International Energy Agency

Current and Future Challenges to Energy Security

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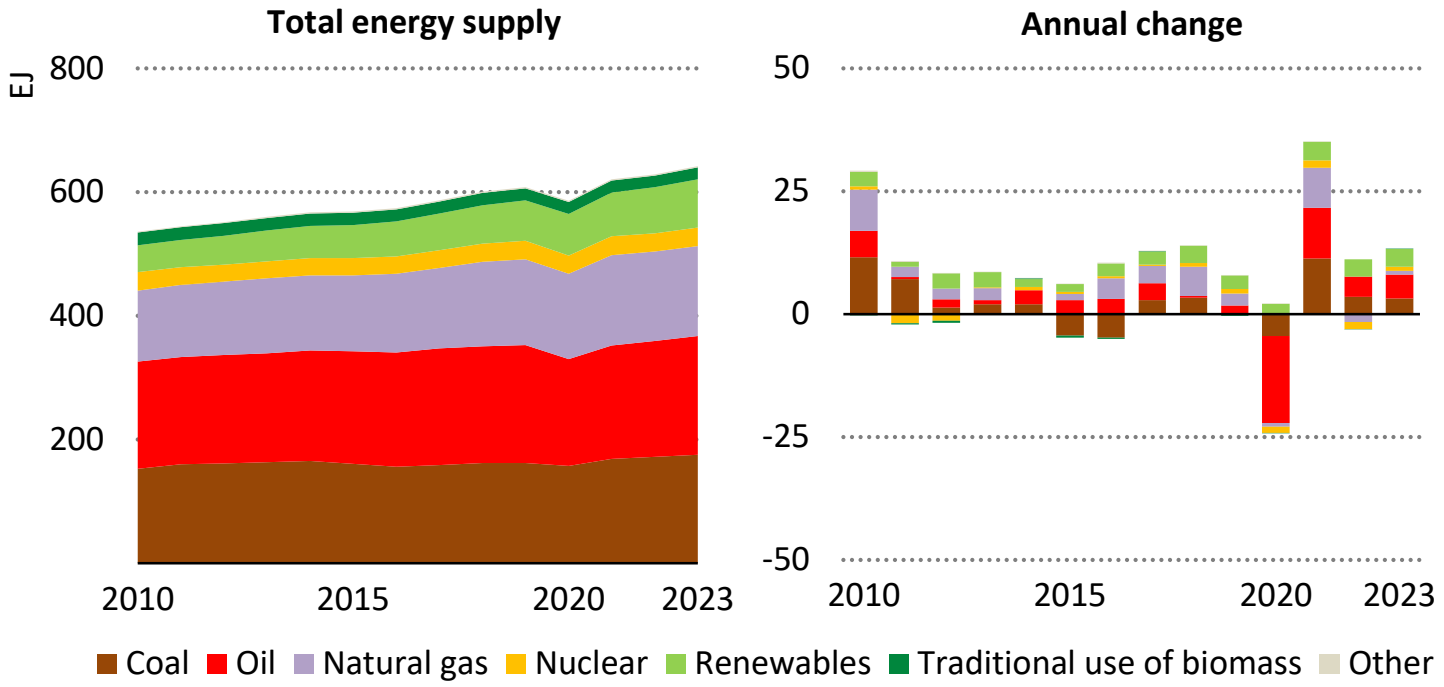
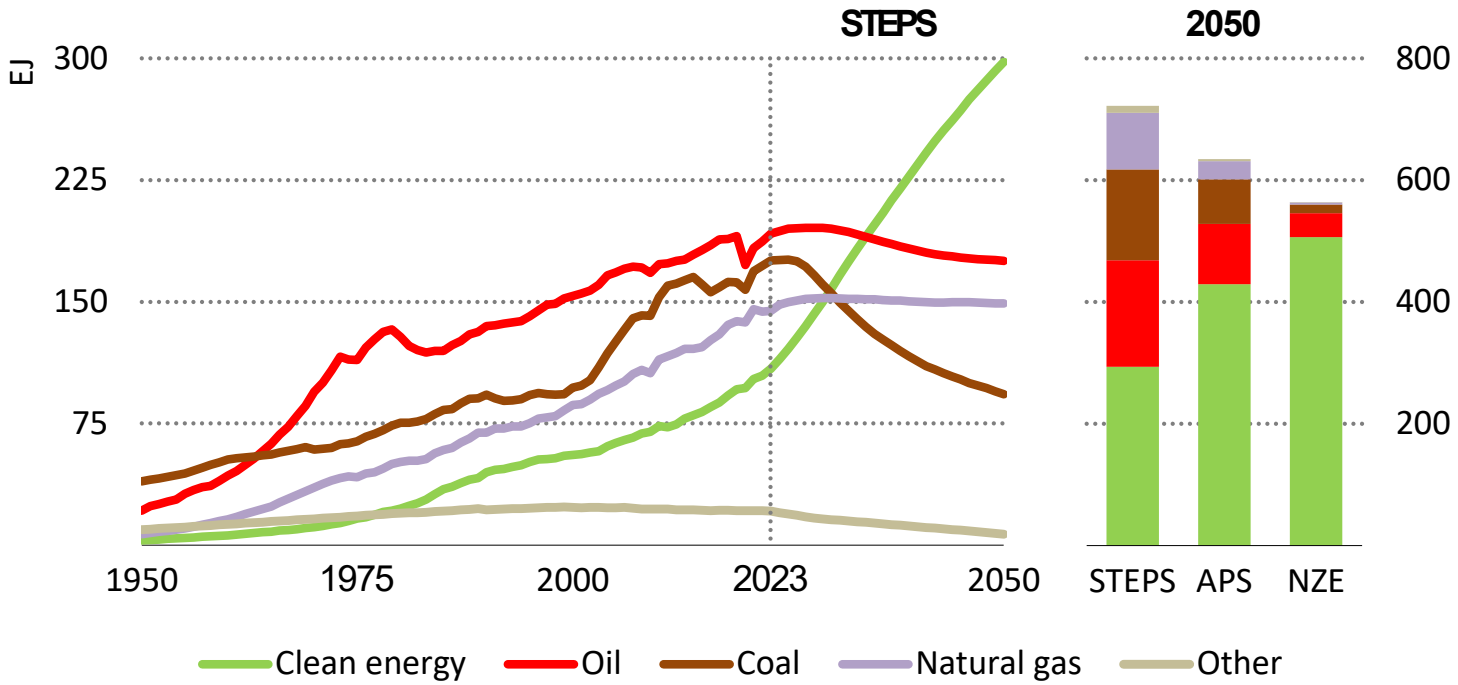
Global total energy supply, 2010-2023



