SINCLAIR KNIGHT MERZ

SKM | M | M | A |

Can Electricity Markets Be Transformed?

Walter Gerardi

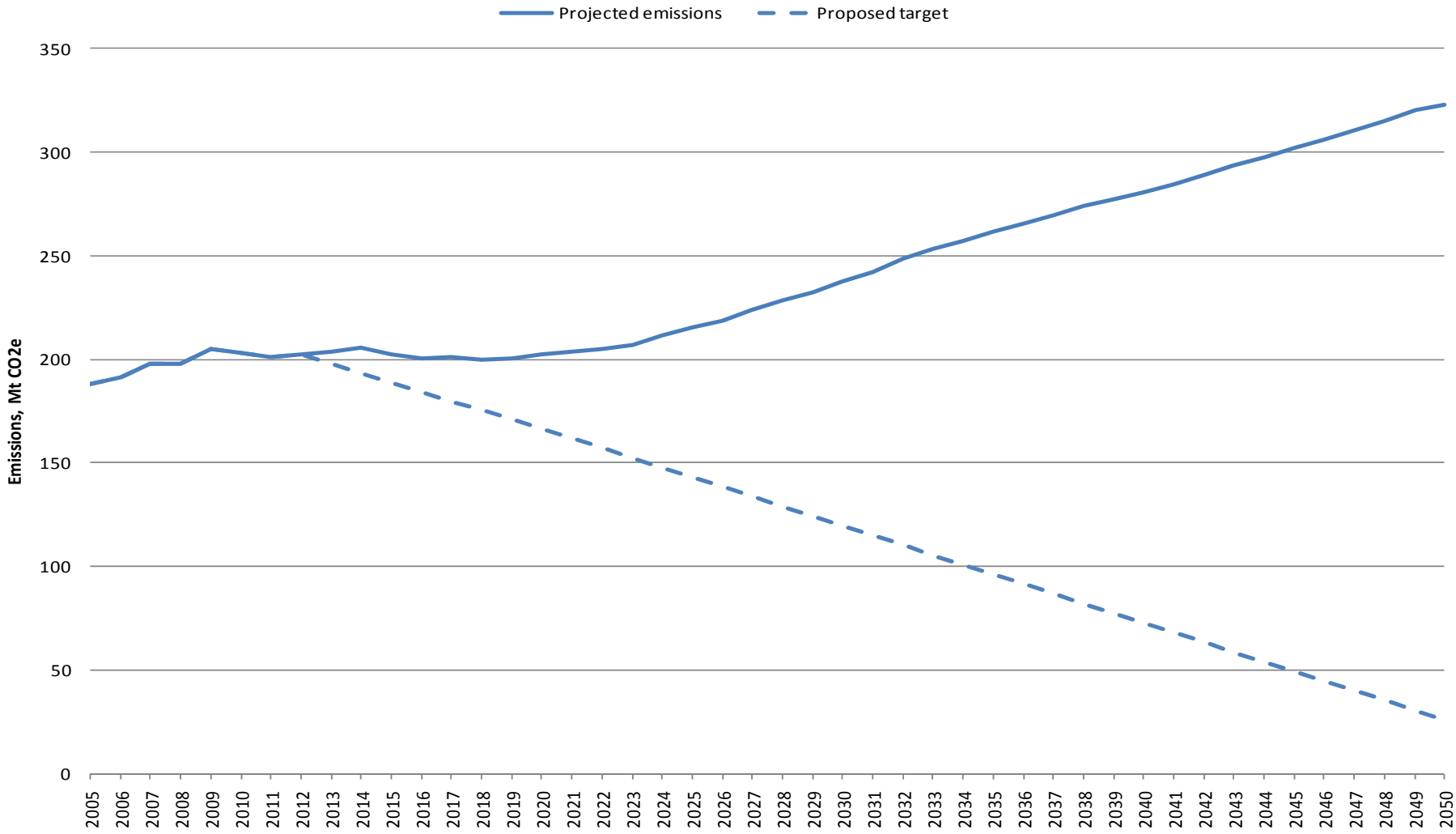
achieve outstanding client success

Outline

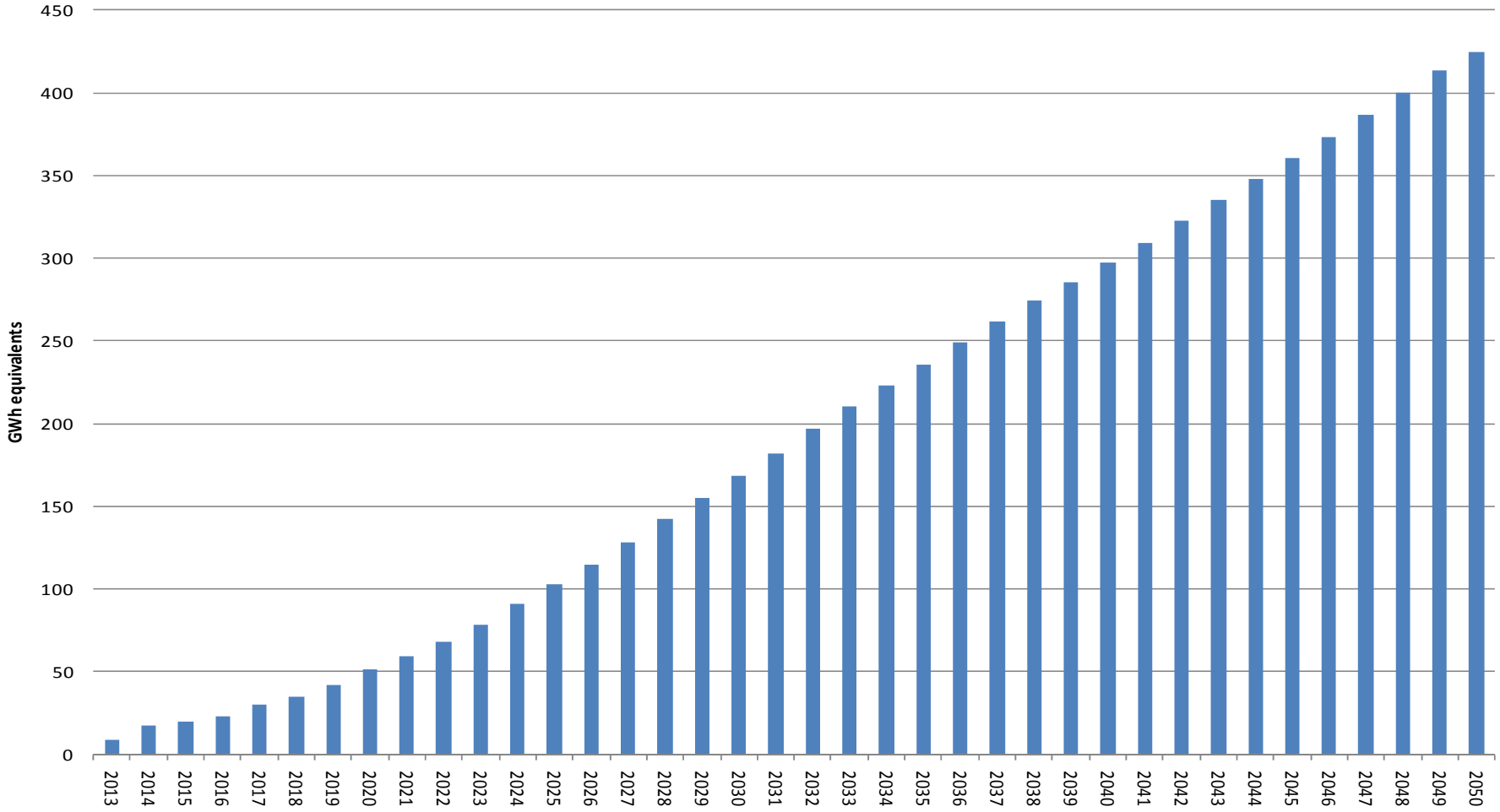
- What is required?
- Current cost comparisons
- Key trends
- What do we need to do get there?
- Policy framework

