

Exploring a possible energy transition in Vietnam; Scenarios for the electricity sector and cost assessment of de-carbonisation

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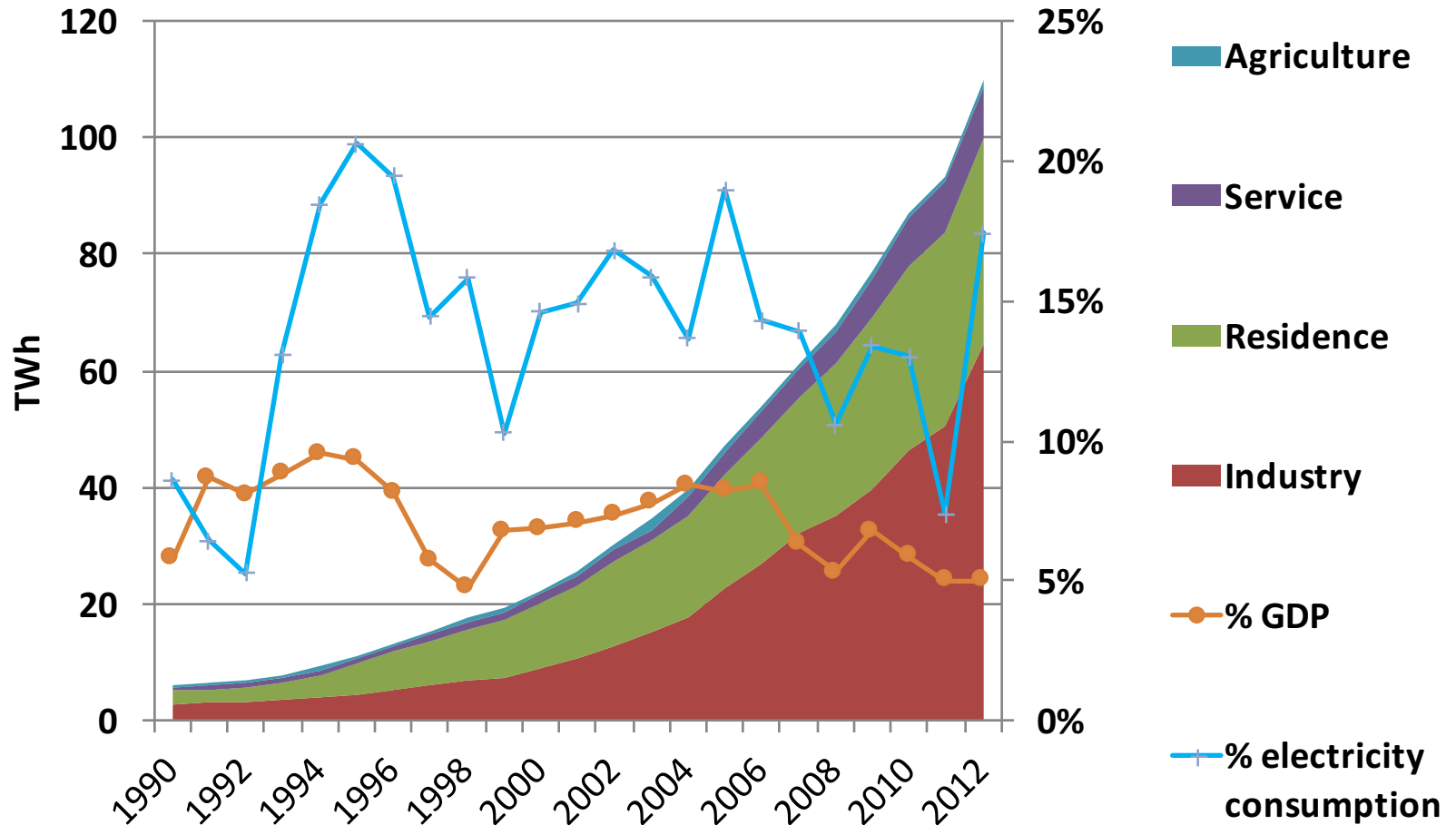
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- **Introduction**
- Research methodology
- Hypotheses and scenarios
- Main assumptions
- Results
- Conclusion

Key messages

- Our research results suggest that Vietnam can consider several relevant options for future electricity system.
- We find that de-carbonisation pathways have average social costs of electricity production not higher than the one of baseline case.

Figure 1. Past trends of electricity consumption and economic growth



Research questions

- Can Vietnam reduce growth in electricity demand for the period 2012-2050?
- Is a strong energy efficiency policy enough for sustainable development of Vietnam's power sector?
- Which possible scenarios ? and policy options, considering costs, security, sustainability or decarbonisation?

