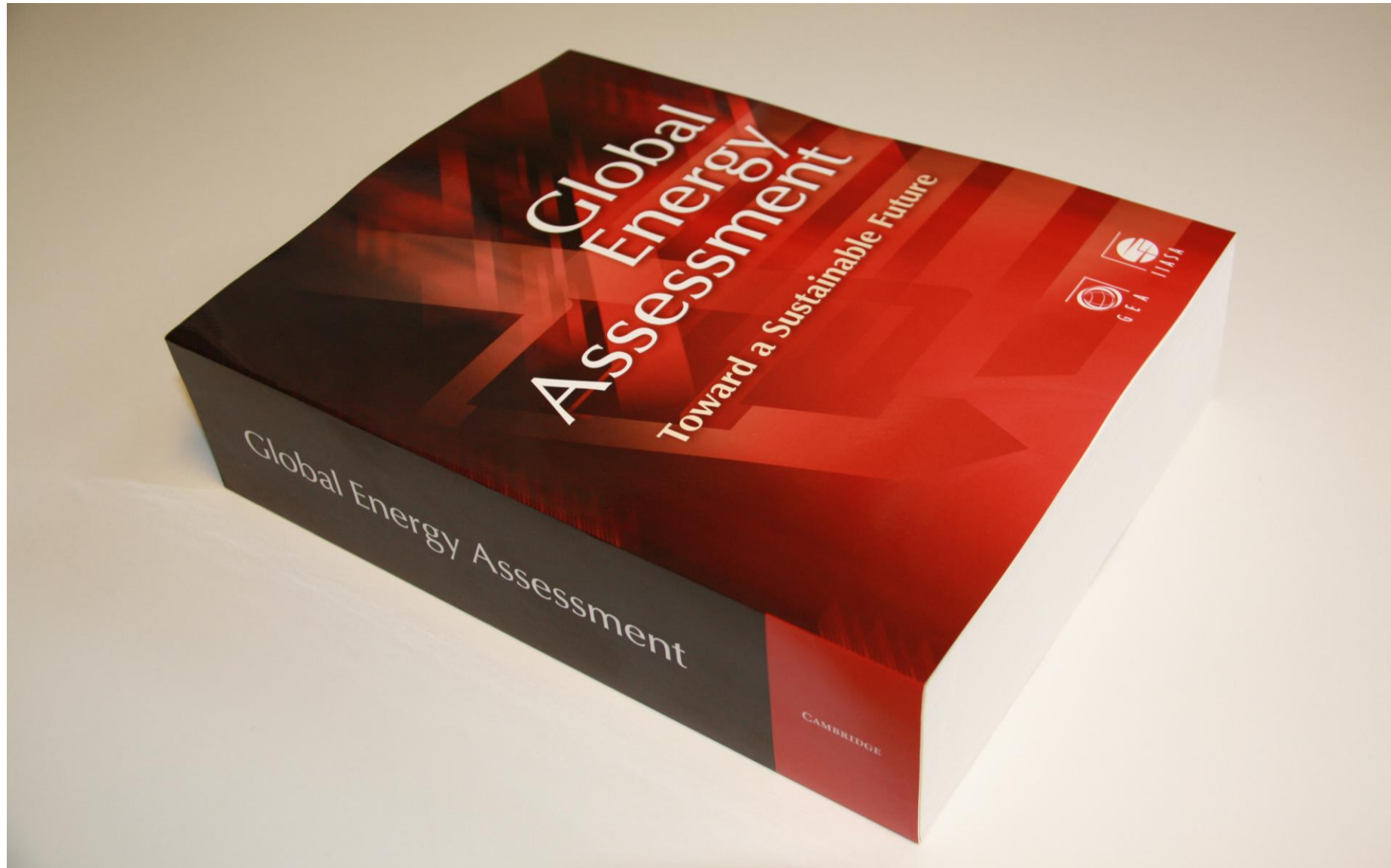


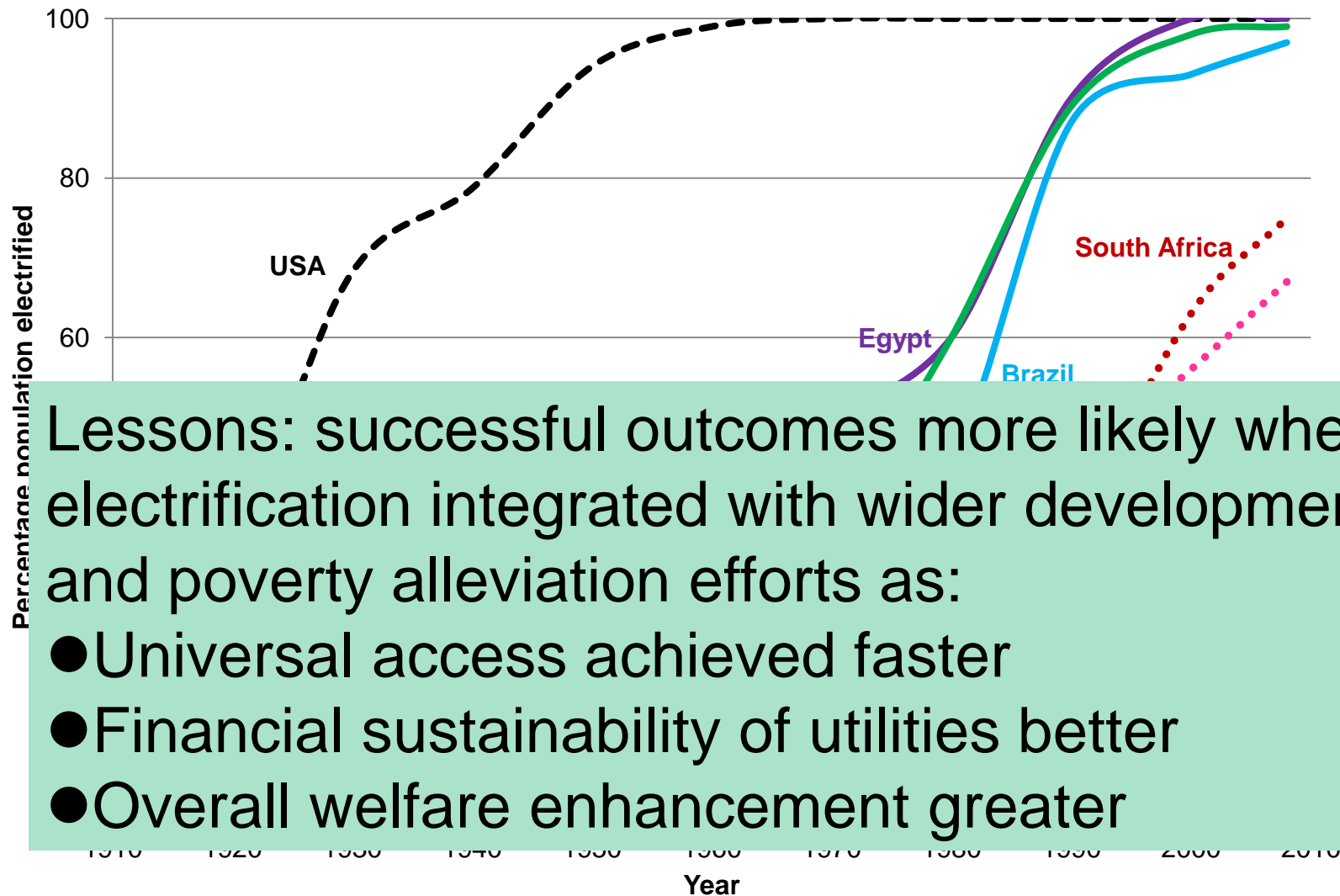


**Nebojsa Nakicenovic
Director**

www.GlobalEnergyAssessment.org

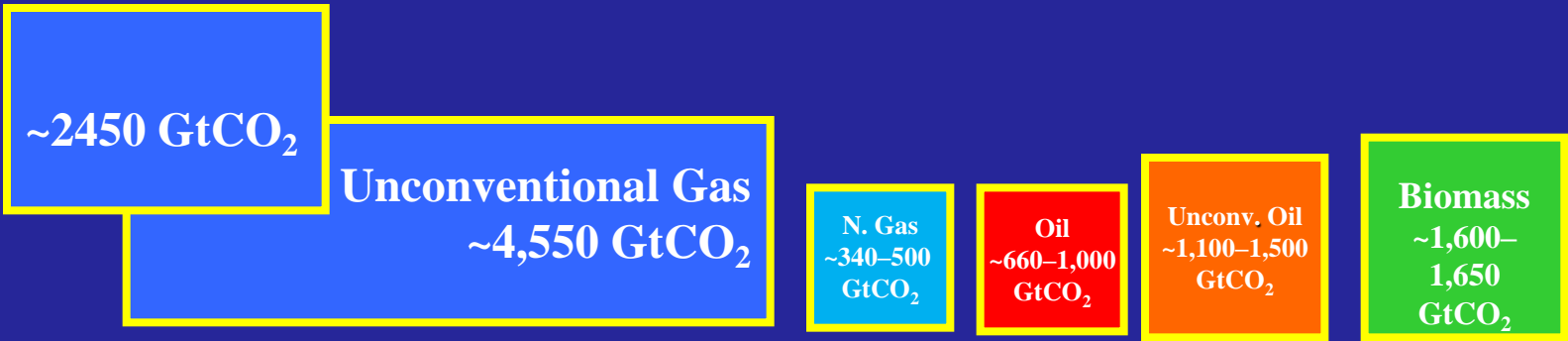
- ➔ From 7 bn people, 3 bn cook with solid fuels and 1.5 bn lack access to electricity
- ➔ Efficiency and decarbonization bring multiple benefits for health, security, climate change
- ➔ Financing requirements are huge, but achievable with right and sustained policies





Lessons: successful outcomes more likely when electrification integrated with wider developmental and poverty alleviation efforts as:

- Universal access achieved faster
- Financial sustainability of utilities better
- Overall welfare enhancement greater



