



Leave your assumptions at the door!

James Leaton

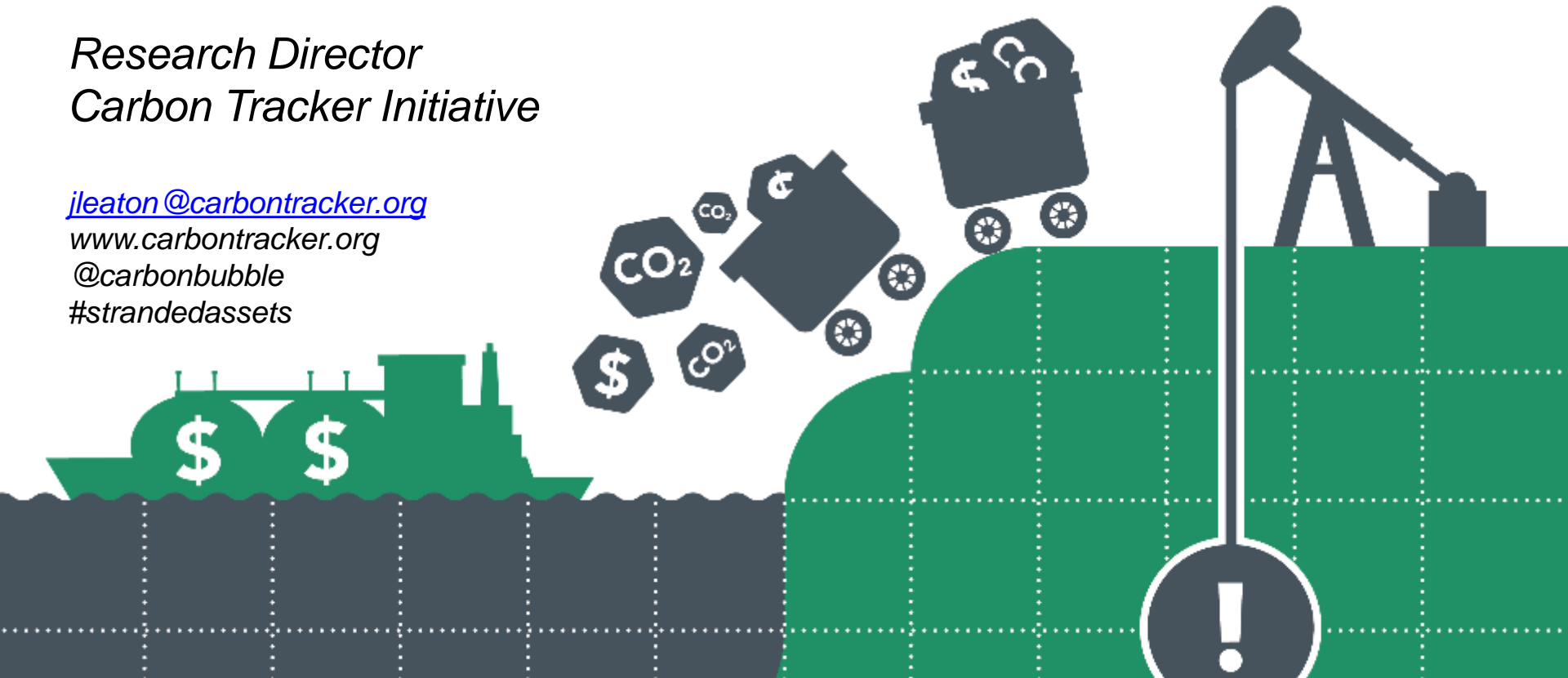
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@carbonbubble

#strandedassets



Carbon Tracker - Who Are We?

Identity

Carbon Tracker is an independent non profit financial think tank funded by EU and US foundations.

Vision

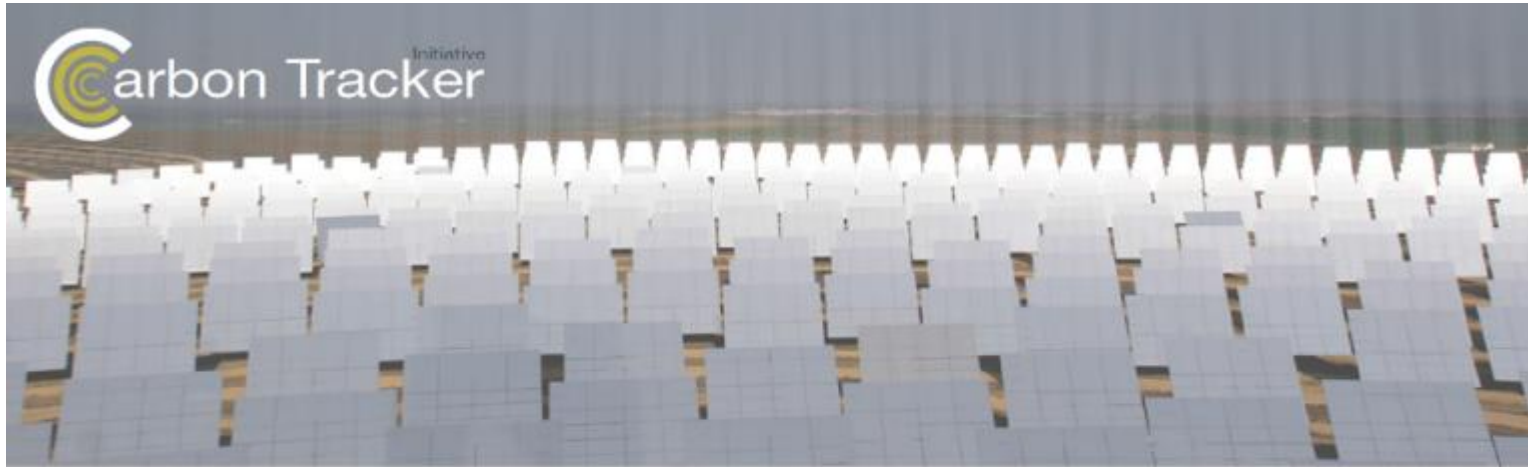
To enable a climate secure global energy market by aligning the capital markets with climate reality.