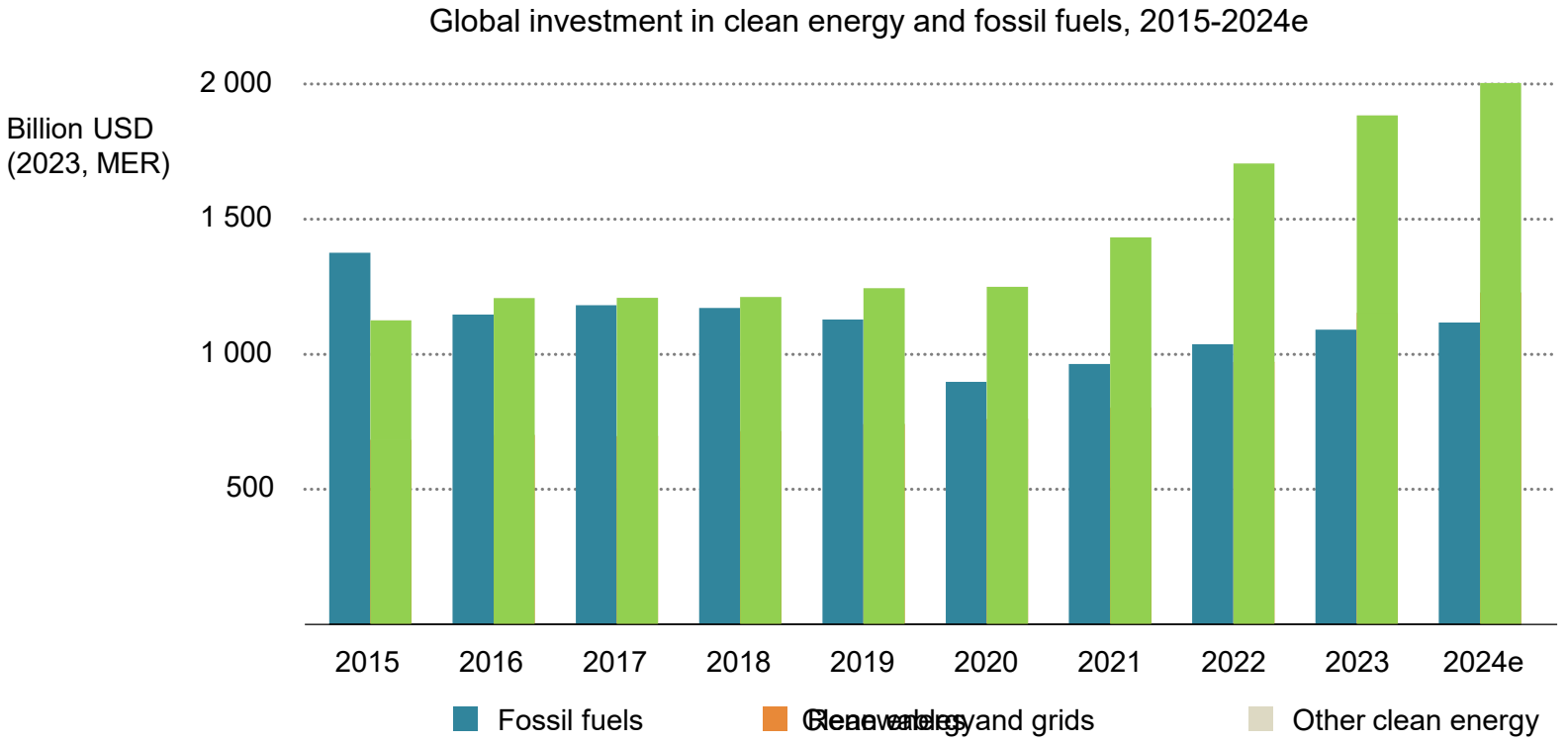
Fossil fuels met two-thirds of the increase in global energy demand in 2023, mostly with more coal and oil, while the increase in clean energy in 2023 was twice as large as in 2022