What is required?

Emissions without carbon policy



How much low emission plant/energy efficiency required?



Situation could be even more challenging

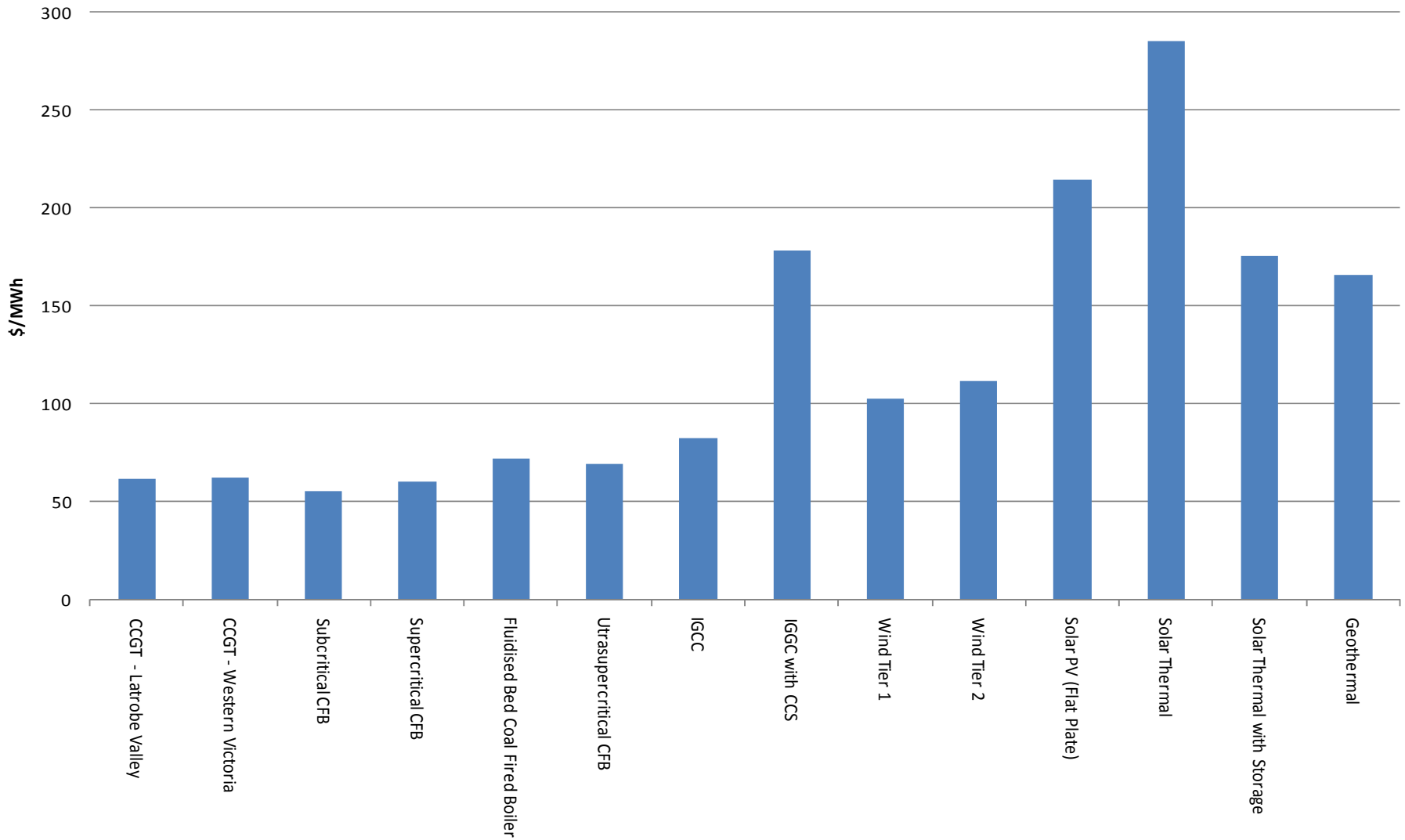
- Electricity generation “share” of target could be greater
- Uptake of electric vehicles
  - Could add up to 10% to electricity use
- Switch to electricity in other stationary energy activities
  - Already happening to a limited extent
- Also could have comparative advantage in low emission energy