Put the phrases "**carbon bubble**", "**unburnable carbon**" and "**stranded assets**" into the environmental and financial vocabulary

Reframed the climate debate by revealing the extent of **misalignment** between global **financial markets** and climate security.

Able to transcend barriers between the **scientific, financial and NGO communities**, stimulating new links between climate science, campaigns and flows of capital.

Navigating uncertainty at speed



Lost in Transition:

How the energy sector is missing potential demand destruction



October 2015

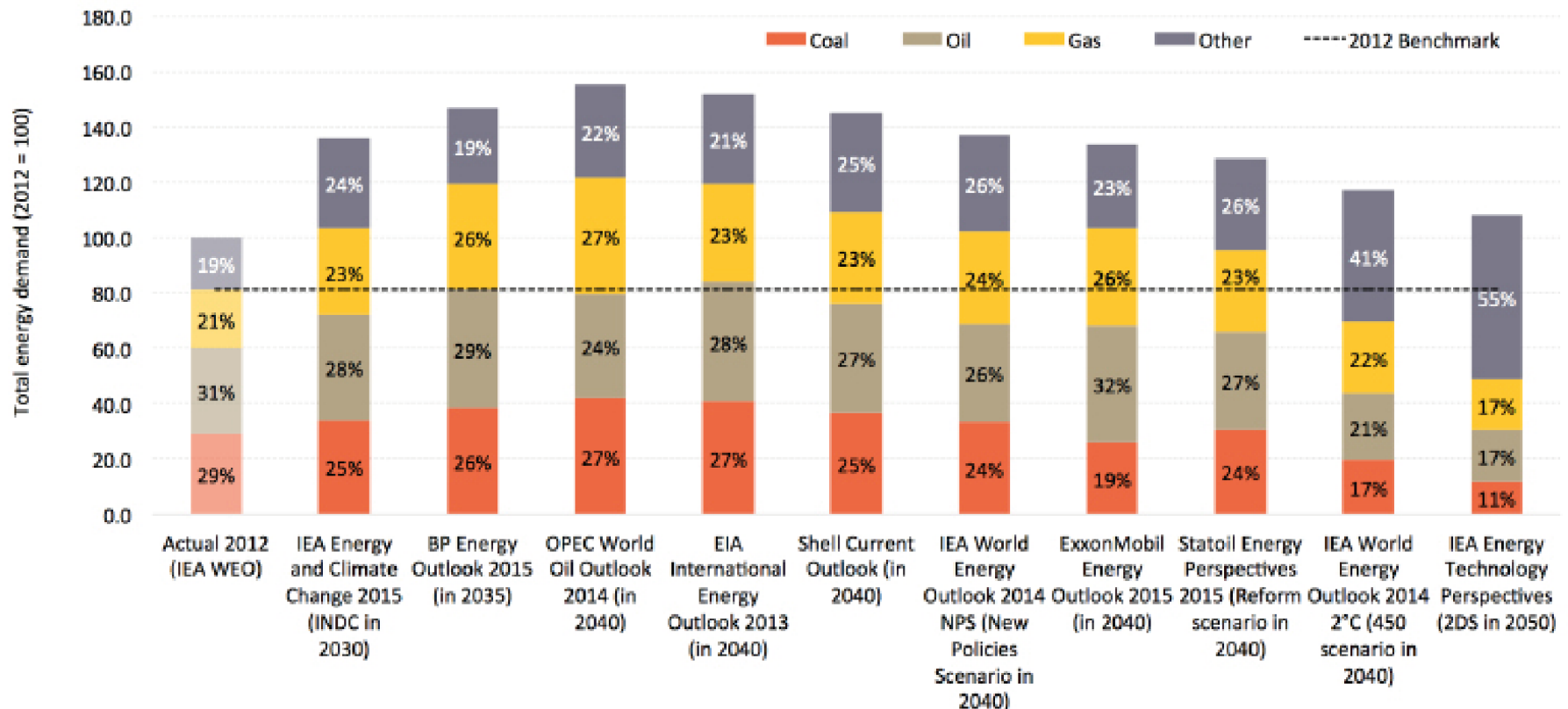
1. Demand

- How **big** is the energy pie going to be?
- Will the **portion** sizes of different technologies change?
- **Absolute** energy levels key for emissions
- **Primary energy** numbers include fossil fuel inefficiency/waste