Figure 2. Flow chart of the scenarios construction

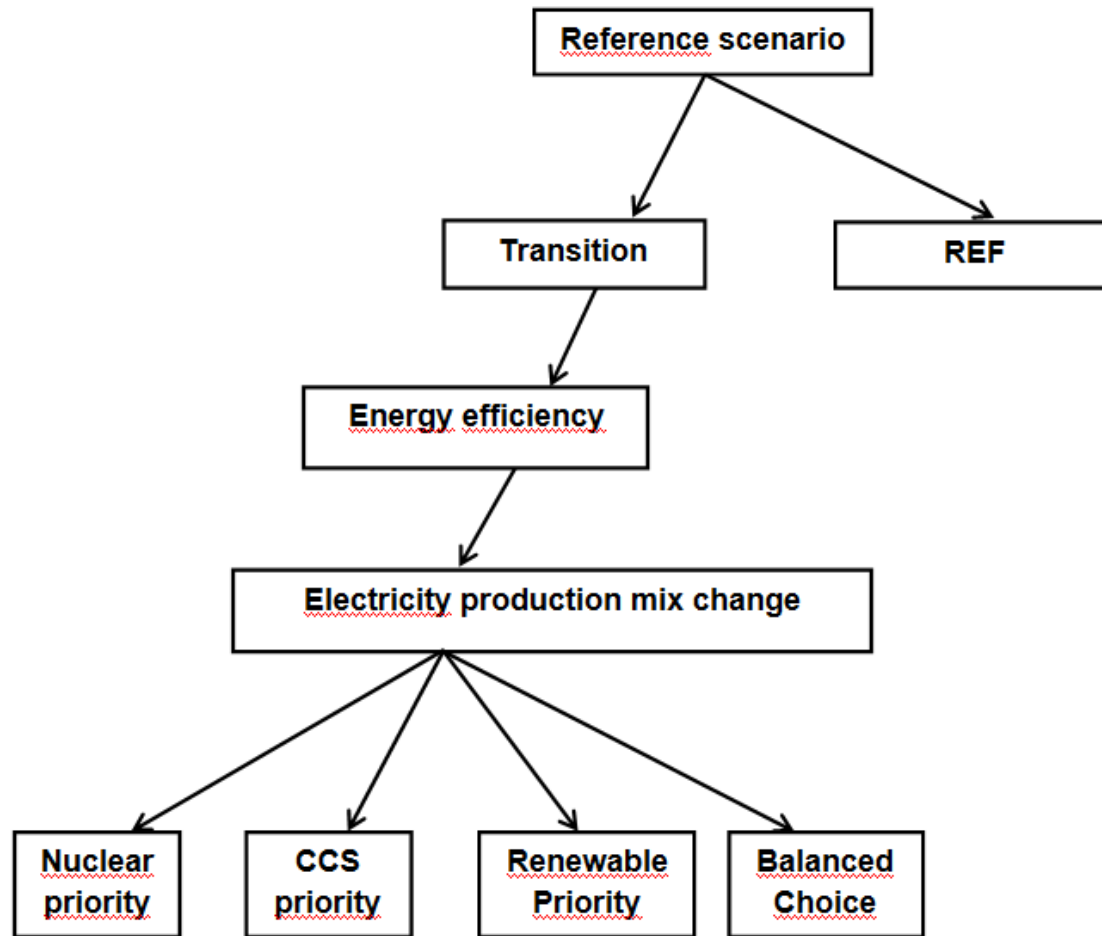


Figure 3. Overview of the ELECsim model

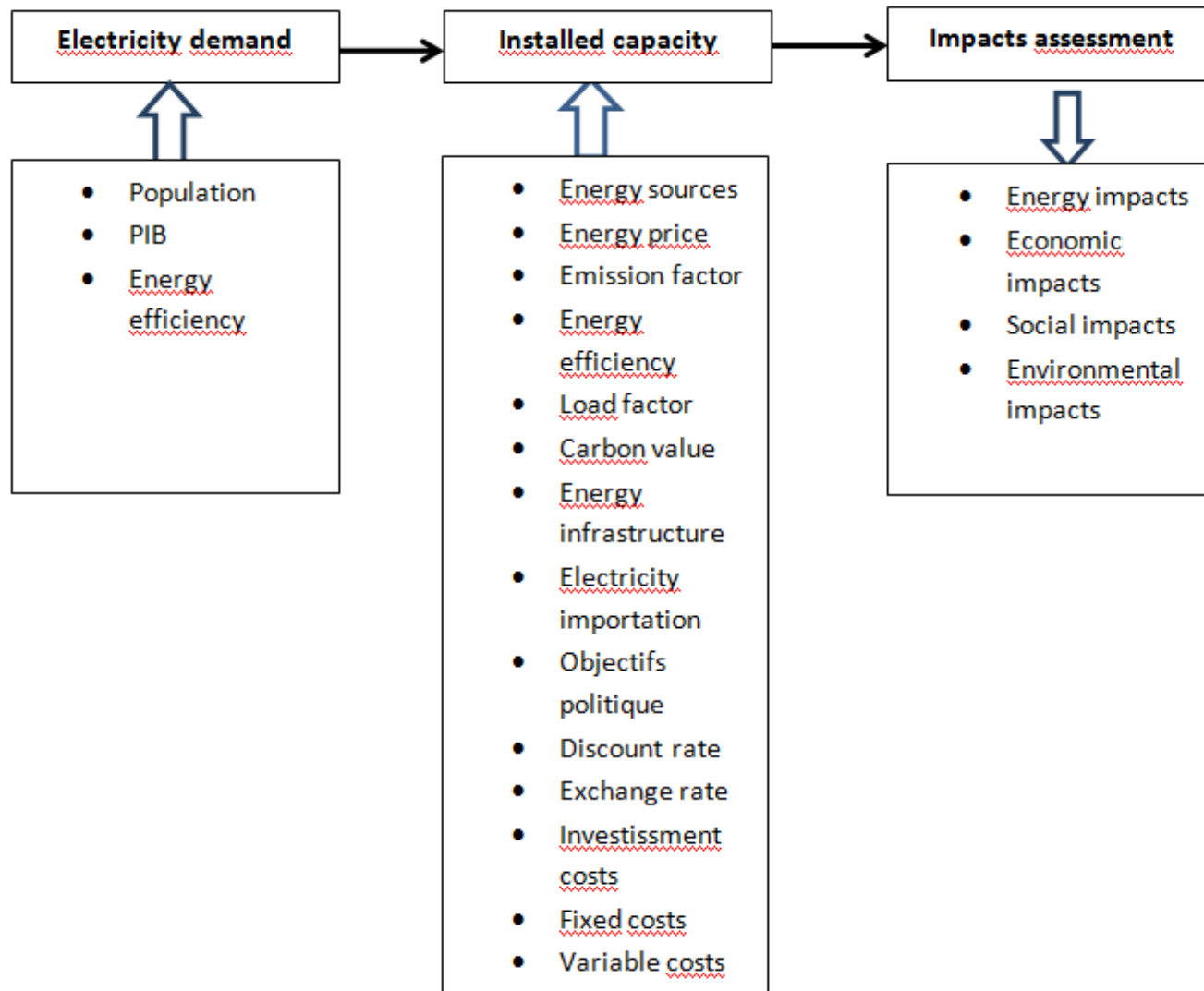


Figure 4. Main assumptions

- Economic growth
- Demographic growth
- Carbon value
- Electricity production technologies

All scenarios use these same assumptions

Objective: assess the impacts of different political choices on energy system, economy, society and environment.

Figure 5. Per capita income growth rate (1990-2012)