Cumulative Emissions for 2°C Stabilization

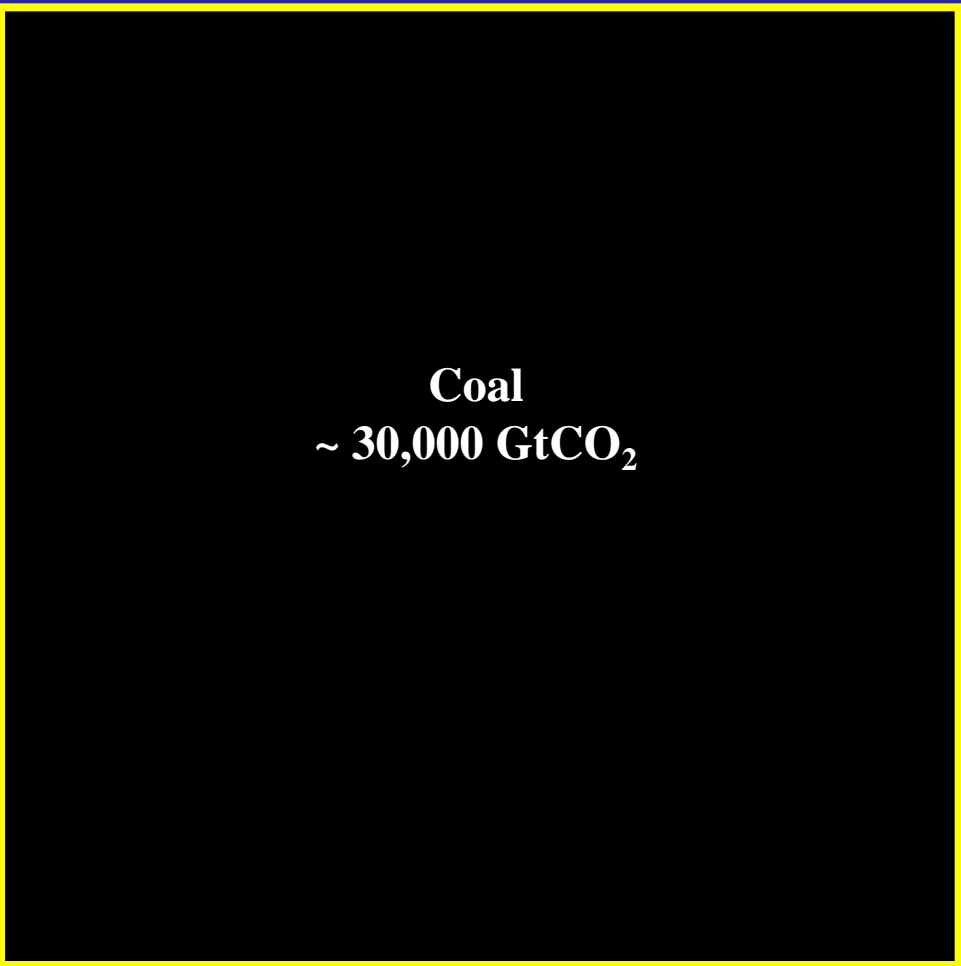
Gas Hydrates
~100,000 GtCO₂

~850 GtCO₂

Historical Emissions
~1900 GtCO₂

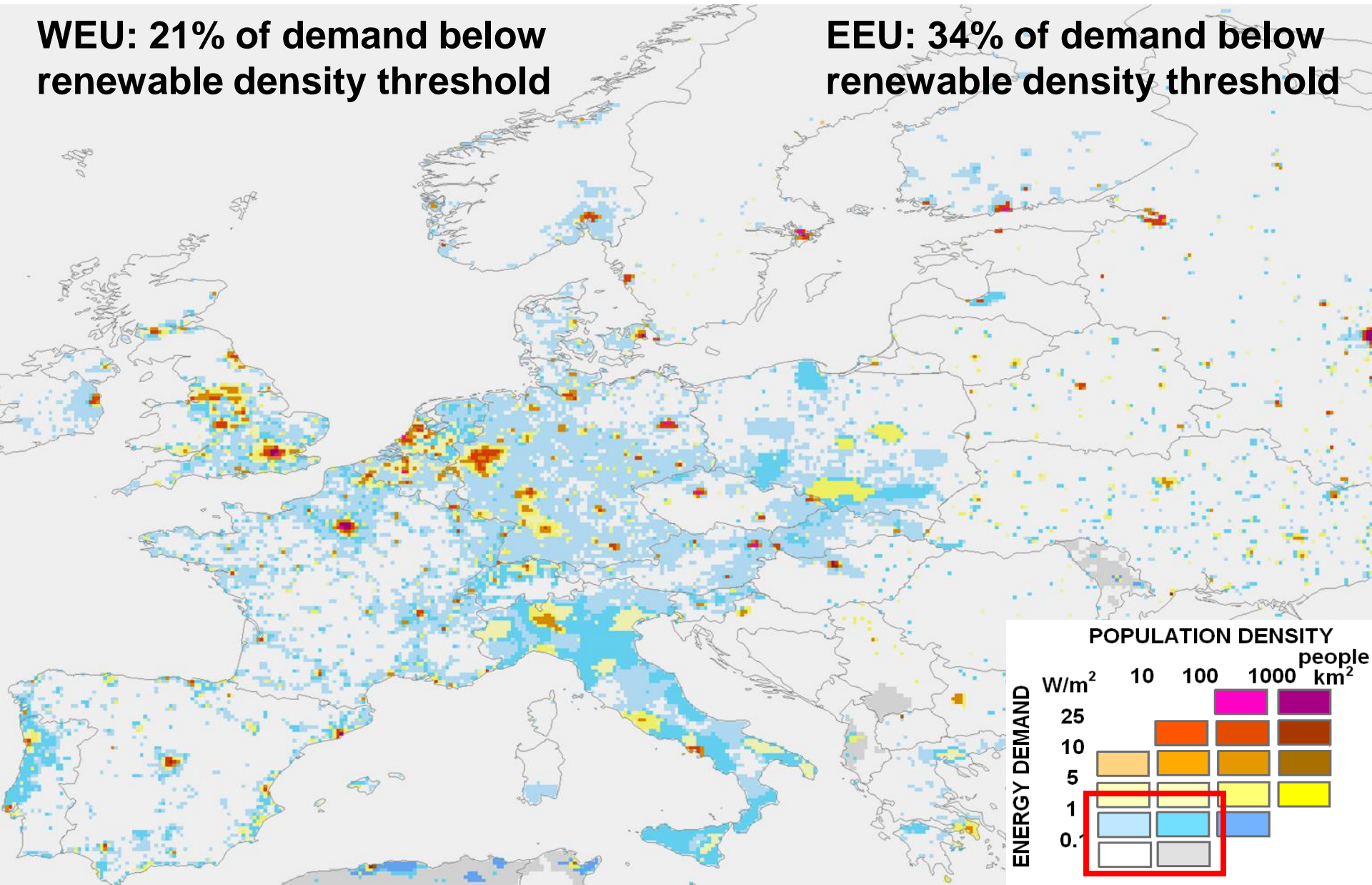
Preindustrial Atmosphere
~2000 GtCO₂

Present Atmosphere
~3060 GtCO₂



