

The Interplay of Energy Policy and Industrial Policy in the Energy Transition

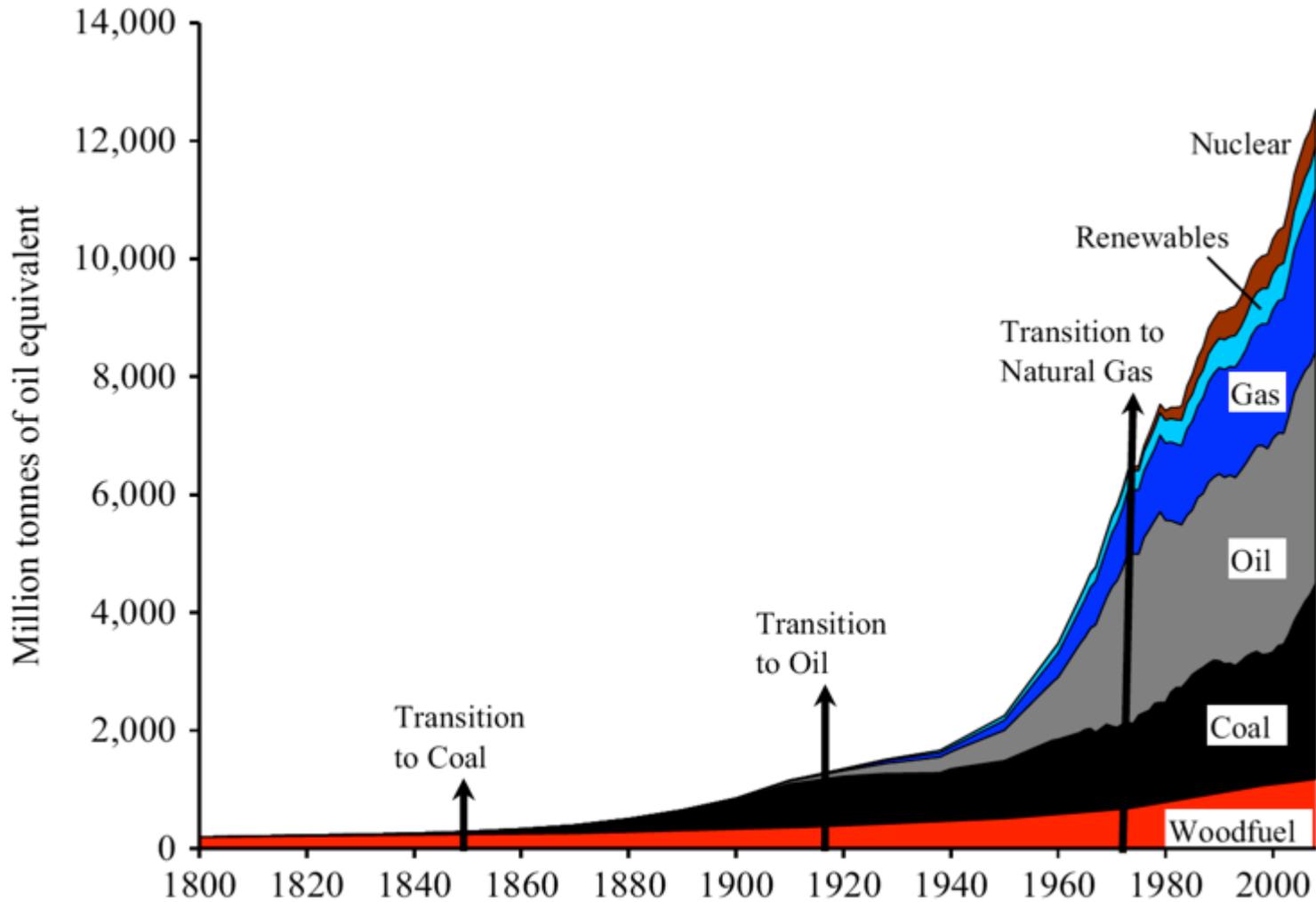
Patrice Geoffron

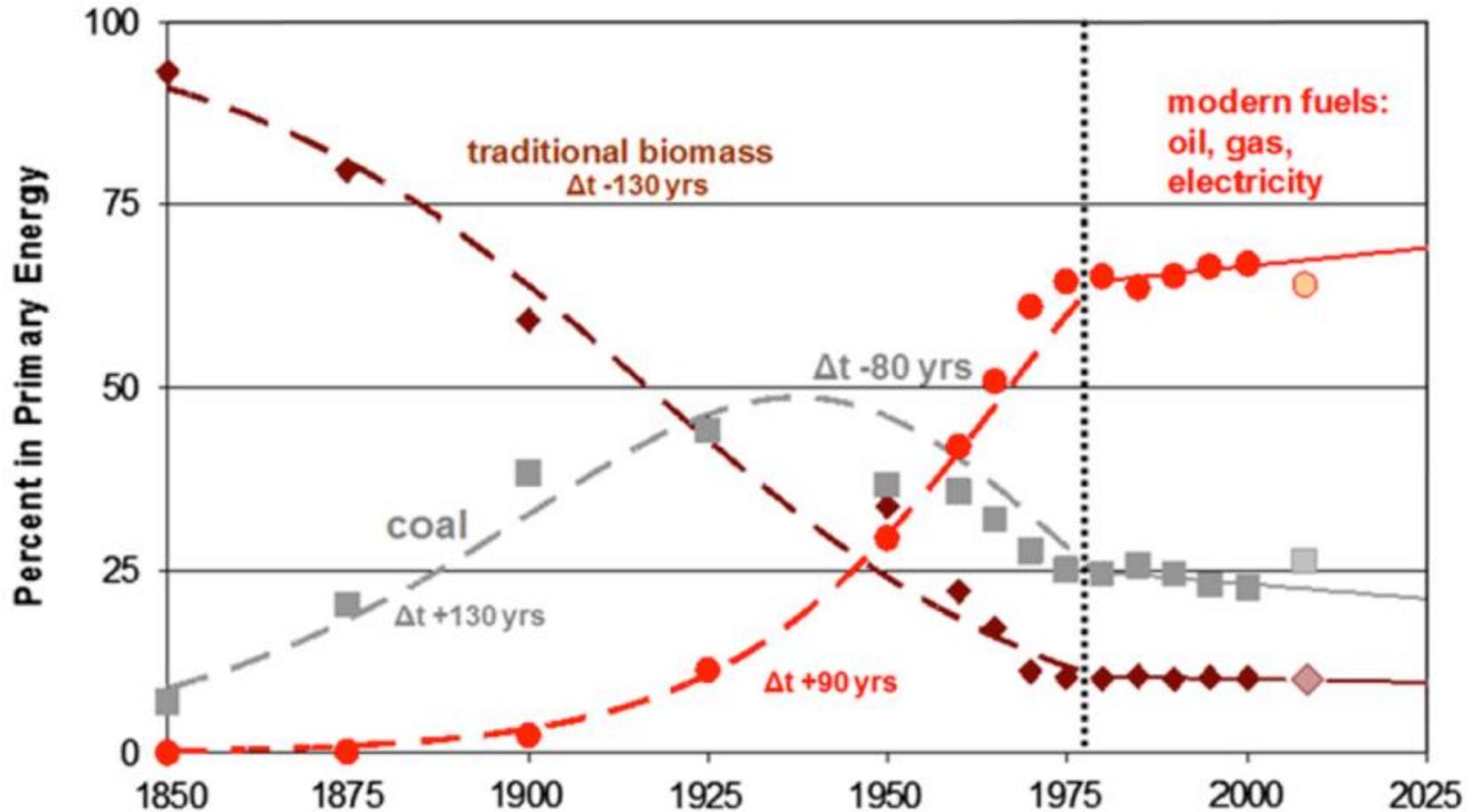
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Public intervention in the energy transition:
A legal and economic perspective on State aid policy

