FOI 191109
Document 1

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From: s22
Sent: Thursday, 29 August 2019 8:48 AM
To: s22
Subject: Understanding historical and projected emissions [SEC=OFFICIAL:Sensitive]
Attachments: MS19-000506.pdf; MS19-000506 - Attachment A - Australia's international emission reduction commitments.pdf; s22 ; MS19-000506 - Attachment C - Key drivers of projected emissions.pdf; Briefing Slides - Understanding Historical and Projected Emissions.pdf

Hi s22 ,

As discussed, please find attached the papers and slide show used to brief Minister Taylor.

Kind Regards

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MS19-000506

To: Minister for Energy and Emissions Reduction (For Information)

UNDERSTANDING HISTORICAL AND PROJECTED EMISSIONS

Recommendation:

That you note the key drivers behind Australia's historical (**Attachment B)** and projected (**Attachment C)** emissions.

Noted / Please discuss

Minister: Date:

Comments:

Clearing Officers: Sent: 29/07/2019	s22		

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3. The 2018 projections indicated that emissions would increase by around 2 Mt CO_2-e per year on current levels to reach 563 Mt CO_2-e in 2030.

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Projected emissions – key drivers

9. The 2018 projections attributed the 2 Mt CO_2-e per year increase on current levels to:

   a. growth in fugitive emissions due to the continued expansion of Australia's LNG industry and the increased global trade for coking coal;

   b. more transport activity, driven by population and economic growth; and

   c. growth in agricultural activity, assuming a return to average seasonal conditions, after drought.

10. Early analysis for the 2019 projections suggests that emissions will be projected to decline to 2030 due to the incorporation of measures under the Climate Solutions Package.

11. **Attachment** s22 **C** provide further detail of the drivers of historical and projected emission trends.

ATTACHMENTS

A: Australia's international emission reduction commitments

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C: Key drivers of projected emissions

ATTACHMENT A

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Document 1b

AUSTRALIA'S TARGETS

Australia has a range of international emission reduction commitments.

Treaty	Target	How are we tracking? (based on the 2018 projections)
Kyoto Protocol first commitment period (CP1)	Limit emissions to 108 per cent of 1990 levels over 2008-2012.	Australia overachieved on this target by 128 Mt CO_2-e (carryover)
United Nations Framework Convention on Climate Change (UNFCCC) Cancun Agreement	5 per cent below year 2000 levels by 2020. Assessed using an emissions budget over 2013 to 2020.	On track. Projected to overachieve by 367 Mt CO_2-e inclusive of carryover or 240 Mt CO_2-e without carryover.
Kyoto Protocol second commitment period (CP2)	Limit emissions to 99.5 per cent of 1990 levels over 2013-2020. This target is consistent with Australia's pledge under the Cancun Agreement.	On track. A precise estimate of overachievement will not be estimated until the end of the commitment period due to the emissions accounting rules applied under the Kyoto Protocol.
UNFCCC Paris Agreement	Between 26 and 28 per cent below 2005 levels in 2030. Assessed using an emissions budget over 2021 to 2030.	If carryover from CP2 is taken into account, the emissions reduction task is 328 Mt CO_2-e – 395 Mt CO_2-e. In the year to December 2018 there is an 11.9 per cent decrease in absolute emissions since 2005.

KEY DRIVERS OF PROJECTED EMISSIONS TO 2030

Australia's emissions projections 2018 estimated that Australia's emissions will increase by 5 per cent on current levels to reach 563 Mt CO_2-e in 2030. This is equivalent to 7 per cent below 2005 levels.

The key drivers of this increase were:

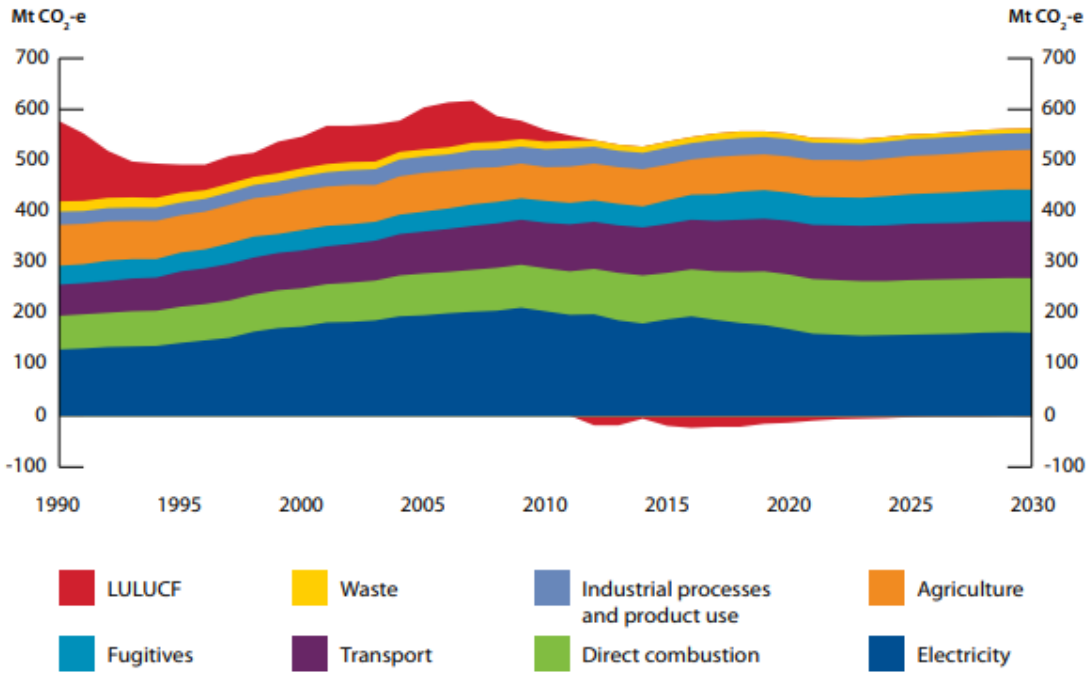
- increasing emissions from LNG production (37% increase);
- increased transport emissions (9% increase);
- a declining sink in the land sector (95% increase, from -22 to -1 Mt CO_2-e); and
- growth in agricultural activity, assuming a return to average seasonal conditions after drought (10% increase).

Electricity sector emissions are projected to be 3% below 2000 levels by 2020 and are projected to be 17% below 2005 levels in 2030. Emissions are projected to continue to decline in the early 2020s due to the continued increase in large and small scale renewable electricity generation. However, emissions start to rise again from 2023 to 2030 due to increasing electricity demand coupled with no withdrawal of large-scale fossil fuel based power stations until 2030.

An additional 200 Mt CO_2-e emissions reductions delivered by the Climate Solutions Package (CSP) were not included in the 2018 projections and will be included 2019.

Early analysis for the 2019 emissions projections suggests that the inclusion of the CSP, state/territory policies renewables policies not previously included in the projections and a reduction in agriculture emissions due to the Qld floods and the ongoing drought will see a decrease in the emissions reduction task for the 2030 target.

Figure 1: Australia's emissions projections 2018 by sector (1990 – 2030)



The following sections provide detail on the drivers of emissions at the sectoral level and a discussion of projected emissions excluding LNG exports.

Sectoral analysis of the trends

Electricity

Electricity emissions have been declining since 2009 and have, together with LULUCF, been the primary driver in Australia meeting its 2020 emissions target.

The 2018 electricity emissions projections show that emissions in the electricity sector are projected to fall to the early 2020s, before gradually increasing to 2030.