Energy forecasting mis-read: Level of energy demand varies significantly

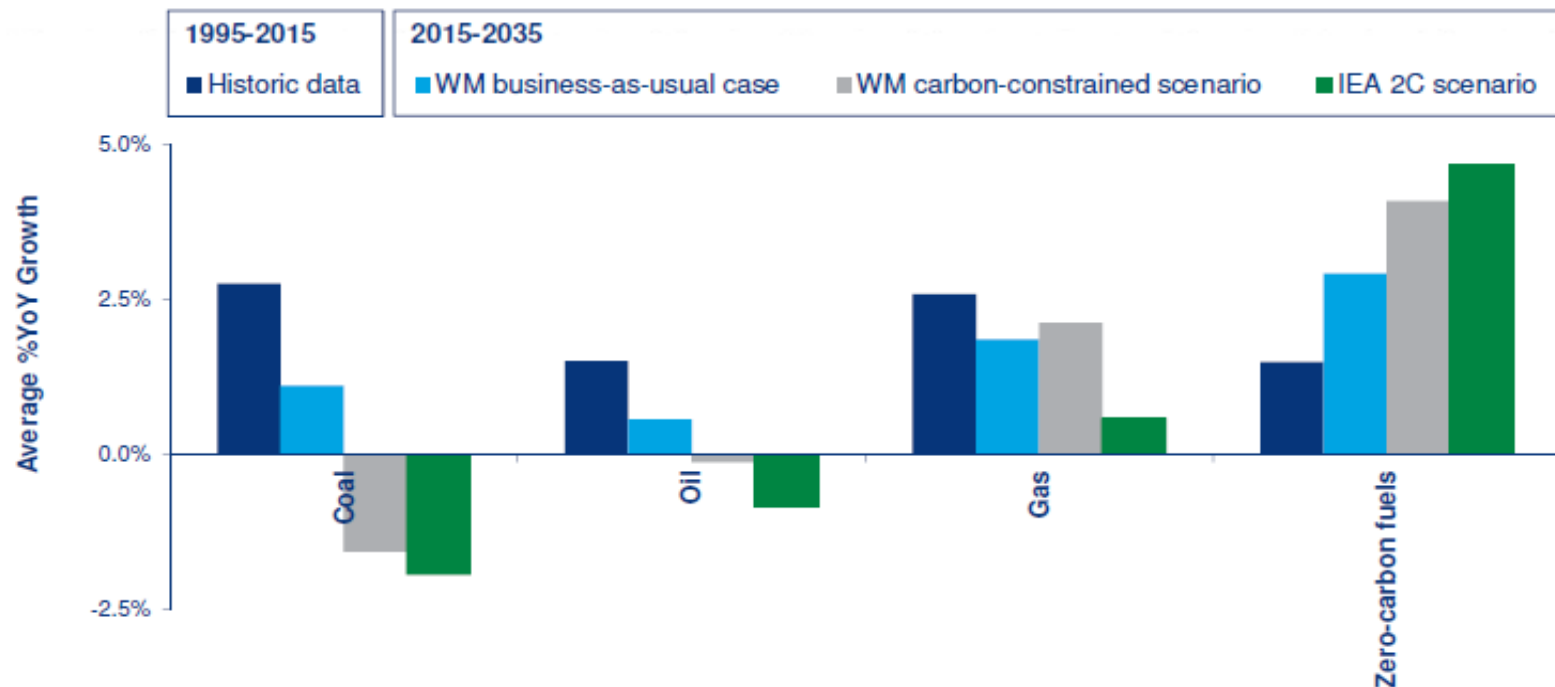
Many industry energy scenarios indicate a slightly smaller percentage of a bigger pie = absolute growth



Timing of peak demand?

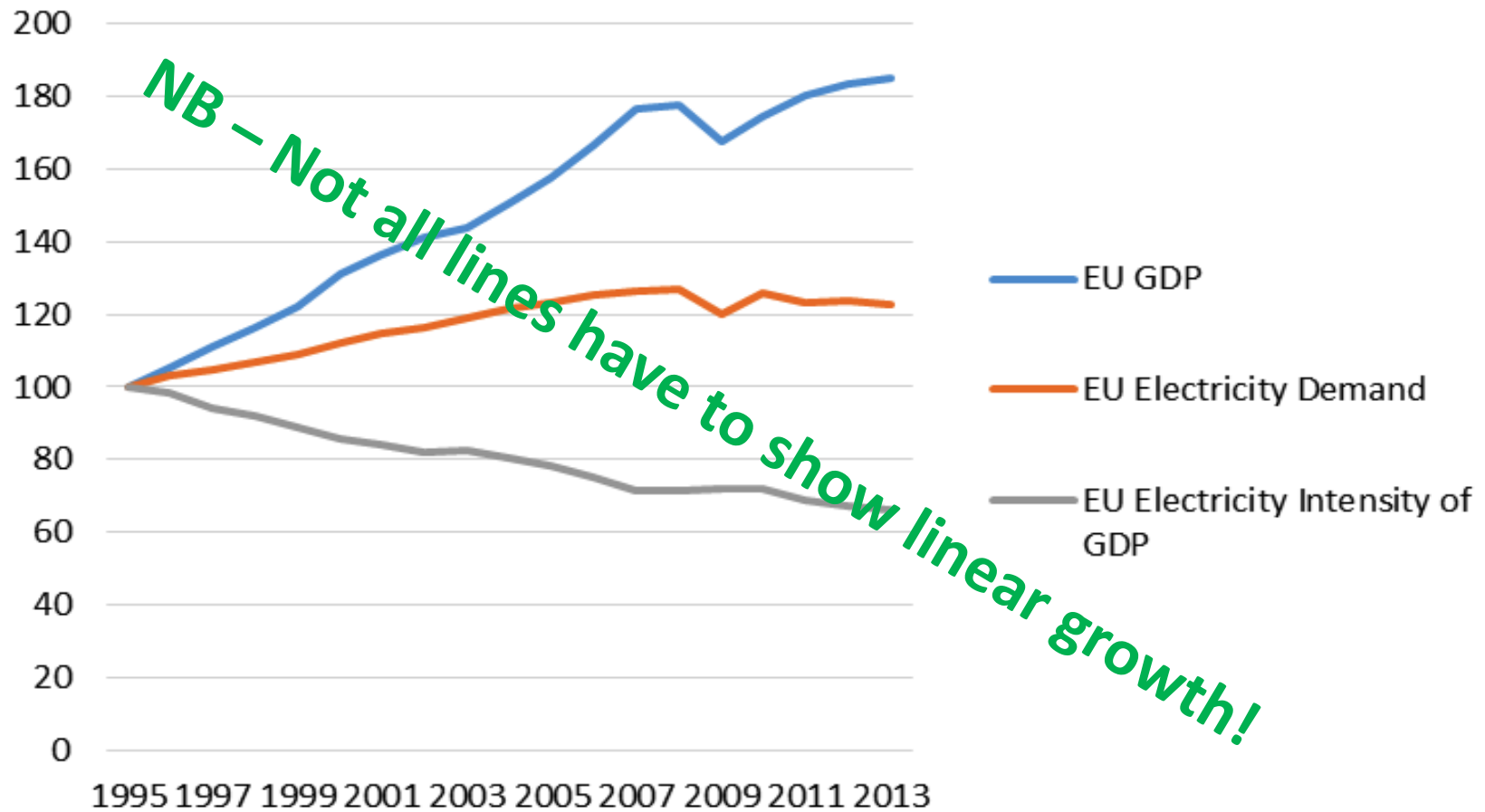
While carbon policy and technological advances accelerate growth in renewables, coal and oil demand could peak before 2035

