



The
Footprint
Company™

Scope 3 Carbon Assessment

ACT Government Directorates
Final Report

July 2021



ACT
Government

BUILDING SOLUTIONS FOR ONE PLANET

Version Control

Version	Description	Date
V1	DRAFT Results for Discussion	28/04/21
V2	Initial Results	17/05/21
V3	Final DRAFT Stage 1 Report	21/05/21
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2. Executive Summary

The ACT Government is recognised for its leadership on the issue of climate mitigation through its commitment to a Net Zero electricity grid by 2025, achieved five years ahead of target. The next phase of action on carbon footprint is the extension of its analysis to Scope 3 (supply chain) as a measure to understand scale and to evaluate options for mitigation action.

This report presents the Scope 3 emissions calculation for the ACT Government and its departments for the financial year 2018-2019. The principle objectives of the study were to:-

- Establish the feasibility of Scope 3 evaluation based on current accounting and reporting systems.
- Complete a reference scope 3 quantification, in accordance with GHG Protocol at a “desk-top” level of accuracy for the FY2018-2019.
- Where possible, identify priority areas of mitigation and provide guidance on scale.
- Provide key recommendations of net steps, processes and mechanisms to consider to advance deep reductions in Scope 3 emissions.

The scope of the assessment includes seven Directorates and considered goods and services, capital goods, business travel, and leased / owned assets. Emissions related to scope 1 and 2 (direct energy use) were excluded as were employee commute, water and waste emissions. Direct energy emissions are shown to provide scale in the summary results. The study is a “desk-top” secondary data level analysis, utilising published records and audit reports for the financial year 2018-2019 on the basis that it represents the most recent “typical” year of operations.

Quantification methodology is aligned to the GHG Protocol for Scope 3, and results are reported in absolute terms (i.e. TCO2-e) as well as normative terms using descriptive Functional Units to assist the User with interpretation of the results, from a practical perspective (e.g. TCO2-e / Canberra Resident; TCO2-e / Departmental FTE). The User should familiarise themselves with the detailed methodology and critical limits statements to support their interpretation and or comparison of results for their desired purpose.

Key findings of the study include:-

- Pursuing Scope 3 emissions reduction plans will require Departments to improve and align financial reporting methods to achieve a quality and completeness level consistent with the needs of the GHG Protocol – and akin to the consistency for current sustainability reporting.
- Inconsistencies in financial reporting and asset accounting limited the capacity to provide comprehensive mitigation recommendations for a number of departments.
- Overall results suggest that Scope 3 emissions footprint are up to ten times higher than Scope 1 & 2 emissions for the reference year. The potential to mitigation 40-45% across supplies and capital works is plausible but requires further work to develop related CO2-e performance metrics for procurement systems.
- An attempt was made at estimating the “emissions sink” benefit of ACT biological assets to given an indication of the value of their active retention and improvement.

Key Recommendations for further Stages are:-

- Work to align accounting methods to support Scope 3 annual assessment and reporting approaches.
- Further modelling to define key Departmental “outputs” and establish Scope 3 emissions intensity targets for all procurement across goods & services and capital works.
- Development of Directorate procurement requirements inclusive of defined Scope 3 targets.
- Consolidation of mitigation pathways into a whole of government Net Zero 2050 roadmap.

3. Results Overview

The estimated total Scope 3 emissions for the reference year amounted to approximately 3.4 TCO₂-e / ACT resident for all Government operations or 1.44m TCO₂-e. Figure 1 compare Scope 3 to the total Scope 1 & 2 emissions of 98,310 TCO₂-e. The estimated “sink” benefit of biological assets was 2.4m TCO₂-e. Approximately 60% of which is driven by Buildings and Leased assets; 20% depreciation of existing assets; 14% goods and services purchases. Figure 2 shows the adjusted proportion of emissions including Scope 1 and 2. Excluded from Scope 3 is the value of existing “assets”. Depreciation is accounted for in Goods and Services as it represents annualised spend on new fixed assets.