Emissions are projected to fall to 2023 due to increased renewable generation (figure 2).

The gradual increase in emissions thereafter is due to growth in electricity demand, in line with population and economic growth, and the fuel mix remaining dominated by coal generation to 2030 (figure 3).

Figure 2: Electricity emissions (2018 - 2030)

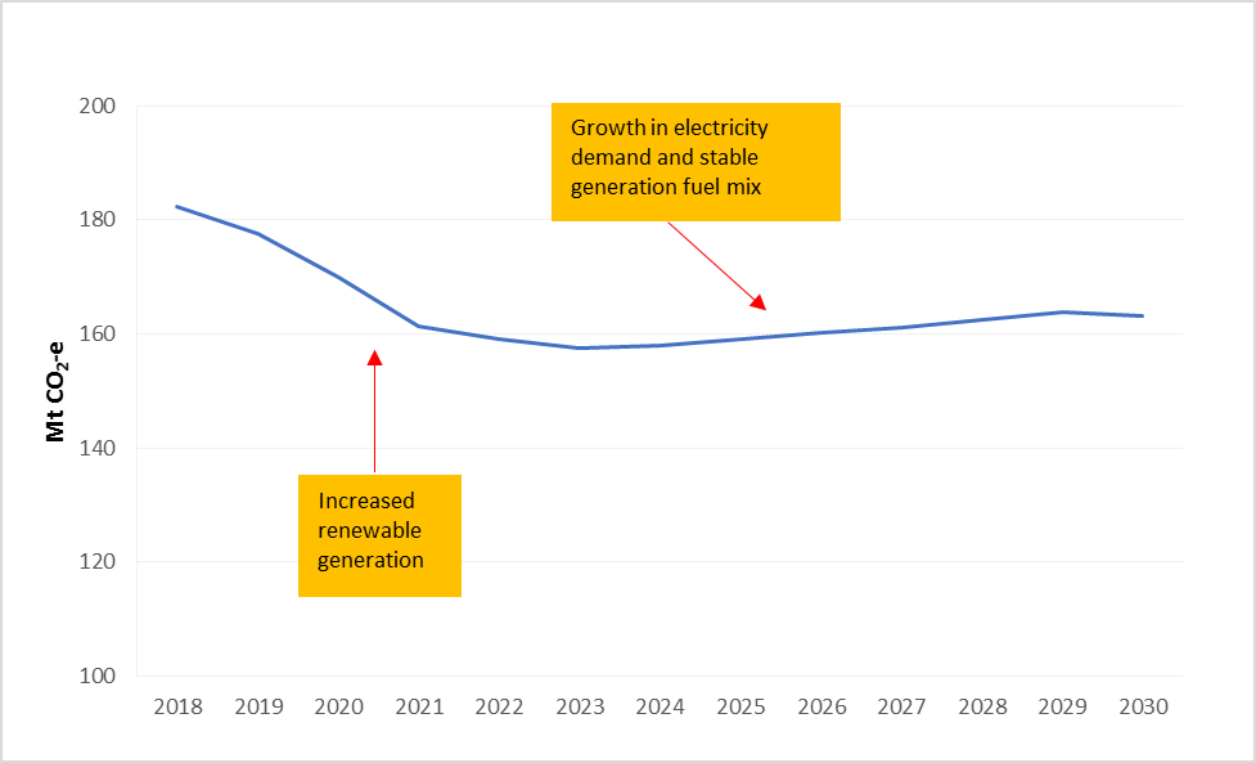
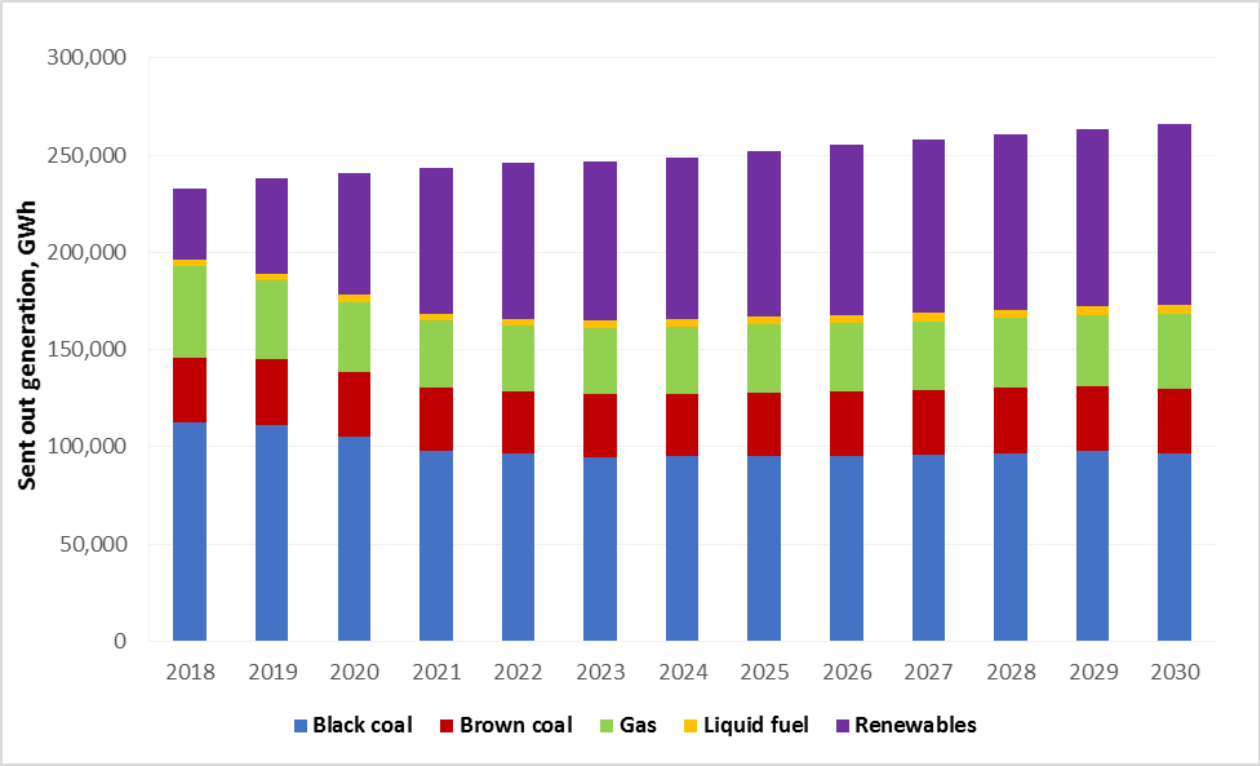


Figure 3: Electricity sector generation fuel mix (2018 - 2030)



Direct Combustion (or Stationary Energy excluding electricity)

