A contribution to

An analysis of medium to long-term impacts on the Australian Oceans

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1.1 Carbon Capture and Storage

Carbon Capture and Storage (CCS) is a geo-engineering negative emission technology. It involves capturing greenhouse gases (in particular CO_2), transporting them to an appropriate site and storing them permanently. The storage is essentially geological (injection in deep saline formations) or done in conjunction with enhanced oil recovery process, either onshore or offshore.

Although it is at an early industrial stage, the technology is proven and available at commercial scale. The risk of accidental release is low and according to the IPCC it is likely that 99% of CO_2 stored in a suitable reservoir will remain stored for at least 1000 years (Greig et al., 2016; Metz et al., 2005).

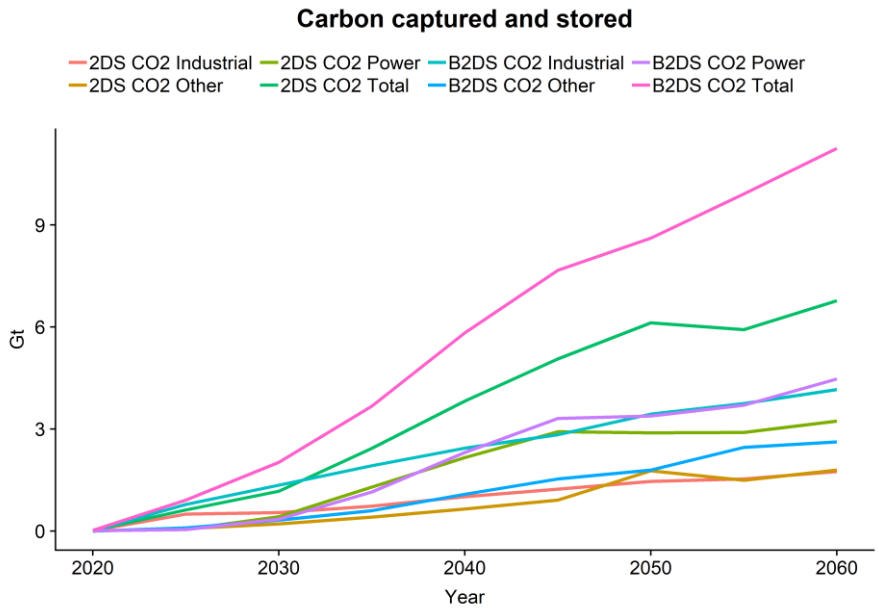


Figure 1. Global C02 captured and stored, according to 2DS and B2DS scenarios (Source: https://www.iea.org/topics/ccsarchive/)

CCS is of particularly interest for Australia, where fossil fuels are abundant and cost competitive. CCS allows for the continuous use of these sources of energy, without the associated emissions. In addition, it provides for a period of negative emission, necessary to reach carbon neutrality, to meet the targets of the Paris Agreement (Greig et al., 2016). Global projections of capture and storage (Figure 1) are based on net carbon emission requirements. They are presented by the International Energy Agency (IEA) according to two scenarios, the 2°C Scenario (2DS) and the Beyond 2°C Scenario (B2DS). Hence the projections rely on global $C0_2$ emissions projections and are related to other alternative sustainable technologies (McCulloch et al., 2016), such as renewable energy (Figure 2). While these projections rely on the Paris Agreement requirements, CCS suffers from a lack of

policy support. Costs are expected very high and financial incentives are needed to support the implementation of the technology (Honegger & Reiner, 2018).