Current cost comparisons

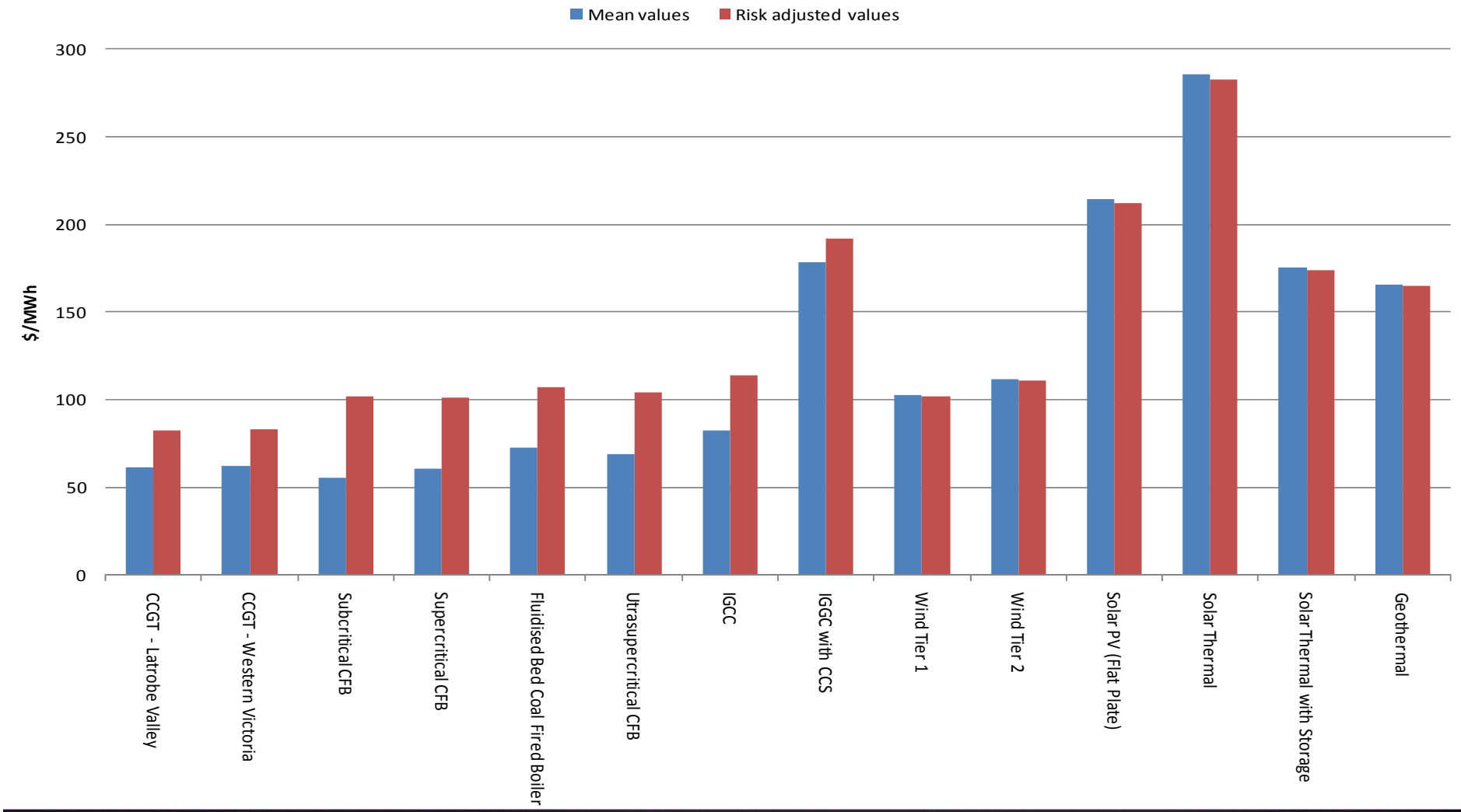
Key cost drivers

- Capital costs of new plant
  - Scale
  - Phase of development
  - Technology learning rates
  - WACC
- Fuel Prices
  - Coal
  - Natural gas
  - Biomass
- Carbon prices
- Technology support
  - RET
  - CEFC