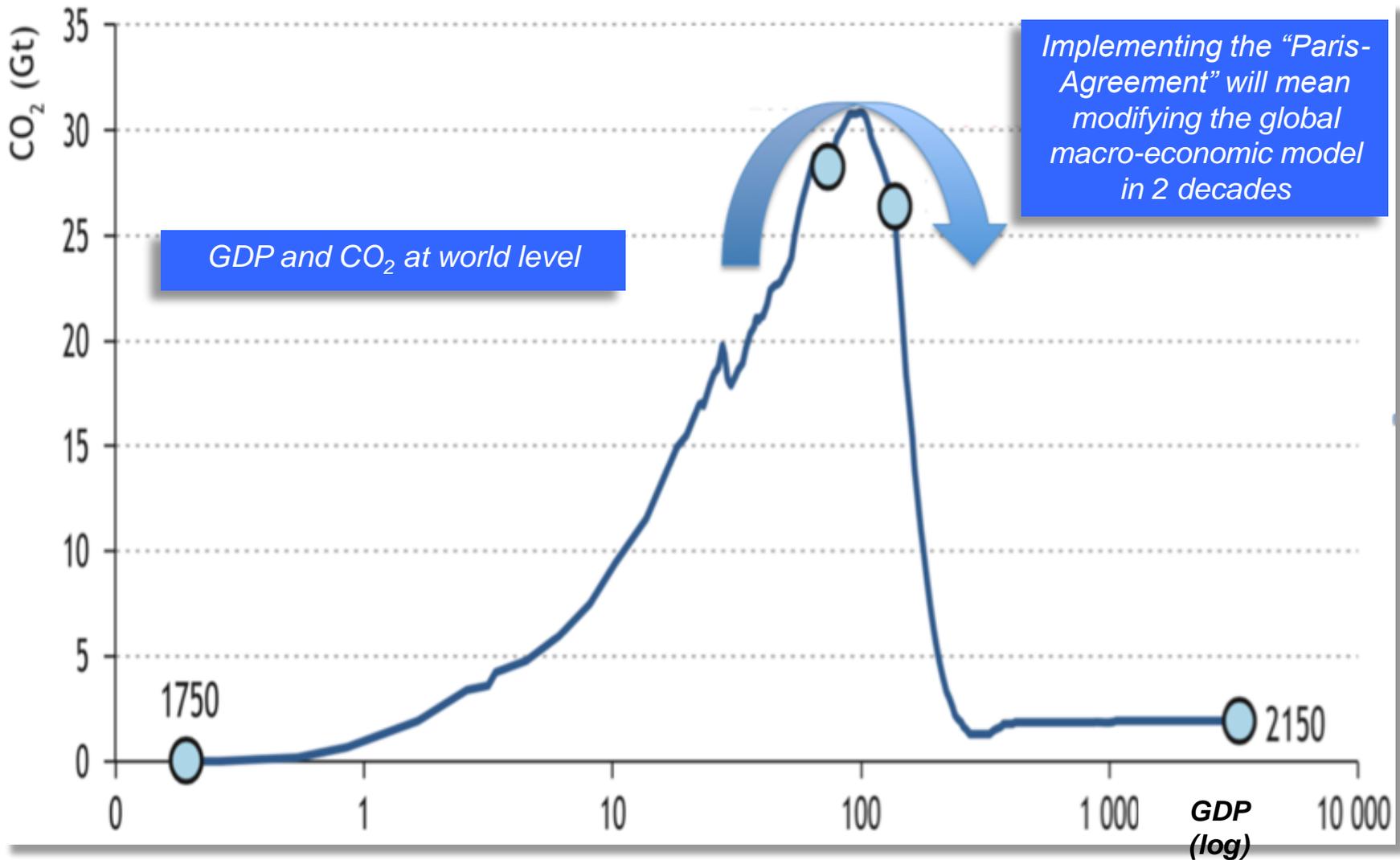
- **Observation that a group of dominating energy sources are challenged and then replaced by another group presenting different characteristics**
- **A particularly significant set of changes to the patterns of energy use in a society:**
 - ✓ *Changes in sources (e.g: wood to coal)*
 - ✓ *Changes in society (e.g: rural to urban; affluence)*
 - ✓ *Changes in environment (deforestation; climate change)*
- **Path dependence (economic costs, technical constraints, social contracts, ...).**