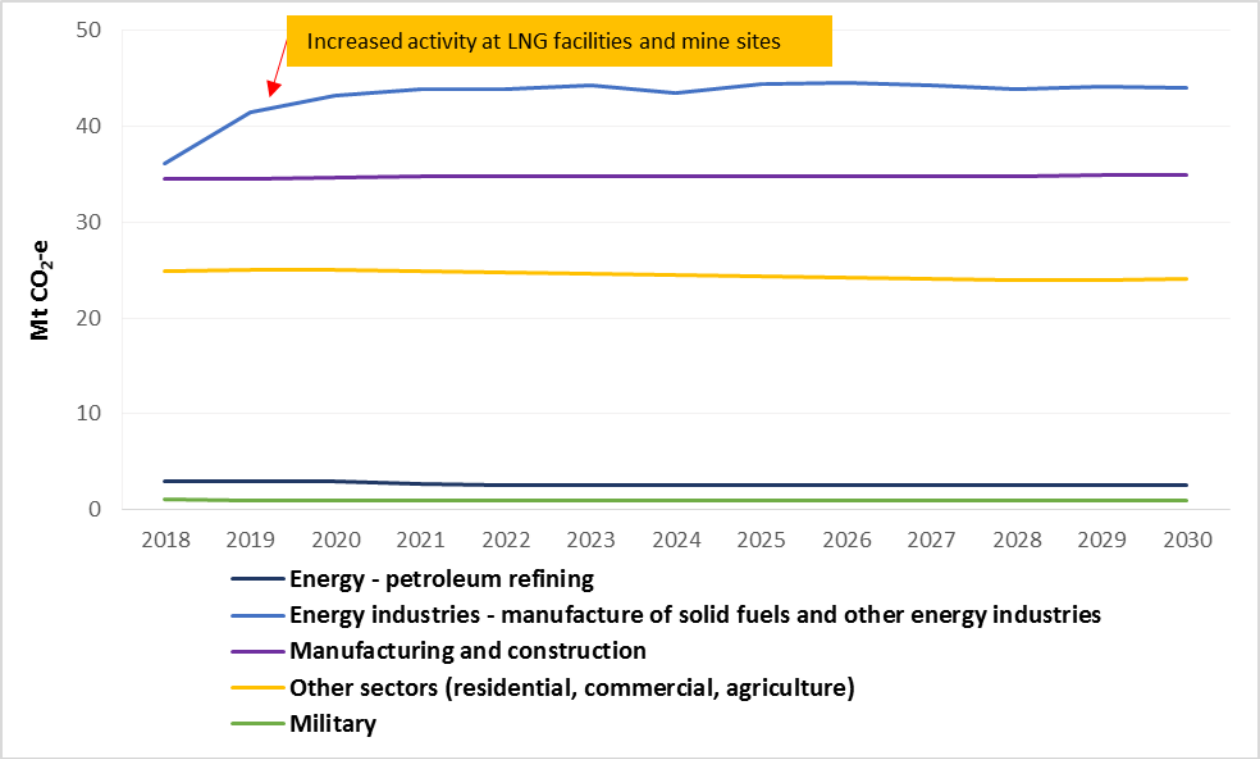
The direct combustion section sector is the third largest emissions source in the economy, and is almost equal to the transport sector which is the second largest. The key driver of increased emissions in this sector is the combustion of gas at LNG trains to driver the liquefaction process.

The 2018 direct combustion emission projections show increases in emissions to 2020, before remaining broadly flat to 2030.

The increase in emissions is due to increased activity at LNG facilities and mine sites, most of which is projected to occur before 2020 as a result of the ramp up of new LNG capacity. By 2020, Australia will be operating 10 LNG plants with capacity to export more than 80 Mt of LNG per year.

Emissions from all other sectors are projected to be flat.

Figure 4: Direct combustion emissions (2018 - 2030)



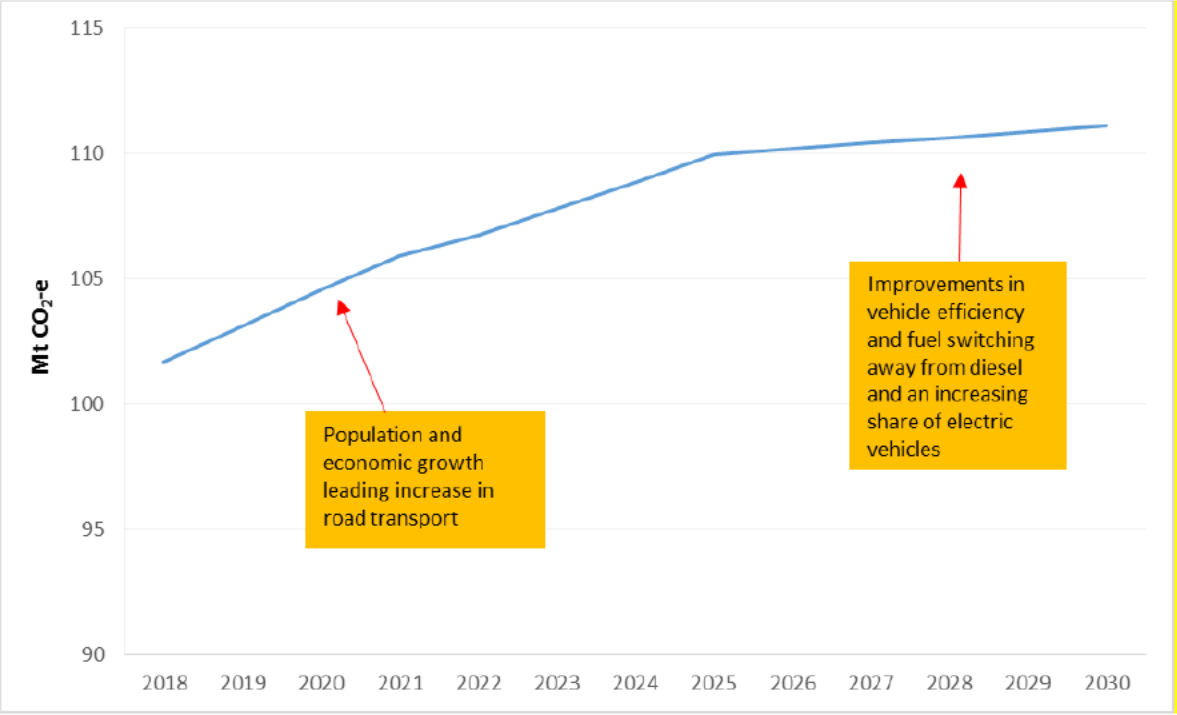
Transport

The transport sector is the second largest source of emissions in the economy (behind electricity), however unlike electricity which has a declining emissions trend, emissions in the transport sector are increasing.

Transport emissions are projected to grow to 2030 as a result of increases in activity from all modes of transport, in line with population and economic growth.