Global energy mix by scenario to 2050



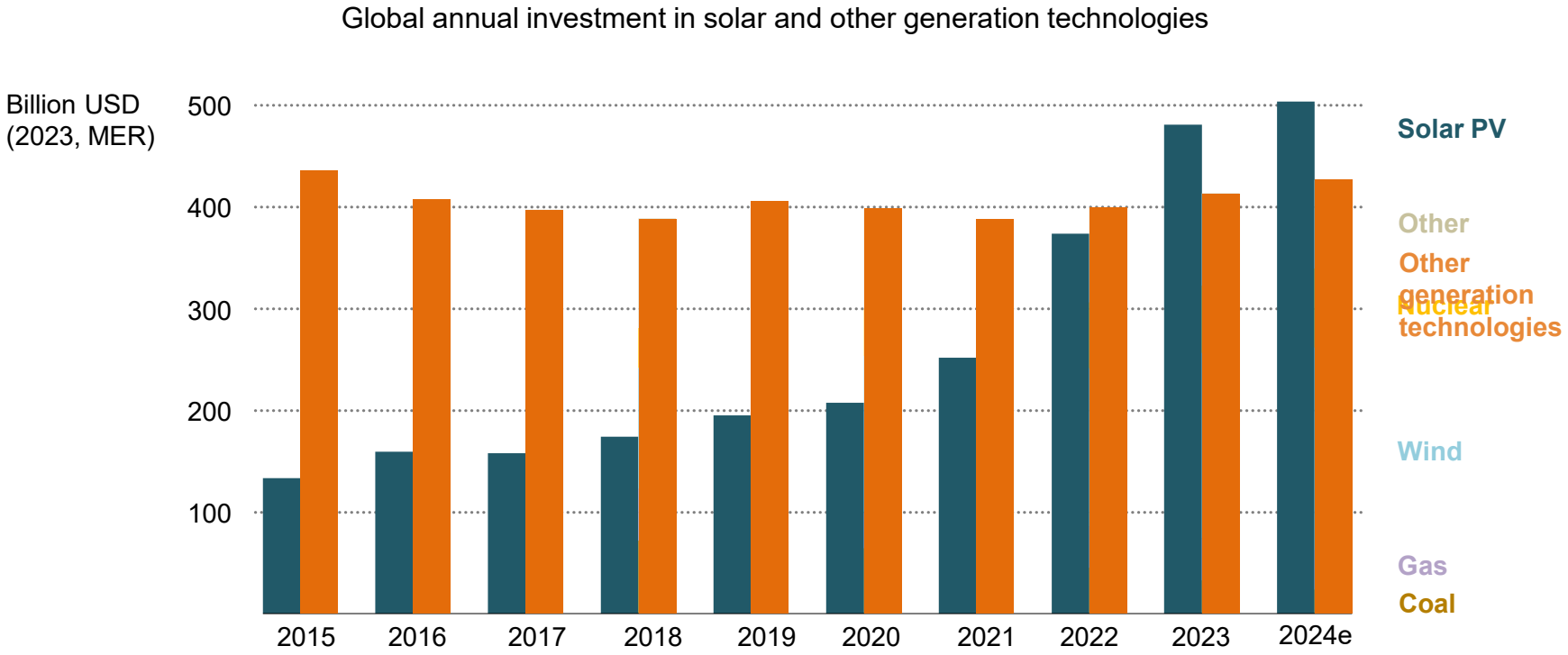
A scenario based on current policy settings sees clean energy poised for huge growth, while coal, oil and natural gas each reach a peak by 2030 and then start to decline

Clean energy pushes global energy investment above USD 3 trillion



Total investment in the energy sector is set to top USD 3 trillion in 2024, thanks mainly to strong clean energy growth. Spending on renewable power and grids, on its own, is now higher than investment in fossil fuels.

