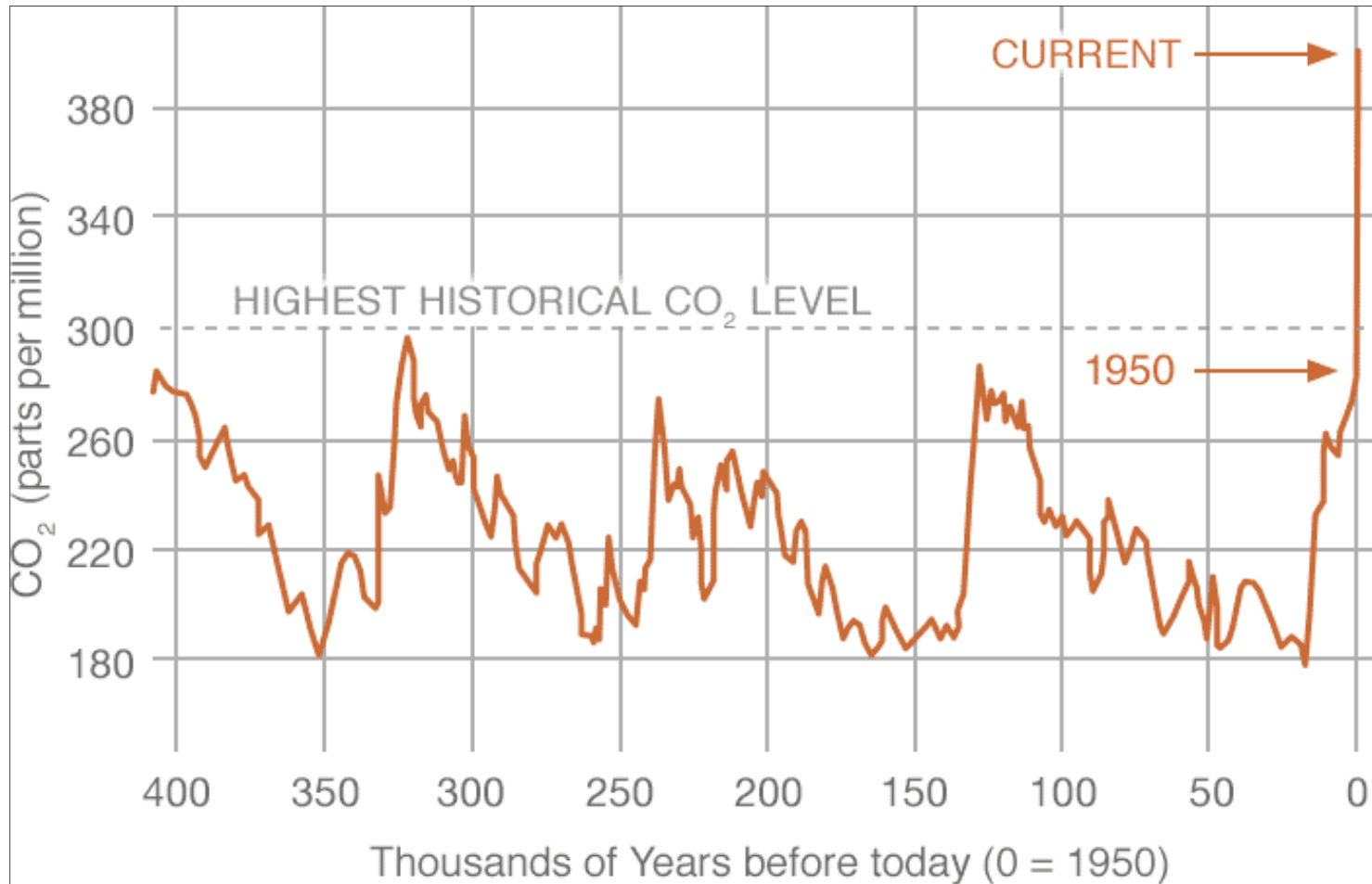


Energy Transitions



Muriel Watt, Annie Ngo, Ben Elliston – ITP Renewables
Iain MacGill - UNSW

Global Emissions

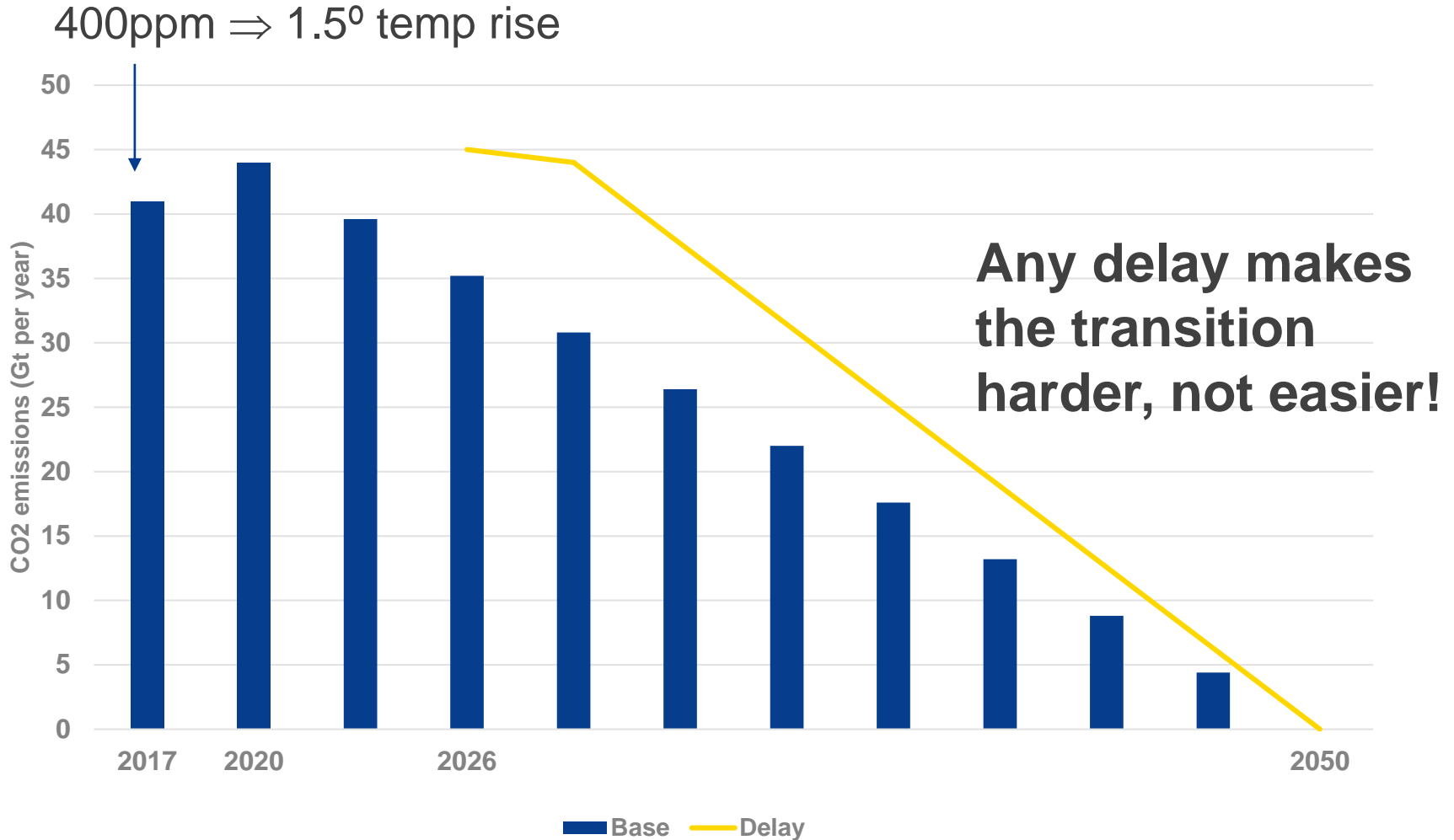


Source: National Oceanic and Atmospheric Administration

The legacy of the last 100 years

- Energy responsible for $> 2/3$ of GHG emissions
 - High reliance on fossil fuels
- Geopolitical and centralised power
 - Large global fossil fuel supply chains
 - Strong resistance to change
- Highly inequitable:
 - Developed countries >200 GJ/person/year
 - Developing countries <20 GJ/person/year
- Technology, infrastructure, governance not suited to 21st century energy systems

Emissions must drop to net zero by 2050



How do we make the Transition?

- Fuel change transitions
 - displacement of fuels
- Technology driven transitions
 - changes in energy technology
 - increased efficiency
- Transitions in market design and institutions
 - in part to facilitate the other transitions