Global energy demand growth: 1995-2015 vs 2015-2035



Source: Wood Mackenzie carbon-constrained scenario (assumes policy changes reach 2.5C threshold), IEA 450 Scenario (limits global warming to 2C)

Decoupling of growth, energy and emissions is key to change

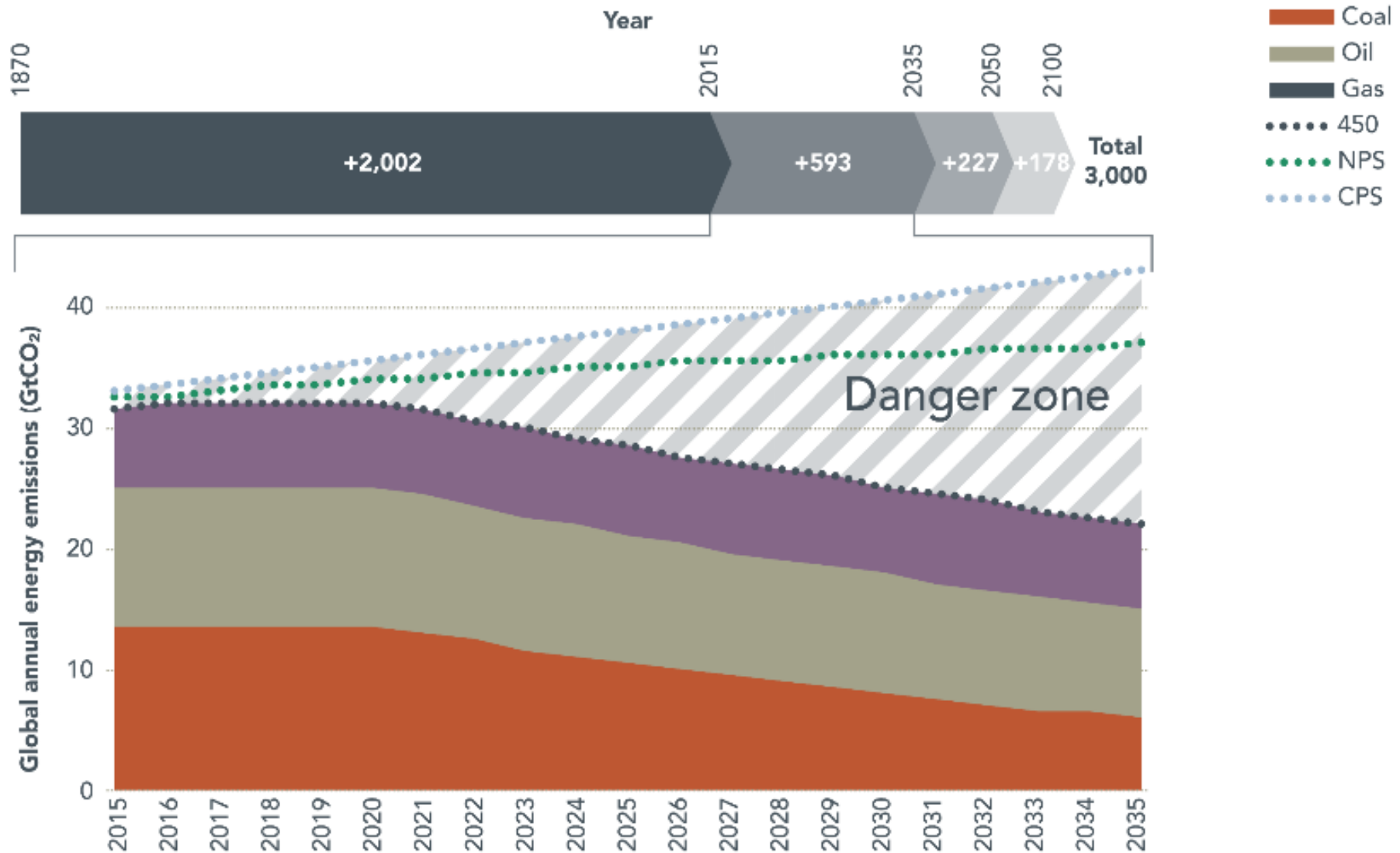


2. Supply & Demand

- **Mis-read** can happen if supply and demand sectors not aligned
- E.g. US **utilities** retiring coal plants but US coal **mining** firms using growth projections for demand
- E.g. 2m bpd gap created increased **oil price volatility**