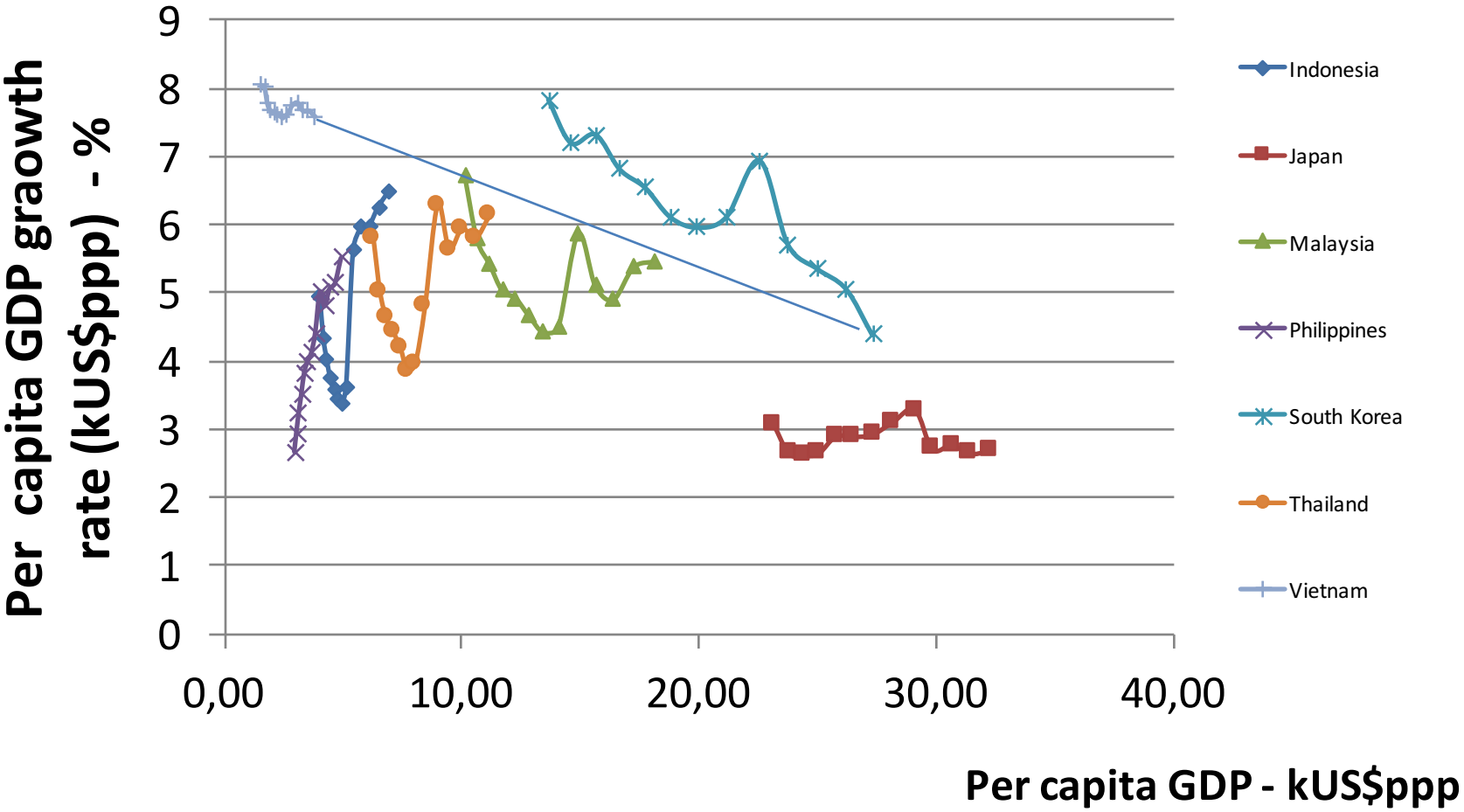
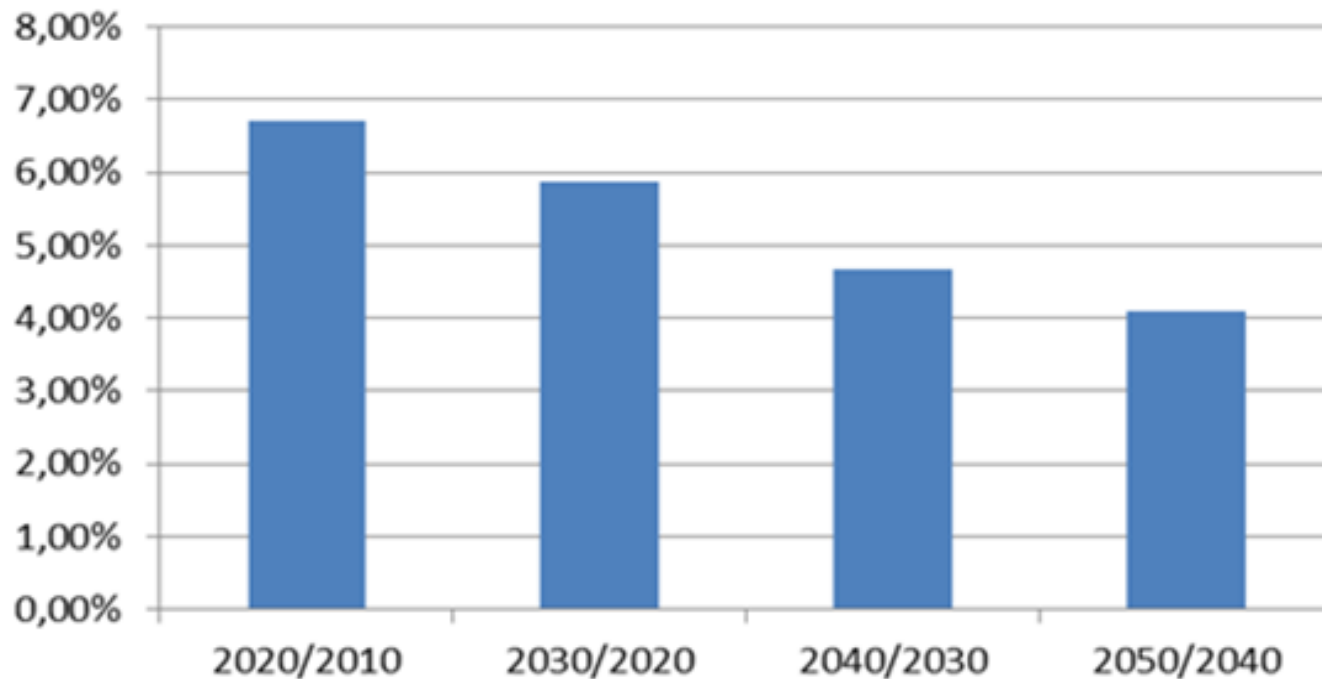
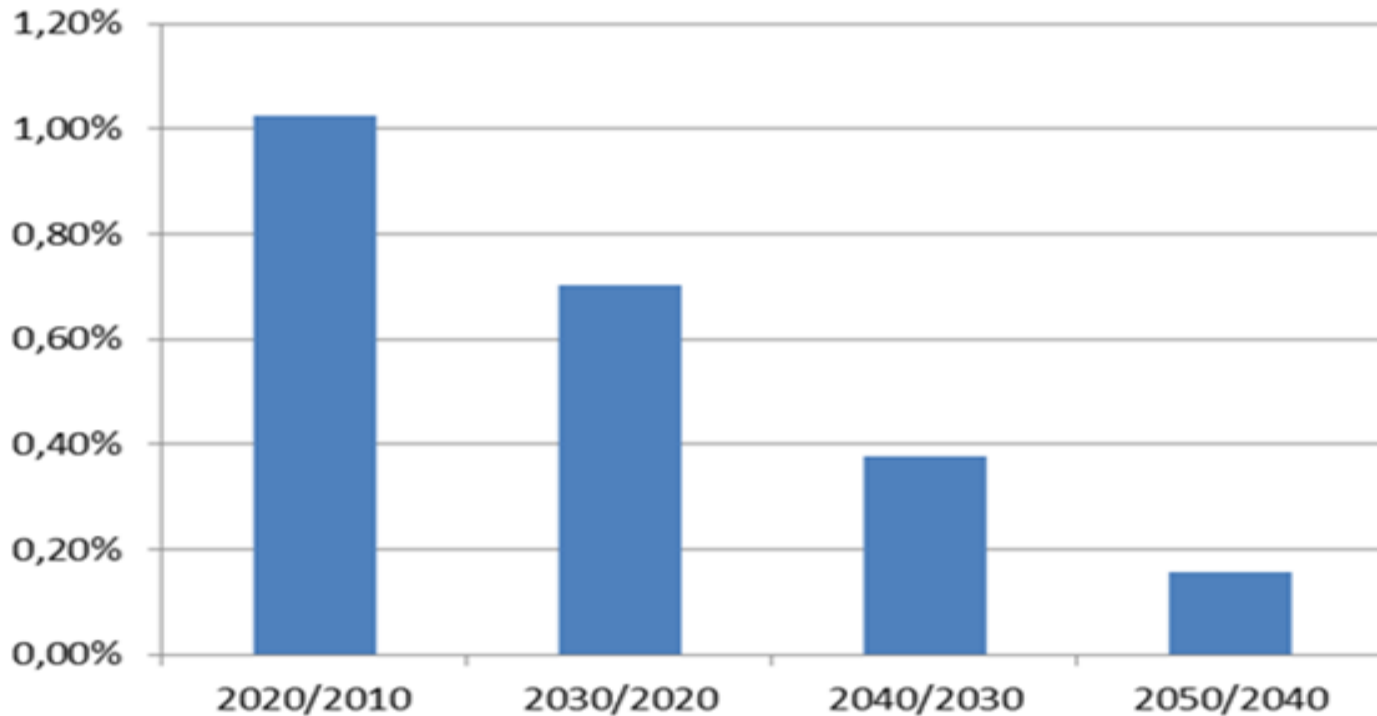


Figure 6. GDP growth rate



Source : Author according to ELECsim simulation

Figure 7. Demographic assumption



Source : (UNFPA, 2011)