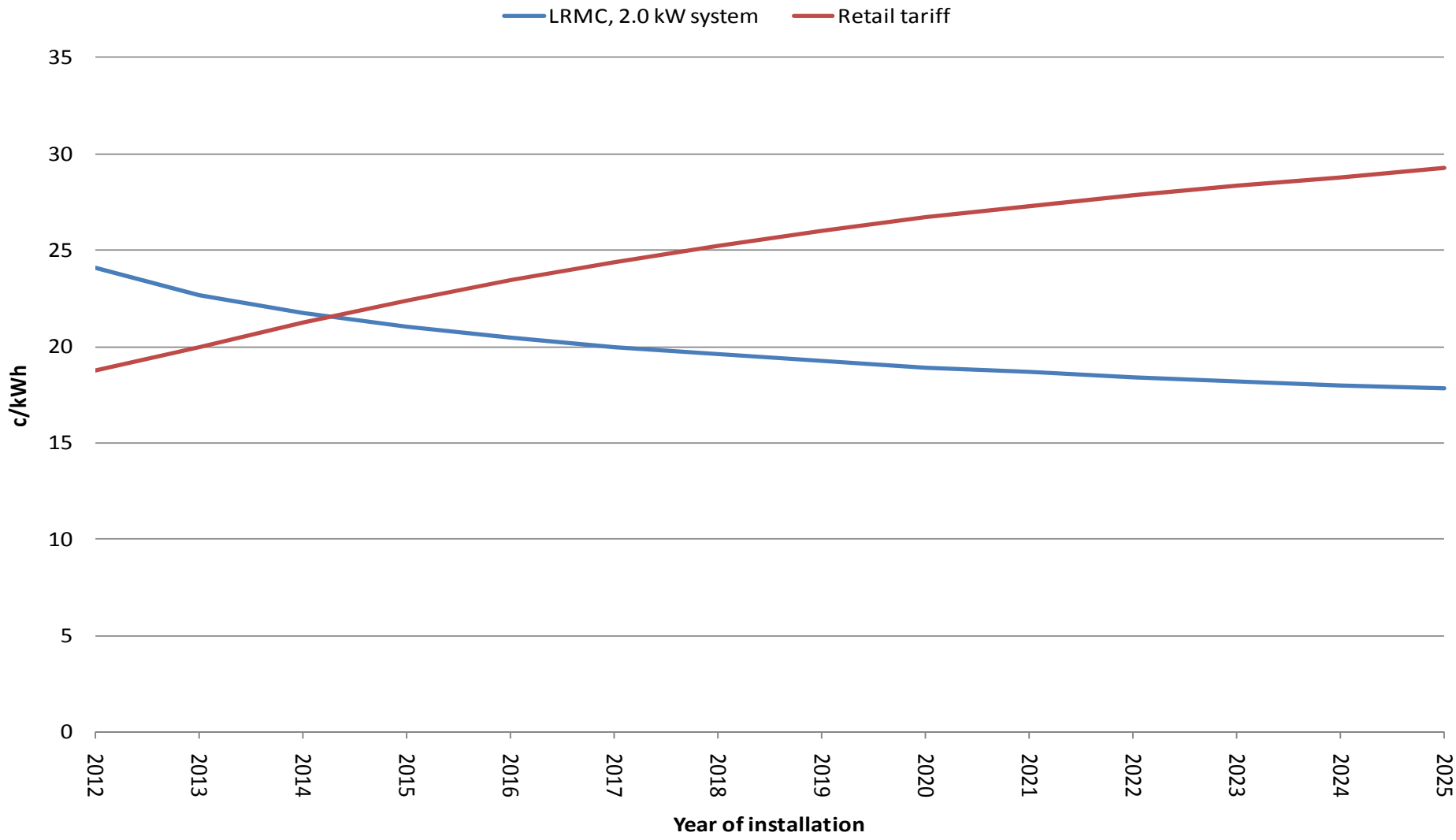
Levelised costs: mean values



But not so simple: risk premium



But not so simple: grid parity



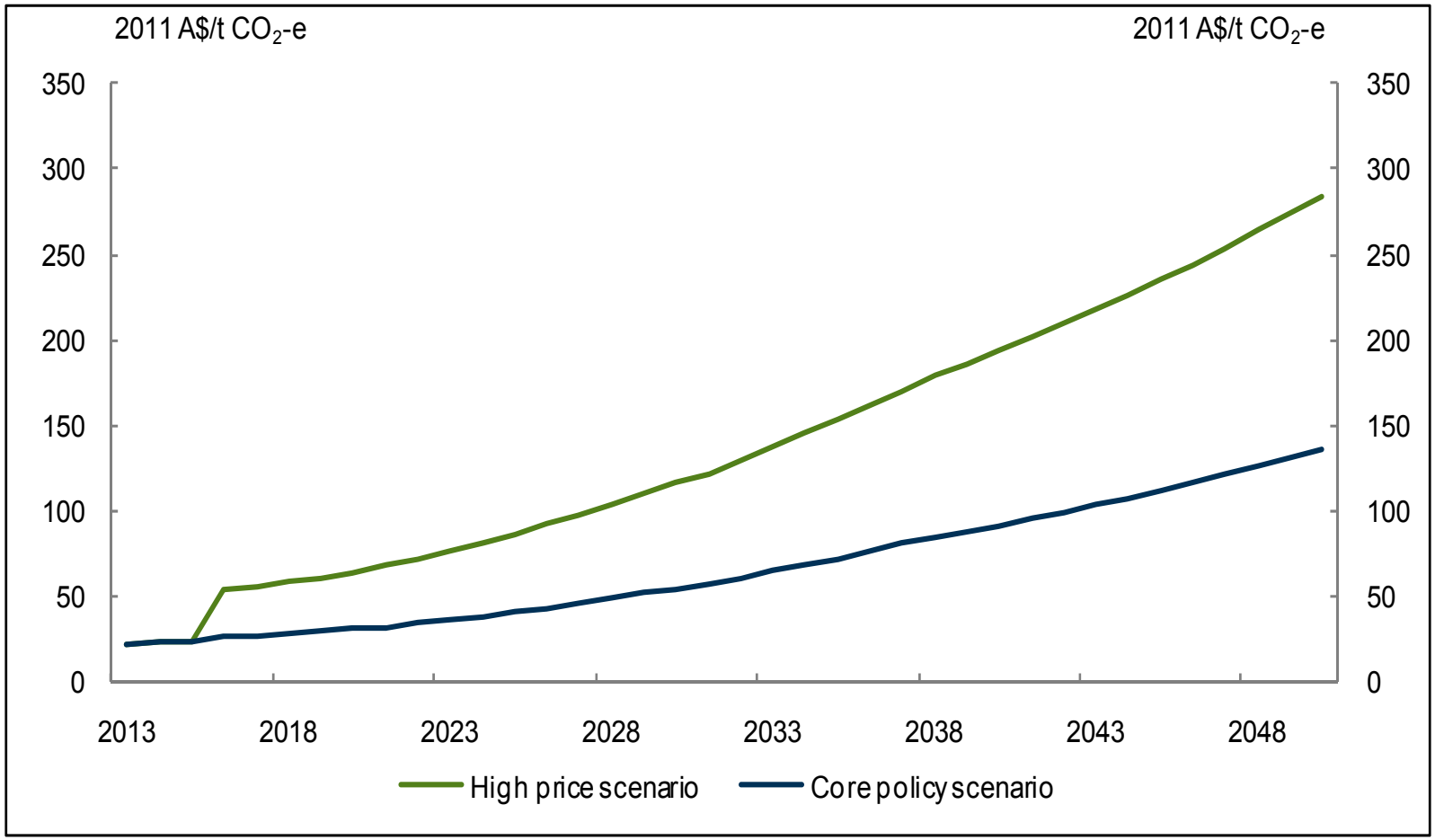
Policy Trends: Clean Energy Future

- Carbon Pricing
  - Fixed price (first 3 years) starting at $23/t CO_2e from 1 July 2012
  - Fixed cap with minimum of 5% below 2000 levels in 2020
  - Cap to be set by Parliament with advice from Climate Change Authority
- Minimum and maximum price caps to 2020
  - Minimum: $15/t CO_2e
  - Maximum: $20/t CO_2e above forecast price
- Not all sectors covered:
  - Greater than 25 kt per facility
  - Agriculture, forestry, land use change, private road transport and legacy waste excluded
  - Excluded sectors may be a source of offsets
- International permits (limited to 50% of total allowable emissions

Policy Trends: Support Measures

- Assistance measures:
  - Free permits for EITEs for at least 6 years
  - $5.5 billion worth of permits to generators with emission intensity greater than 1 t/MWh
  - Pay for set retirement: 2000 MW of capacity with emission intensity greater than 1.2 t/MWh
  - $1.8 billion to hep other manufacturers/SMEs to adjust, plus $1.2 billion for coal industry to adjust
- Carbon Farming Initiative
  - Source of offsets from land use change and legacy waste
  - Biodiversity funding
- Energy efficiency measures
  - Expansion of MEPS and EEO programs
  - Energy Savings Initiative
- Renewable Energy Support:
  - Clean Energy Finance Corporation ($10 billion)
  - ARENA