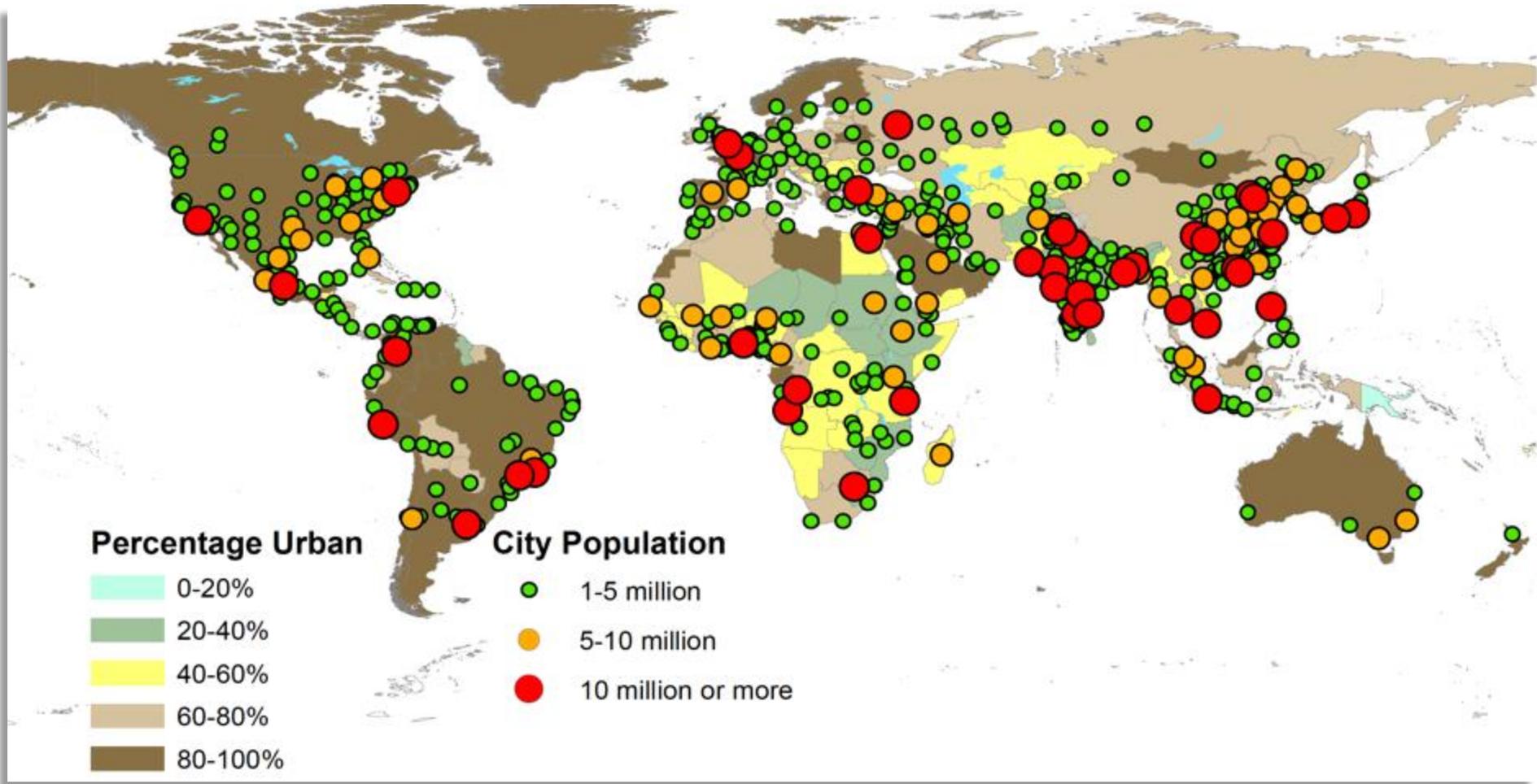
- **Transitions have often depended on the timing and influence of broader external landscape forces:**
 - ✓ For instance, peak energy prices, as occurred for coal in 1921 and 1926, or for oil in 1973, 1979,
 - ✓ sometimes pushed consumers away from a particular energy source, while scrapping old technology associated with the incumbent source.
- **Time-scale:**
 - ✓ The process from technological innovation to niche market to dominance took a minimum of 40 years
 - ✓ An aggregate energy transition, involving the entire economy, could take centuries, as it depended on the switch in fuels and technologies for multiple energy services in many sectors.
- **Understanding co-evolutionary processes:**
 - ✓ Successful uptake tended to depend on the co-evolution of technologies, industries and institutions
 - ✓ that enabled new energy sources to emerge from niches and become core elements in a stable “regime”.



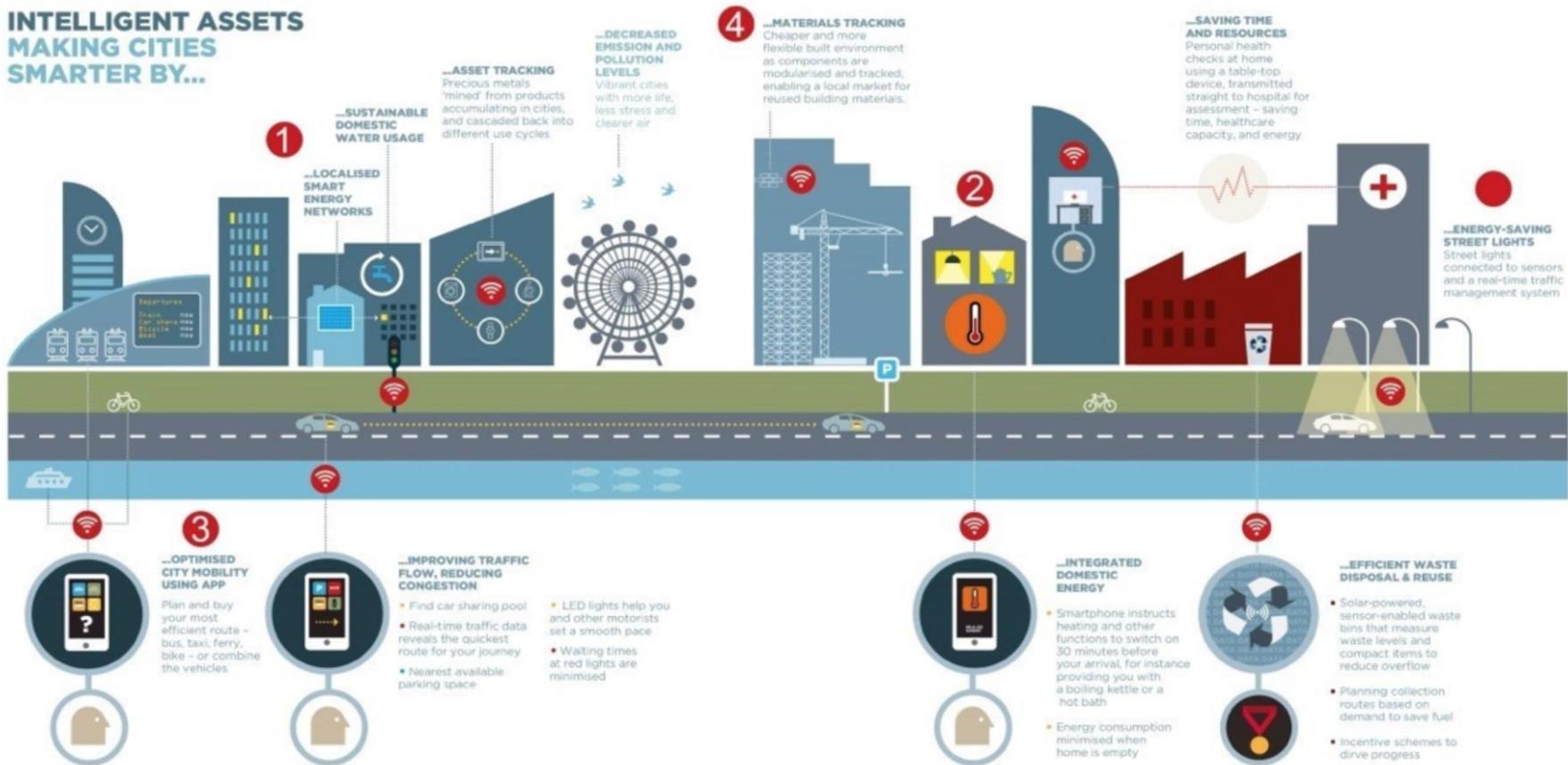


But this time, it's different... (1/3)