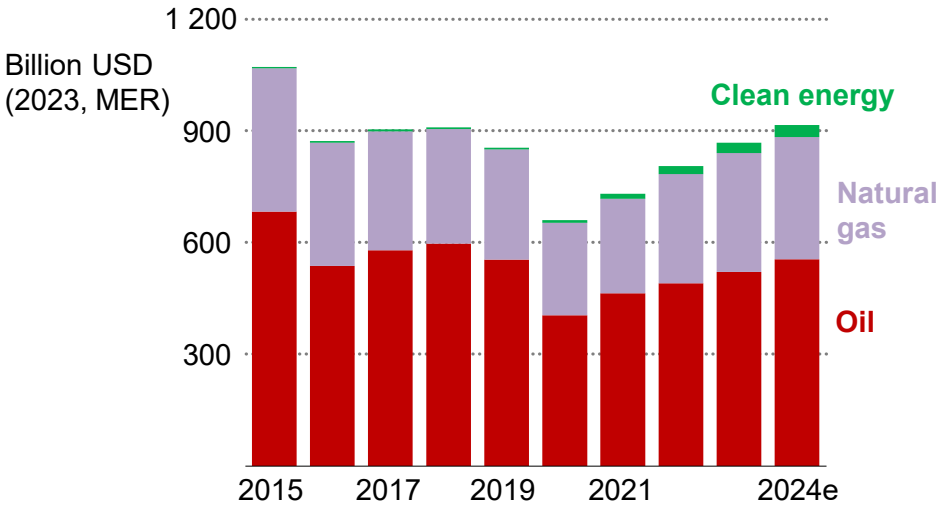
Solar PV has overtaken all other generation technologies combined



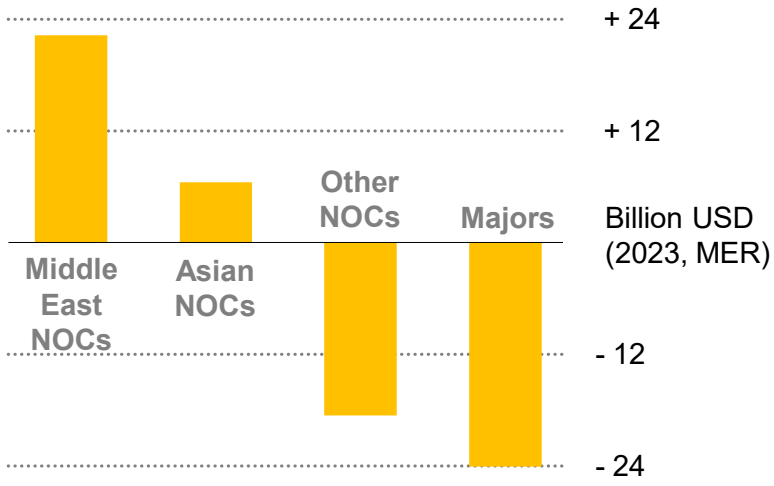
Investment in solar PV is set to hit half a trillion dollars in 2024, putting it at the centre of the transformation of the global energy sector. Investment in wind and nuclear power has risen as gas and coal spending falls back.