Scope 3 per capita intensity was found to vary by Directorate from a low of 0.19 TCO₂-e / capita for Education to a high of 1.08 TCO₂-e / capita for Transport Canberra and City Services. Due to study limitations, it was not possible to generate a complete estimate of mitigation potential overall. It was possible to identify a number of key mitigation pathways and provide estimates of reduction based on design / procurement alternatives. Analysis of the supplies and property mitigation potential suggests a possible long range target (i.e. to 2040) of 40% or more, amounting to a sum in the order of 600,000 tonnes or more. To confirm this, additional modelling is recommended. (Refer to discussion on pages 4, 5, 6 & 7).

Care should be exercised with the intensity interpretation at Departmental level due to the limit of definition in financial reporting, as described in the Limits and method section. Estimate total for Buildings is based on property department reports and do not include some hospitals and medical centres, schools, TCCS infrastructure, or CSD housing portfolio – owing to the difficulty in defining total building area. It should be noted that “depreciation” has been included which is assumed to represent an annualised value of these “fixed assets”.

'Supplies and Services' value for Education directorate is based on average carbon co-efficient from other directorates' values due to limitations in data availability for this directorate. Financial data provided for CMTEDD includes for services and support provided to other directorates and may be affected by double counting. It is possible that there is some double counting between property, plant and equipment and Buildings.