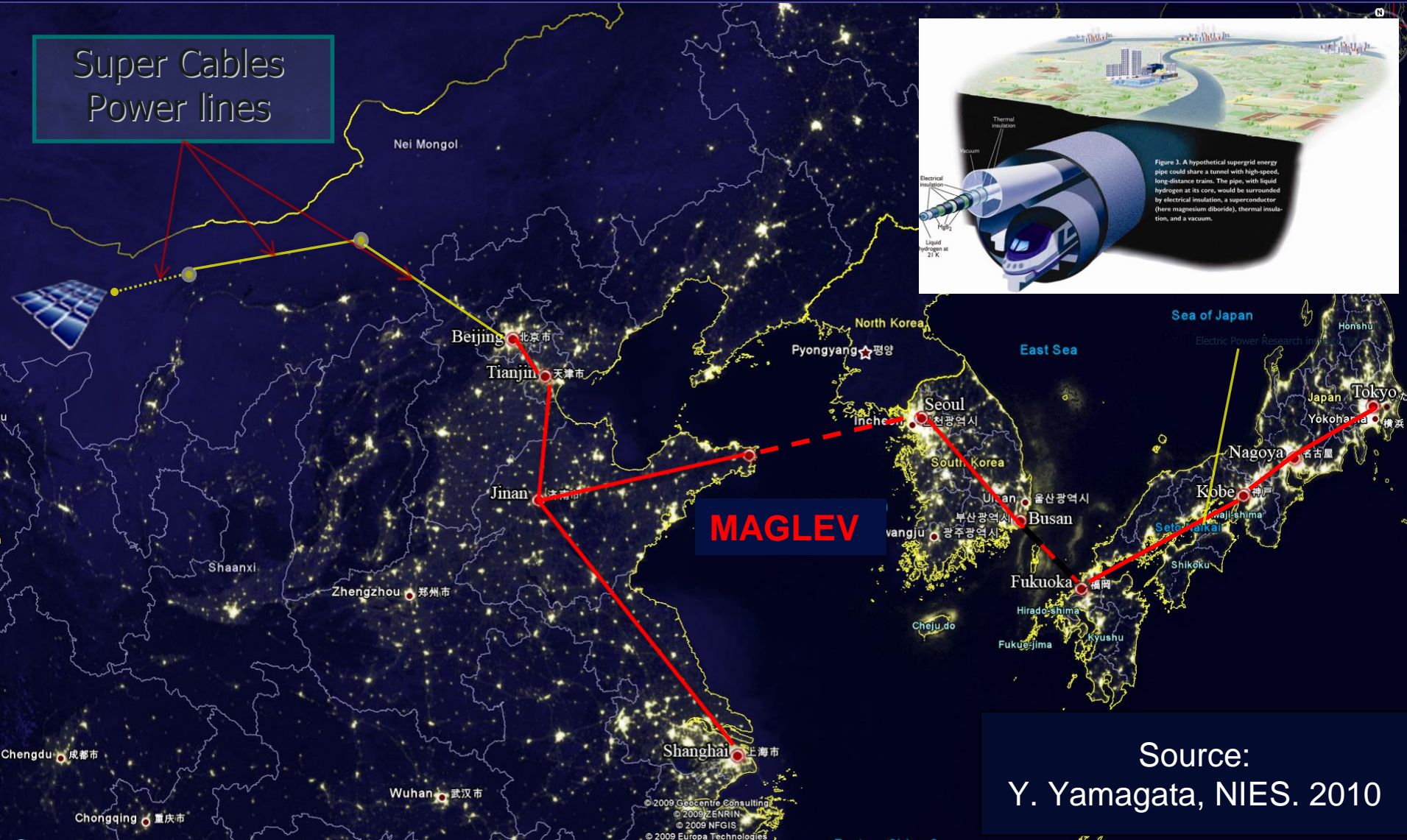
WEU: 21% of demand below renewable density threshold

EEU: 34% of demand below renewable density threshold

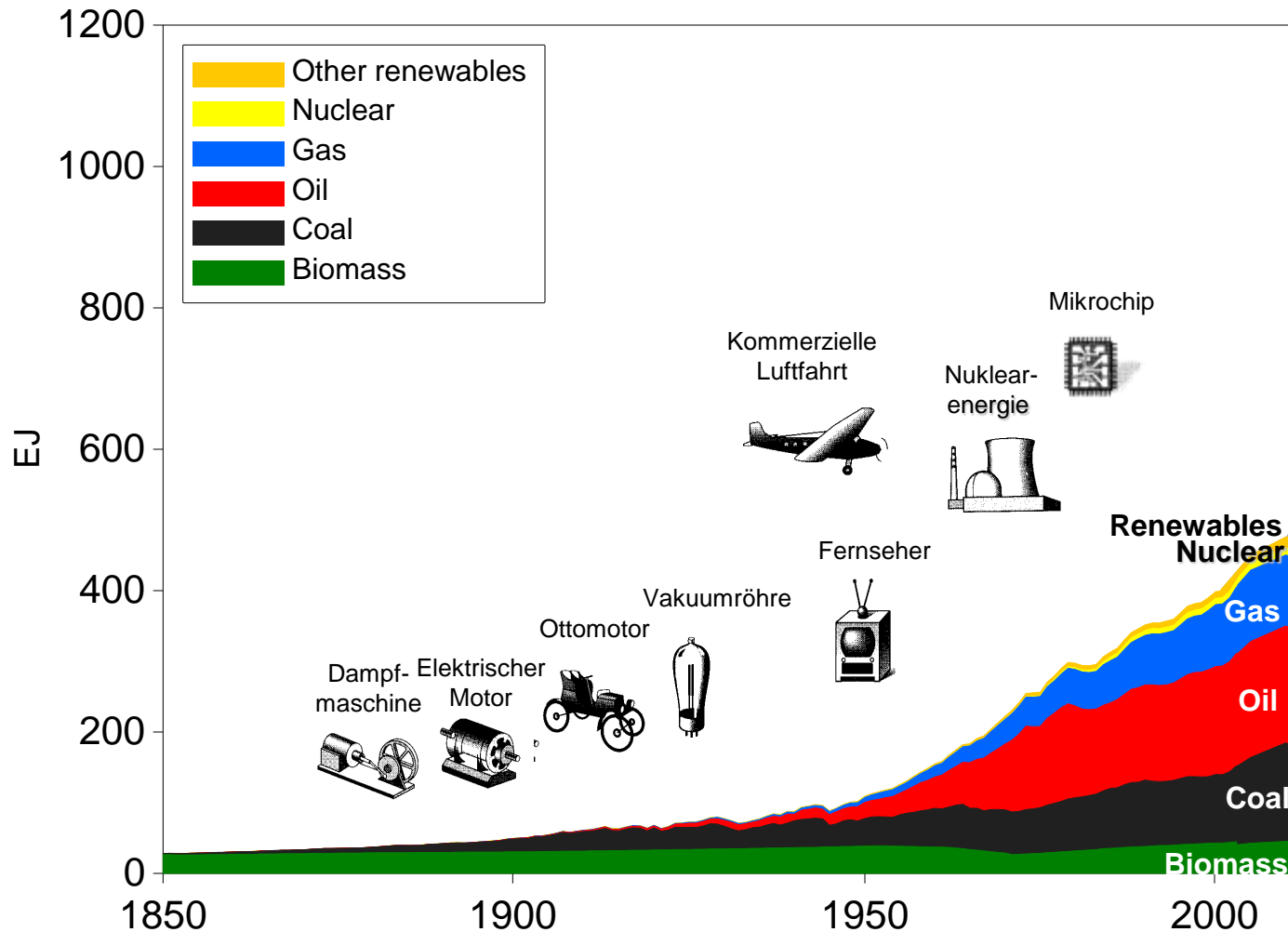


Mögliche Synergien zwischen neuen Energie- und Transportinfrastrukturen: Asiatisches "Supergrid"