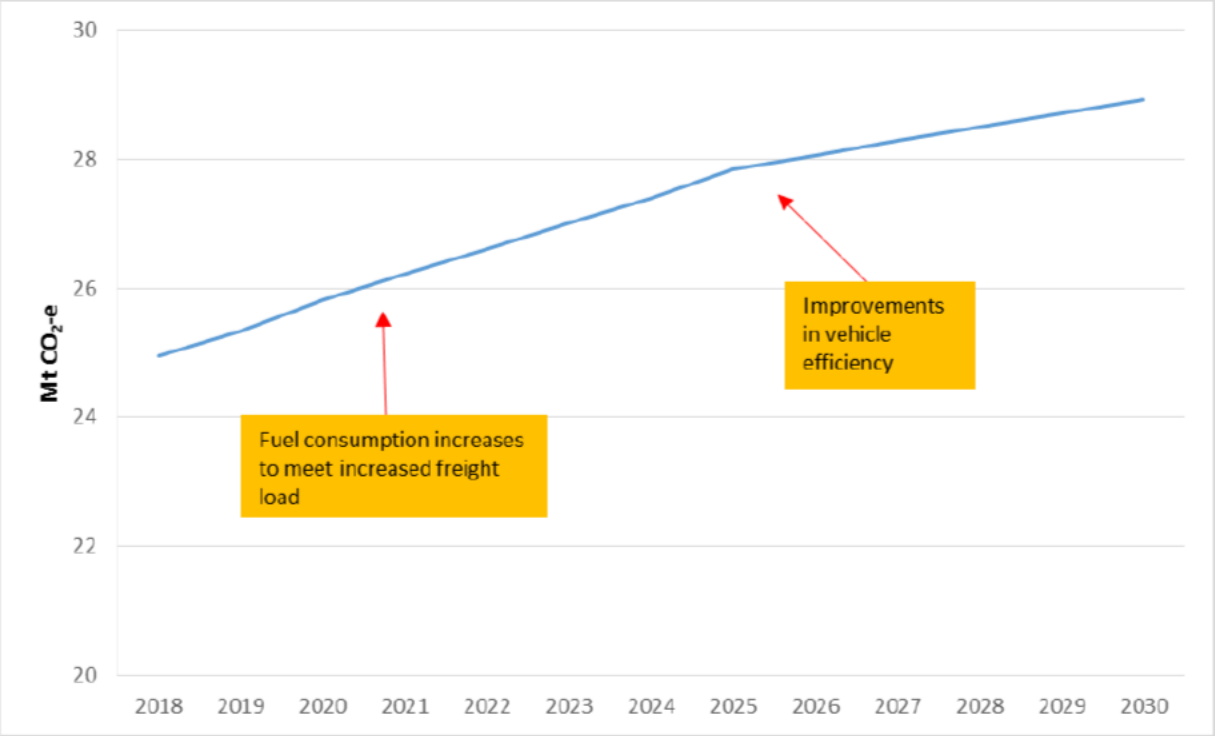
Emissions from road transport are projected to increase until 2025 when increases in activity are more than offset by improvements in vehicle efficiency, fuel switching away from diesel and an increasing share of electric vehicles (figure 5).

Figure 5: Road transport emissions (2018 - 2030)



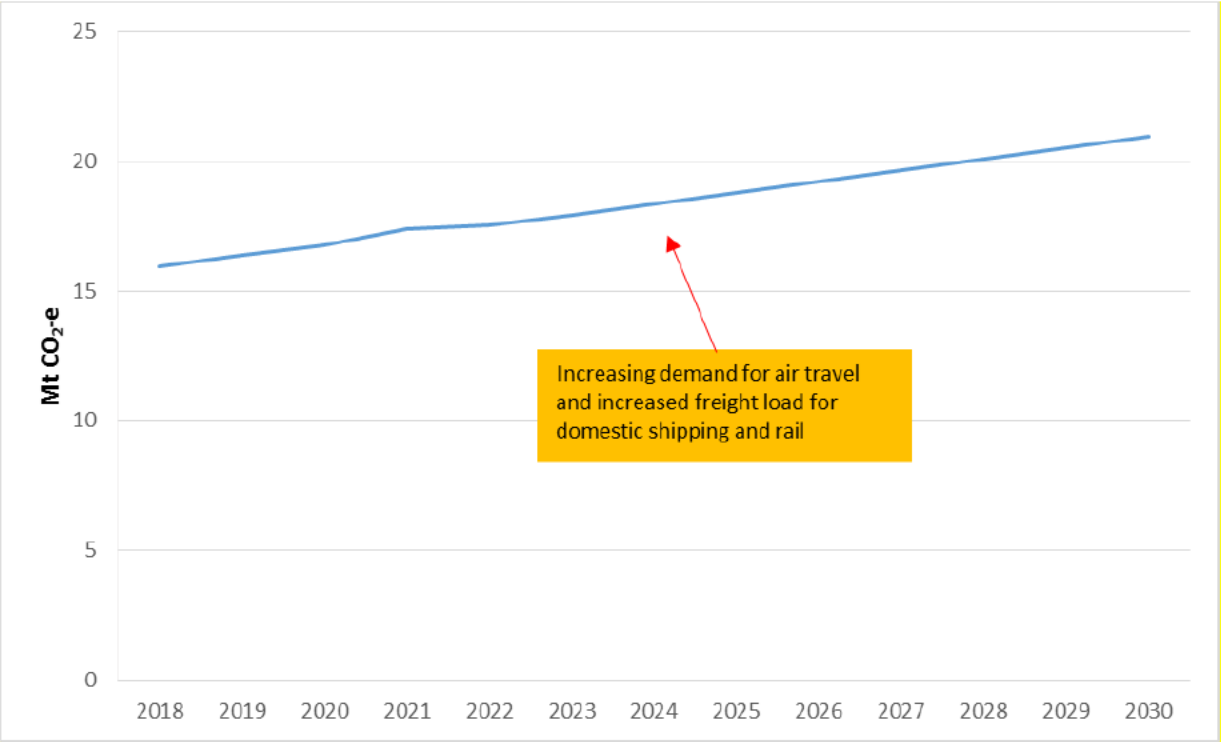
Emissions from heavy vehicles are projected increase to 2030 as fuel consumption increases to meet the increased freight load. Efficiency improvements slows the growth in emissions from around 2025 (figure 6).

Figure 6: Heavy transport emissions (2018 - 2030)



Emissions from non-road sectors are projected to grow to 2030 with most of the growth occurring in domestic aviation due to increasing demand for air travel. Emissions from domestic shipping and rail are projected to increase as they take on an increased freight load (figure 7).

Figure 7: Non-road transport emissions (2018 - 2030)

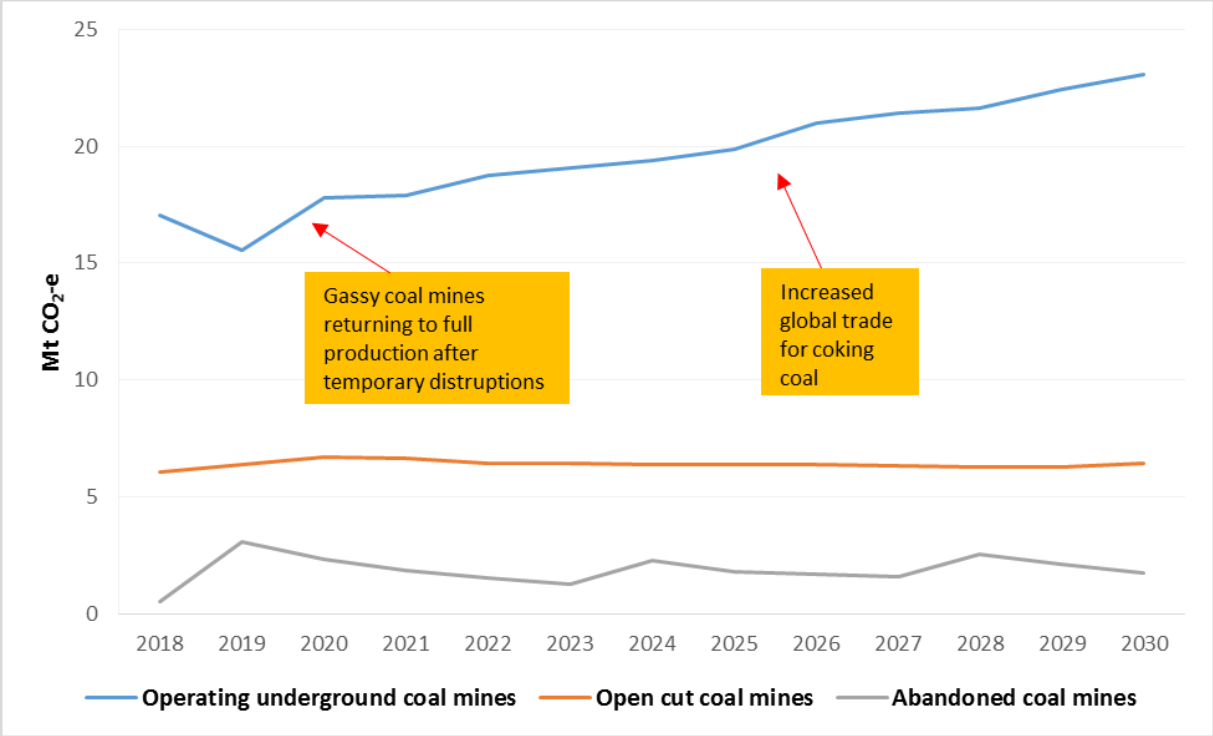


Fugitive emissions

Coal fugitive emissions are projected to grow to 2030. Emissions from coal mines are projected to increase as a number of gassy coal mines return to full production after temporary declines.