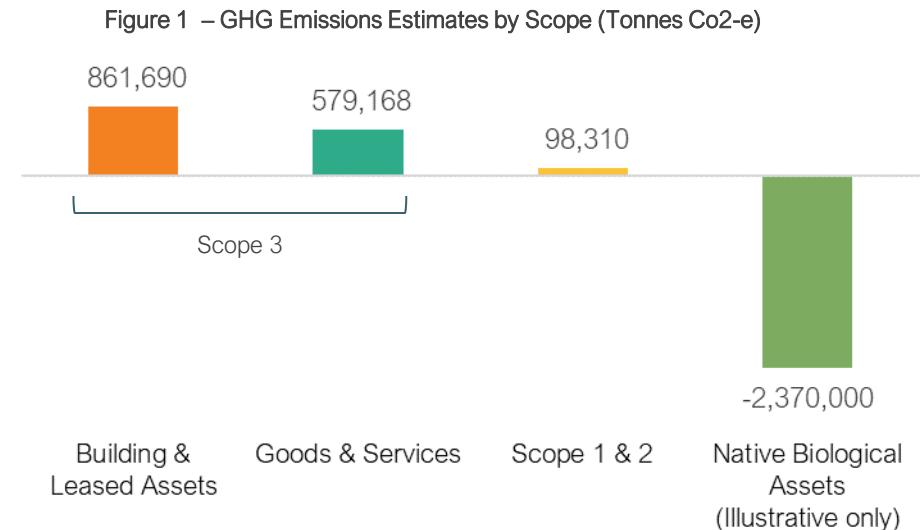


Figure 2 – Scope 1,2 & 3 Emissions Proportion by Type

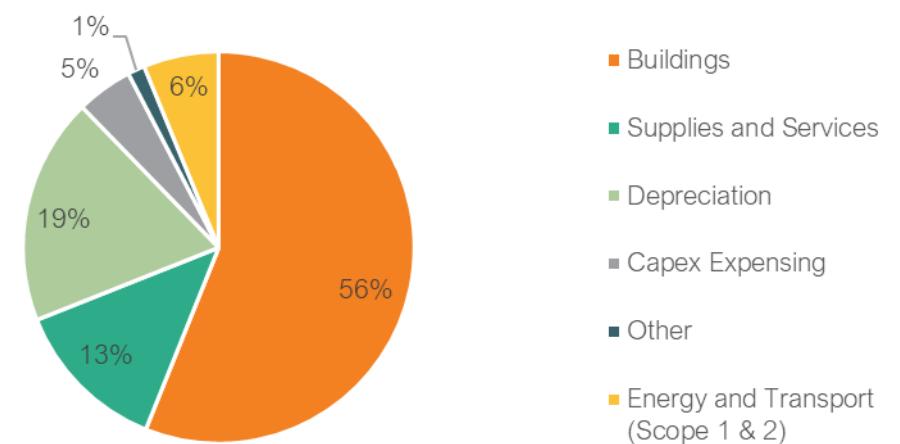
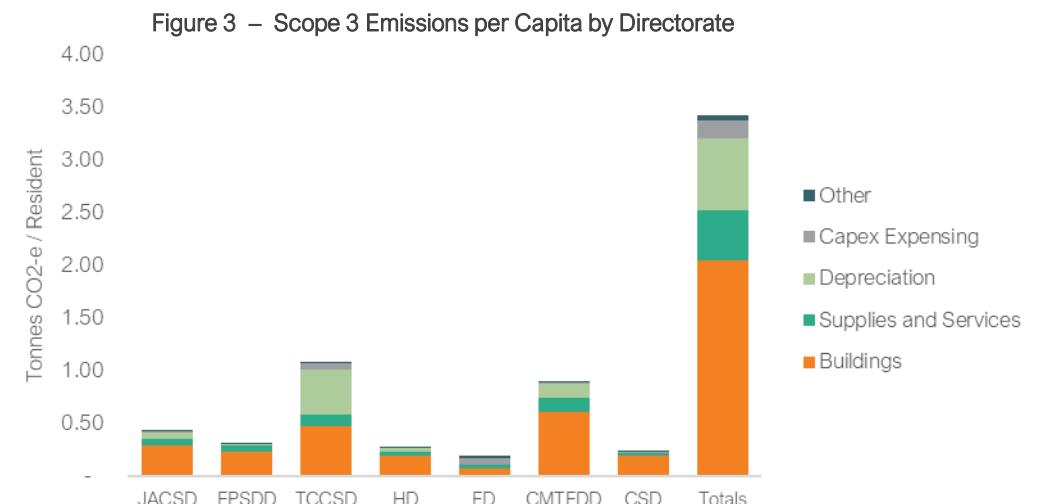


Table 1 – GHG Emissions Scope Covered & Computation Method Applied, by GHG Protocol Consumption Category

Category	Description	Computation Method
1	Goods & Services	Spend-based method = SUM (\$ x CO ₂ -e EF/\$)
2/15	Capital Goods	Combination of Spend and Average Data methods where units available.
5	Waste	Spend-method for handling of waste
6	Business Travel	Spend based method.
8	Leased assets	Average data method = SUM (sqm x CO ₂ -e EF / sqm)



4. Detailed Results Discussion

Figure 4 shows a comparative analysis of the absolute Scope 3 emissions (in TCO2-e) for each Directorate by GHG scope category. The results show in absolute terms, TCCSD has the highest impact, in large part owing to its significant role in major capital infrastructure provision. CMTEDD is second highest and ED is the lowest (although this does not include for the asset value of existing building infrastructure). There is high uncertainty in relation to Education (ED) which requires further investigation.

To provide an indication of emissions efficiency, the Directorate absolute totals are normalised to full time equivalent staff (FTE). That is, an understanding of the emissions intensity of the core service provision of the Directorate. Figure 5 shows the result FTE analysis. It can be seen that TCCSD remains the highest intensity (note: FTE numbers exclude bus / tram drivers – 75%) and is an outlier at 929 TCO2-e / FTE. The average of all Directorates is 240 TCO2-e / FTE and all other Directorates are generally consistent with the overall average.

The results shown in Figure 5 are limited by the inconsistencies across the Directorates in the accounting and disclosure of FTE. Given that, the Scope 3 emissions intensity per FTE is a possible foundational measure of efficiency, it is recommended that future stages of work includes a more comprehensive analysis and Directorate engagement to streamline FTE accounting methods to provide the foundation for a reference year Scope 3 intensity indicator. This would establish the basis of mitigation pathway modelling and the definition of Scope 3 reduction targets measured and reported in TCO2-e / FTE annually. A KPI per FTE or per capita at the Directorate level would be a meaningful measure for Directorate leadership to pursue and evaluate mitigation action and investment against.