Oil and gas investments have returned to pre-pandemic levels

Investment by oil and gas companies

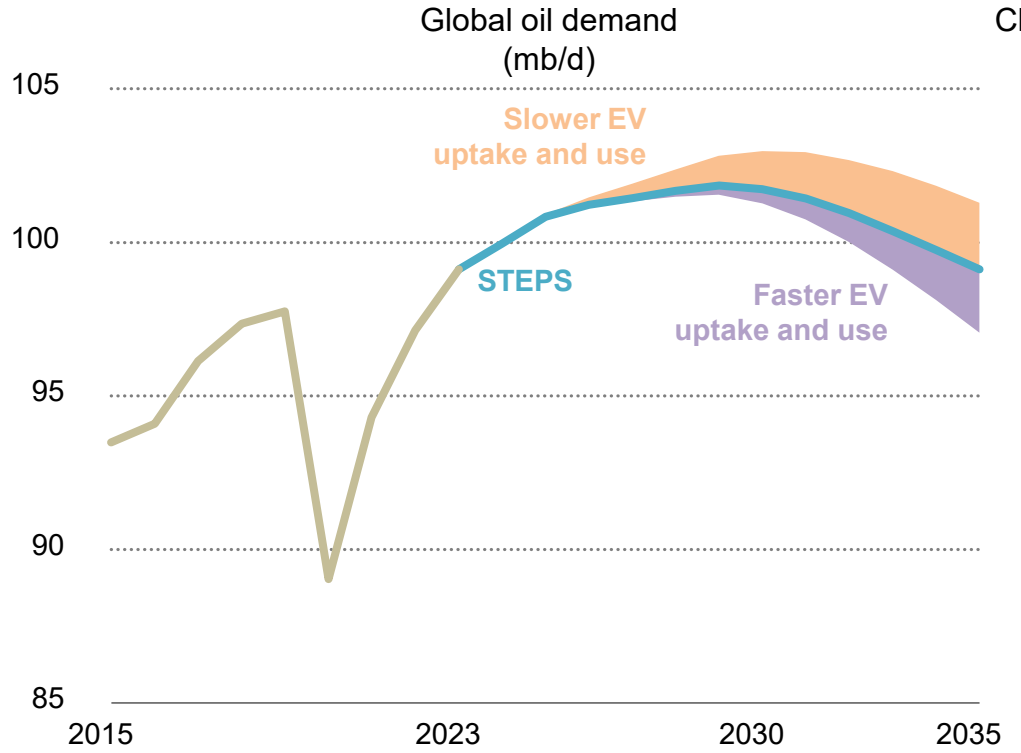


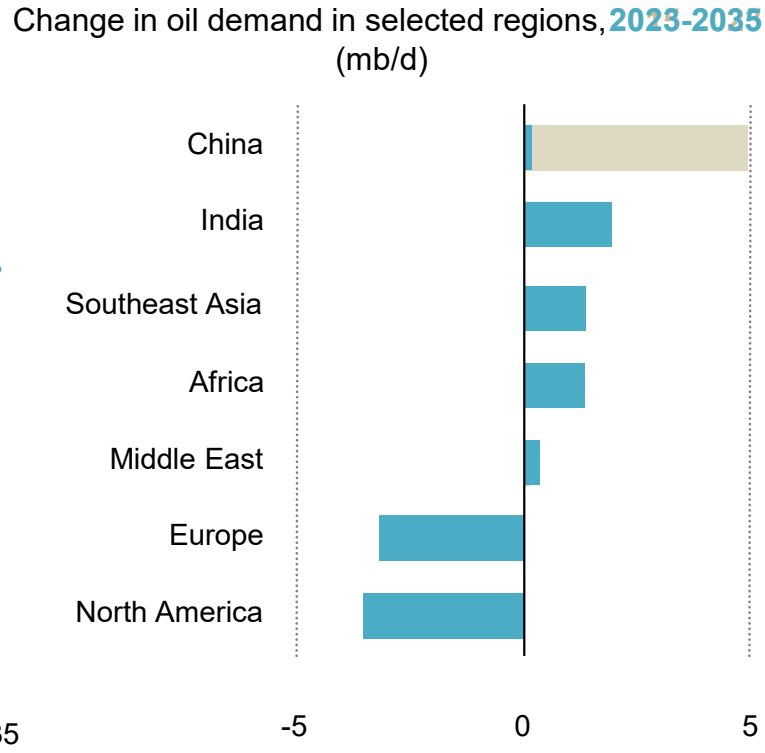
Change in annual upstream investment by selected company grouping, 2019-2024e



The rebound in oil and gas investment has been led by National Oil Companies (NOCs) in the Middle East and Asia. Clean energy investment by the industry is around USD 30 billion, less than 4% of total capital spending.

