

# Economic implications of carbon neutrality in China

2021年4月8日

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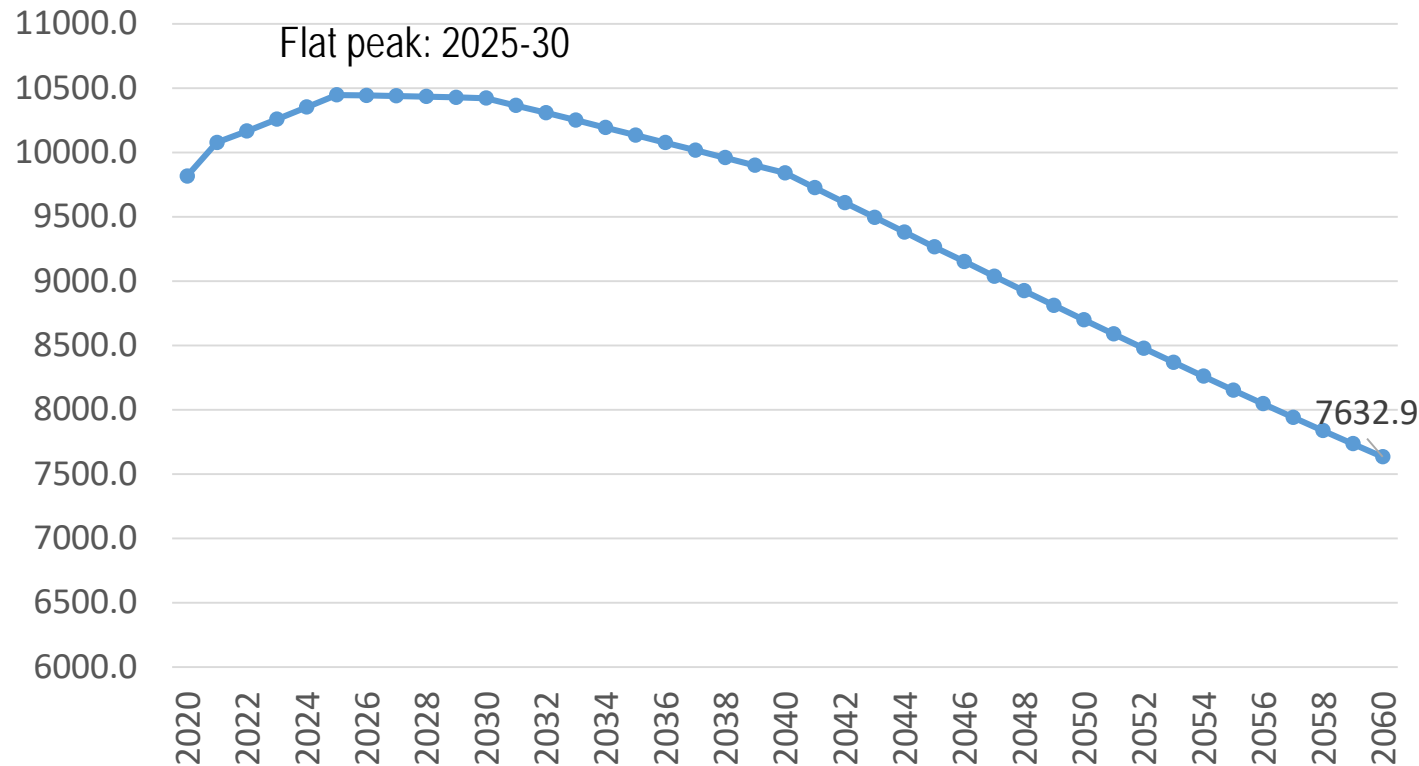


# What are the economic implications of the Chinese government's goals of

- Peaking CO<sub>2</sub> emissions before 2030
- Reducing CO<sub>2</sub> emissions intensity of GDP by more than 65% by 2030 comparing with its 2005 level
- Increasing the share of non-fossil fuel in total energy to around 25% in 2030
- Reaching net zero carbon emissions before 2060