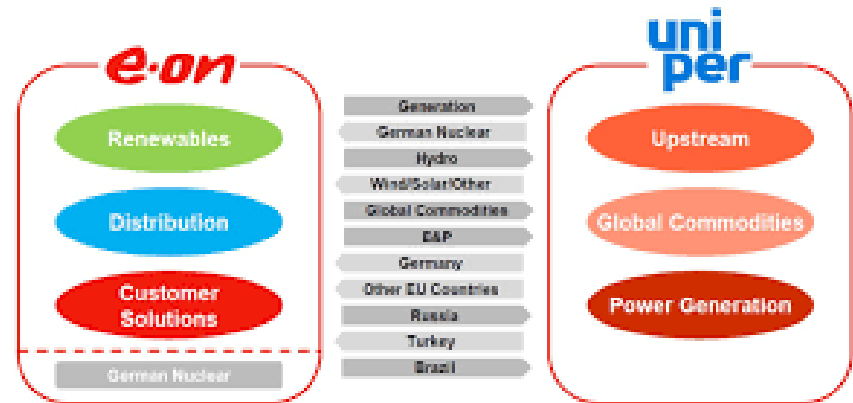


Delta between IEA scenarios: Over \$2 trillion of capex over next decade to avoid 156 GtCO₂ of emissions



3. Changing conditions for coal & gas plants

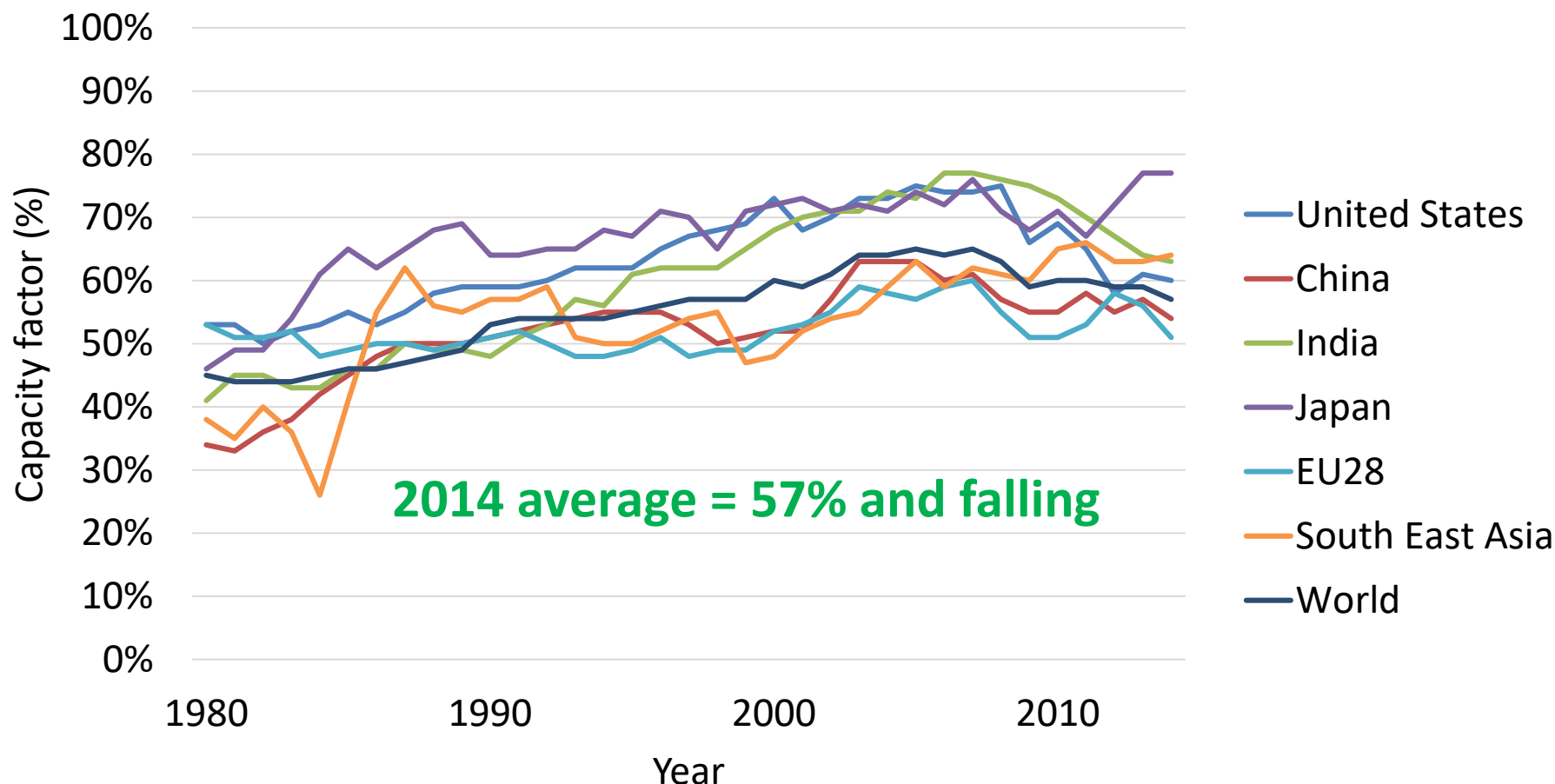
- **Capacity factors** impacted by falling demand, renewables and off-grid growth
- **Competition** is getting cheaper and more flexible
- **Lifetimes** may be curtailed – early retirements / stranded assets



Means new business models and restructuring to reflect the changing relationships we have with energy.