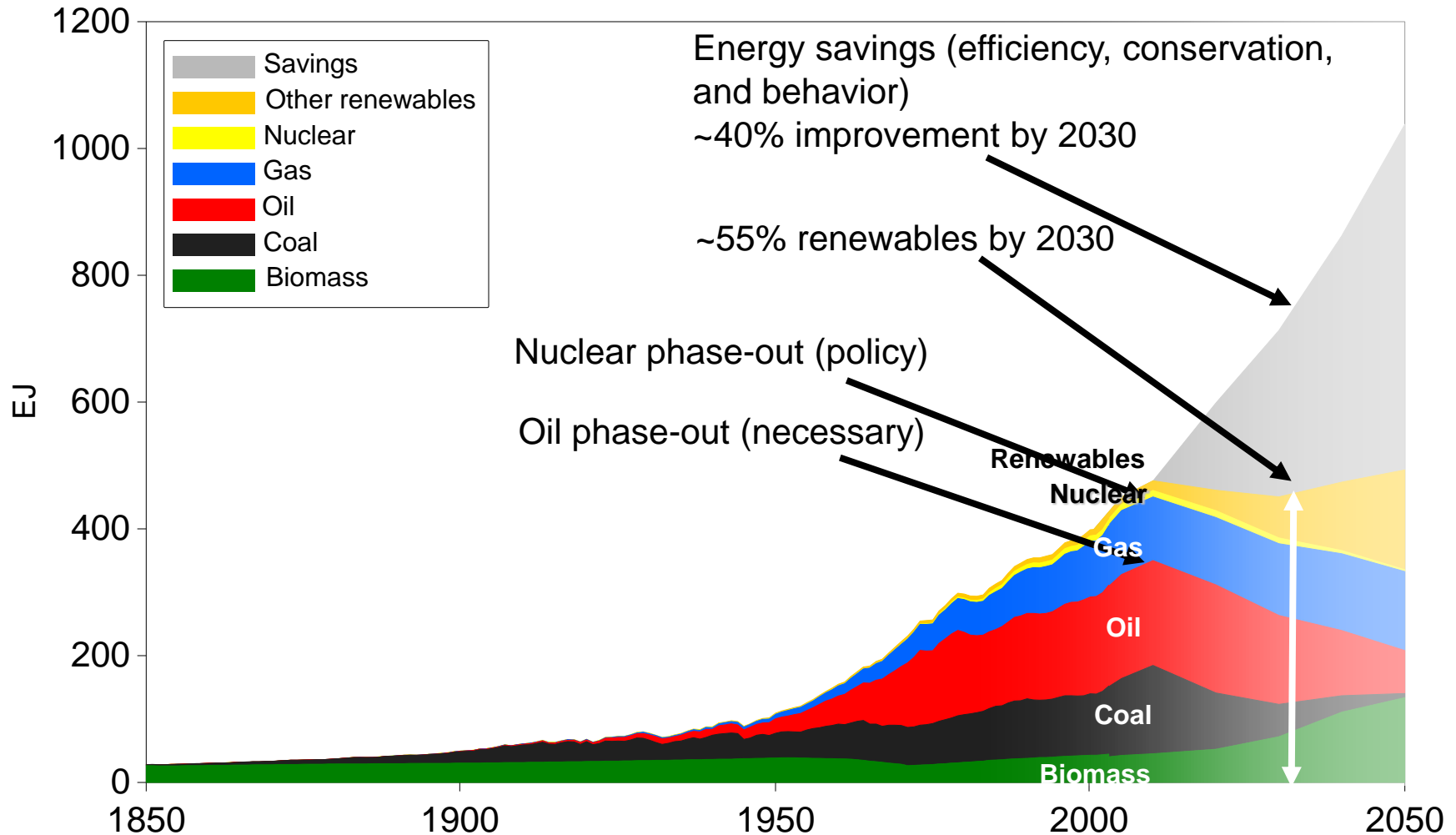
Super Cables
Power lines



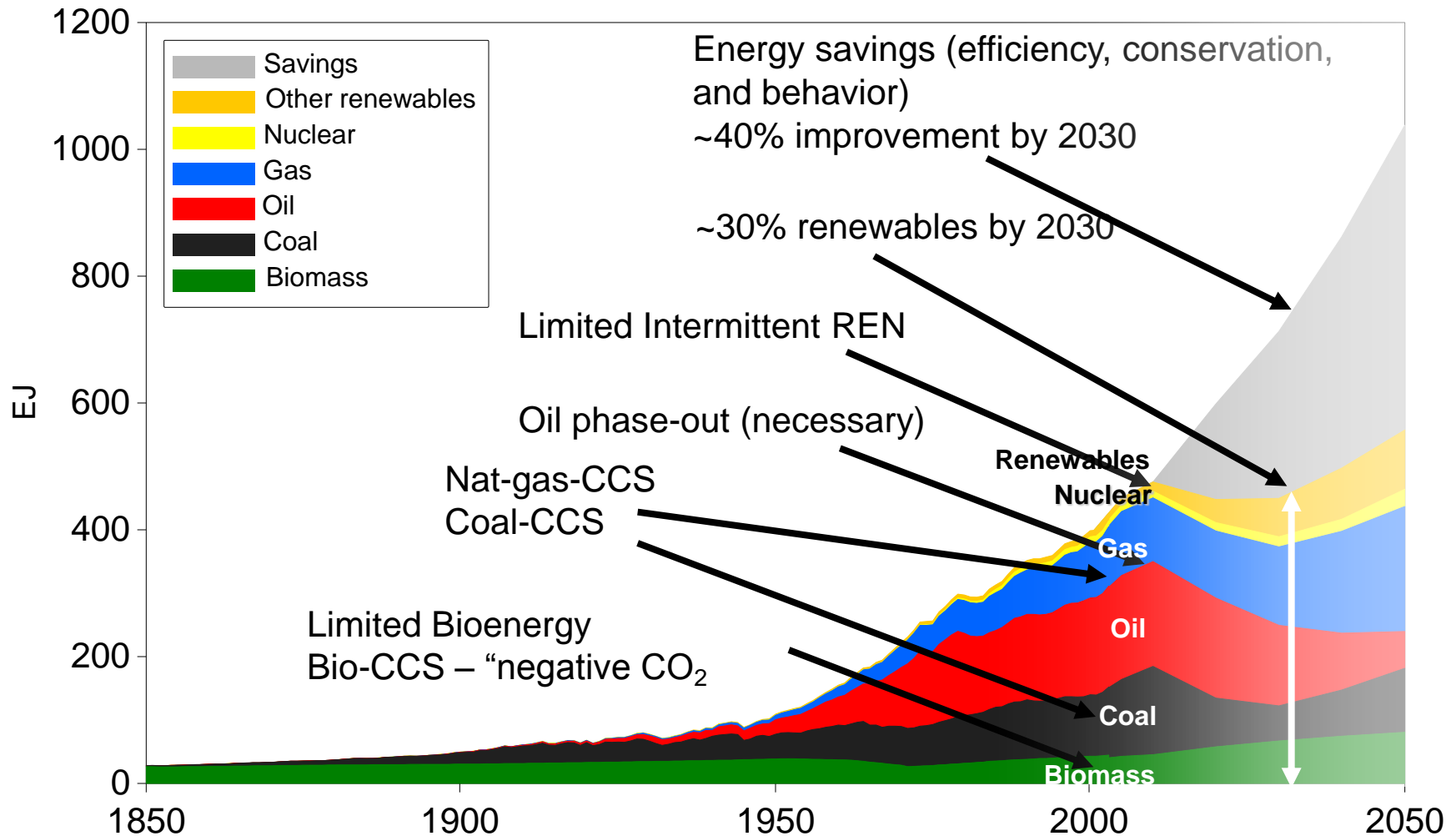
Source:
Y. Yamagata, NIES. 2010



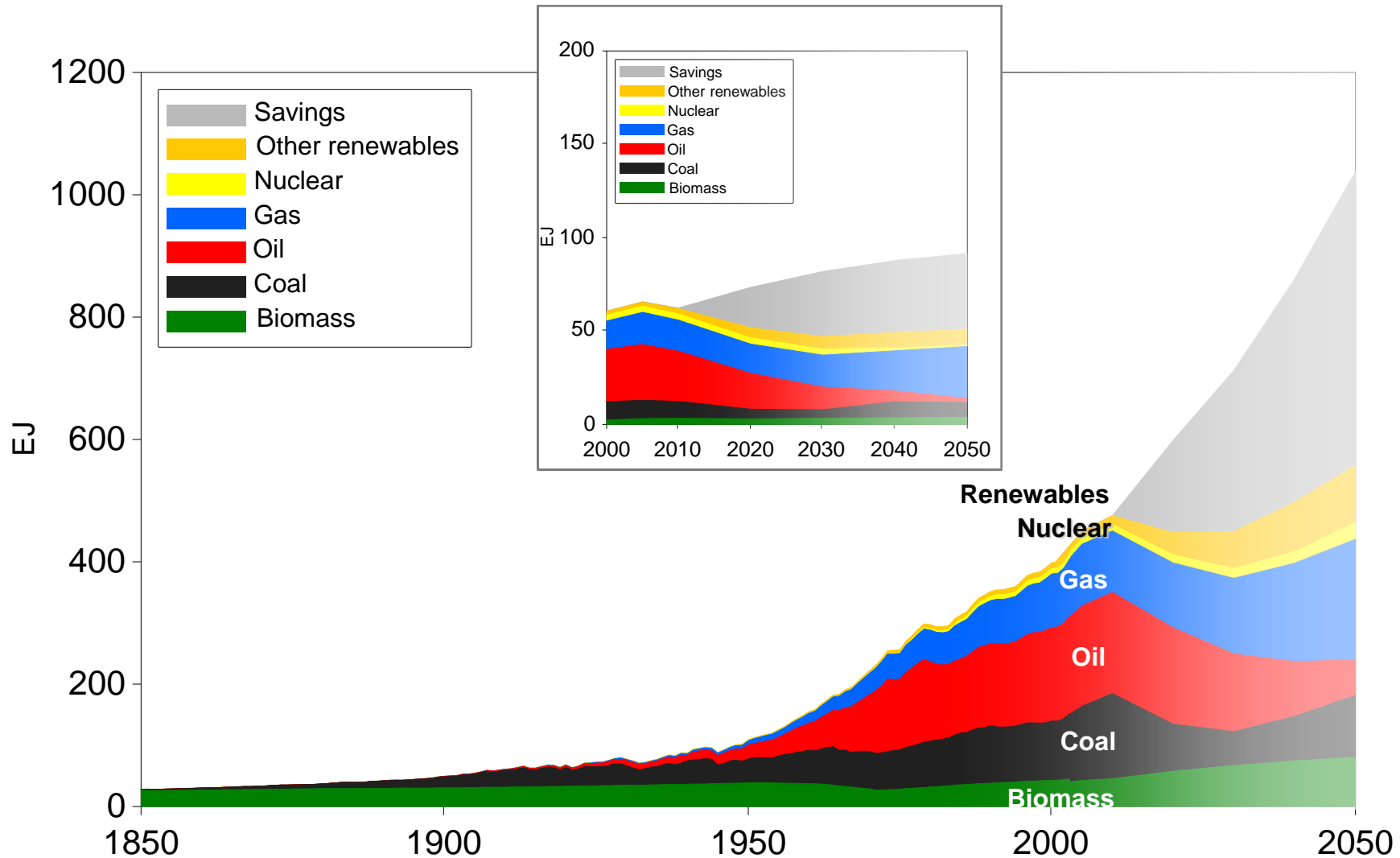
no CCS, no Nuclear



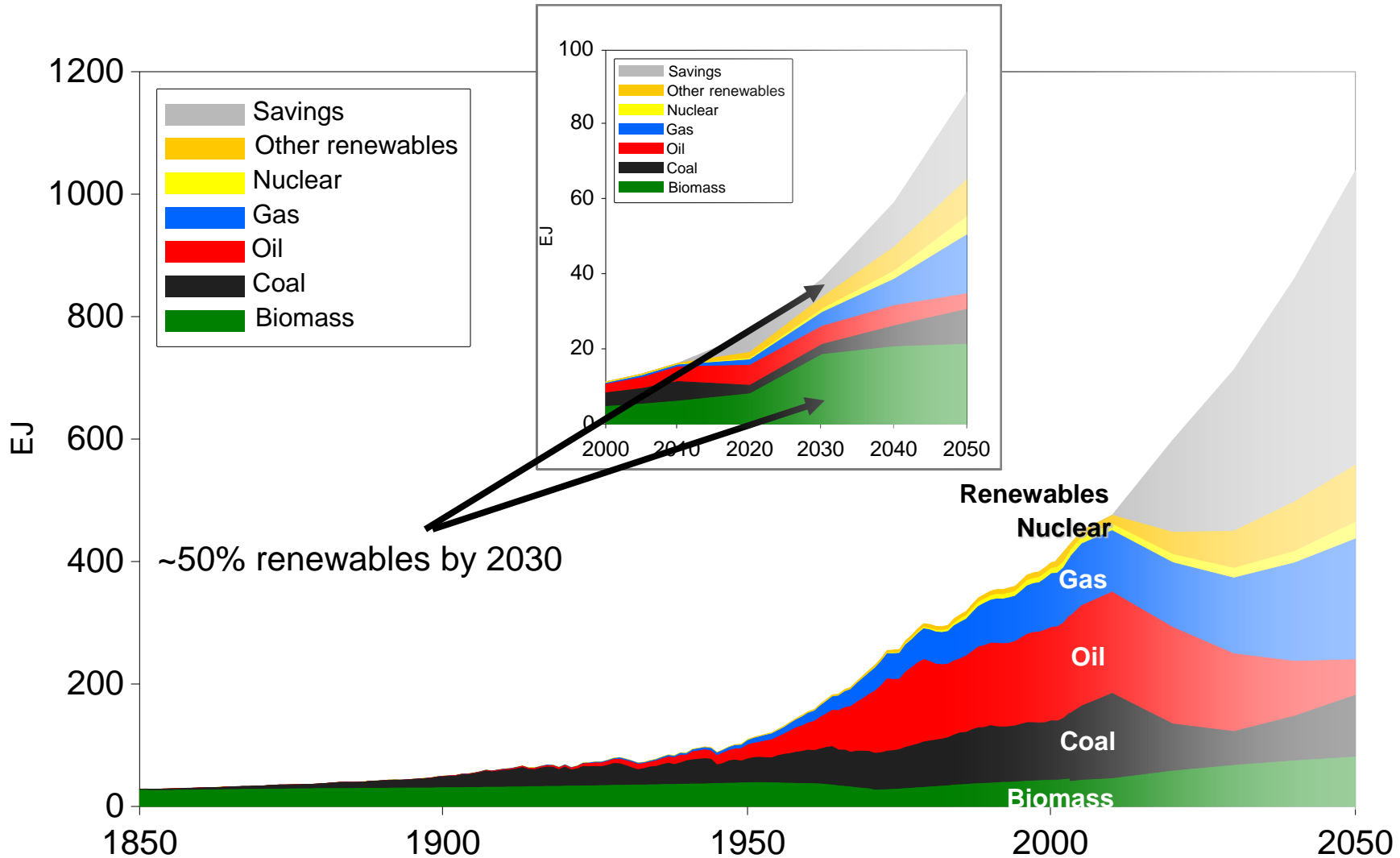
lim. Bioenergy, lim. Intermittent REN



Europe

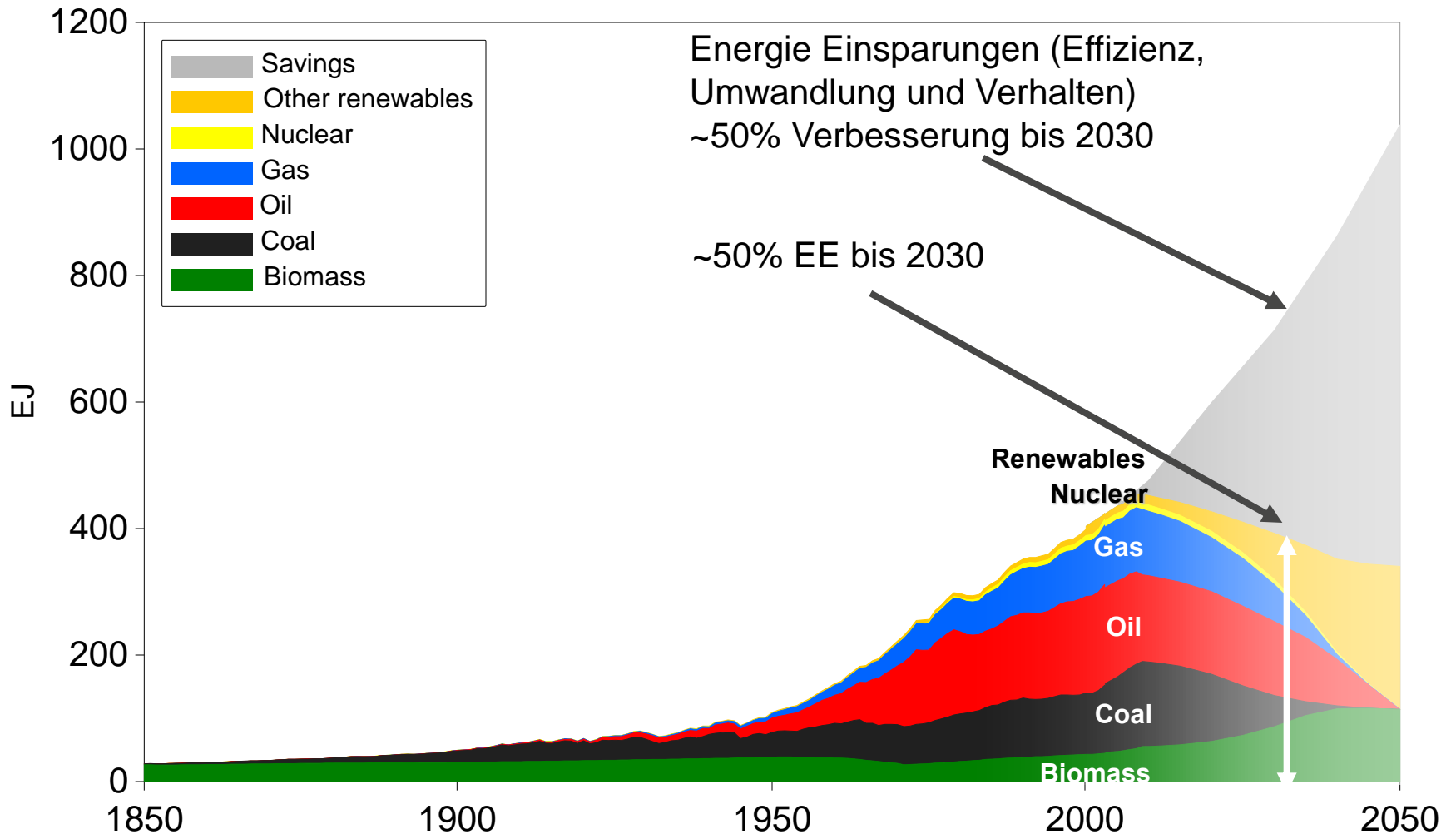


Africa