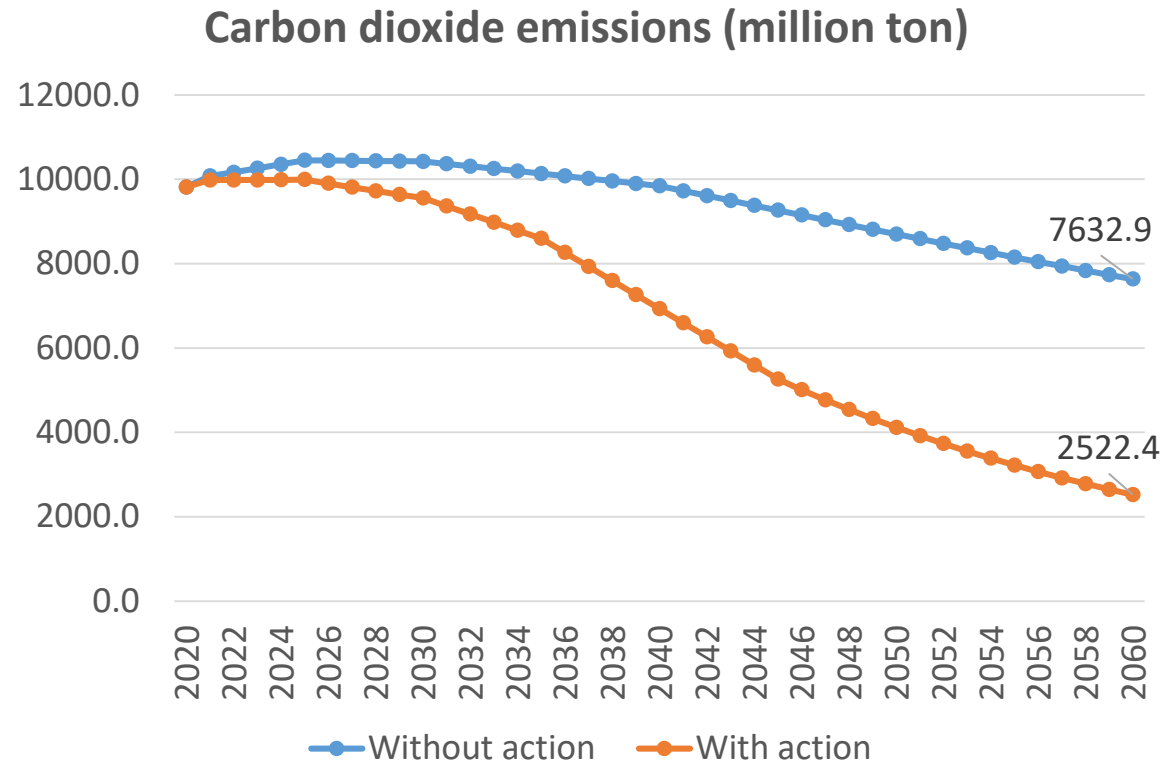
# Without action (in the base case) CO<sub>2</sub> emissions declines after 2030

Carbon dioxide emissions (million ton)



- Why do the emissions decline?
  - Improving energy efficiency
  - increasing use of cleaner energy
  - imposing a small carbon price
- All emissions are from fossil fuel combustion

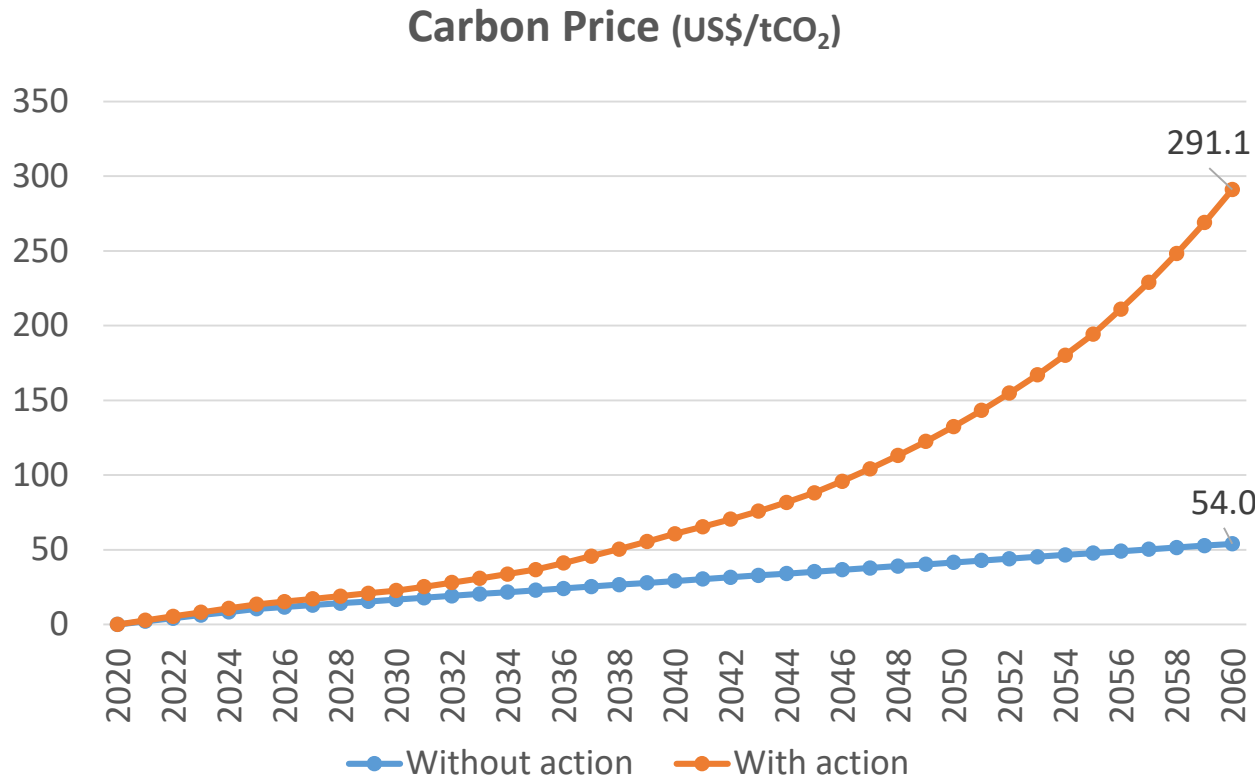
# To achieve carbon neutrality, CO<sub>2</sub> emissions have to decline further



- In 2060, 2522mt Co<sub>2</sub> can be offset by
- Carbon capture and storage (CCS)
  - Bioenergy carbon capture and storage (BECCS)
  - Direct air carbon capture and storage (DACCS)
  - Forest sink
  - Other technology not explicitly represented in the model