Figure 8. Carbon value

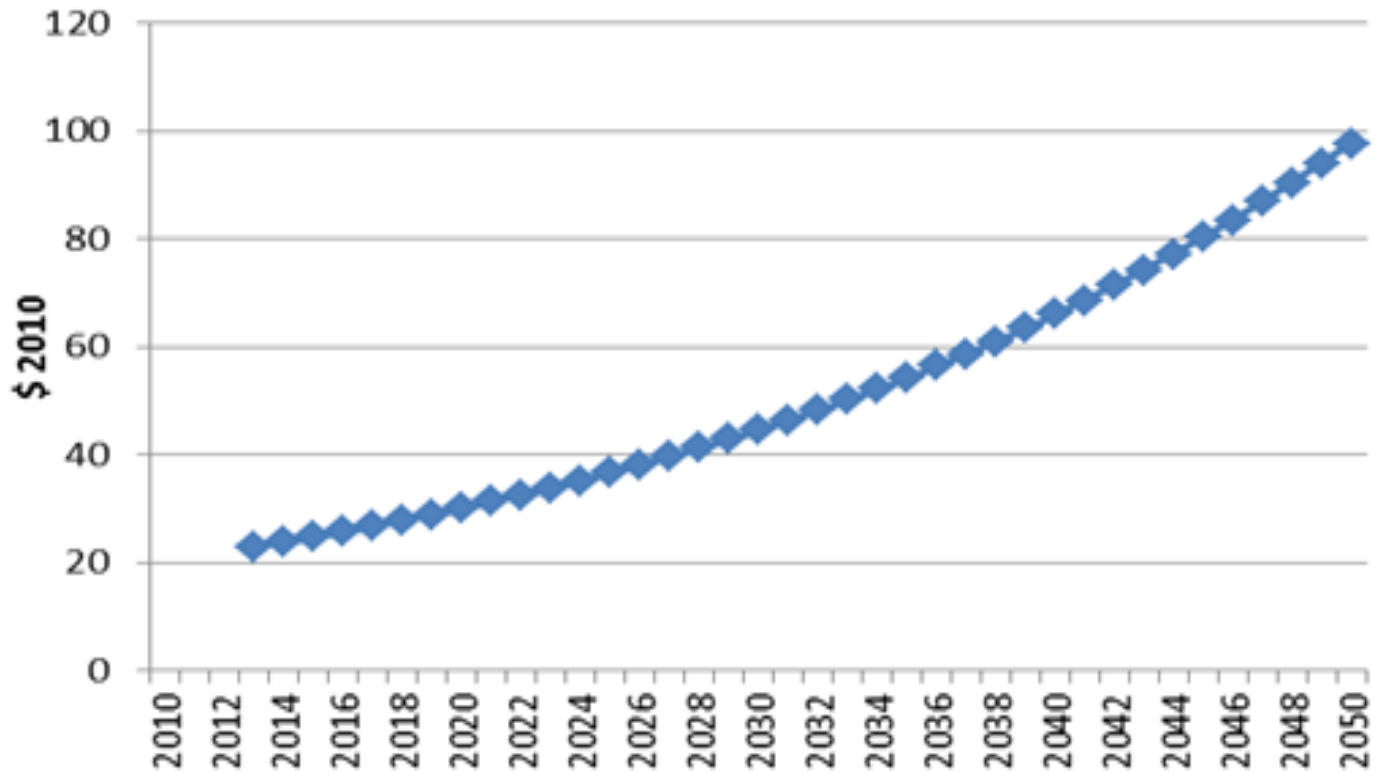


Figure 9. Complete investment cost for electricity technologies

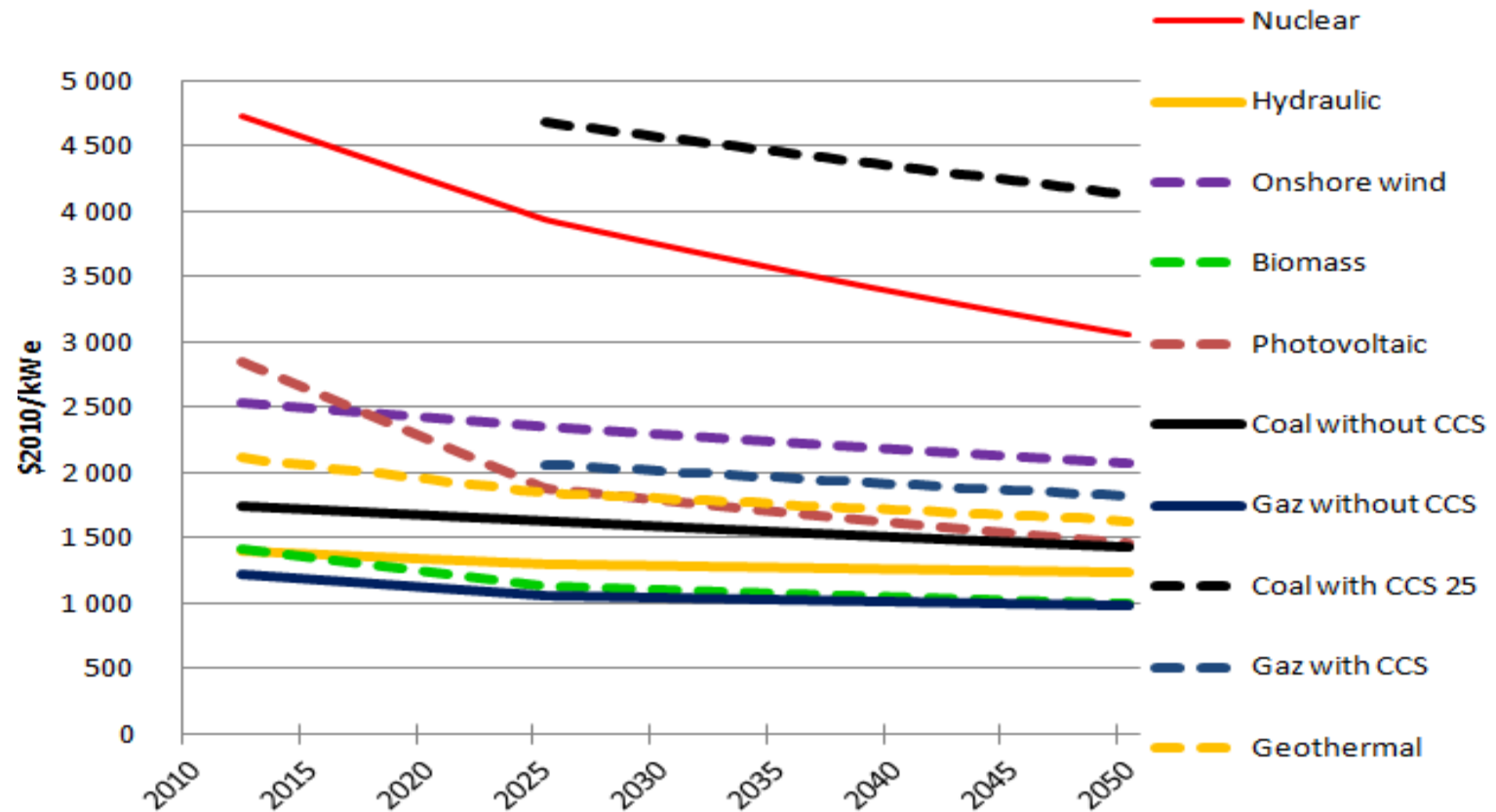
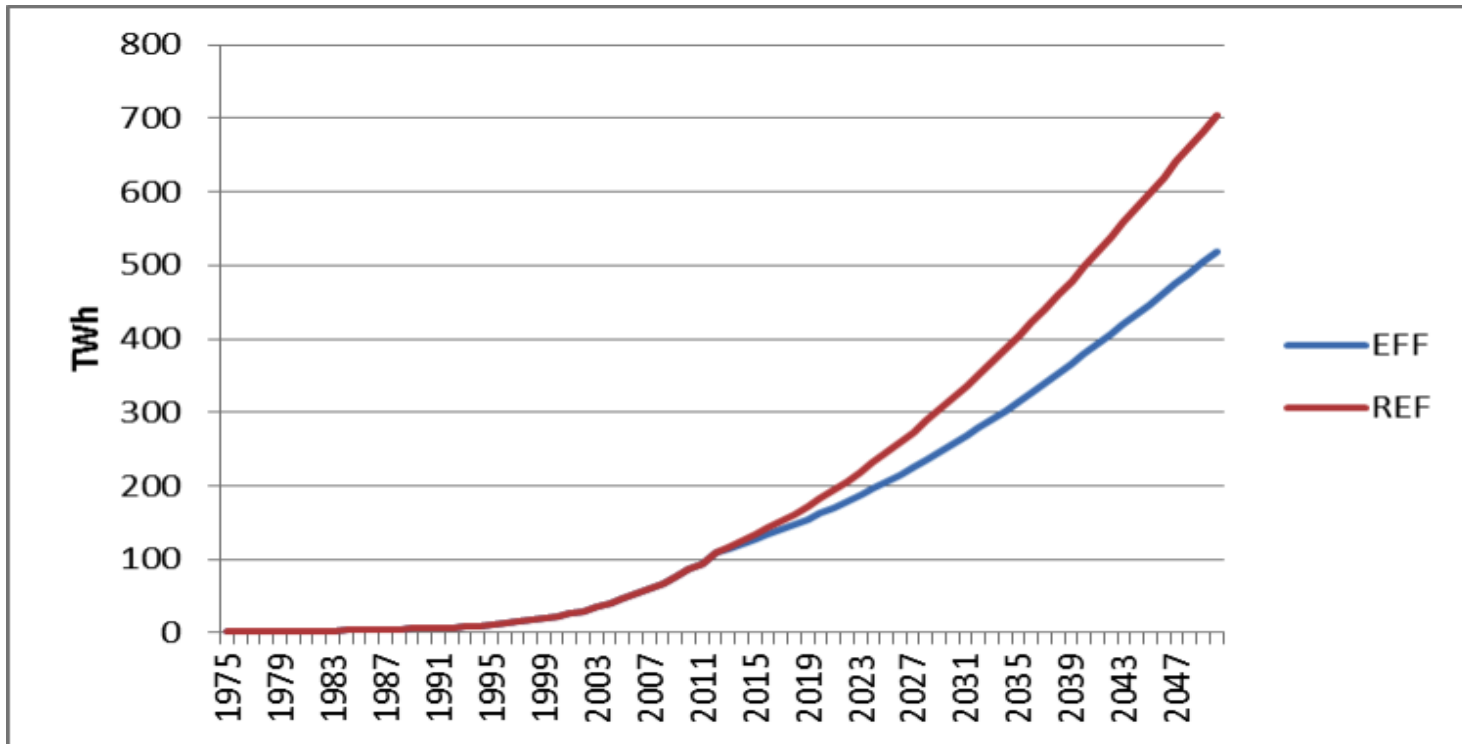