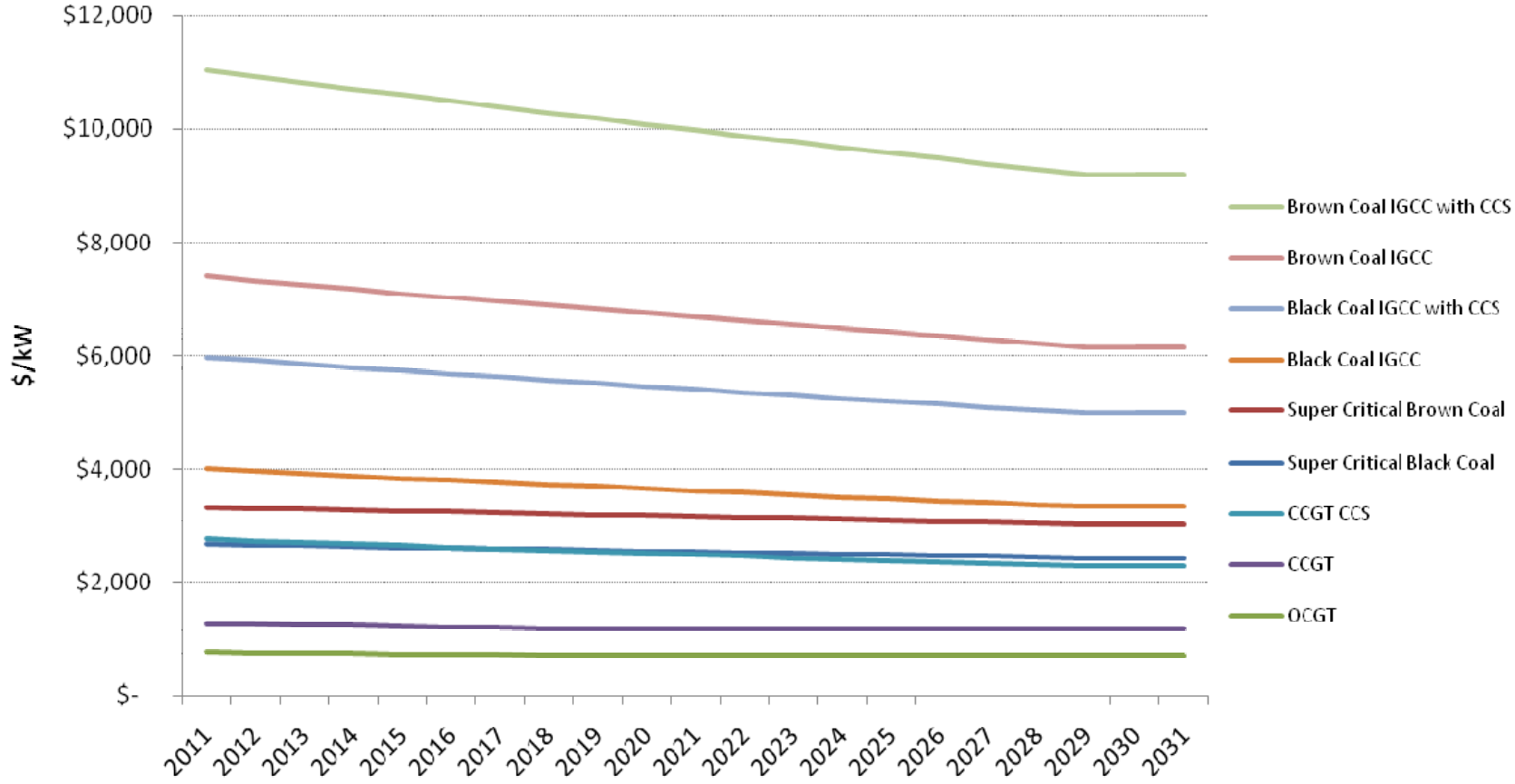
Carbon price outlook



Competitive trends: capital costs

- Capital costs of new plant
  - Expected to fall gradually from recent highs as commodity cycles reverse
    - Cyclical downturn also evident due to slowing economic growth
  - Accelerated R&D on new technologies
  - Lowering of WACC
  - Separation of cost trends
    - "Manufactured" generation equipment
      - E.g. PV modules and wind turbines
    - Civil/structural component