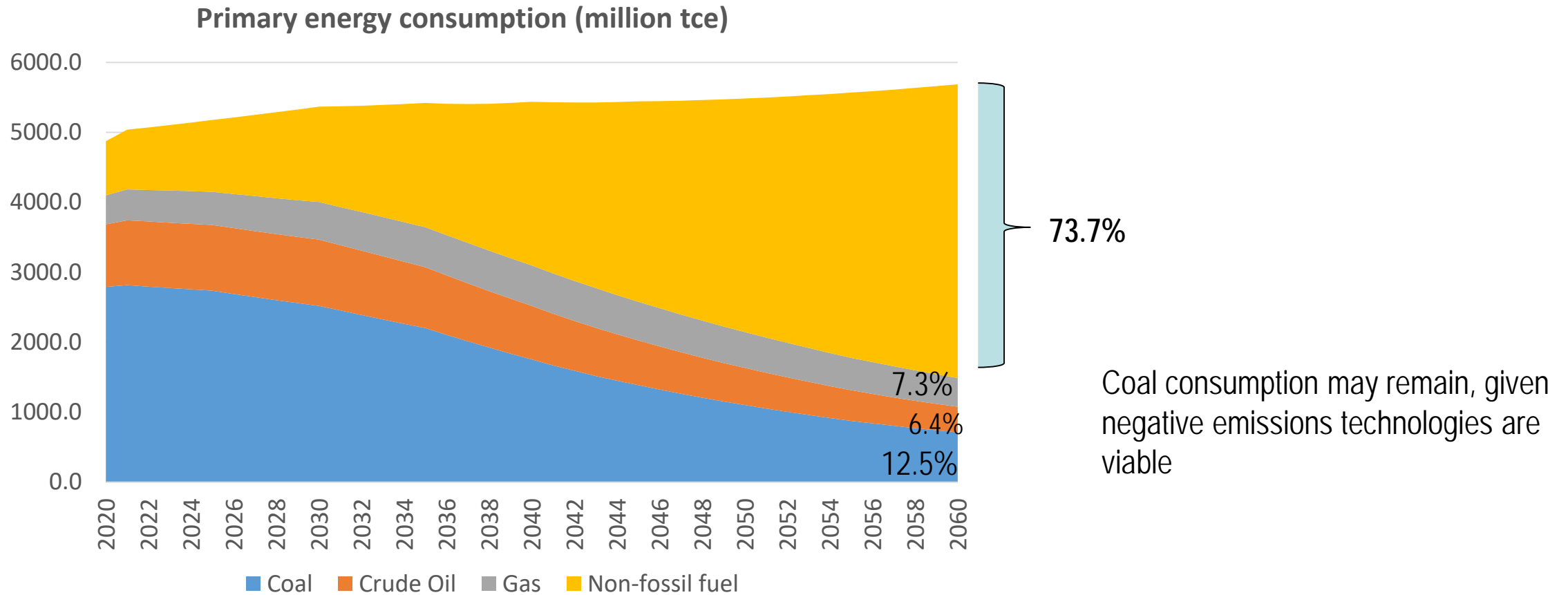


# Action requires high carbon price

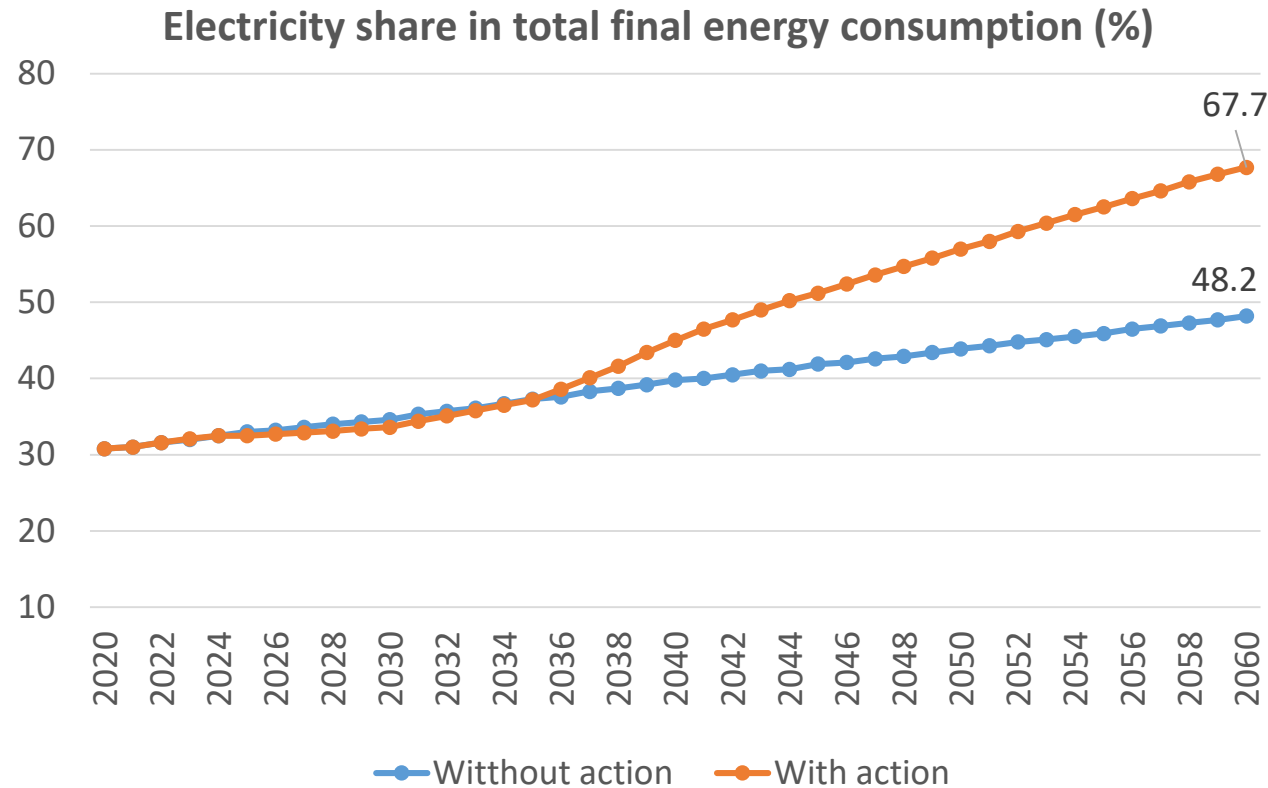


- accelerate energy efficiency improvement;
- Further reduce the production cost of cleaner energy
- Enhance electrification penetration
- Introduce negative emissions technologies
- Endogenously imposed carbon price
- Carbon prices: costs of mitigation to the economy
- All carbon pricing revenues are recycled in a lump-sum fashion to the households