After 2020 coal emissions continue to grow, based on the International Energy Agency (IEA) assumption of an increase in global trade for coking coal (used in iron and steel production). In Australia a higher proportion of coking coal is produced from underground coal mines, which have a higher average emissions intensity than open cut mines.

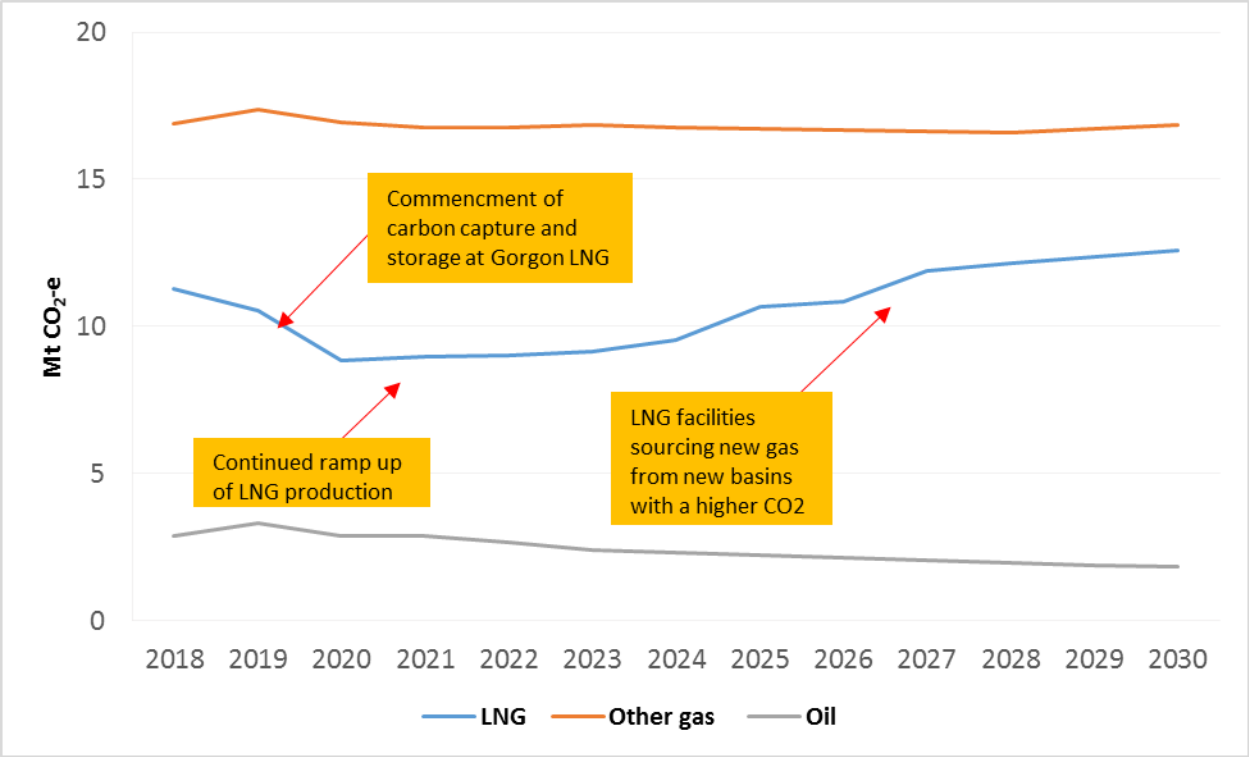
Figure 8: Coal fugitive emissions (2018 - 2030)



Oil and gas fugitive emissions are projected to grow to 2030. Emissions from LNG plants are projected to increase as Australia's new LNG plants come online and ramp up to full production by the early 2020s. This is offset by the commencement of Carbon Capture and Storage at the Gorgon LNG project prior to 2020.

To 2030 several LNG plants are expected to source gas from new basins as current feed gas sources deplete. As the percentage of CO_2 is higher for some of these new feed gas sources, the overall emissions intensity of Australia's LNG increases.

Figure 9: Oil and gas fugitive emissions (2018 - 2030)



Industrial Processes and Product Use

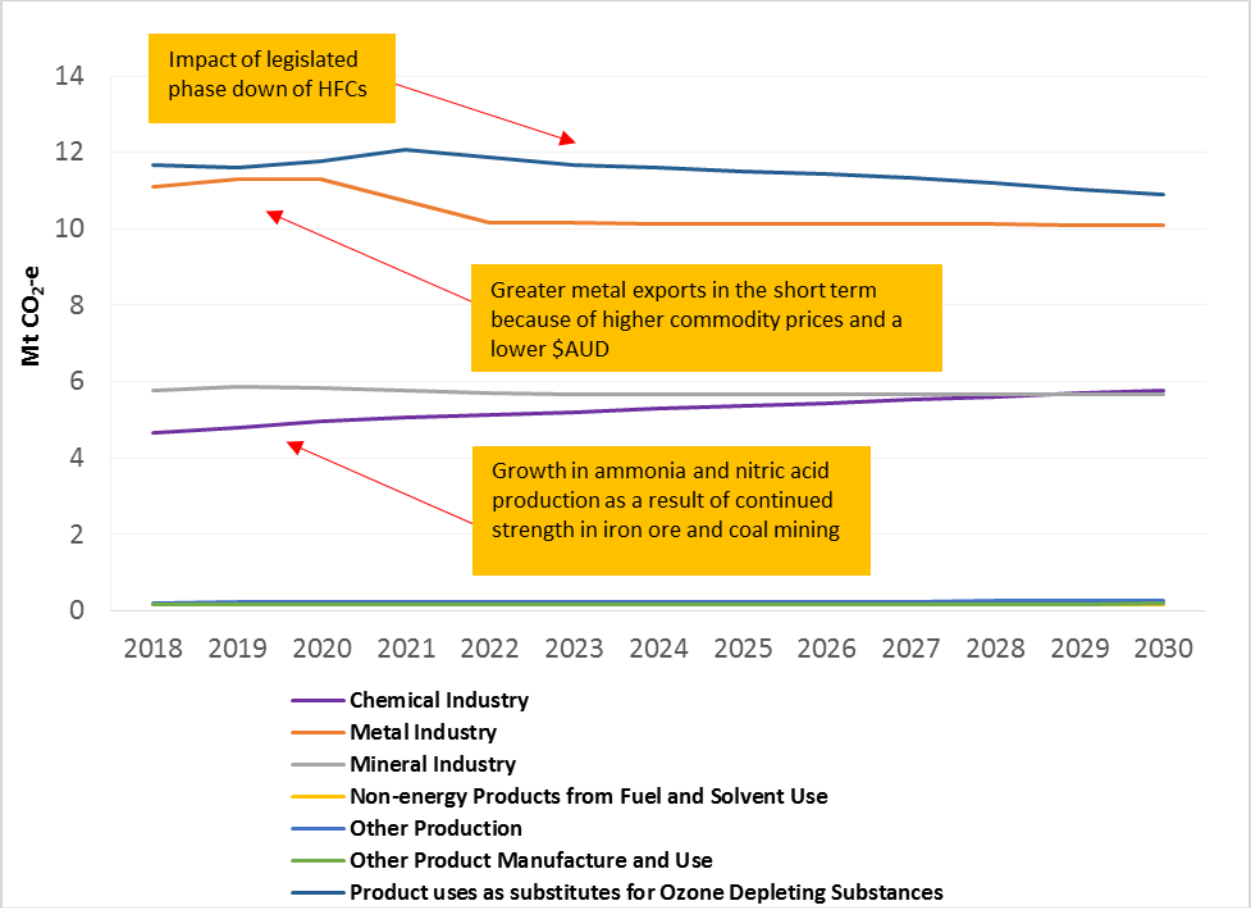
Industrial processes and product use emissions are projected to be broadly flat, with offsetting increases and decreases in subsectors.