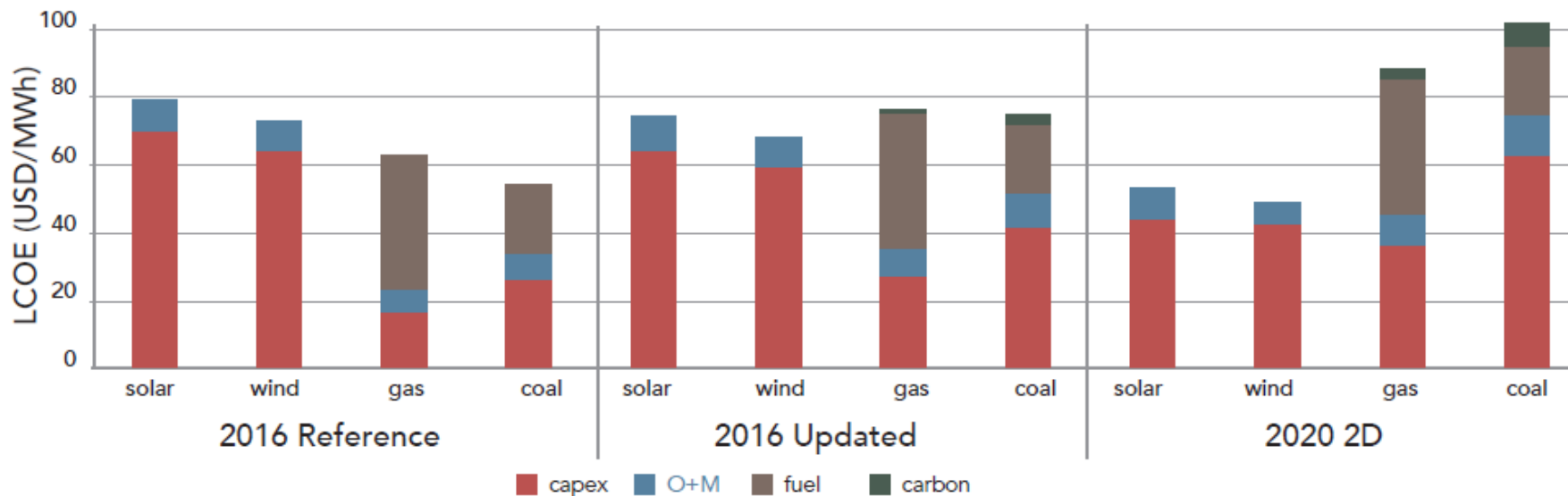
Coal plants operate 80-90% of the time..... *on paper*

Capacity factor of coal plants in major markets



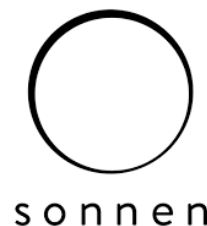
Average global LCOE trends with updated assumptions confirm direction of travel

- Boilerplate assumptions favour fossil fuels
- 2016 real world assumptions = renewables competitive
- Post 2020 2degrees – renewables win
- LCOE not the whole story but explains trends



For details see “End of the load” report

New players in the energy sector



4. Changing economics for renewables

Technology

- Learning rates
- Deployment volumes
- Complementarity (battery + solar + communications)