# With action: Non-fossil fuel will increase to 74% in the total primary energy consumption in 2060



# Electricity share



Electricity share in total final energy increases from 48% (without action) to 68%(with action)

## Industries

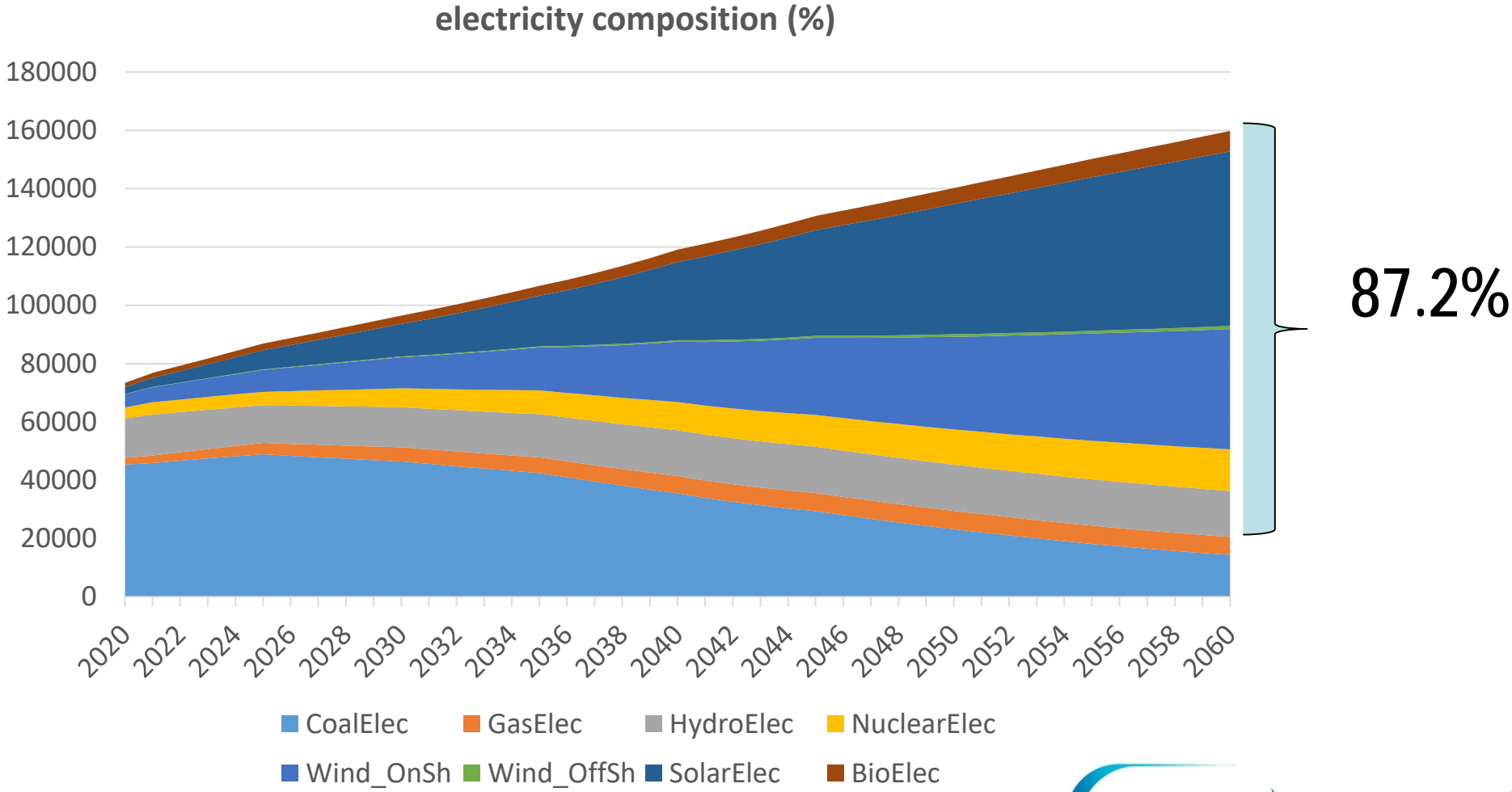
- Transport: away from petrol towards electricity
- Space heating: away from coal towards electricity
- energy intensity sectors: electrification