Chemical industry emissions are projected to increase due to the growth of ammonia and nitric acid production which is used in explosives in the iron ore and coal mining industries.

Emissions from the metal industry are projected to be higher in the short term due to higher commodity prices and a lower Australian dollar, leading to greater exports.

Reductions in emissions from the product uses as substitutes for ozone depleting substances, also known as the hydrofluorocarbon (HFC), are due to the legislated phase-down of bulk HFC gases permitted to be imported into Australia from 2018.

Figure 10: Industrial processes and product use emissions (2018 - 2030)



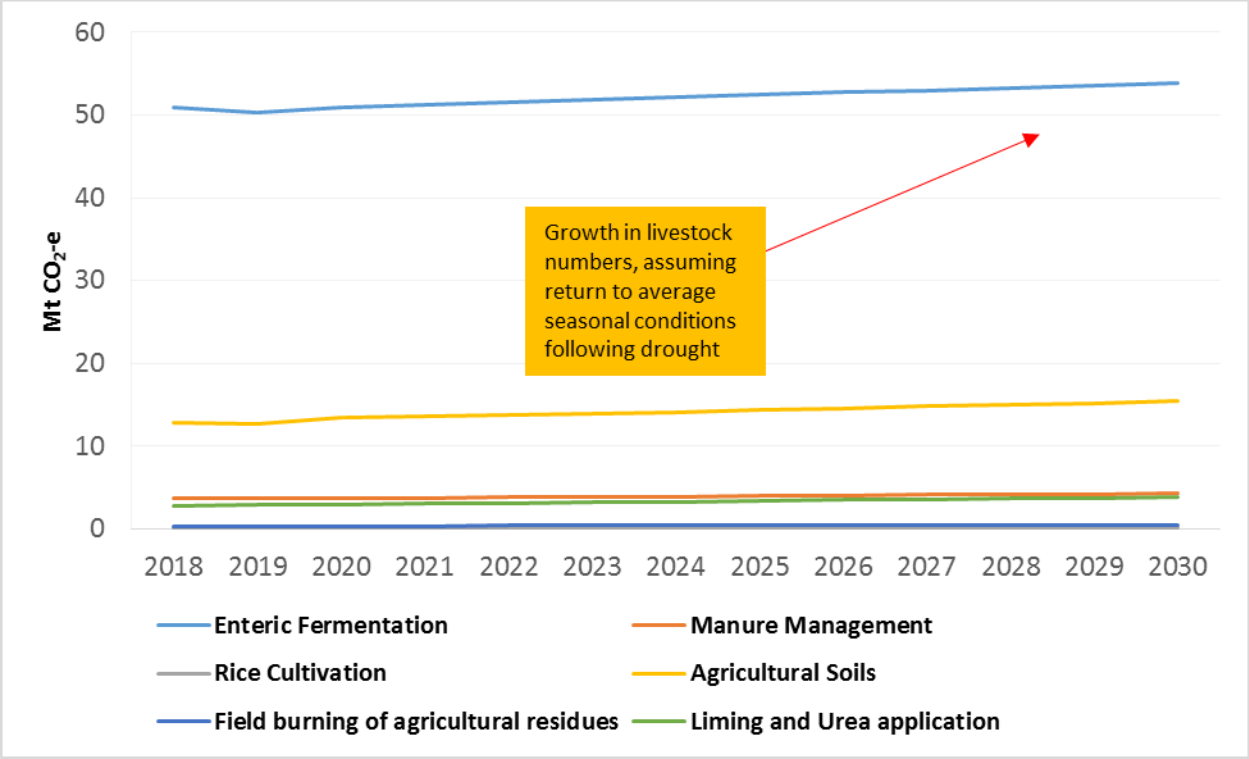
Agriculture

Agriculture emissions are the fourth largest source of emissions in the economy behind the energy sub-sectors (electricity, direct combustions, and transport). While agriculture emissions vary due to with climatic conditions, primarily drought, emissions in this sector are relatively stable over very long time frames. For example, emissions in this sector were 80 Mt CO2-e in 1990 and are projected to be 78 Mt CO_2-e in 2030.

Agriculture emissions are projected to grow to 2030.

Most agriculture emissions are from enteric fermentation from livestock, mainly beef cattle, sheep and dairy cattle. Cattle numbers grow on the return to average seasonal conditions following the drought, but do not reach previously forecast levels.

Figure 11: Agriculture emissions (2018 - 2030)