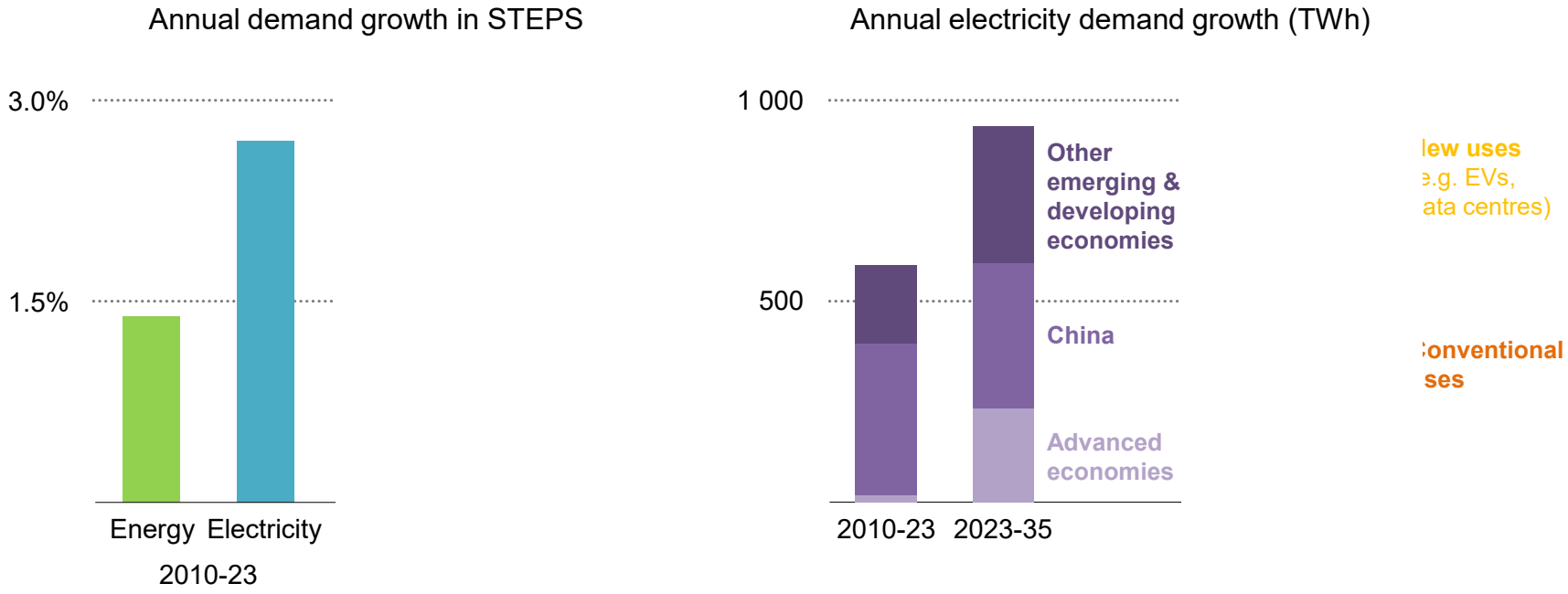
Oil demand's engine is switching to electricity





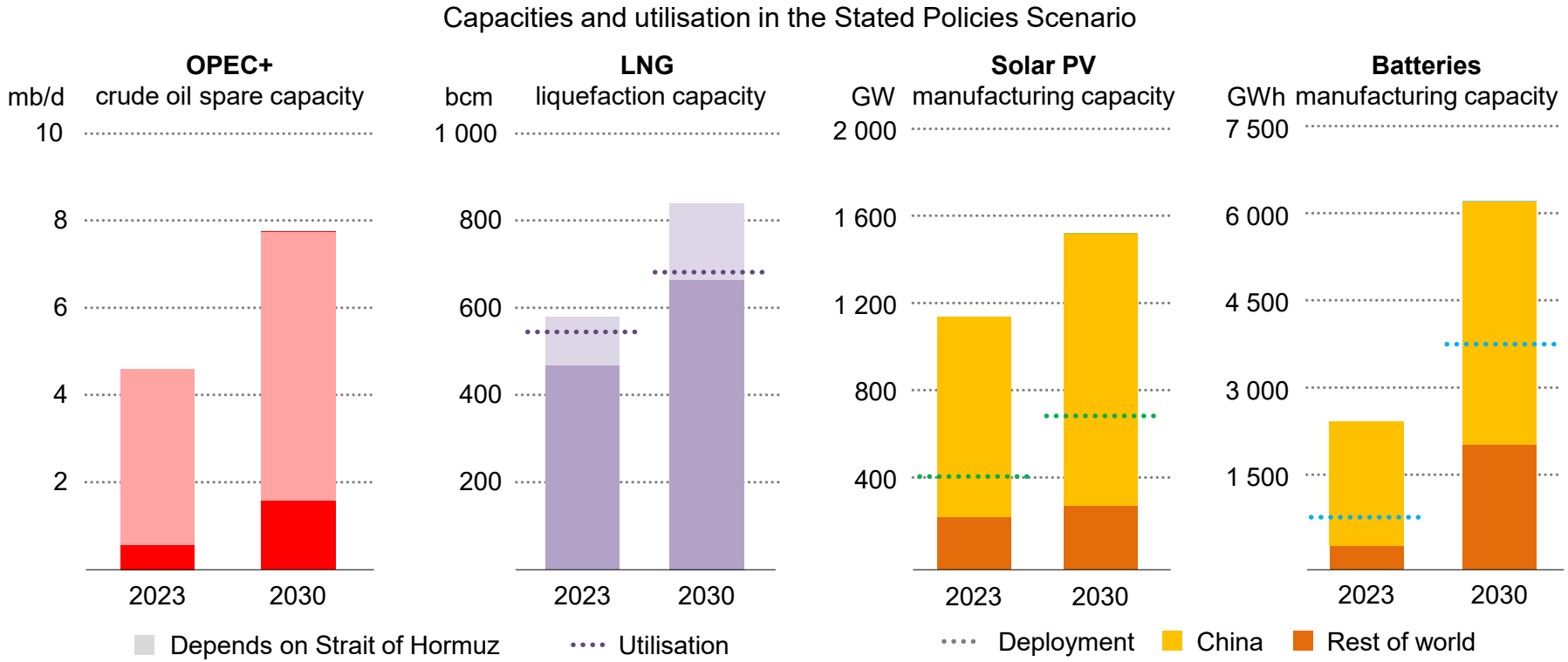
As China scales up electric mobility, India, Southeast Asia and Africa are the main sources of growth in oil use to 2035. Even if projected uptake of electric vehicles slows in key markets, a peak in oil demand remains on the horizon