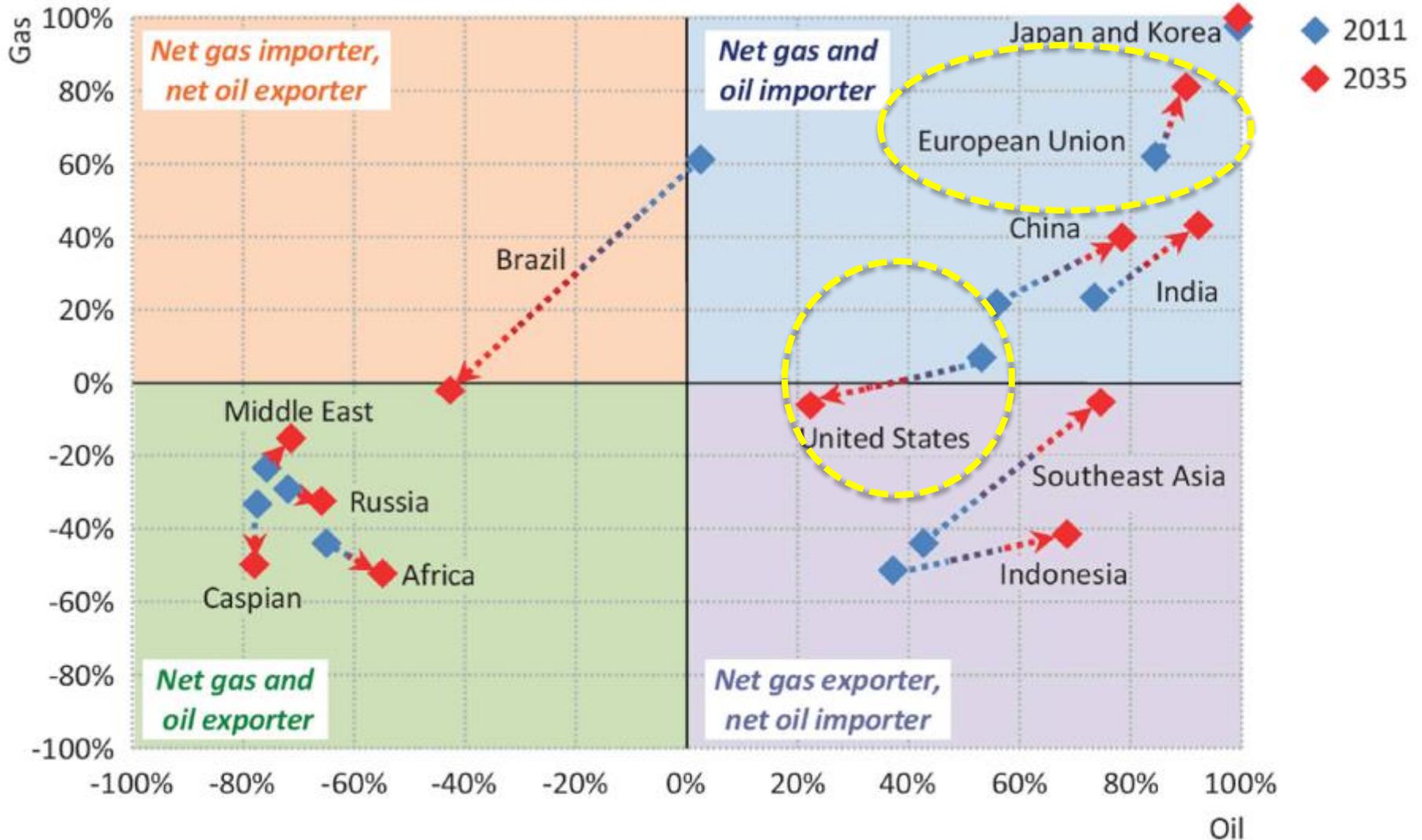




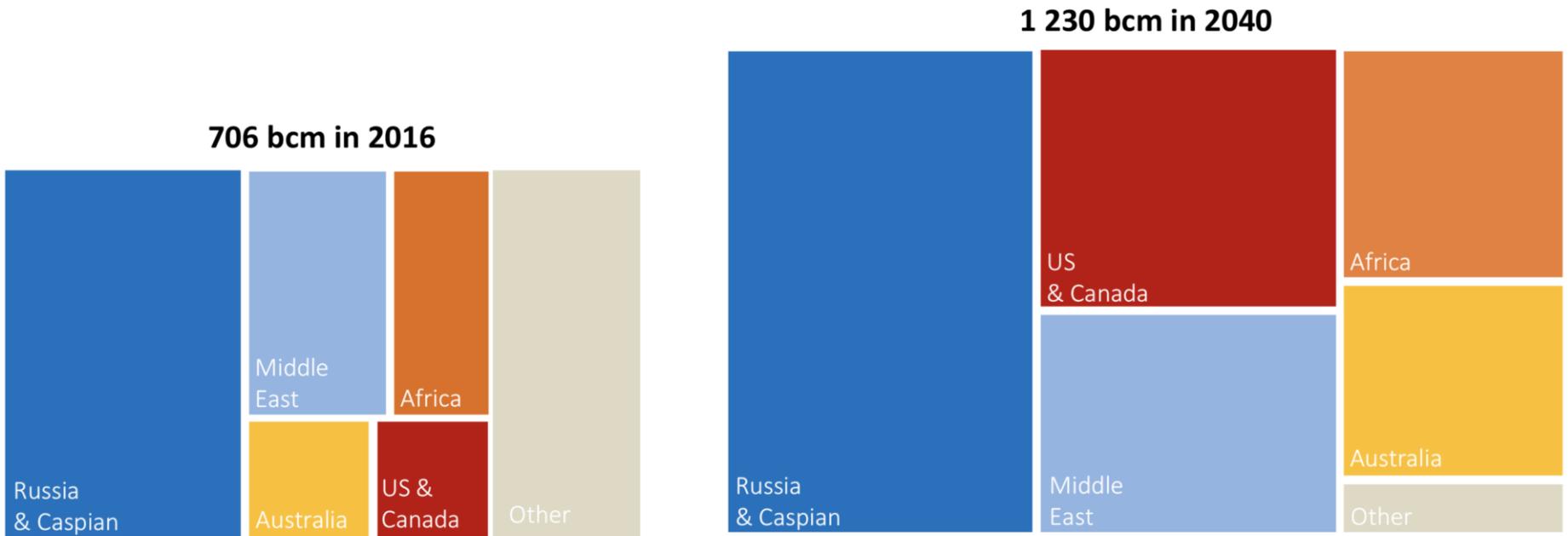
INTELLIGENT ASSETS MAKING CITIES SMARTER BY...