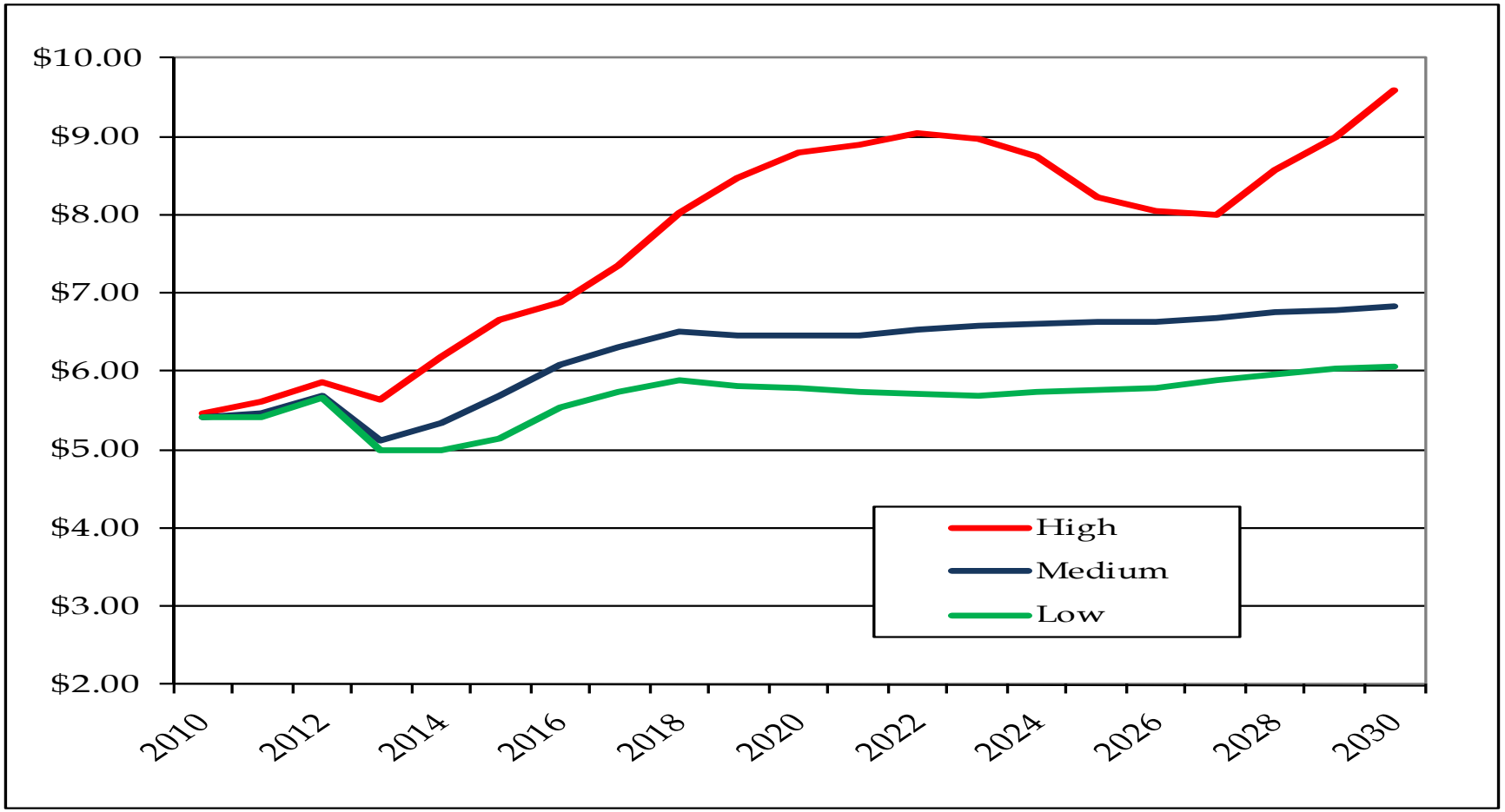
Capital cost trends



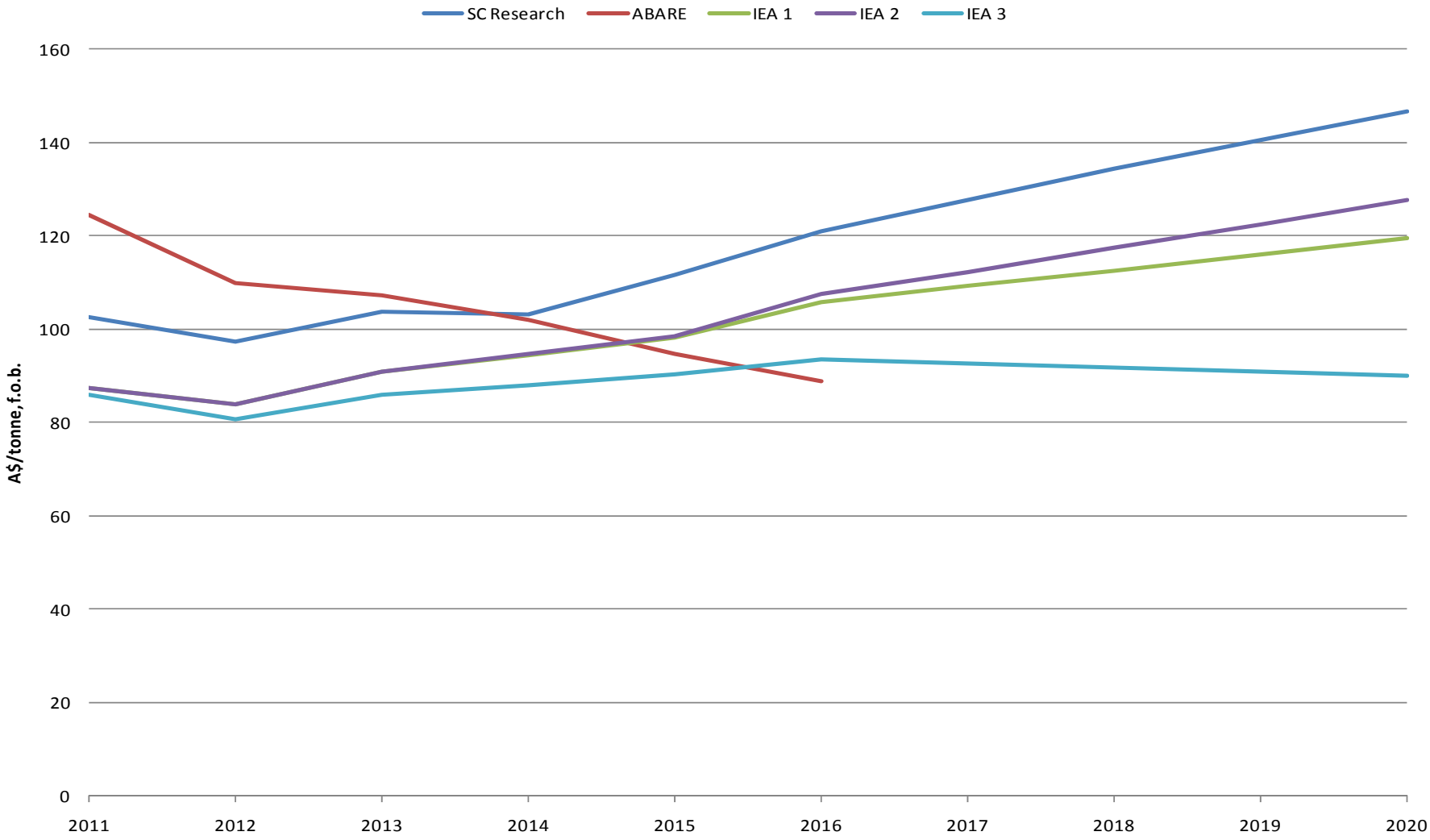
Fuel price trends

- Coal prices
  - Expected to fall from record highs in short to medium term
  - Rise gradually in the long term
  - Carbon mitigation policies will also put downward pressure on prices
- Gas prices
  - Eastern seaboard gas prices rising to world benchmark levels (LNG net back pricing)
    - Dual market
    - Expectation of oil price linkage in Asia
      - But can shale gas happen there?
  - Carbon mitigation will have ambiguous impacts on world prices