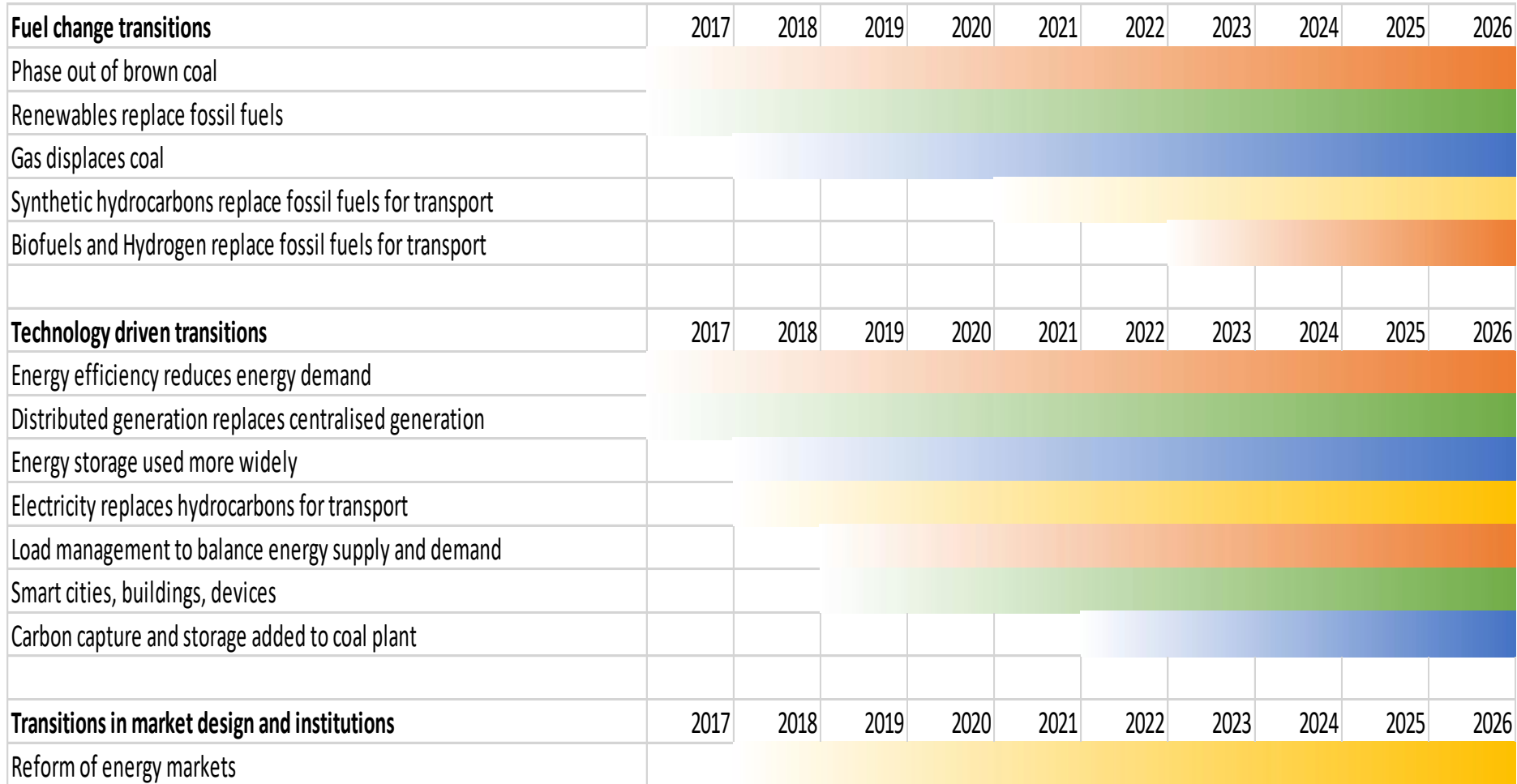
What can we agree upon?

- A carbon price, so emissions are factored into investment and asset decisions
- Significantly reduced reliance on coal and oil
- A range of clean energy technologies, with renewables key
- A significant role for energy efficiency
- Market mechanisms and technologies to manage high penetration variable renewables
- More engaged and informed energy users
- Integrated planning across:
 - energy, water and other services
 - liveable, affordable and healthy living environments
 - urban planning and transport to prevent lock-in to inefficient systems

Where there is still some debate?

- The future role for carbon capture and storage and nuclear
 - both have struggled with cost and deployment
- The role of gas
- The role of hydrogen as another energy vector
- The extent of the challenges posed by integration of variable renewables
- The extent of changes needed in energy market design
- Future cost reductions for different renewable energy technologies

Possible Australian Transitions



Sustainable Energy Futures

- More renewable
- More electric
- More distributed and consumer driven
- More digital
- More flexible
- More global and more local



A way forward for Australia

- We can have affordable, secure, environmentally sustainable energy
- Reduce emissions fast – we have the perfect opportunity
 - Aging coal fleet, reducing oil stocks, loss of manufacturing, congested cities, sparse rural populations, vast renewable energies
- Australia has the responsibility to assist other countries
- Good governance crucial
 - Markets are a means not an end
 - Political processes not well suited
- Don't use uncertain climate change impacts to delay action!
- Coherence between domestic policy and global agreements
- Transition must facilitate shared prosperity and equity

Equity Metrics