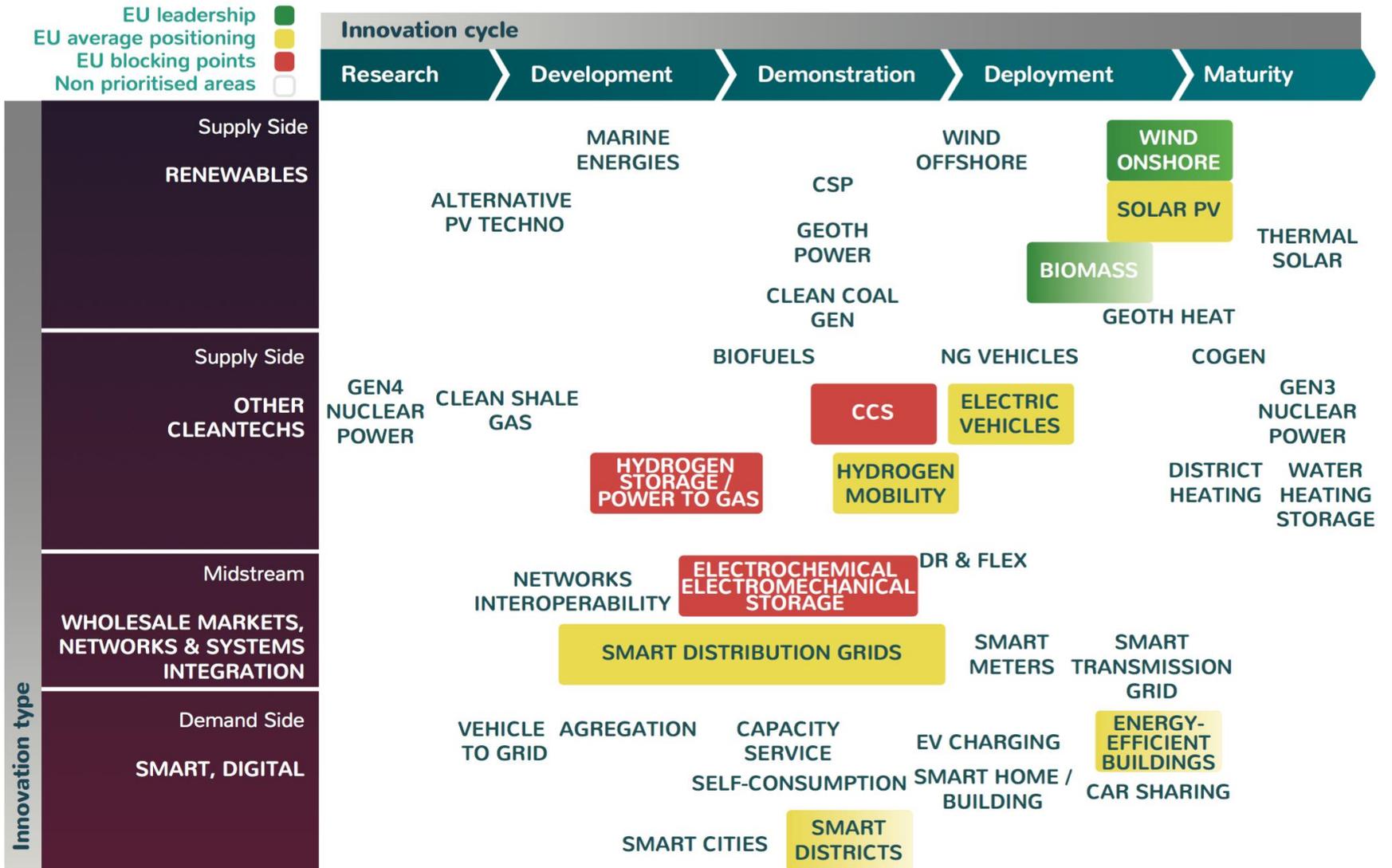
Energy security: a moving landscape (1/2)