## Households

- New energy cars
- Cooking and heating towards electricity

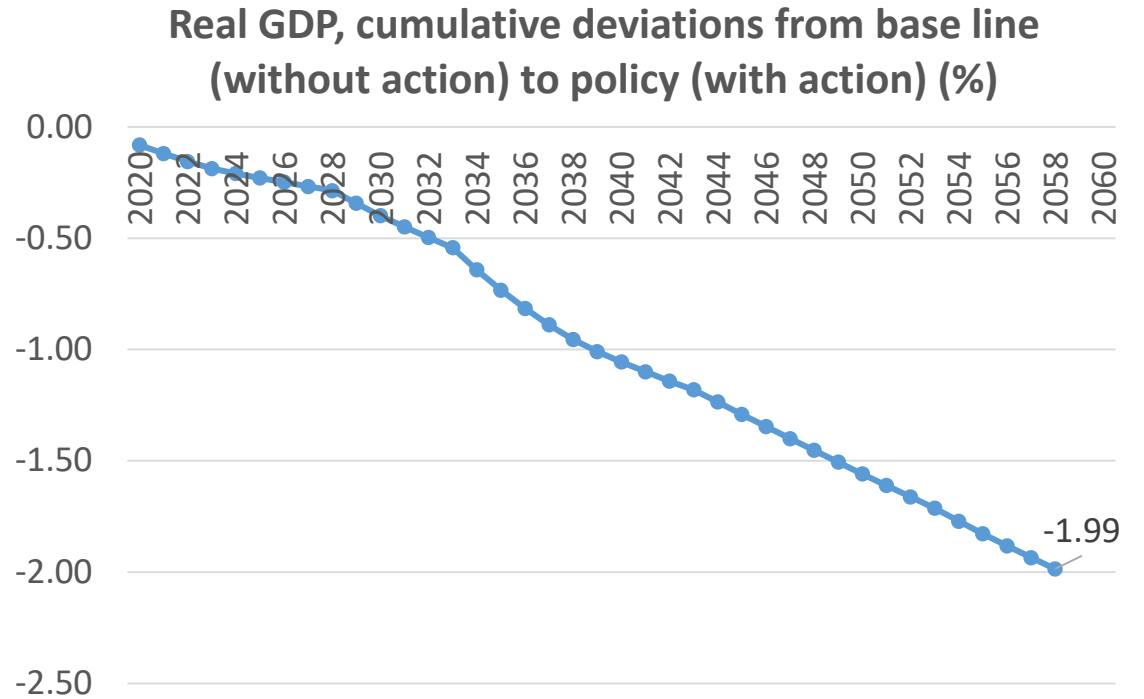
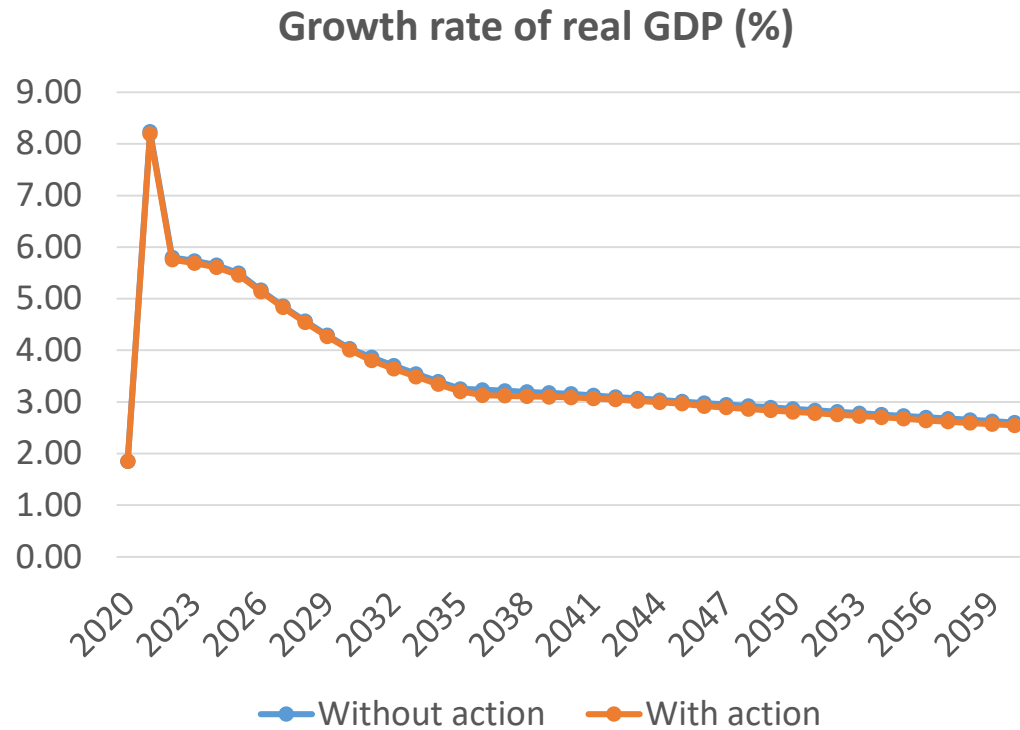


