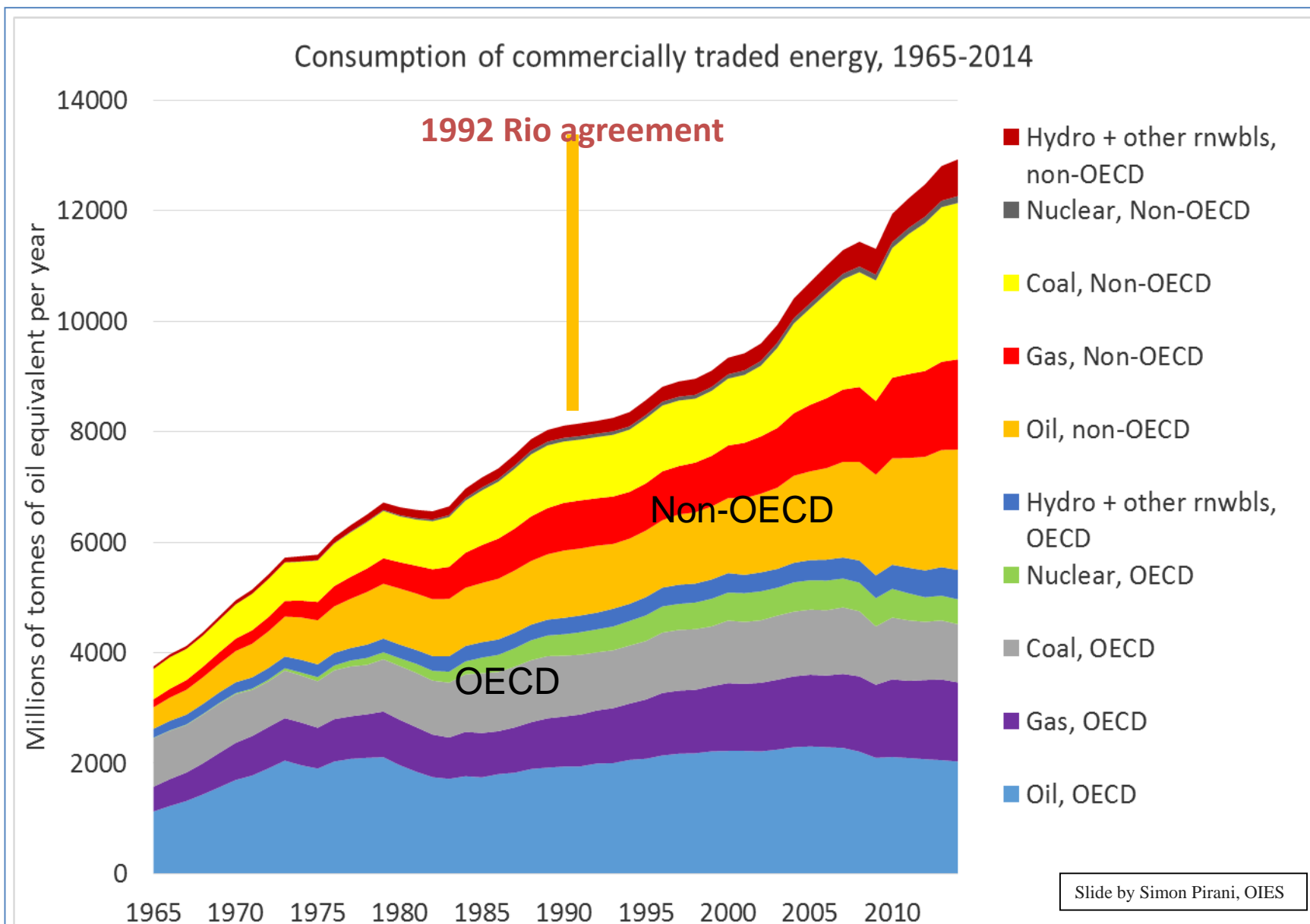
e. The commodification of energy products has been central to inequalities of energy supply