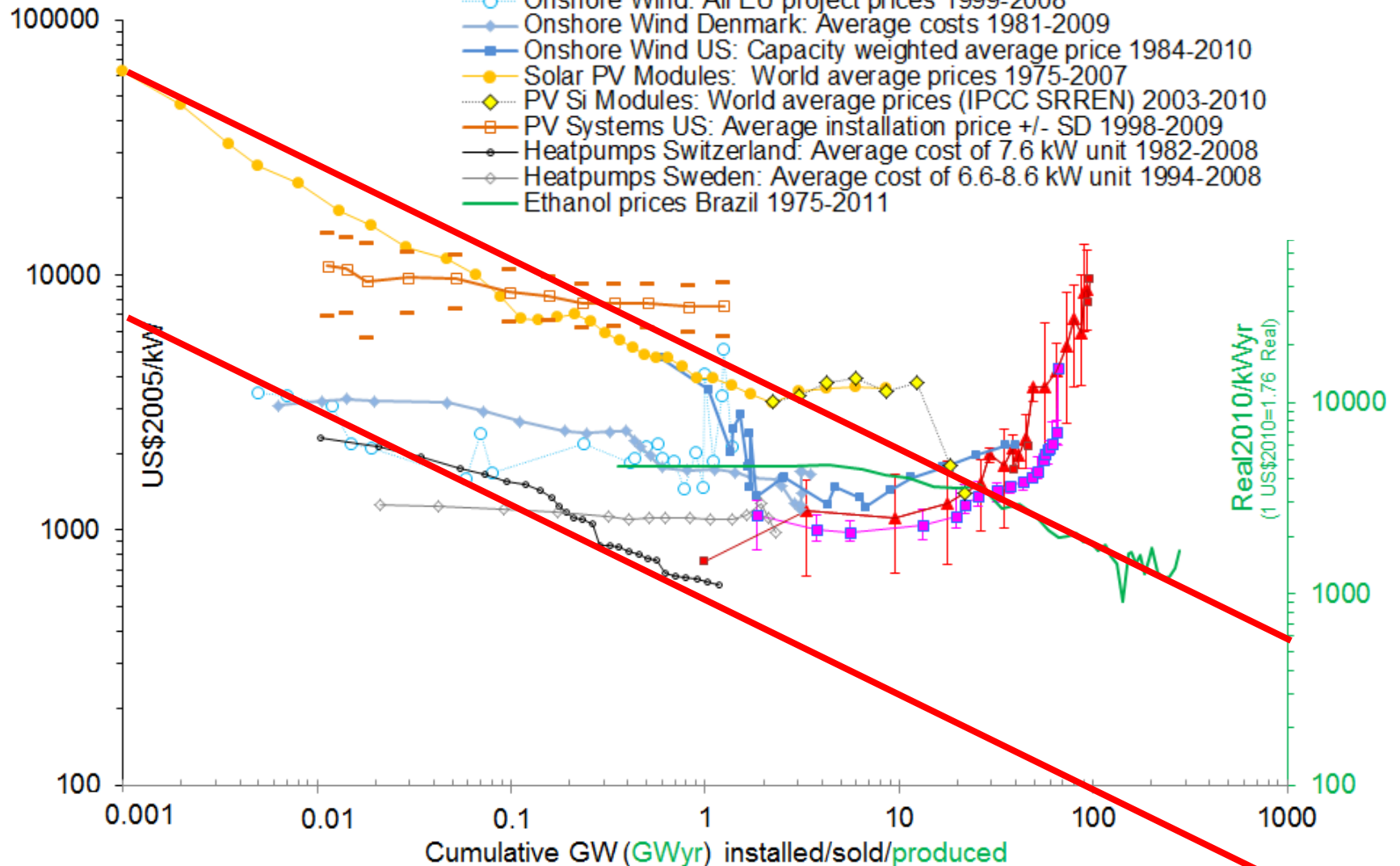


~50% renewables by 2030

Global Primary Energy



- ▲ Nuclear US: Average and Minimum/Maximum 1971-1996
- Nuclear US: Single Reactor (No Range) 1971-1996
- Nuclear France: Average and Min/Max 1977-1999
- Offshore Wind: All EU project prices 1999-2008
- Onshore Wind Denmark: Average costs 1981-2009
- Onshore Wind US: Capacity weighted average price 1984-2010
- Solar PV Modules: World average prices 1975-2007
- ◆ PV Si Modules: World average prices (IPCC SRREN) 2003-2010
- PV Systems US: Average installation price +/- SD 1998-2009
- Heatpumps Switzerland: Average cost of 7.6 kW unit 1982-2008
- ◇ Heatpumps Sweden: Average cost of 6.6-8.6 kW unit 1994-2008
- Ethanol prices Brazil 1975-2011



Annual Energy Investments	Innovation RD&D [billion US\$2005]	Markets Formation [billion US\$2005]	Present Investments [billion US\$2005]	Investment for SE4All [billion US\$2005]
	2010	2010	2010	2010 - 2030
Efficiency	>> 8	~ 5	300	260-370
Renewables	> 12	~ 20	200	260-410
Access	< 1	< 1	~ 9	40-60
Total	> 50	< 150	1250	1780 - 2440