# With action: electricity generated by non-fossil fuel will increase to 87% in 2060





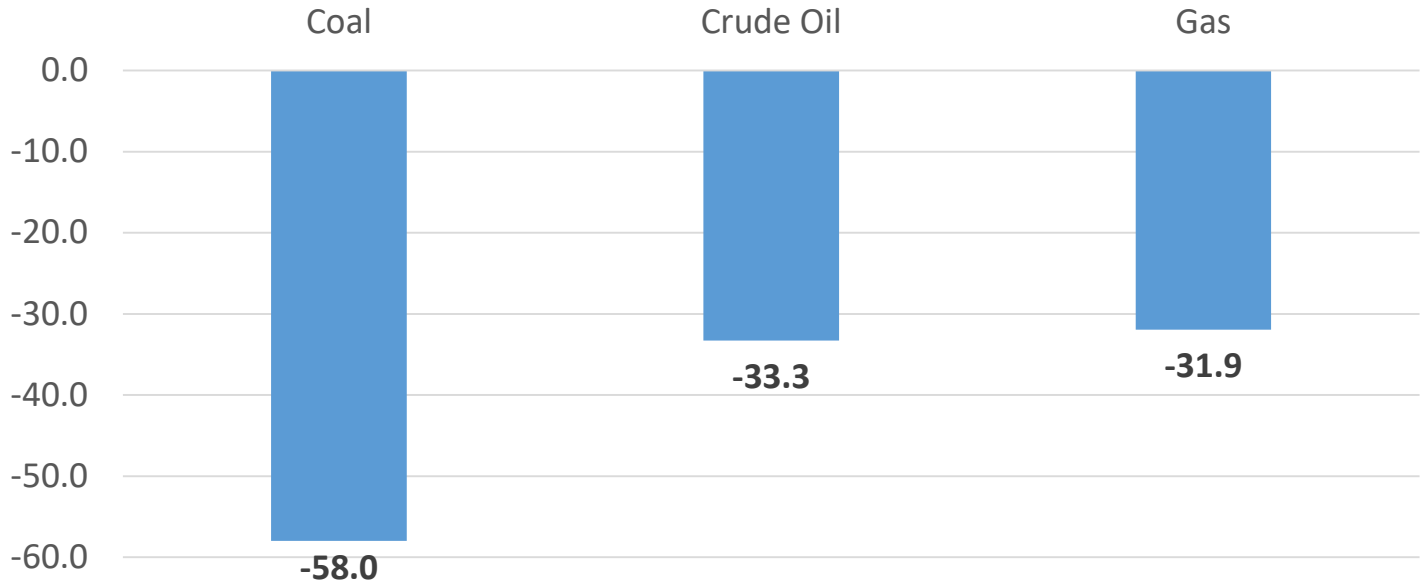
# With Action: GDP will still grow strongly