**Energy use
per head
figures:
part, but
not all, of
the story**



2. Putting political history (the international climate negotiations) into context



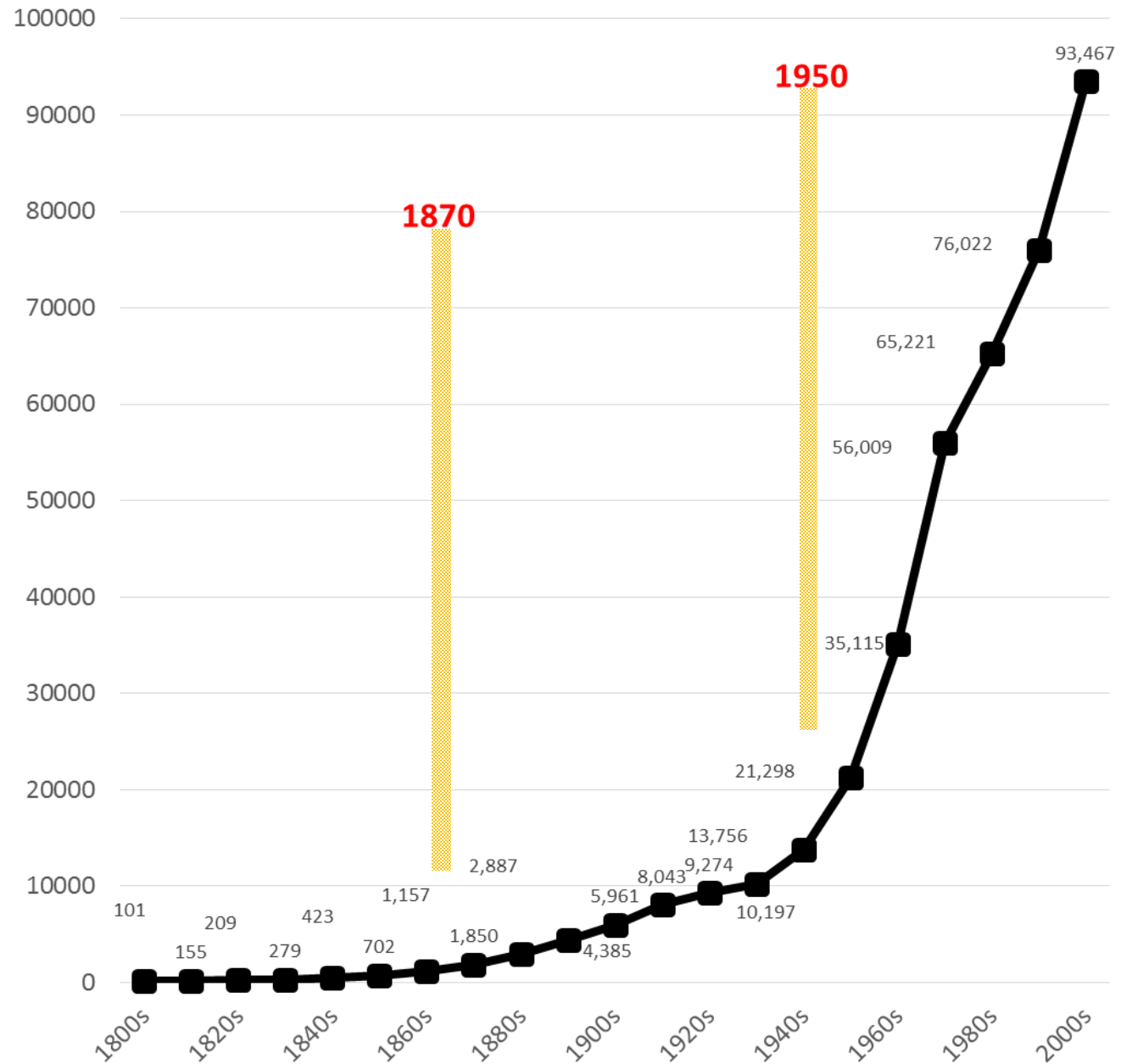
3. Chronologies

The largest consuming technologies (electricity, ICE, steam turbines, chemical fertilisers) came from the second industrial revolution

The big volume increases came after 1950, during the “great acceleration”

Trends that pushed consumption growth: urbanisation; industrialisation; changes in the labour process; motorisation; electrification; household consumption and consumerism

World fossil fuel production, 1800-2009
million tonnes of oil equivalent per decade