Average NEM gas prices



Export coal prices

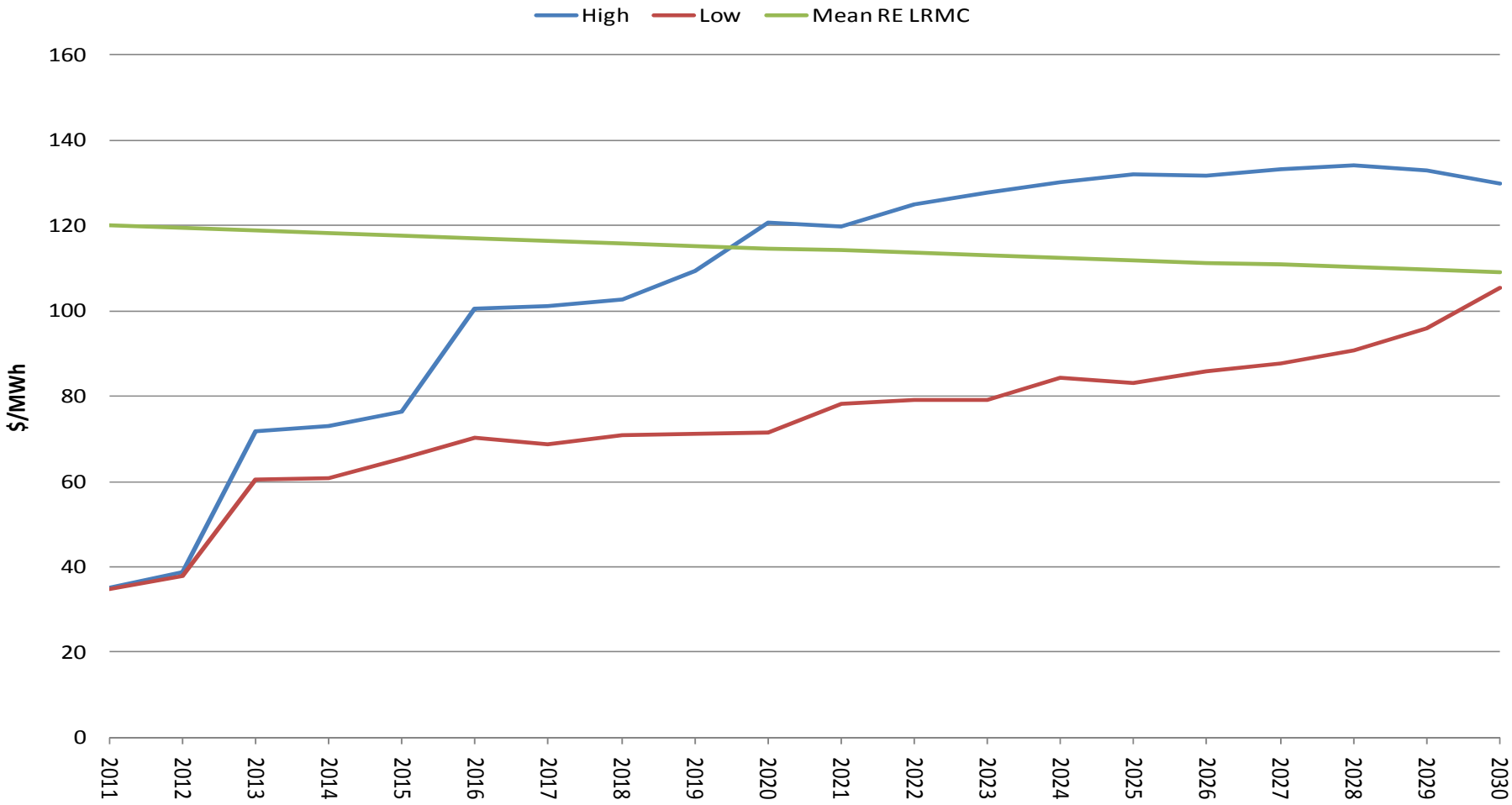


What do we need to do to get there?

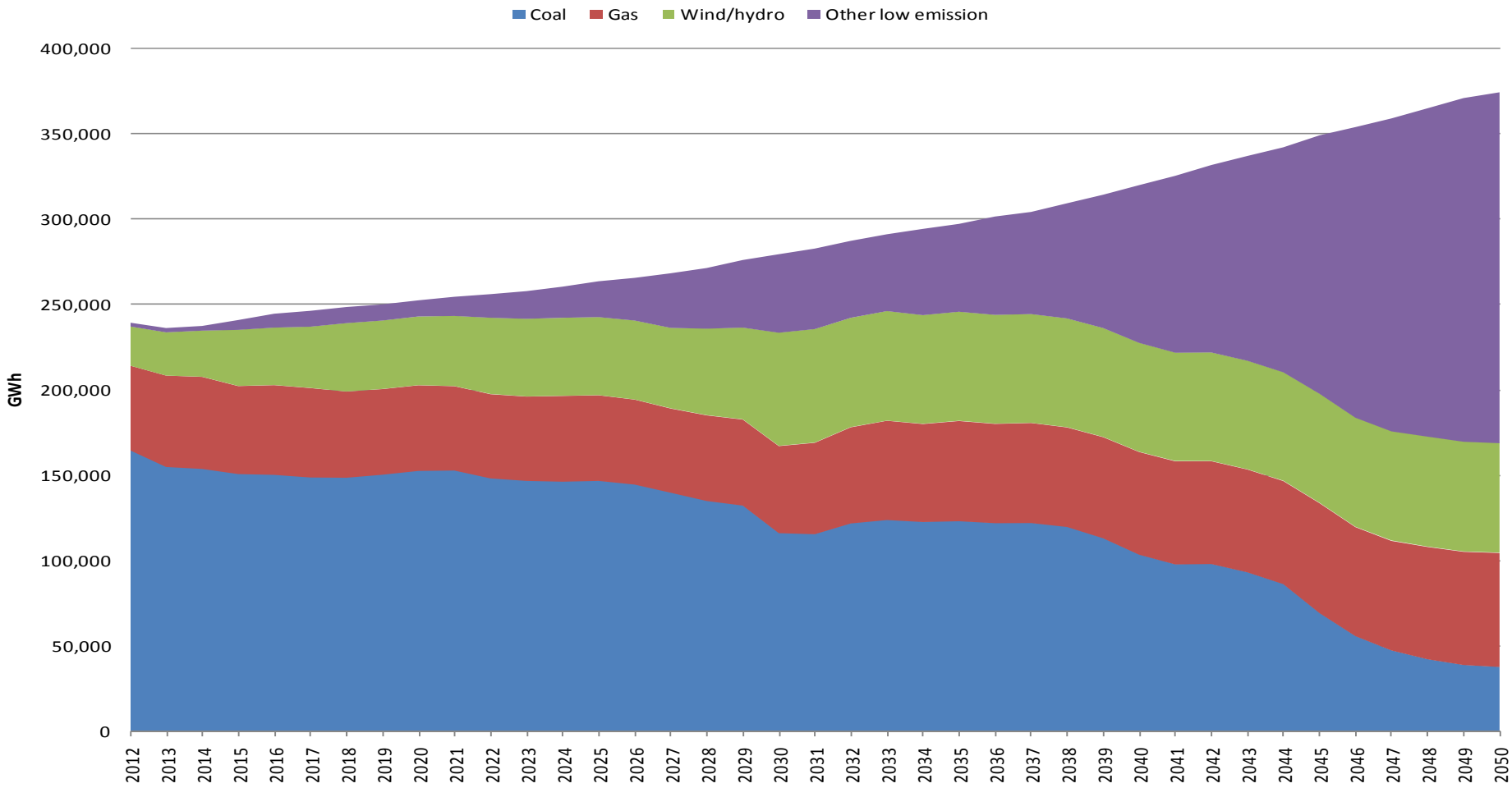
Issues

- Cost trends point to rising costs of high emission technologies (coal, gas) and falling costs for low emission technologies
- But support for renewable energy will still be required in the short to medium term to bridge the gap
  - R&D
  - Demonstration
  - Technology deployment support
  - Market facilitation
  - Overcoming technology lock-in
- Will need the development and deployment of less mature low emission technologies