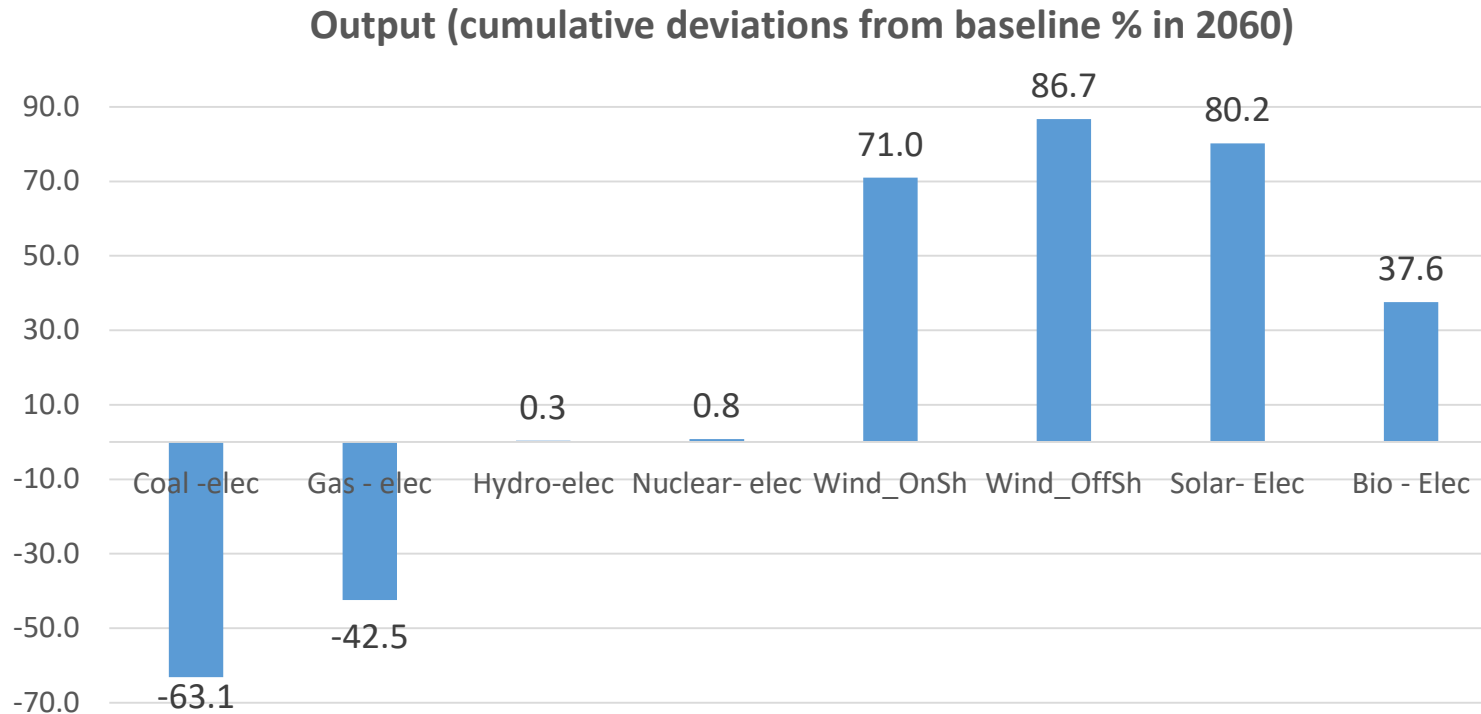


# With action: primary fossil fuel production will reduce significantly

Output - cumulative deviations from baseline in 2060 (%)



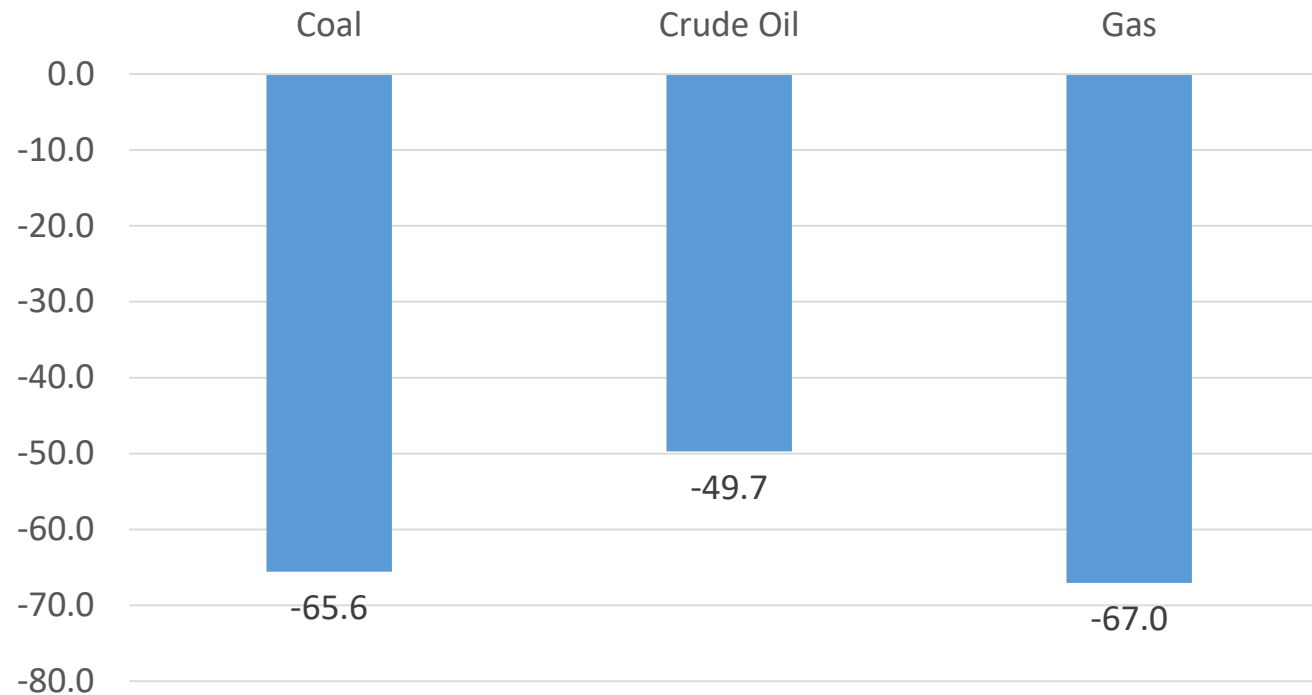
# With action: Electricity generation industries will have mixed stories



- Solar and Wind (onshore and offshore) power will increase dramatically
- Bio electricity will develop strongly
- Coal and gas fired electricity will drop significantly