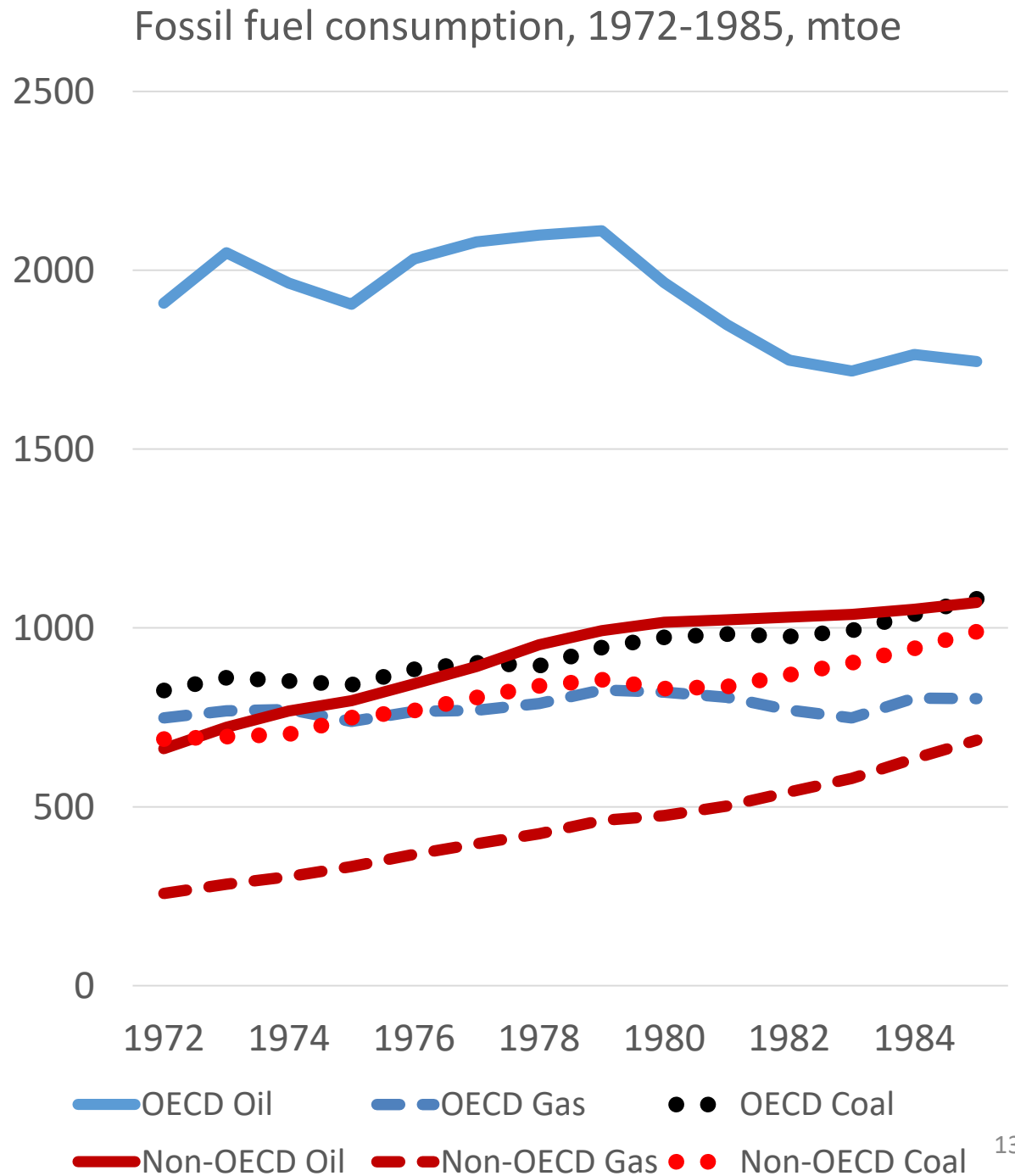
The 1950s-60s: post-war boom

- **Infrastructure developed in wartime played a crucial role**
- **The USA was completely dominant**
- **Roads, electricity, industry went to Europe**
- **Rich world populations acquired cars**
- **Household consumption grew**
- **Appliances substituted for domestic labour, but the didn't reduce hours**

The 1970s

“Energy crisis” is a meaningless term. There were two oil price shocks (1973, 1979). They caused:

- a real crisis for developing-world oil importers;
- an oil price adjustment for rich nations;
- crises of perception and policy.