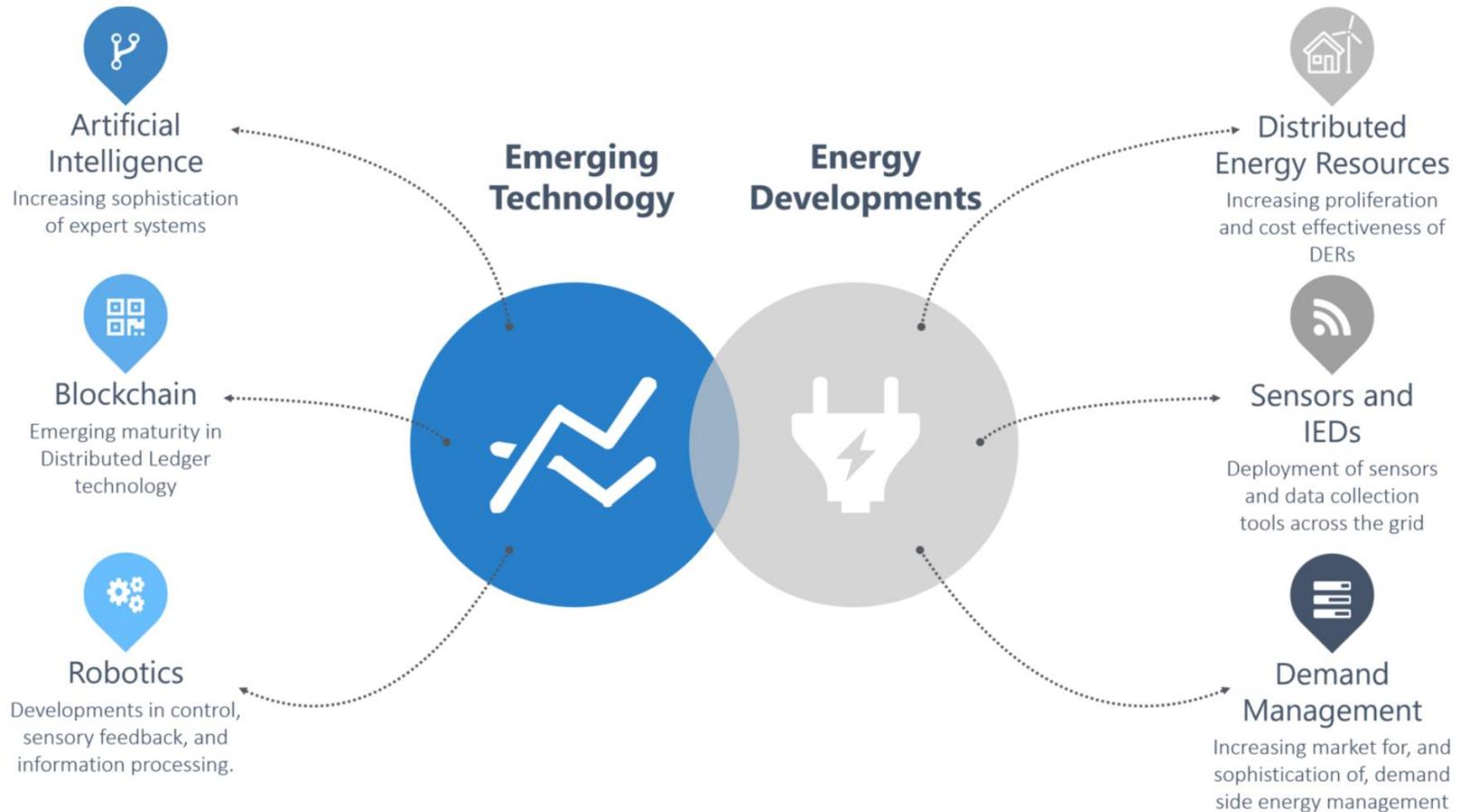


Gas exporters



Facing a Darwinian technological portfolio...





The 4th Industrial Revolution (4IR) and the Role of Energy

... and the technological “convergence” (2/2)

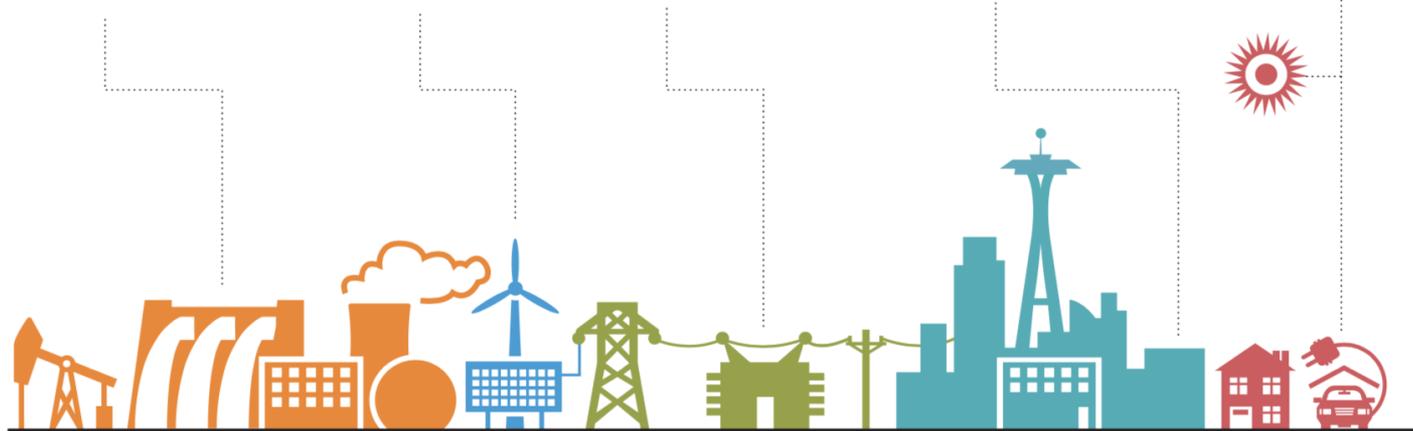
Distributed energy resources enabled by big data-driven alignment of supply and demand

Data-driven asset strategies including preventative and condition-based maintenance and predictive outage

Smart grid and smart pipes allow automated controls to improve network resiliency, safety, and efficiency

Customer interactions governed by analysis of customer journeys, segmentation, and personalized communication

Platform supports distributed energy resources and marketplaces



Back-office automation and data-driven decision making



Field workforce with mobile access to maps, data, work-management tools, and real-time expertise