# With action: China's requirements for imported energy – important implications for Australia (1)

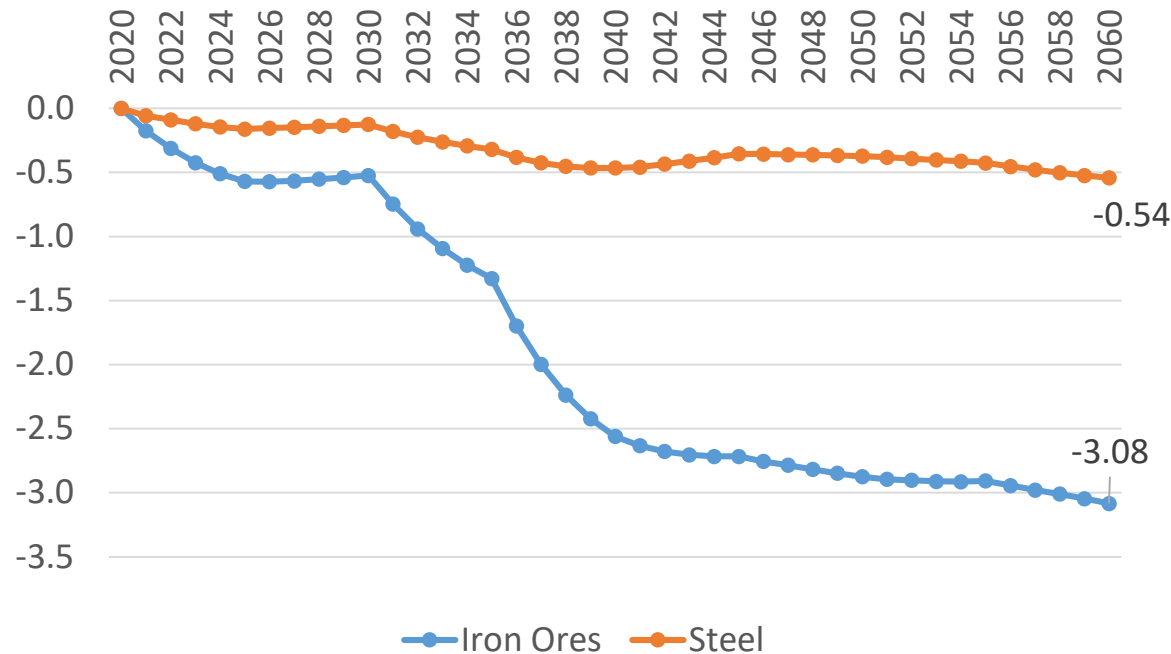
Import - cumulative deviations from baseline in 2060 (%)



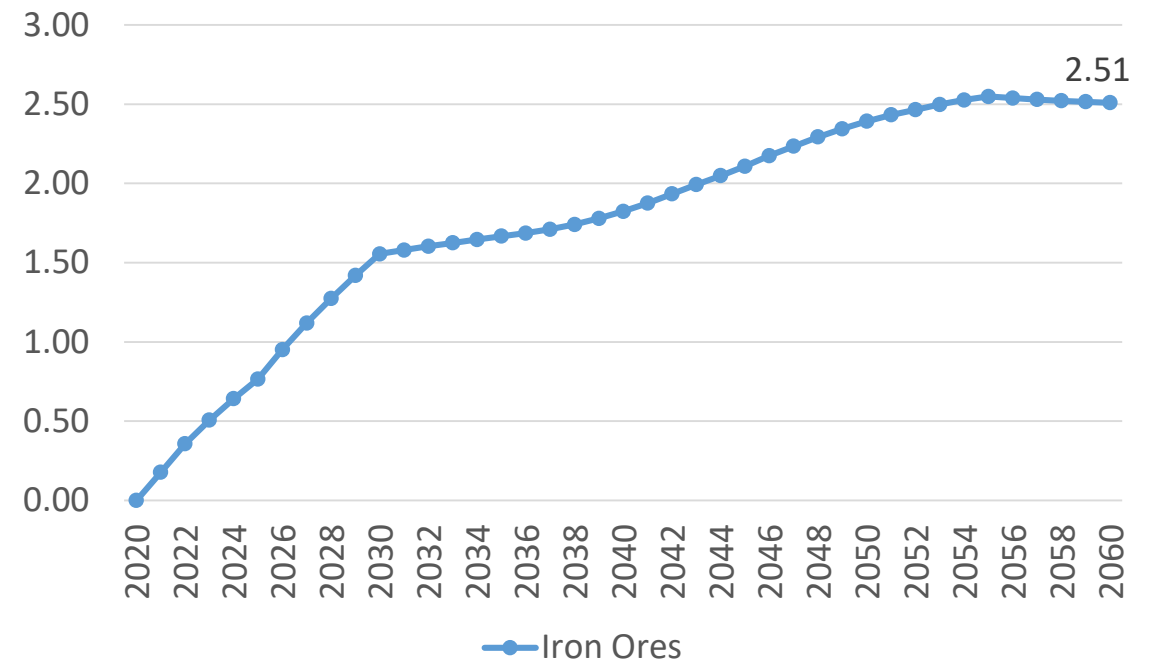
- Import of coal, gas and crude oil will reduce sharply

# With action: China's requirements for imported iron ores- important implications for Australia (2)

Domestic production - Cumulative deviations from baseline (%)



Import - Cumulative deviations from baseline (%)





# Conclusions and policy implications

- Achieving net zero carbon dioxide emissions in 2060 with relatively little harm to the economy is possible
  - Without carbon neutrality actions, GDP will grow at 3.61% per annum, between 2020 to 2060
  - With actions, GDP will grow at 3.56% per annum
  - a carbon price of below USD\$300 in 2060 could suffice
  - China should be able to reach its target of doubling real GDP between 2020 and 2035 simultaneously
- China's energy structure will change significantly
  - Cleaner energy will be dominant, replacing fossil fuel energy
  - Electricity usage will increase strongly
- China's requirement for imported energy will change dramatically
  - Significant declines in the import of coal, crude oil and gas
- China' import of iron ores might increase slightly