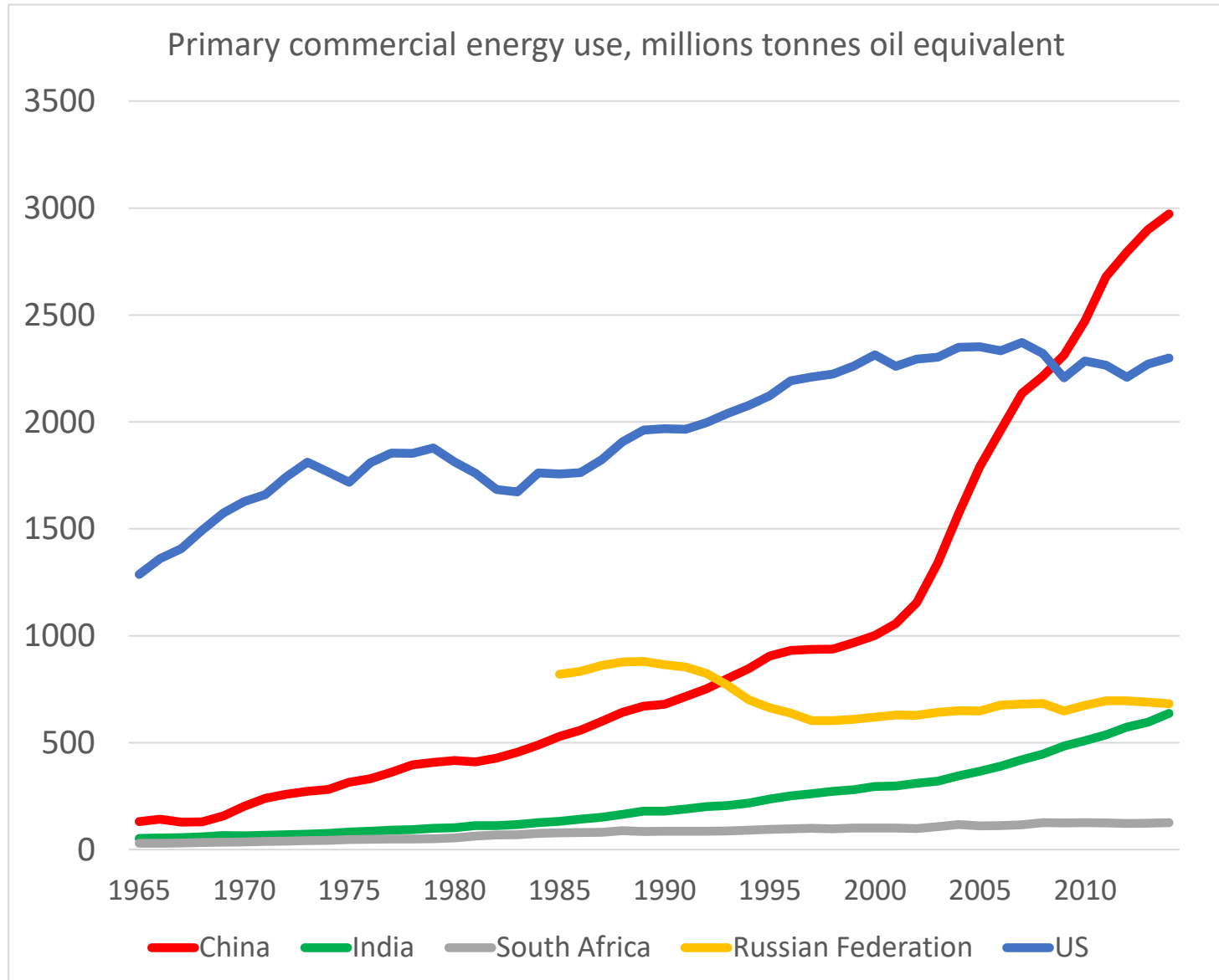
The 1980s: crises and oil price shocks

- **Consumption is still overwhelmingly in the “global north”**
- **Efficiency gains and conservation gains. But some of these were reversed after oil prices fell in the mid 1980s**
- **The discovery of global warming in the late 1980s proves to be a turning point**