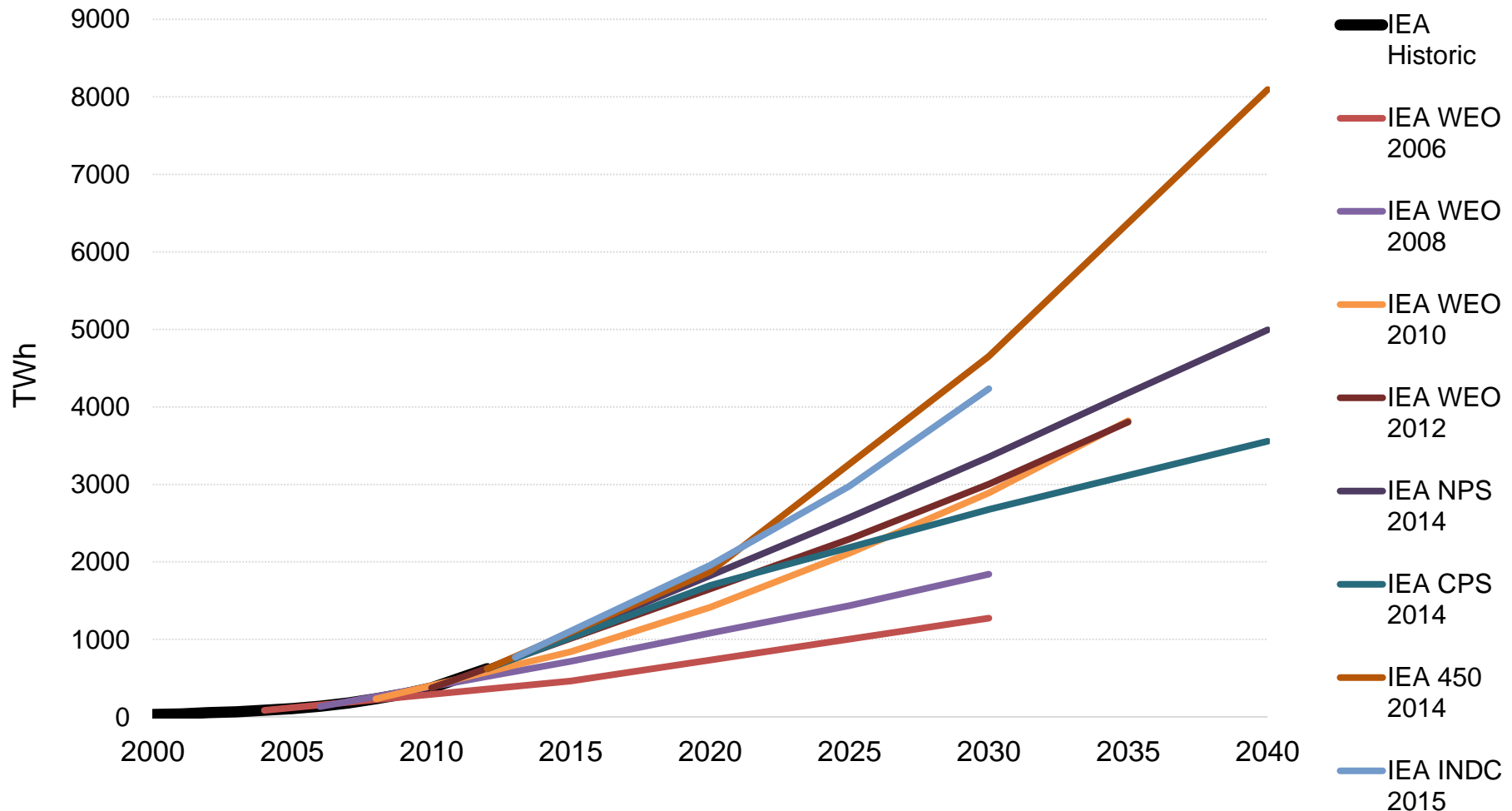
Finance

- Government guarantees
- Climate bonds
- Corporate balance sheets
- Energy funds
- Utilities
- Oil&Gas companies

The discount rate for capital intensive renewables is an assumption that is easily forgotten in updating models or future scenarios

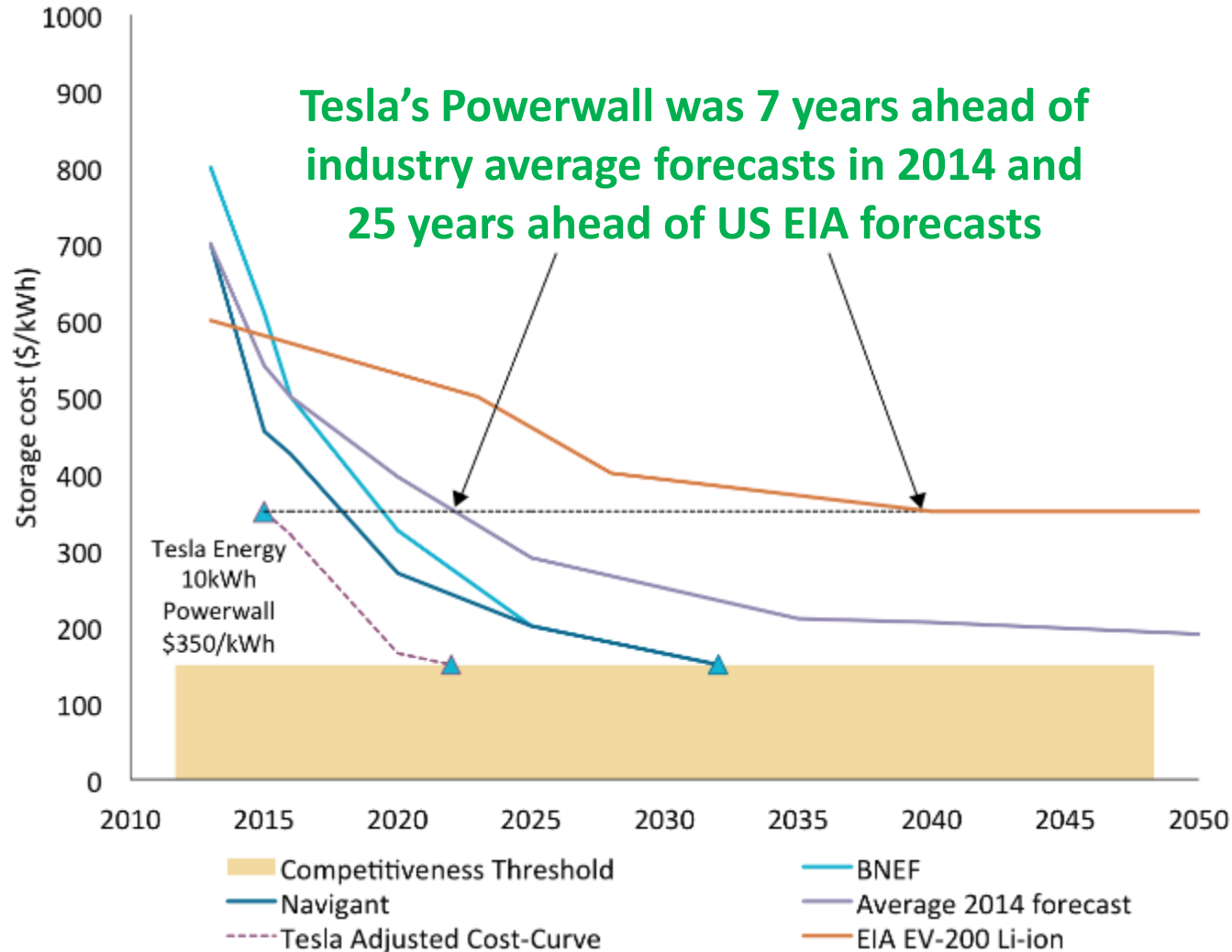
Things can look very different in just 5-10 years