Moving at speed into the Age of Electricity



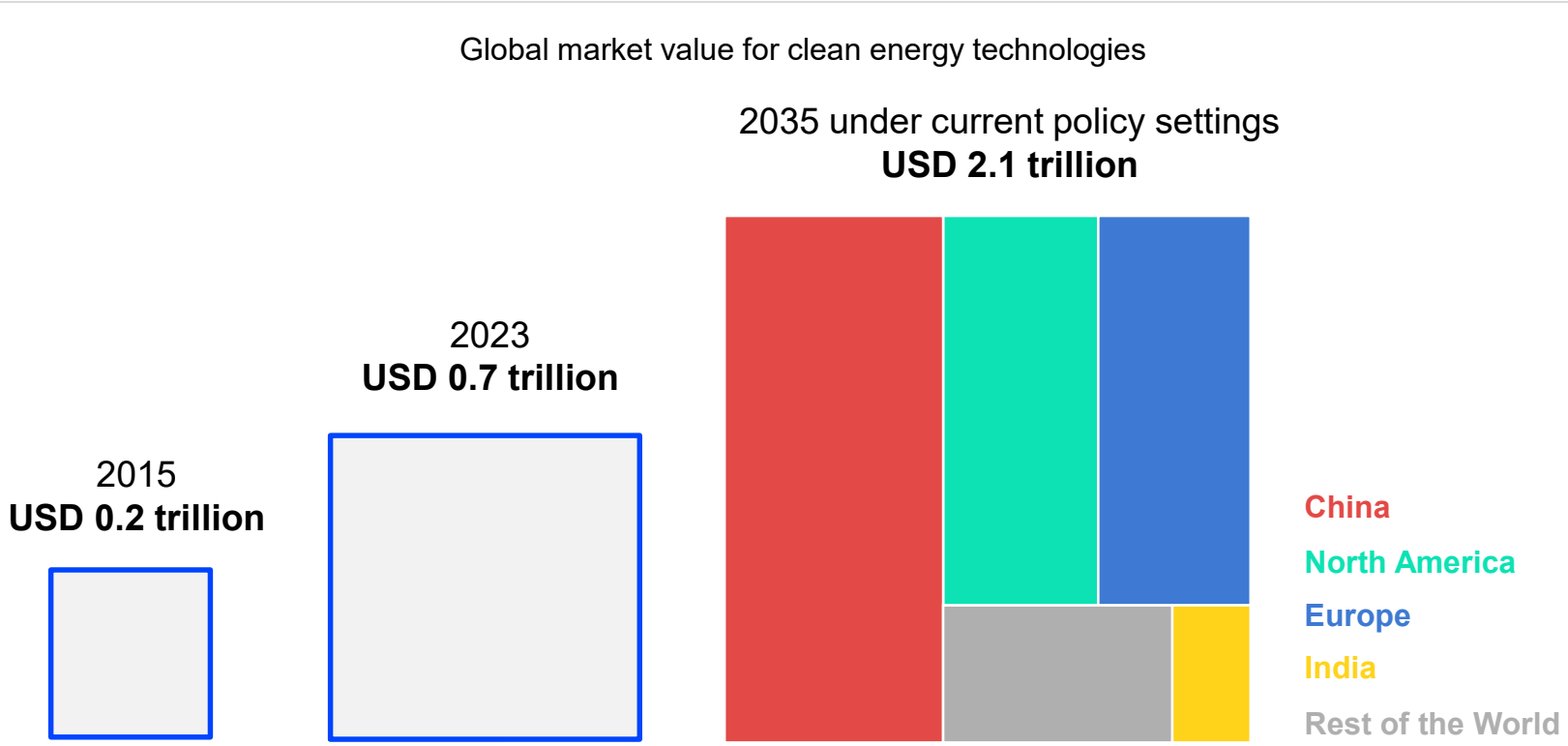
Electricity is growing faster than all other energy sources and it's growing across a wide range of economies, as conventional drivers of growth are supplemented by new ones like EVs, data centres and heat pumps