The 1990s: shunning the global warming challenge

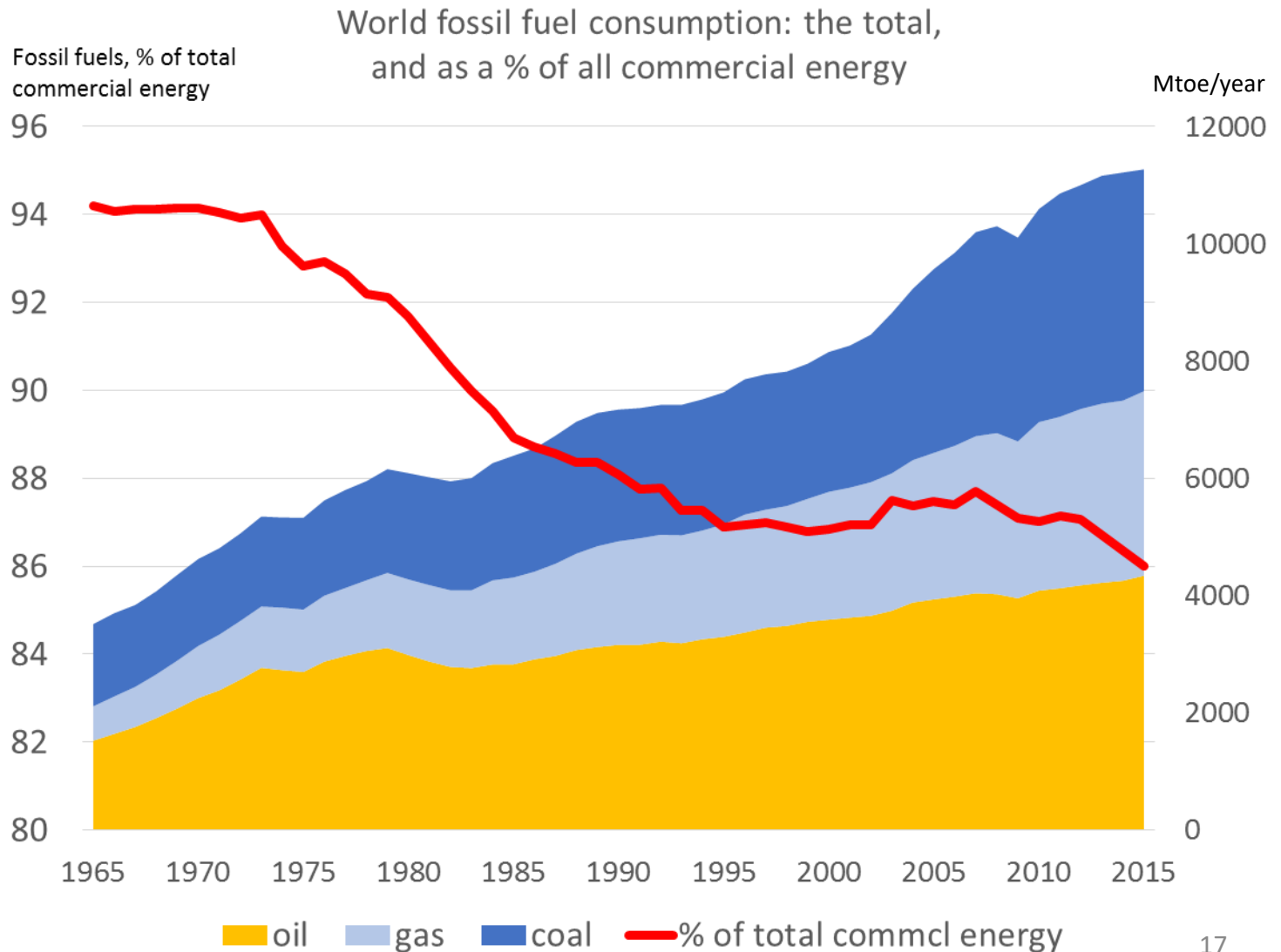
- **Rio: “no binding targets” policy adopted**
- **Subsidies for fossil fuel production and consumption start to grow**
- **The age of neo-liberalism - which, in energy markets, means electricity liberalisation**
- **Kyoto 1997: market mechanisms to decarbonise**

The 2000s: China is a crucial factor



The 2000s: acceleration renewed

Measured in the only way that matters, i.e. by total fossil fuel consumption and total carbon emissions, climate policies have failed. Consumption rose steeply in the 2000s. As a proportion of primary commercial energy, fossil fuel use fell, but not as much as it did in the 1970s-80s



Conclusions

- History is not neutral. The view presented, of consumption by and through technological, social and economic systems, is at odds with views focused on individual consumption and ecological damage by an undifferentiated humanity
- Research on energy transitions concluded that changes in energy end-use services are key; that technological innovations are initially hit-and-miss, and diffusion is slow. There has been debate about the possibility of faster transitions. I propose a focus on the interaction of technological and social change
- The lessons of global political history are relevant. The failure of the Rio process is a historical failure of states. A transition needs to be one in which the whole of society becomes the motive force of change

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"Insightful, precise and well-written, *Burning Up* turns energy consumption on its head. Pirani fills a crucial gap ... Anybody fighting climate change should read this" - Mika Minio-Paluello, campaigner at Platform London and co-author of *The Oil Road: Journeys from the Caspian Sea to the City of London* (Verso, 2013)

"This meticulous depiction of how fossil fuels are woven into our human systems - not only technological but also economic, social and political - is an invaluable aid to getting them back under control" - Walt Patterson, author of *Electricity vs Fire* (2015)

"Explains the technological, social and economic processes that have prioritised a particular way of satisfying society's demand for energy services" - Michael Bradshaw, Professor of Global Energy, Warwick Business School, UK, author of *Global Energy Dilemmas* (2013)