IEA scenarios of solar + wind electricity generation have evolved over time



Energy models not so good at incorporating transformational technologies

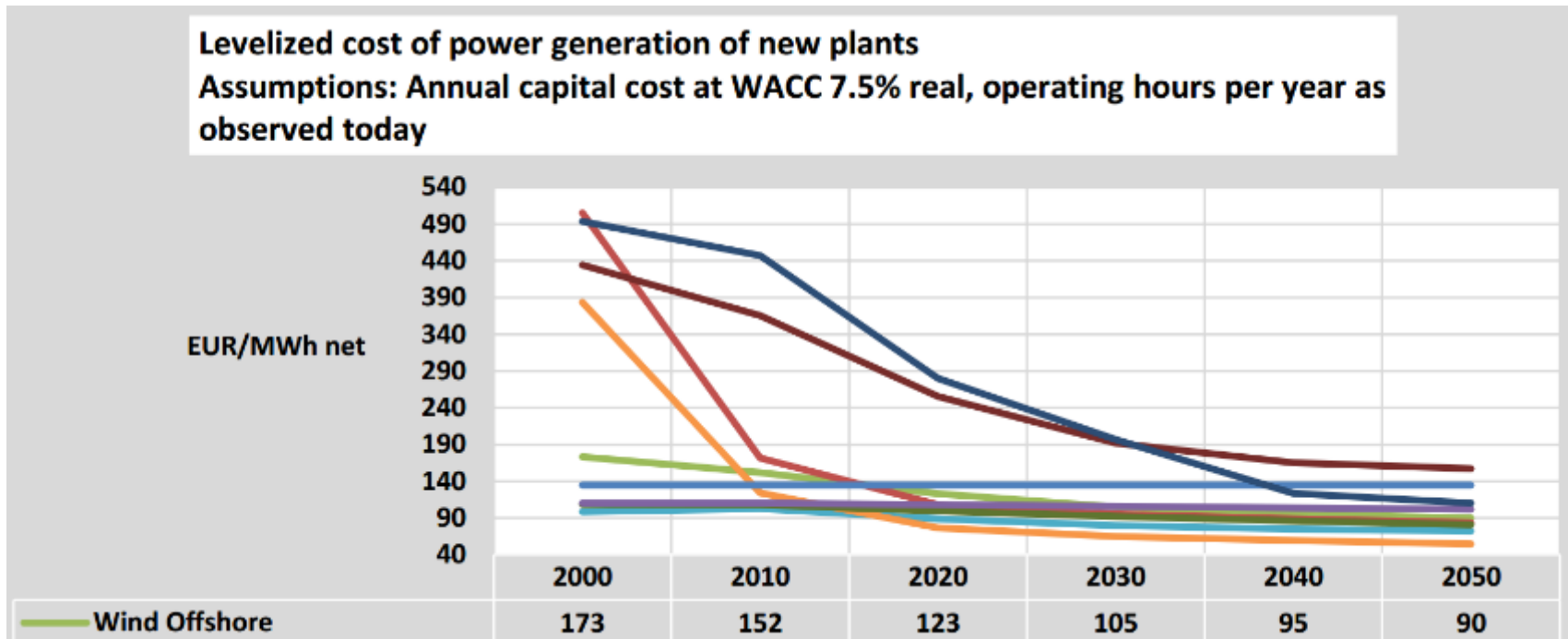
Battery costs are coming down faster than expected



Looking forward – EU already out of date

2016 lowest cost vs EU Reference Scenario 2016

- July: Dong 2 x 350MW Offshore Wind winning bid: **72.70** €/MWh
- Sep: Vattenfall 350MW Offshore Wind winning bid: **63.80** €/MWh



European Commission

https://ec.europa.eu/energy/sites/ener/files/documents/REF2016_report_FINAL-web.pdf

Who ate all the pie?

The next stop after 3% is 97%...

Bernstein research:

“The possibility (although an increasing possibility with the emergence of BMW...and potentially Apple in the segment) is that electric vehicles become cheaper, cleaner, and more reliable than vehicles powered by internal combustion engines.

In that situation, electric vehicles do not expand to 3% of new car sales in 2020 and then settle at 10% or 15% in 2025 or 2030. Instead, electric vehicles go from 3% of fleet additions in 2020 and take share at an accelerating rate until they are 97% of fleet additions at some point 15 to 20 years from now.”



NB – Not everybody has to get the same size piece

5. Changing policy context

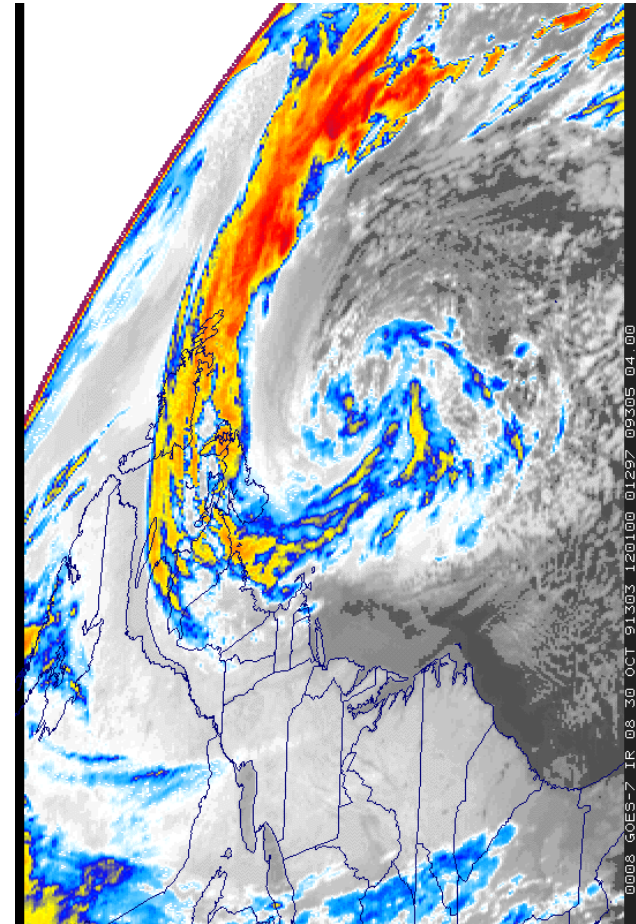




Face direction of travel

6. Navigating through the perfect storm

- Latest cost information
- Transparency of assumptions
- Dynamic variables over time
- Potential for rapid transition
- Is a low carbon future closer than we think?
- Keep on challenging your assumptions!



Thank you

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