High level of situational awareness to enable energy balancing

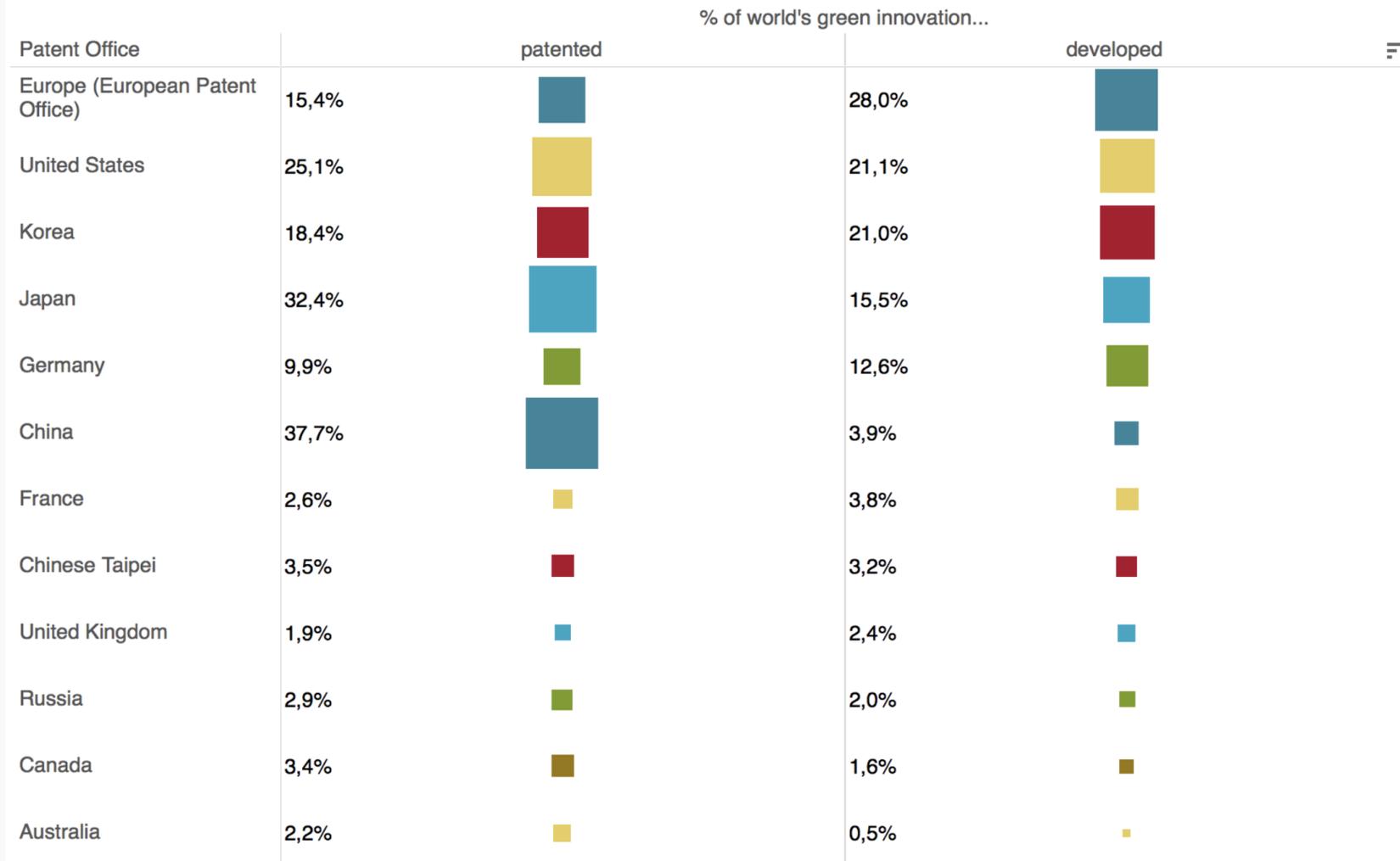


TOP 5 Solar Panel Manufacturers [Ranked by shipment guidance (GW)]

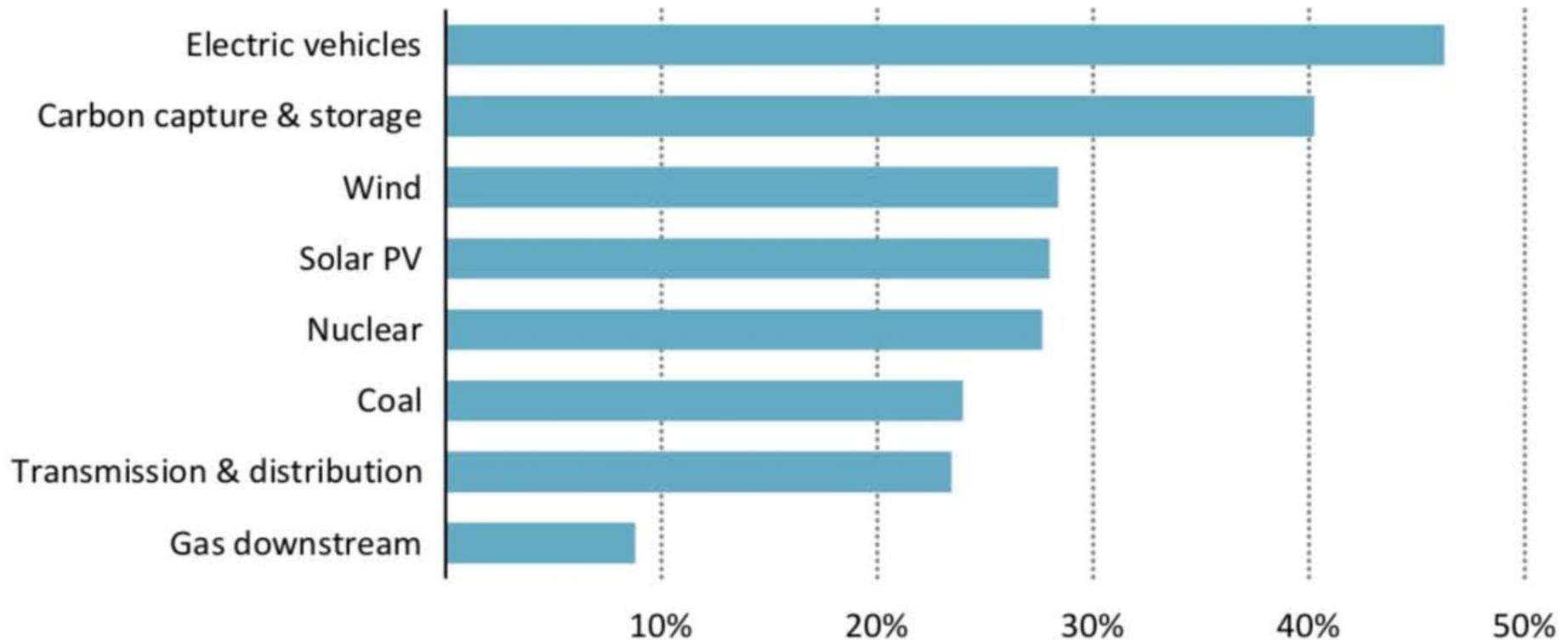
2008		2015	
 1.Sharp	 1.Trina Solar		
 2.First Solar	 2.Yngli Green Energy		
 3.Yngli Green Energy	 3.Canadian Solar		
 4.Kyocera	 4.Hanwha SolarOne		
 5.Trina Solar	 5.Jinko Solar		

TOP 10 Wind Turbine Manufacturers (Ranked by Global Market Share)

2008		2015	
 1.Vestas	 6.Sulzon	 1.Goldwind	 6.Enercon
 2.GE	 7.Sinovel	 2.Vestas	 7.Guodian
 3.Gamesa	 8.Goldwin	 3.GE	 8.Ming Yang
 4.Enercon	 9.Dongfang	 4.Siemens	 9.Envision
 5.Siemens	 10.Nordex	 5.Gamesa	 10.CSIC



China's share of global cumulative investments (2017-2040)