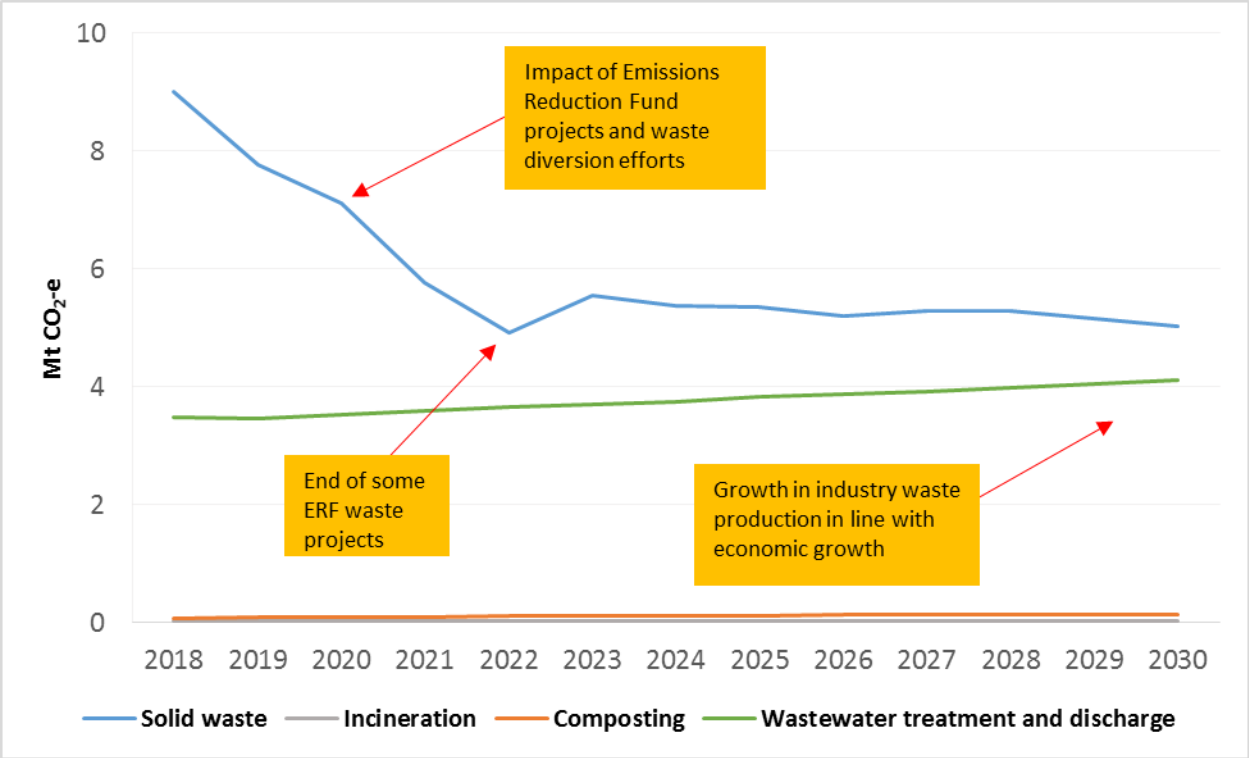


Waste

Waste emissions are projected to decline to the early 2020s, reflecting the impact of Emission Reduction Fund projects as well as efforts to divert waste from landfill.

After 2022, waste emissions are projected to increase slightly as population growth and industry production begins to outpace projected rates of methane capture.

Figure 12: Waste emissions (2018 - 2030)



Land use land use change and forestry

Declines in emissions in the LULUCF sector have been a key reason Australia exceeded its emissions targets under the Kyoto Protocol. Key drivers of emissions reductions in this sector have been restrictions on broad-scale land clearing, reductions in native forest timber harvesting, expansion of plantation forests and relatively wet conditions in the period 2010 to 2015.

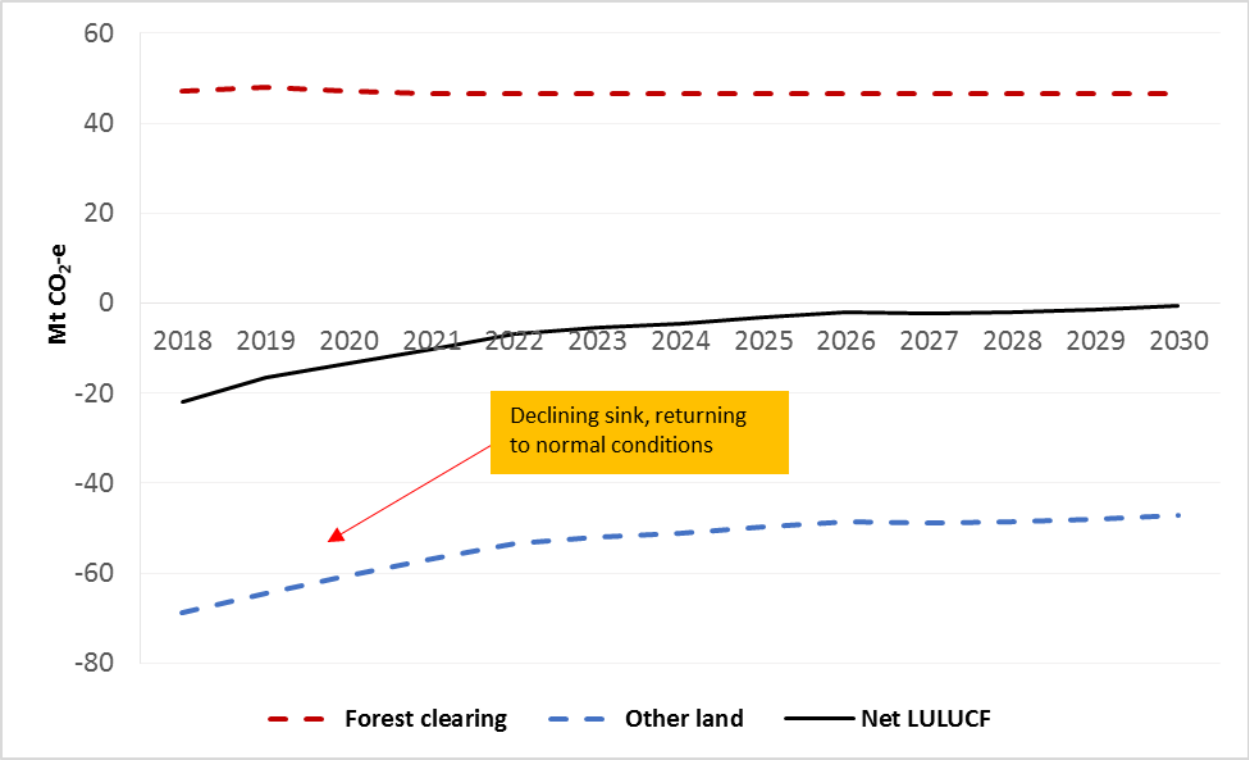
These series of factors, however, are not expected to driver further emissions reductions in this sector, and with the return of drought conditions this sector is expected to move from a net sink to being net neutral in terms of emissions by 2030.

Net LULUCF emissions are projected to rise from the historical lows seen in recent inventory years.

These lows reflect a large net sink driven by increasing forest cover across Australia, including from forests that are re-appearing on previously cleared land more rapidly than land managers are able to re-clear that bush encroachment. These strong increases in forest cover are not expected to be maintained over the projections period with the return to normal conditions, approach net zero emissions.

Land clearing emissions are largely stable over the projections period, reflecting continuing high rates of re-clearing to maintain pastures for grazing, offsetting the declining rate of conversion of primary forests in line with farmers' terms-of-trade forecasts.

Figure 13: Land use land use change forestry emissions (2018 - 2030)



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Emissions from the production of LNG are found in the

- electricity sector (emissions from electricity used in the gas field and processing plants by LNG facilities, most of which are not connected to the grid);
- direct combustion sector (other energy emissions from the production of LNG); and
- fugitive emissions (emissions which are released during the extraction and processing of gas).

Australian Government
Department of the Environment and Energy

Understanding Australia's Historical and Projected Emissions

31 July 2019

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15. Tracking against emissions targets

2020 target[1]

	point target				2013-2020 emissions budget (Mt CO_2-e)			
	2000	2018 actuals	2020 (projected)	2020 target	emissions budget	emissions (projected)	balance	final emissions balance including overachievement
Mt CO_2-e	536	538	540	509	4,488	4,269	-219	-367
% change on 2000		0.4%	0.7%	-5%				

2030 target[1]

	point target				2021-2030 emissions budget (Mt CO_2-e)			
	2005	2018 actuals	2030 (projected)	2030 target	emissions budget	emissions (projected)	balance	final emissions balance including overachievement[2]
Mt CO_2-e	611	538	563	452	4,800	5,487	695	328
% change on 2005		-11.9%	-8%	-26%				

Notes:

1. Figures under 'point target' are based on the December 2018 Quarterly Inventory. Figures indicated as 'projected' and figures under 'emissions budget' are based on Australia's Emissions Projections 2018 (December 2018).
2. Does not include the Climate Solutions Package