Energy security risks remain high even as market balances ease



The world is set to enter a new energy market context in the second half of this decade, marked by continued geopolitical hazards but also by relatively abundant supply of multiple fuels and technologies

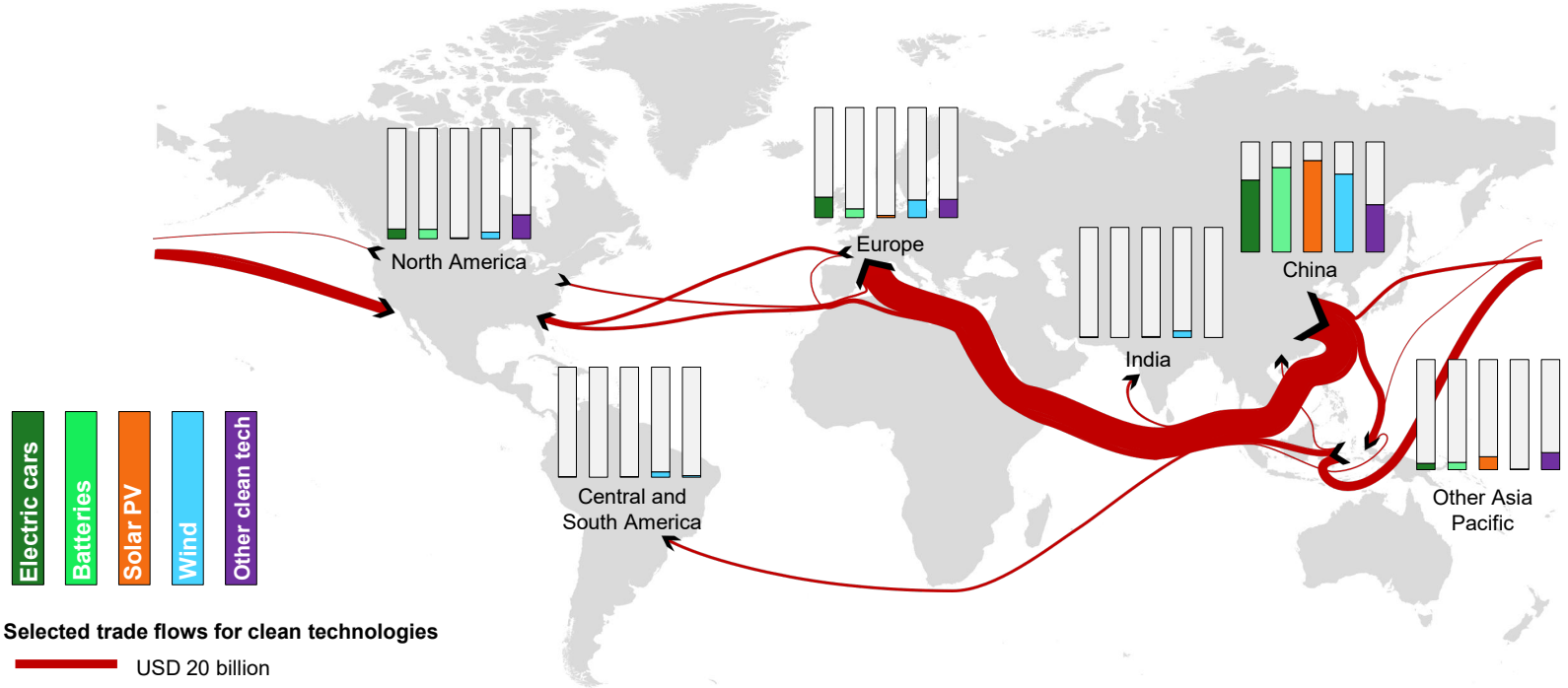
Clean & modern technologies are a sizeable economic opportunity



The market for clean technologies is set to triple to 2035 under current policy settings, close to value of the global crude oil market in recent years.

Investment in clean technology manufacturing is booming

Share of global clean technology manufacturing output by technology, 2023



The manufacturing of clean technologies is highly concentrated geographically, with China accounting for around 70% of the global manufacturing output value for the six key clean technologies.

Some Elements for Reflections

- **Big… and Bigger** - global energy demand keeps rising but the number and the size of transformations that are taking place are simply remarkable.
- **The "Age of Electrons"** – electricity is getting the centre of stage with rising share in traditional end user sectors and new emerging ones, including cooling and artificial intelligence
- **Down, but not Out** – the outlook for fossil fuels is affected by energy transition with a demand peak in sight, but traditional sectors will be with us for long time
- **A new Kid on the Block** – a new global energy economy is emerging, making energy at the crossroad of industry, trade, climate and jobs policies (and opening up new opportunities)