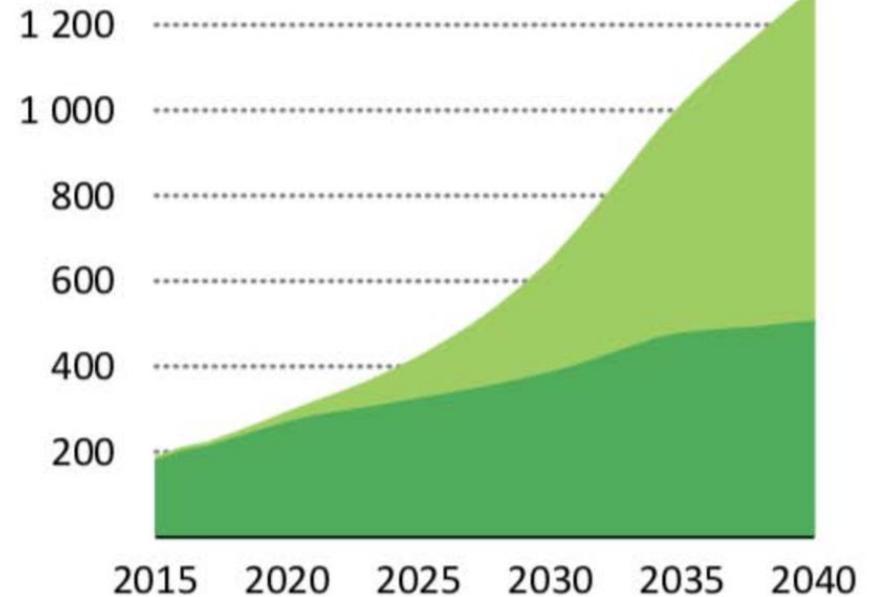
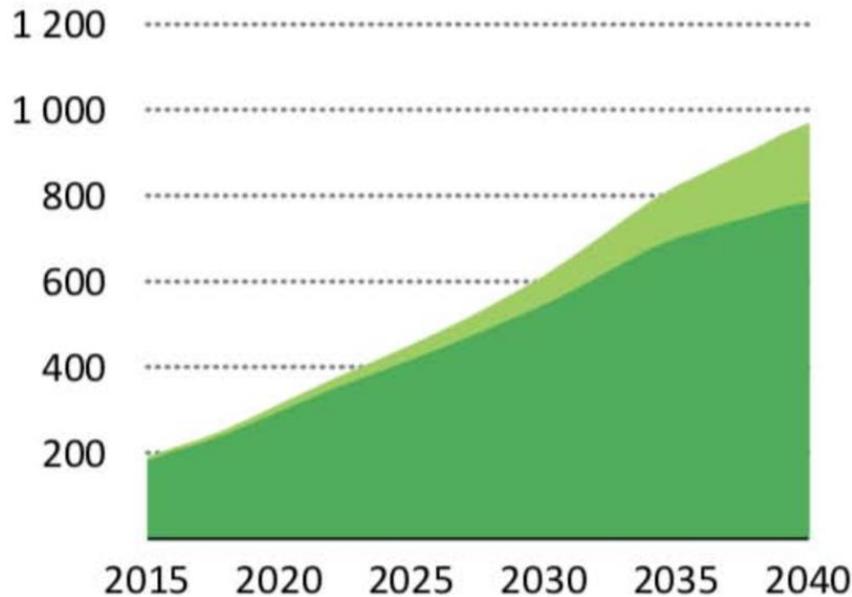


The effects of China's energy transition are reflected in its high shares of global investment in a range of low-carbon technologies in the New Policies Scenario

New Policies Scenario

Sustainable Development Scenario

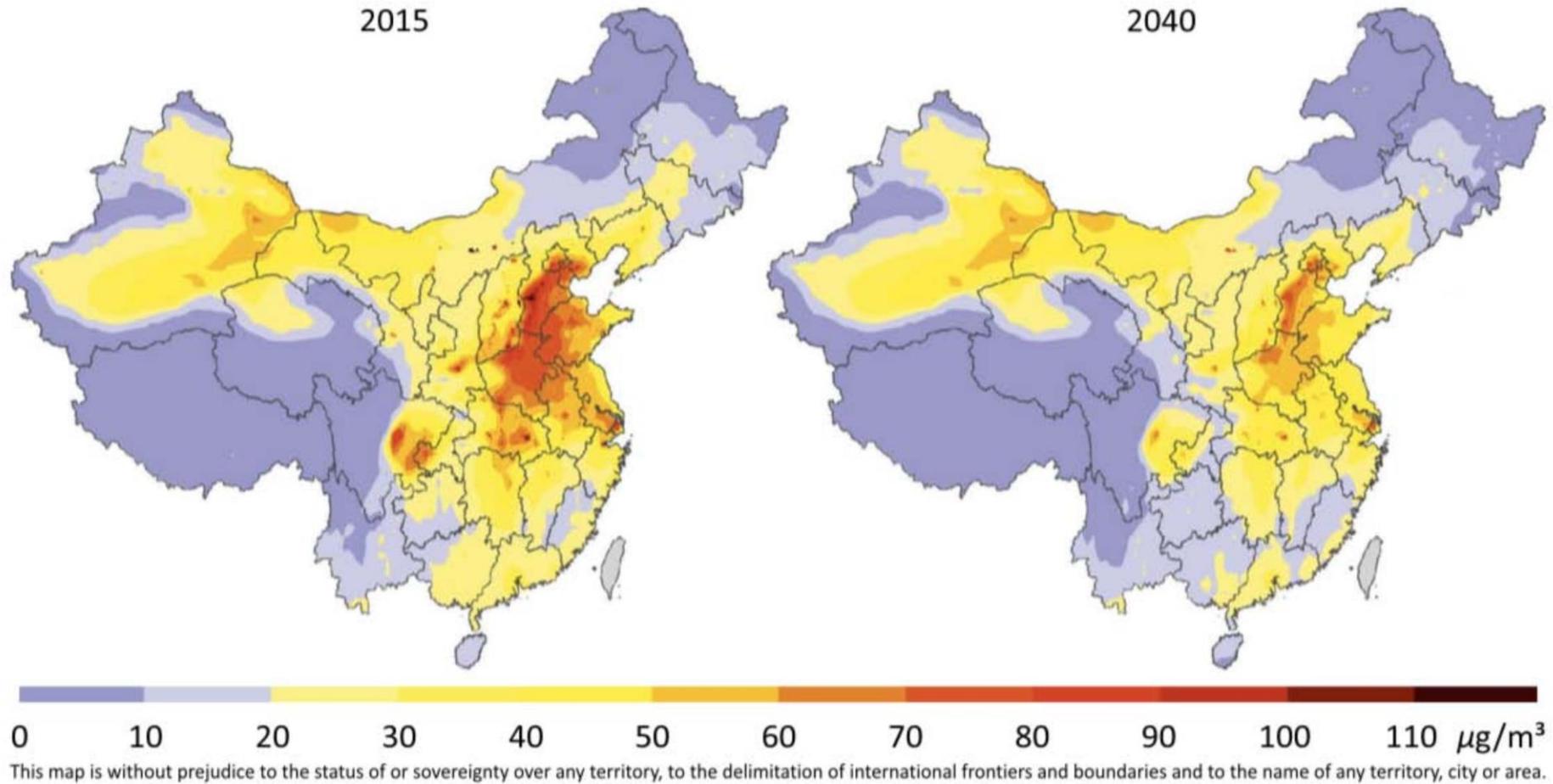
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CO₂ emissions savings from: ■ Solar PV panels ■ EV batteries

China's exports of low-carbon technologies support worldwide CO₂ emissions savings

The Chinese commitment in the low carbon transition is credible considering the air quality issue



- **The European vision:**
 - *20*20*20 in 2020; - 80% in 2050*
 - *The energy transition as a “socio-economic” project*
- **But the Paris-Agreement could lead:**
 - *To a fierce competition on low carbon technologies*
 - *With a unique capacity of China to benefit from a “large scale”...*
 - *... and a unique capacity of US to deal with the IT-energy convergence.*
- **In front of that new “paradigm”, the European vision is nationally fragmented, with a risk to lose the “momentum”...**
- **... the design of the industrial policies and the State aid regime has to be replaced in this context.**