Figure 10. Impacts on the electricity consumption

Figure 13. Difference of electricity consumption in two REF and EFF scenarios



Source : author according to database of Enerdata et (Institute of Energy, 2011)

Figure 11. Installed capacity in 2050

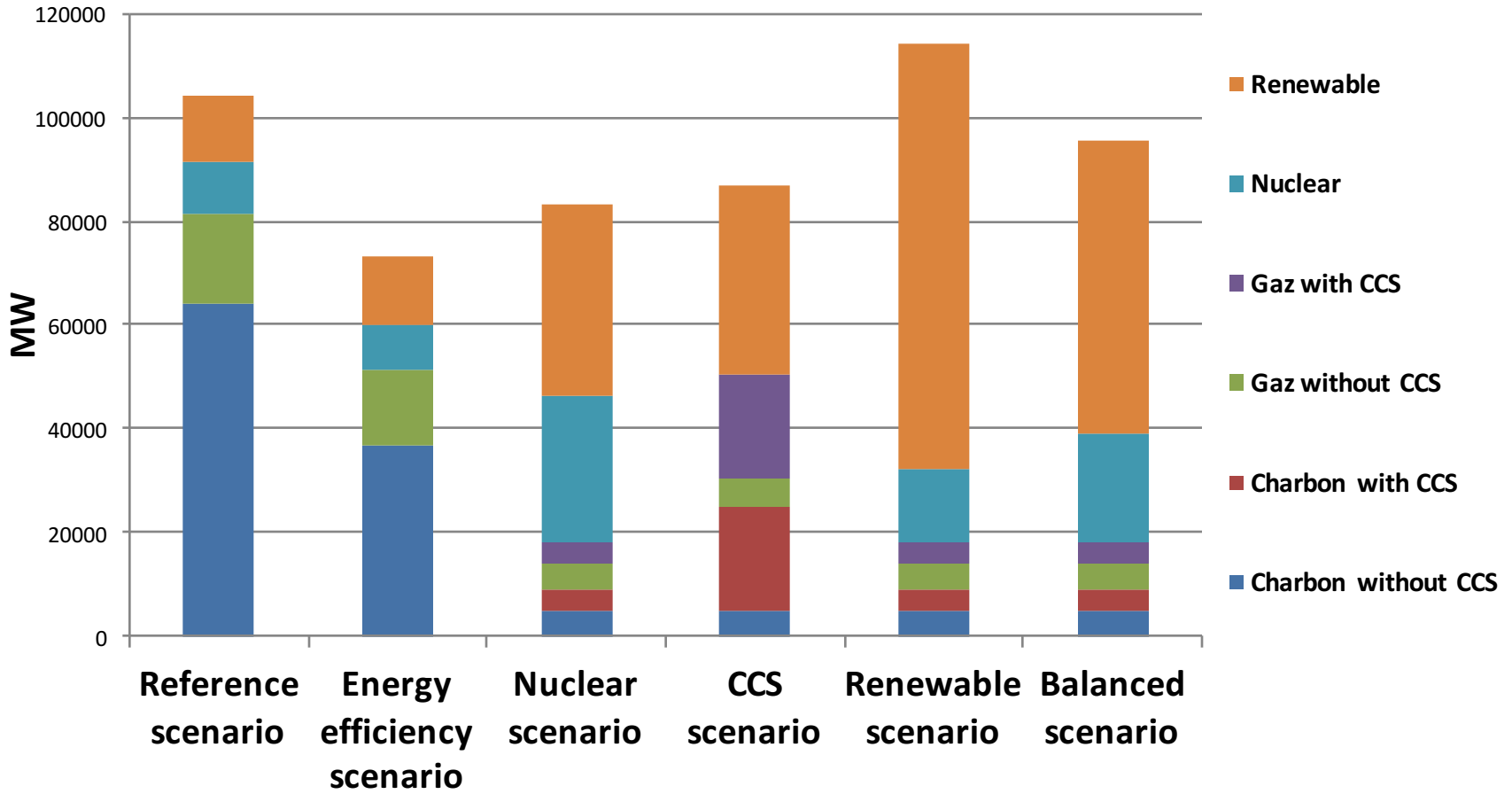


Figure 12. Impact on CO2 emissions for 2012-2050

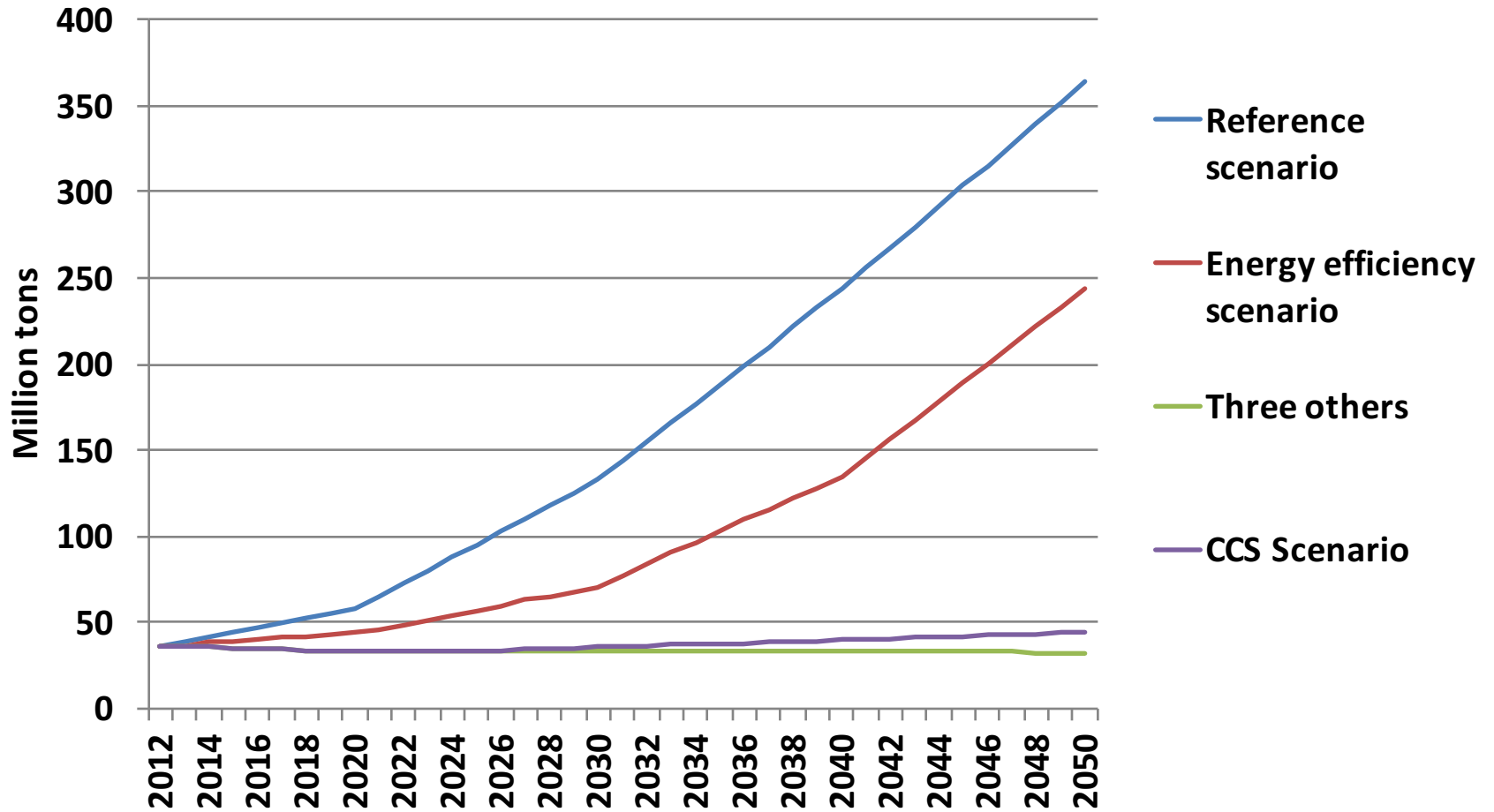


Figure13. Cumulated CO2 emissions (2012-2050)