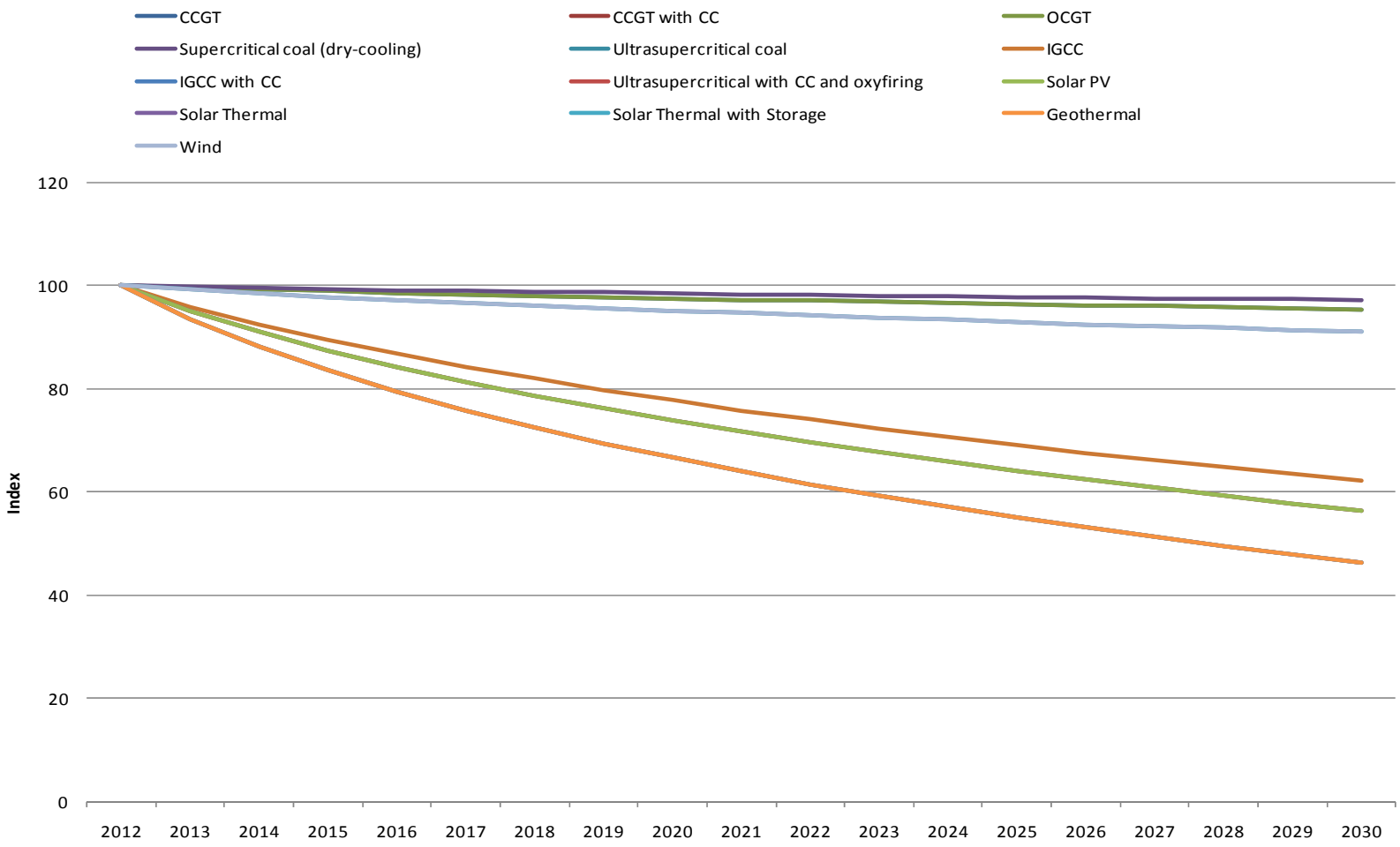
Average Price versus Renewable Energy LRMC



Generation mix: core policy: need for new technologies



Technology cost reductions required



Reduce risks: risk matrix

	IGCC CCS	Natural Gas GGCT	Wind	Geothermal	Solar Thermal
Technological risk					
Risk of technological failure	High	Low	Low	High	Low
Performance risk	High	Moderate	Moderate	High	Moderate
Construction Delay	Moderate	Low	Low	Moderate	Moderate
Carbon price risk	Moderate	Moderate	None	None	None
Fuel price risk	Moderate	High	None	None	None
Fuel supply risk	Low	High	None	None	None
Regulation risk					
Government Policy					
a. More/less stringent caps over time	Moderate	High	None	None	None
b. Favour other technologies	Moderate	Moderate	Moderate	Moderate	Moderate
c. Complementary policies	Moderate	Moderate	Moderate	Moderate	Moderate
Market regulations					
a. Dispatch rules	Moderate	Moderate	Moderate	Moderate	Moderate
b. Network pricing and access rules	Low	Low	Moderate	High	High
c. Ancillary service requirements	Low	Low	High	Low	High

Reduce risks: risk matrix

	IGCC CCS	Natural Gas GGCT	Wind	Geothermal	Solar Thermal
Other regulations					
a. Local planning rules	Moderate	Low	High	Low	Low
b. Environmental rules	High	Low	High	Low	Low
c. Rules governing storage and seepage	High	None	None	None	None
Market risks					
Price trends and volatility	High	High	High	High	High
Competitor cost trends after entry (volume risk)	High	low	Low	Moderate	Moderate
Ramp up risk	Moderate	Moderate	Low	Low	Moderate
Large Load Leaves	High	High	Low	Low	Moderate
Breakthrough technologies down the track	High	High	Moderate	Moderate	Moderate
Transmission constraints	Moderate	Moderate	Low	Low	Moderate
MLF Adjustments	Moderate	Low	High	High	High
Carbon Transport Cost	Moderate	None	None	None	None
Storage Cost	High	None	None	None	None

Support policies

- Key attributes:
  - Targeted: one policy per market barrier
  - Need to demonstrate:
    - Overcomes market barrier
    - Benefits exceed costs
    - Effective in achieving goal
    - Fair
    - Institutional fit
  - No perfect policy response
    - Good design that appreciates the risks and uncertainties required
- Mix of programs required
  - R&D
  - Demonstration programs
  - Commercialisation
  - Early stage deployment

Questions:

Walter Gerardi
Principal Consultant
SKM MMA
03 8668 3081
0417 508 778