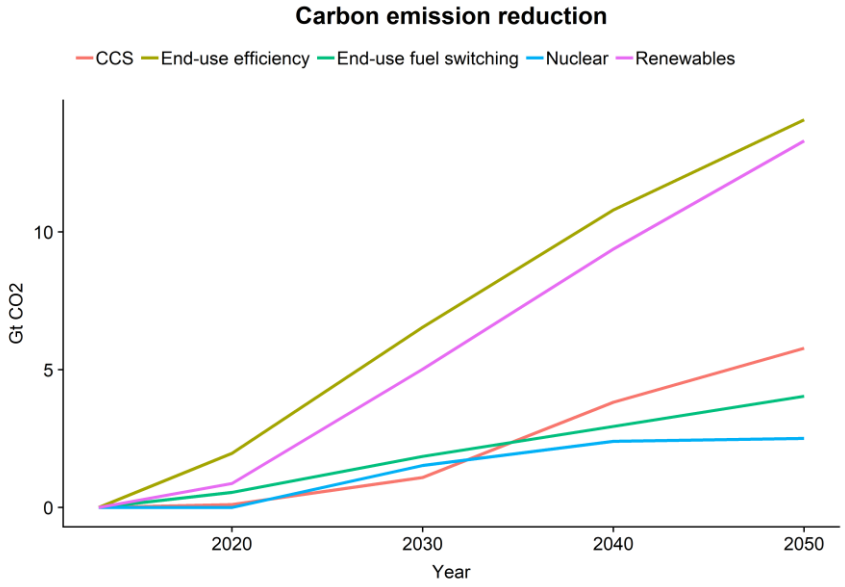
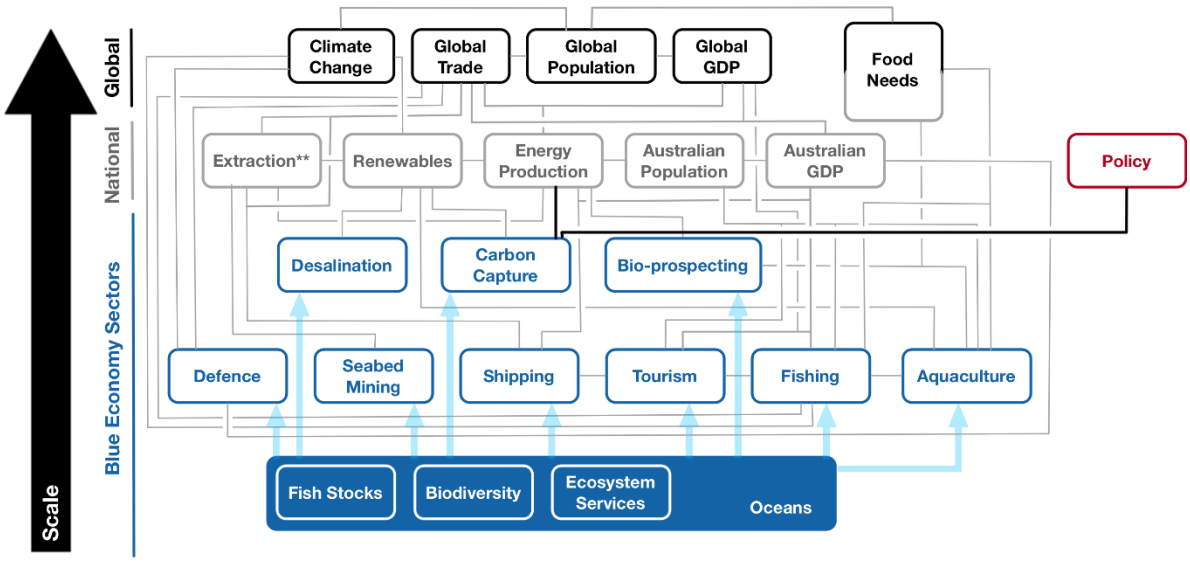


Figure 2. Global carbon emission reduction projection

With only 0.3 % of the world's population Australia contributed for 1.3% of the world's greenhouse gases emissions with 550 Mt in 2017 (Commonwealth Of Australia, 2017). In Australia, CCS appears to be the lowest cost option to reduce net carbon emission and meet the targets of the Paris agreement. In this regard, appropriate investment from government and industry is necessary promptly for a commercial deployment of CCS in the medium term (past 2019) with a widespread deployment by 2050 (Greig et al., 2016). So far, there are no large-scale commercial CCS projects, although there have been some demonstration projects (e.g. Otway project), and there are some proposed projects including CarbonNet (Bass Strait) and Gorgon (NWShelf). It is unknown whether the Australian government will support these proposals through to full operation. (Jim Greenwood, personal communication)

1.2 Sector-specific conceptual model



** Extraction - land and sea

Figure 3. The initial conceptual model in Figure 1 in the main document, complemented with information about sector-specific drivers obtained from the analysis of sector projections. See main text for more information.

1.3 References

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