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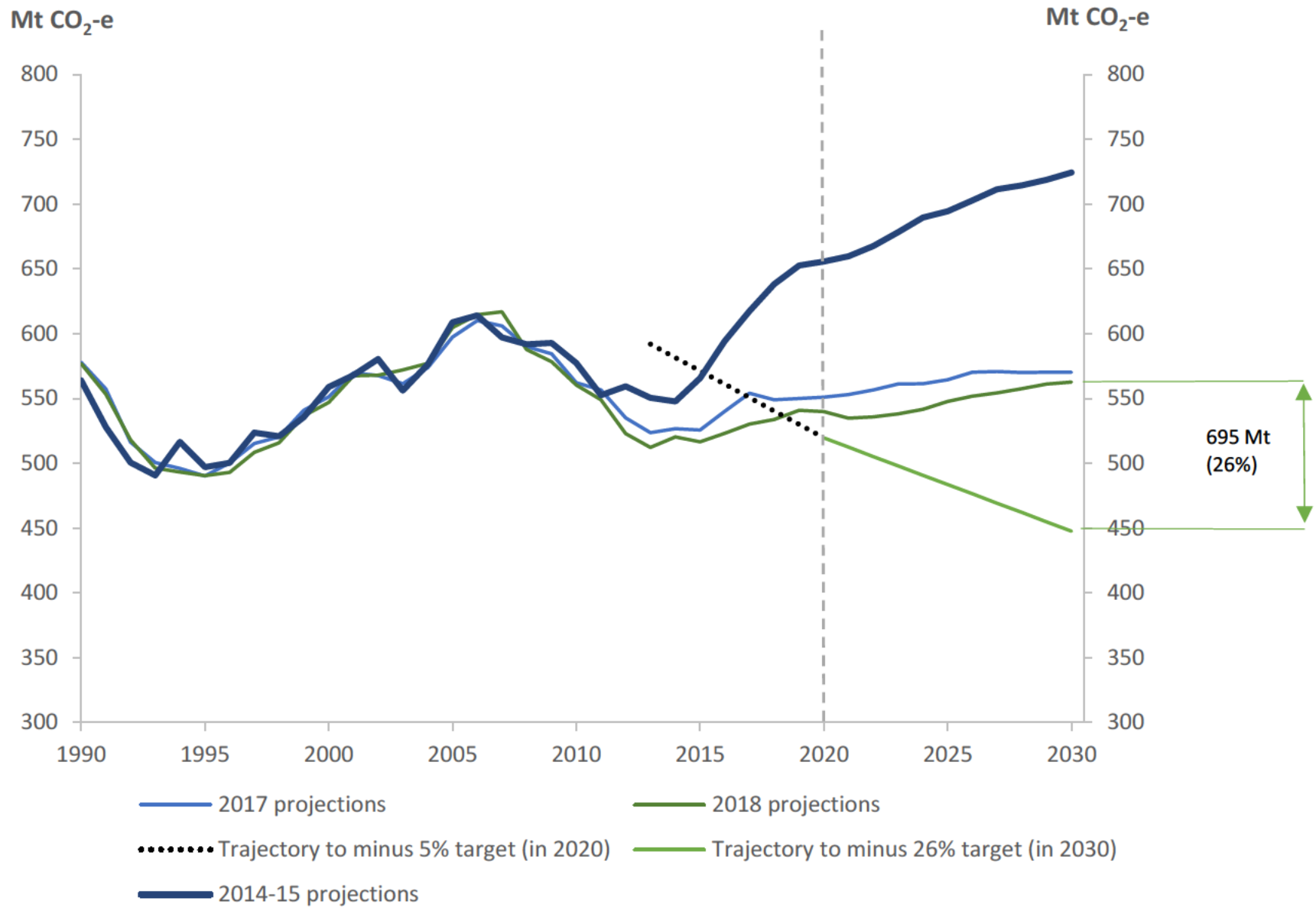
17. Australia's emissions projections



Note: does not include overachievement

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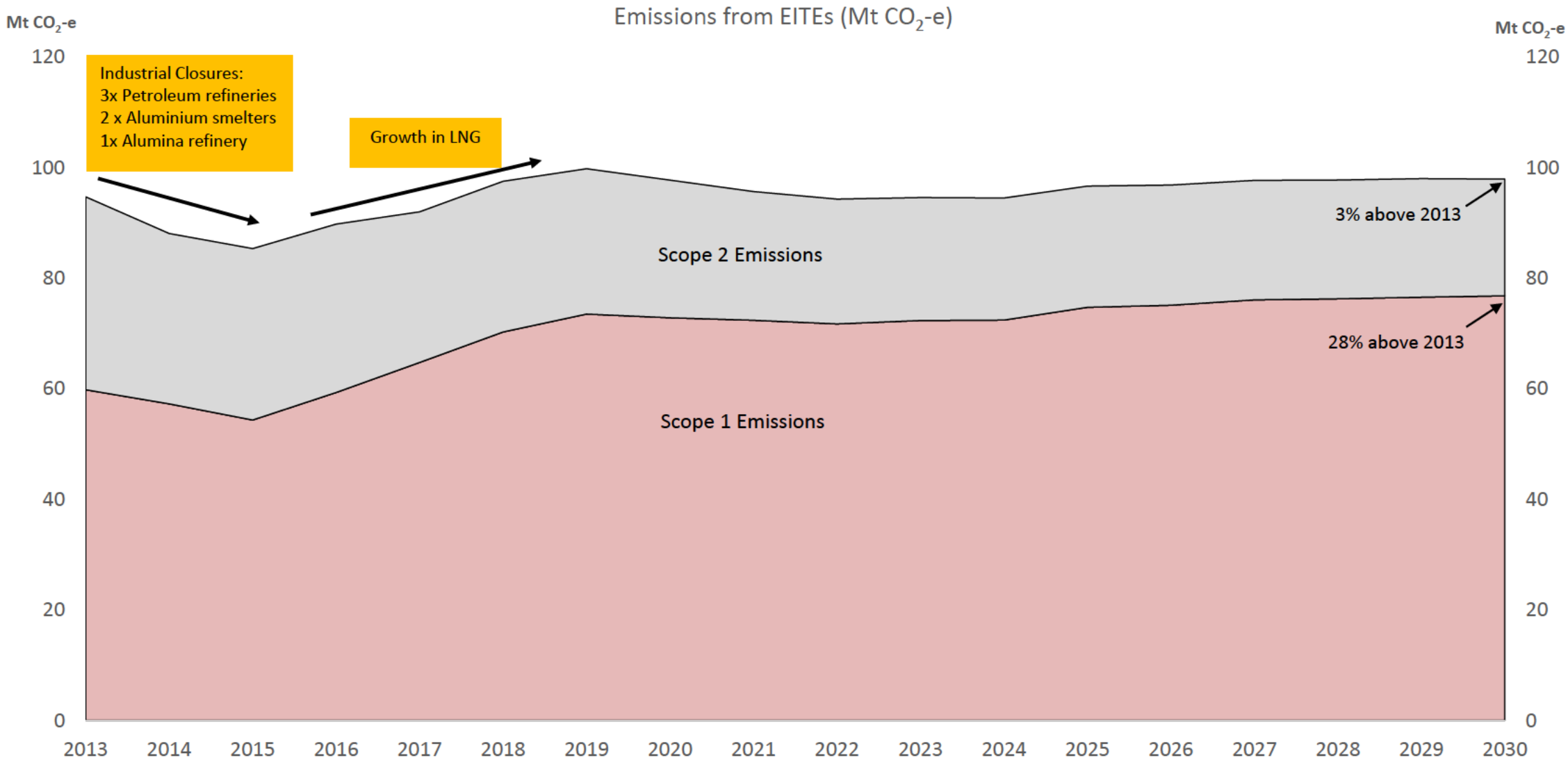
22. EITE emissions



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