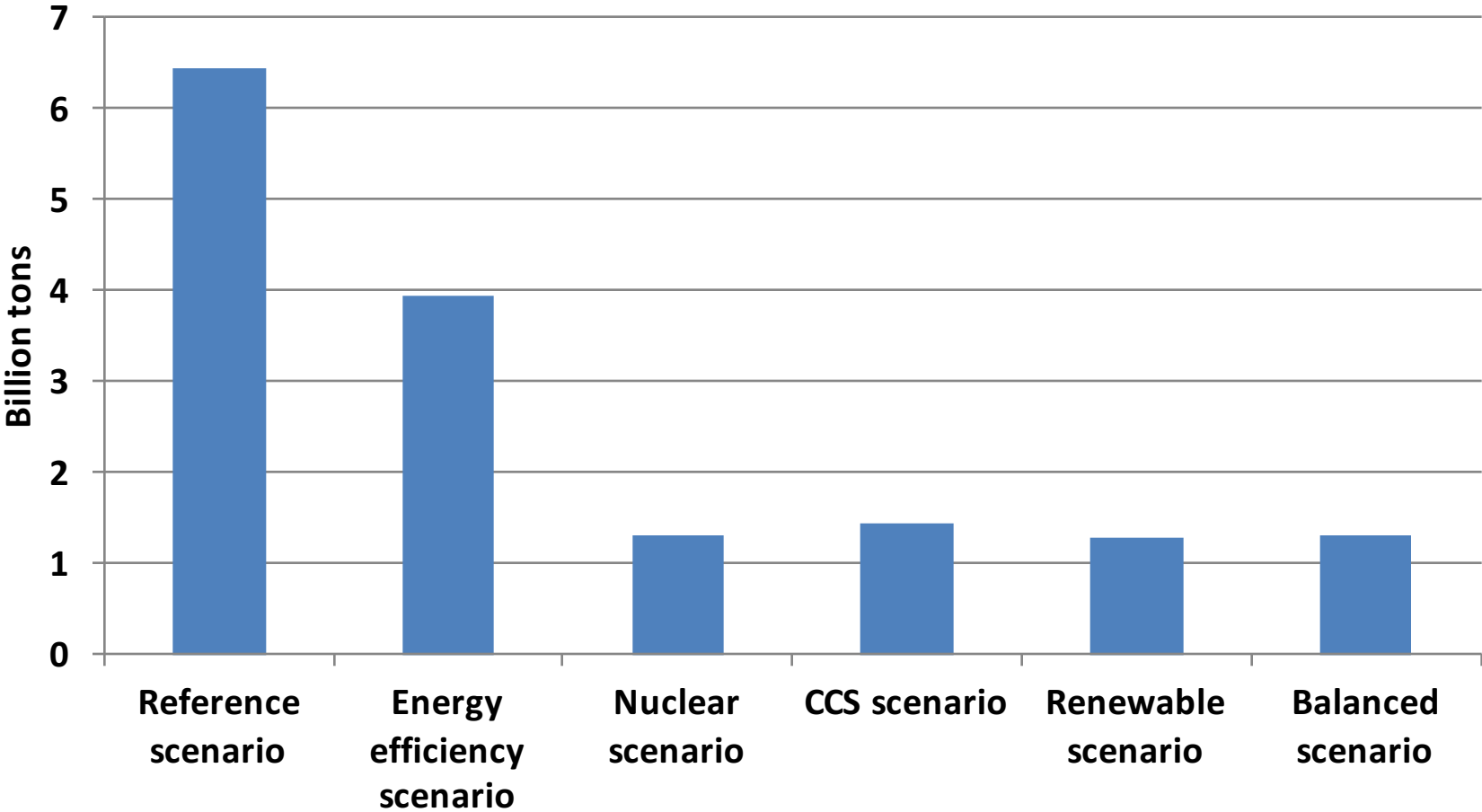


Figure 14. Total investment cost for 2013-2050

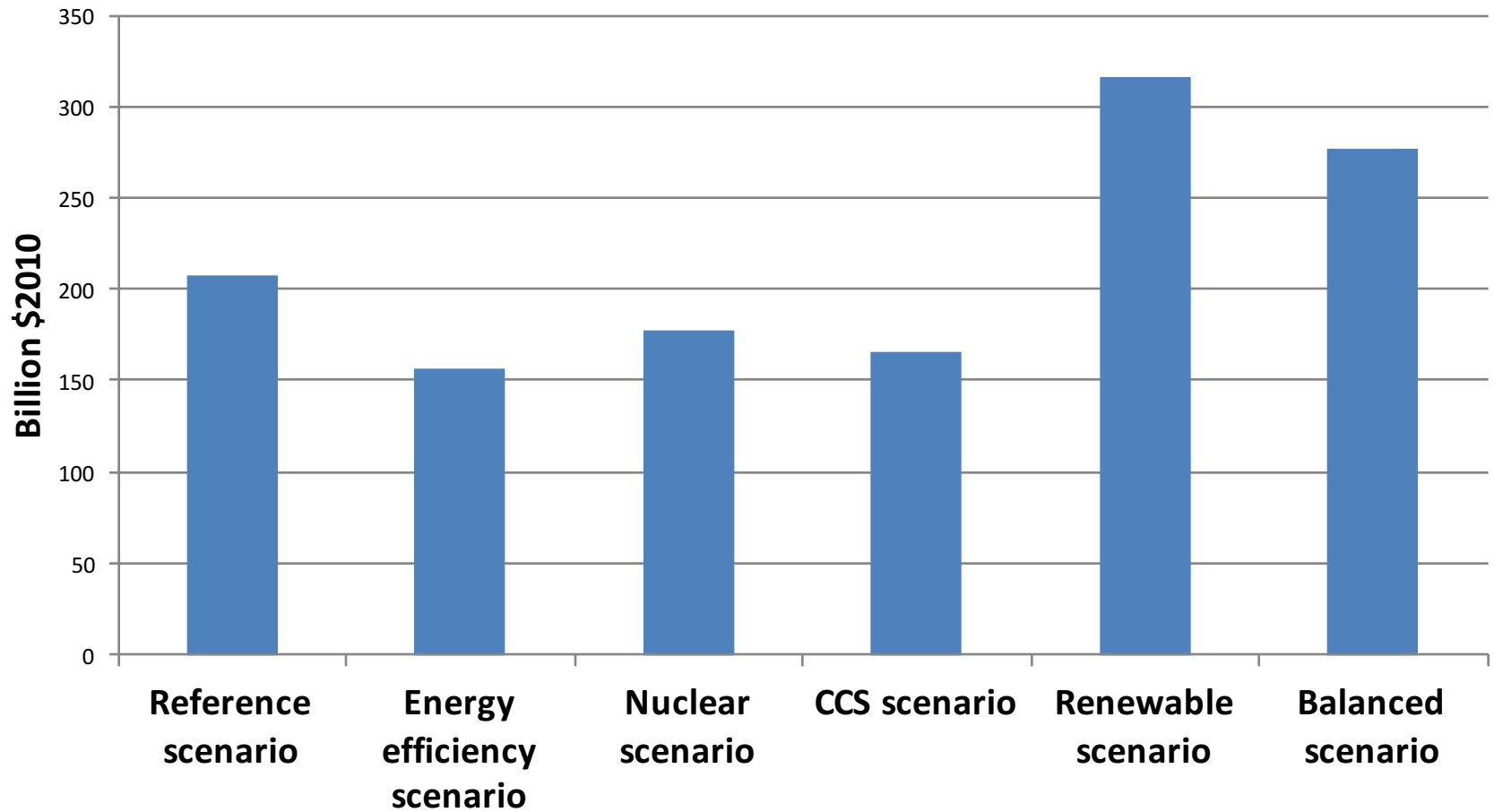


Figure 15. Fossil energy import bills

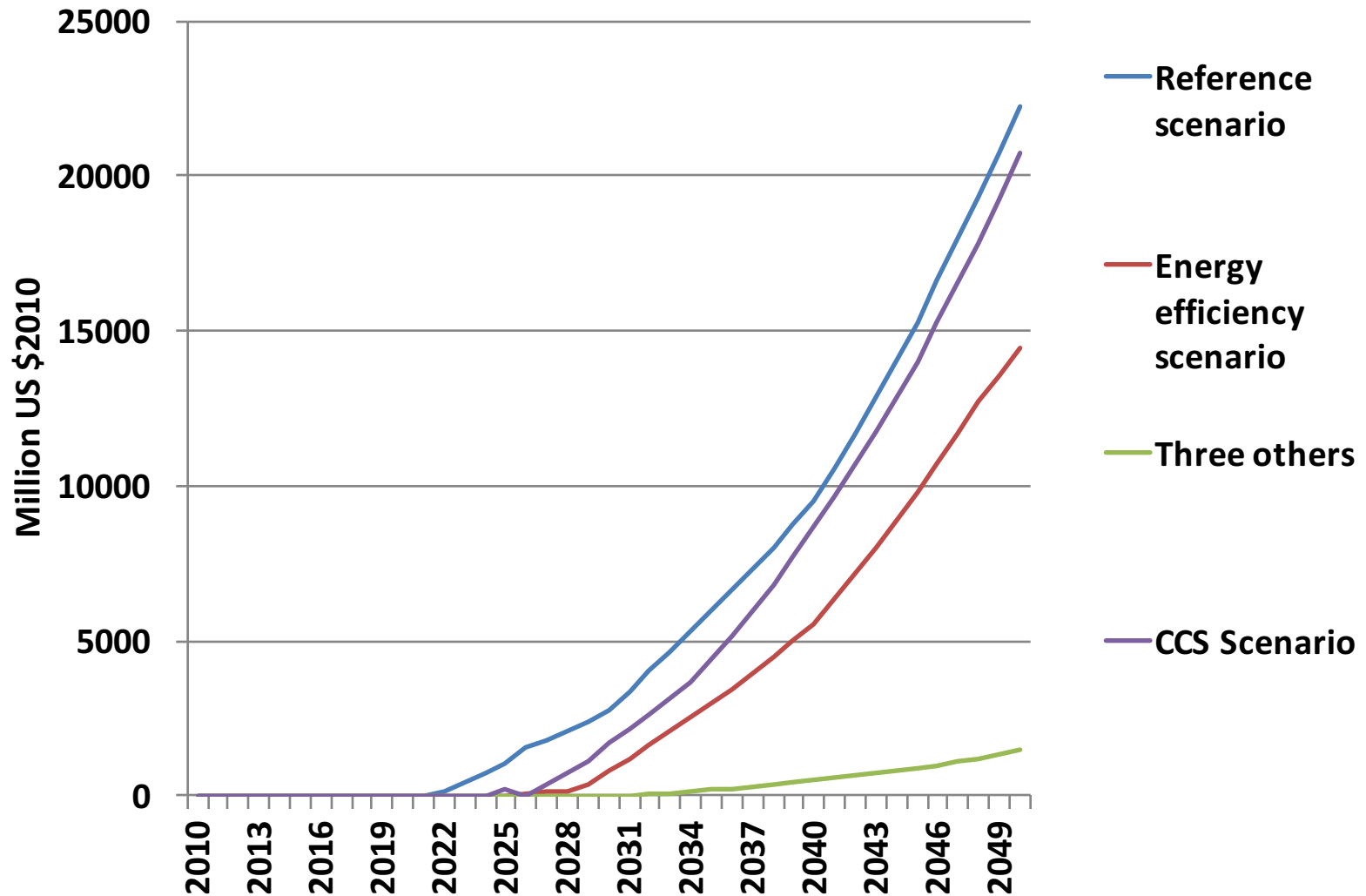


Figure 16. Cumulative energy import bills for period 2012-2050

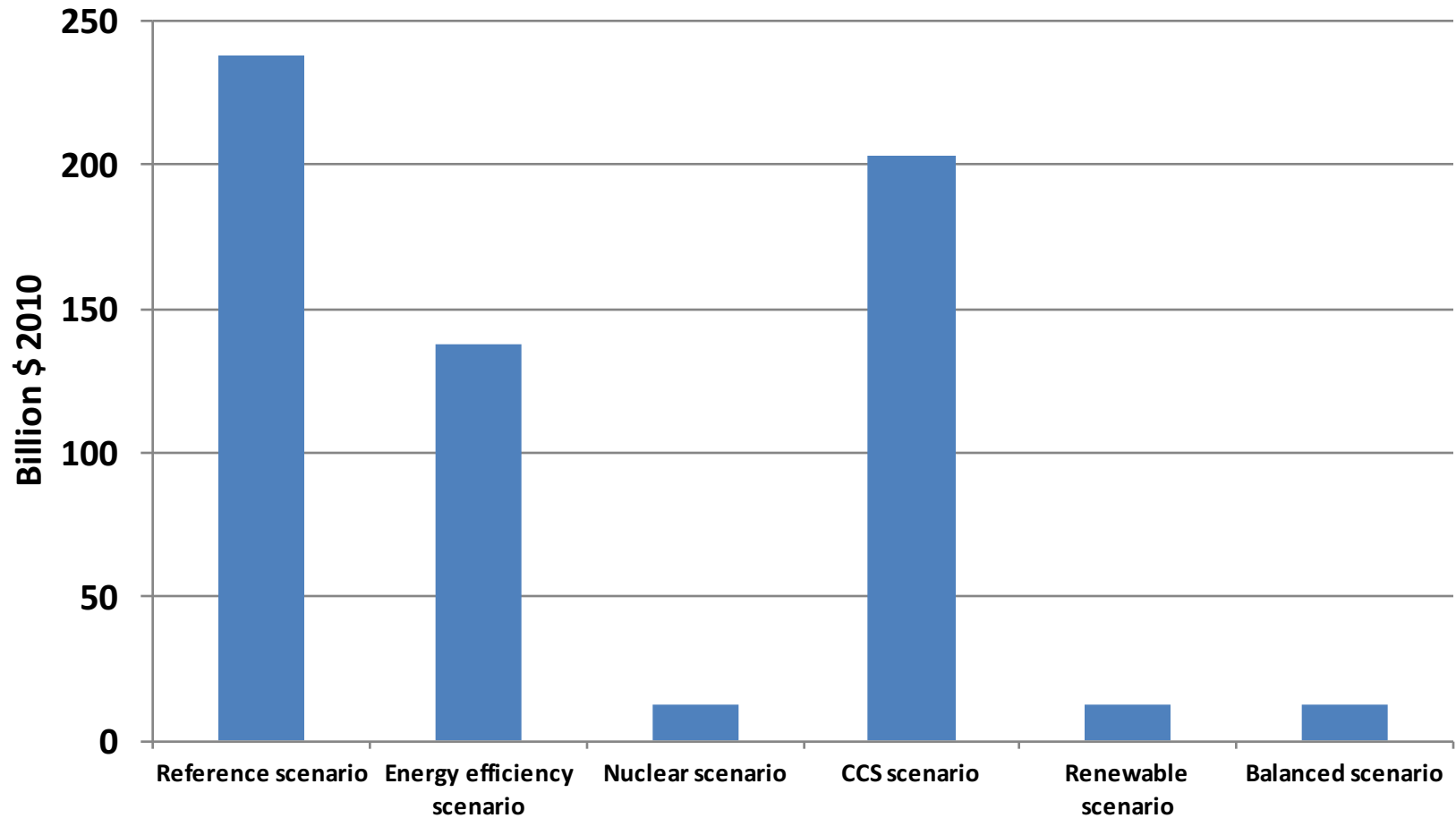


Figure 17. Average annual social cost of electricity production

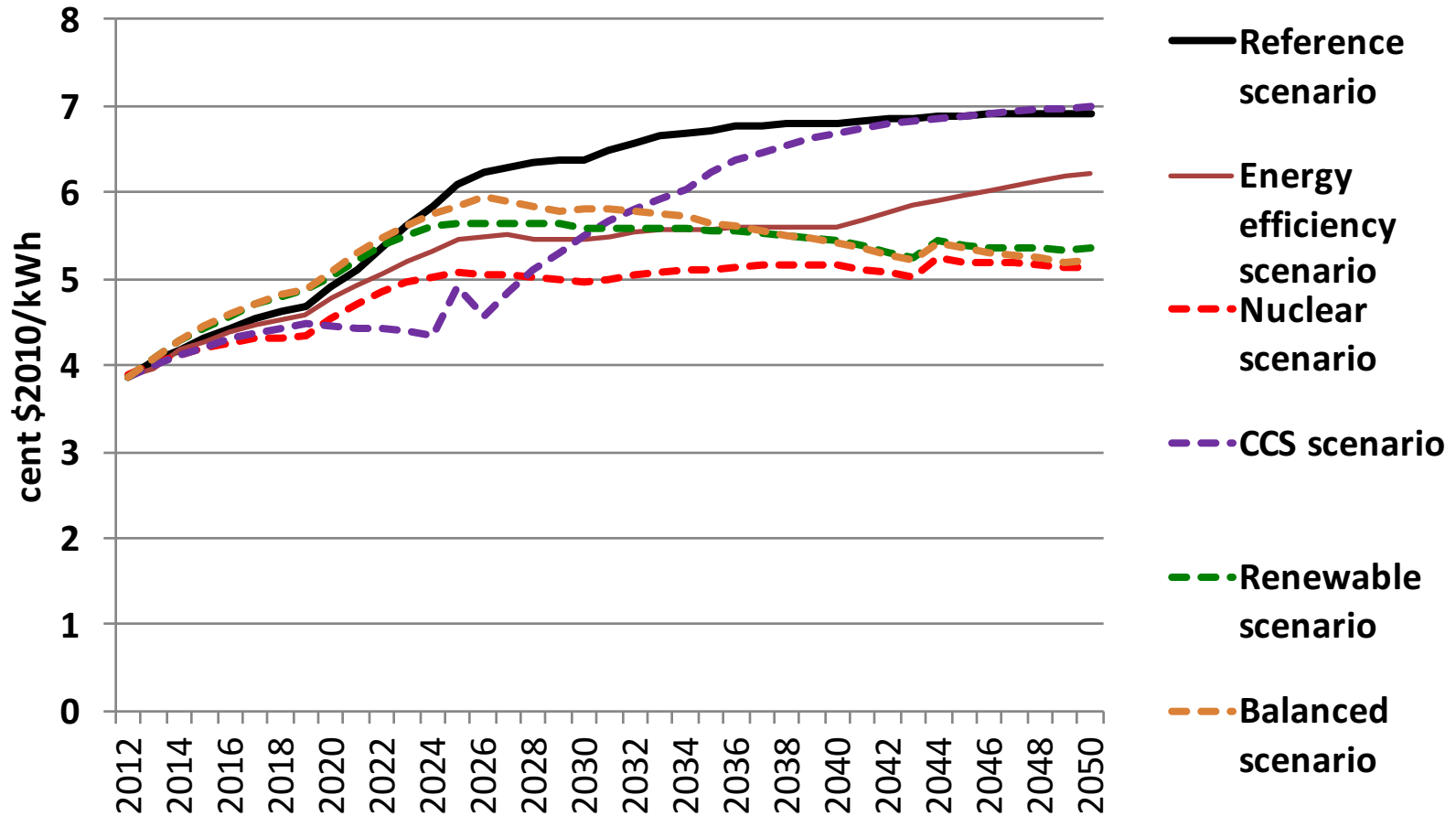
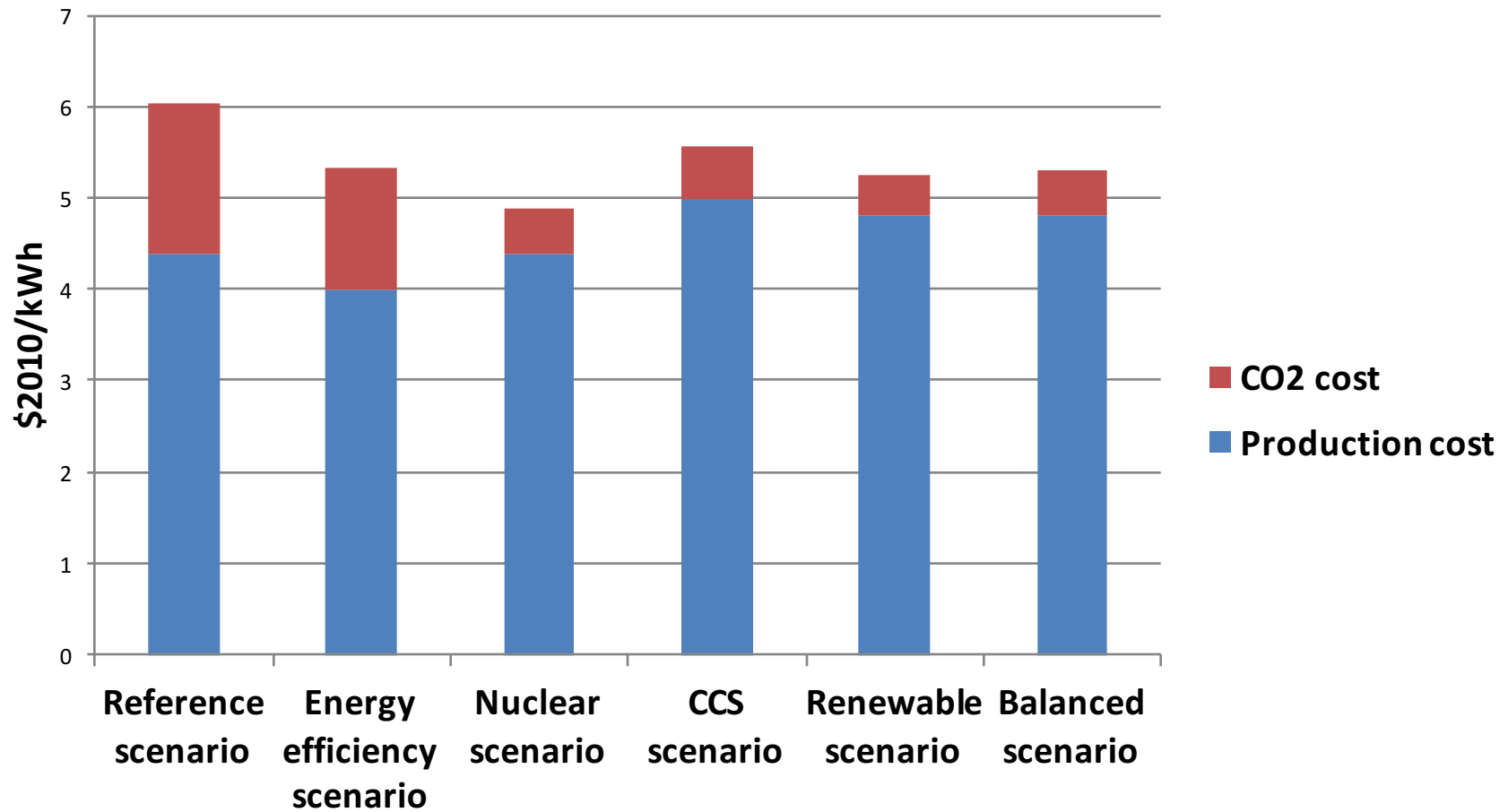


Figure 18. Average social cost of electricity production for 2012-2050



Conclusion

- **CCS scenario is not satisfactory** regarding two criteria (high investment cost and emission of CO₂) due to technological uncertainties.
 - **Nuclear scenario**, conditioned by the political and environmental debates, seems however a (good ?) most sensible choice if only based on total costs.
 - **Renewable scenario** is particularly interesting because it is less subject to risk opposition than nuclear.
 - **Balanced scenario**, although it is more expensive than nuclear, allows to be less dependent on one sector, increases security of supply of electricity and flexibility for the country.
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- We can see that some options are more flexible and less controversial such balanced or renewable scenario
 - In any case energy and climate policy choices are crucial in the next decade

Thank you !