As noted in section 3 above, within the limits of the study scope and information, the overall total mitigation potential is estimated to be between 40-45% from the 2018-2019 baseline. The absolute mitigation contribution potential varies by Directorate and by Scope 3 category. For example, across “supplies and services” mitigation potential is estimated at 18-20% - with upside where the “unallocated” consumption was resolved. “Depreciation” and “capital works” represent either “replacement capital work” or “new build” works, together defined “embodied carbon”. Generally, a 30-40% immediate embodied carbon reduction target (from current practice) is possible and has a published evidence base to support. Further discussion on this point is provided in the relevant report sections.

It is recommended that further work is pursued to establish a comprehensive series of carbon performance targets across all Directorates and for each major impact category. The highest value, lowest cost mitigation potential exists for capital works and new building investment. The implementation of contractually deliverable embodied carbon performance (in kgCO2-e / unit of building), if employed by ACT Government would set a world benchmark in carbon mitigation leadership. Moreover, it would have the effect of transforming the construction and materials sector, in the same way that ACT governments leadership on Home energy / star rating legislation transformed operating energy footprint in the 1990’s.

NOTES:

Overlap in calculation boundaries may exist between capital expenditure and depreciation values due to uncertainty in Directorate reporting.

Exclusions are fixed asset values, and standard exclusions per overall study methodology.

Figure 4 – Absolute Scope 3 Emissions by Directorate

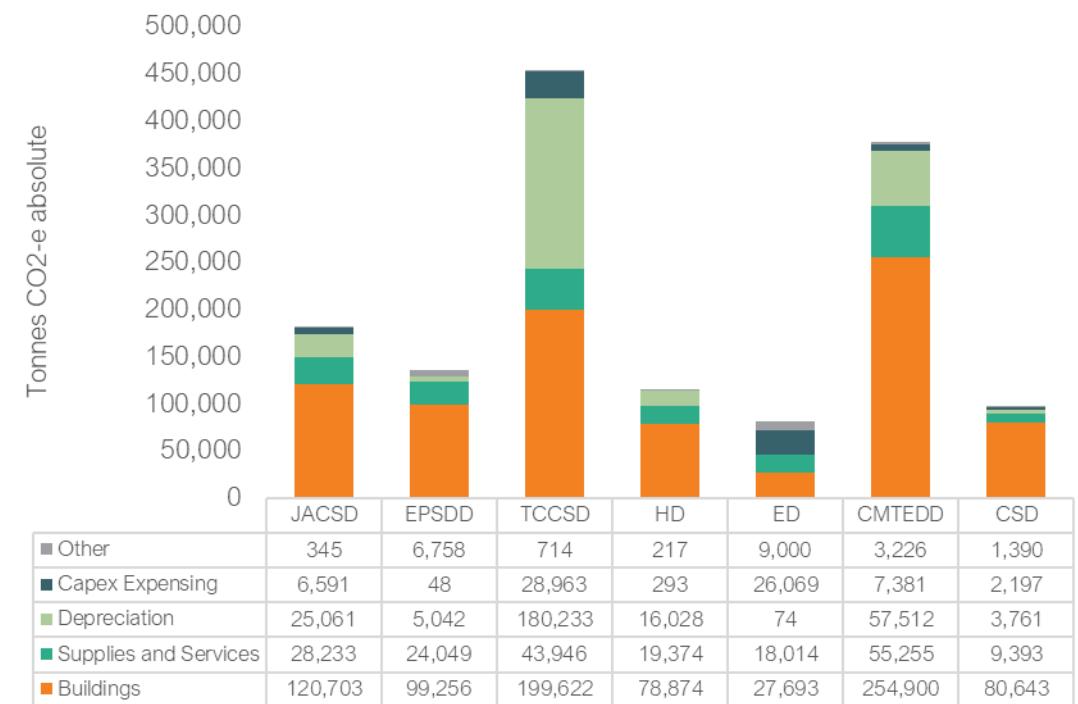
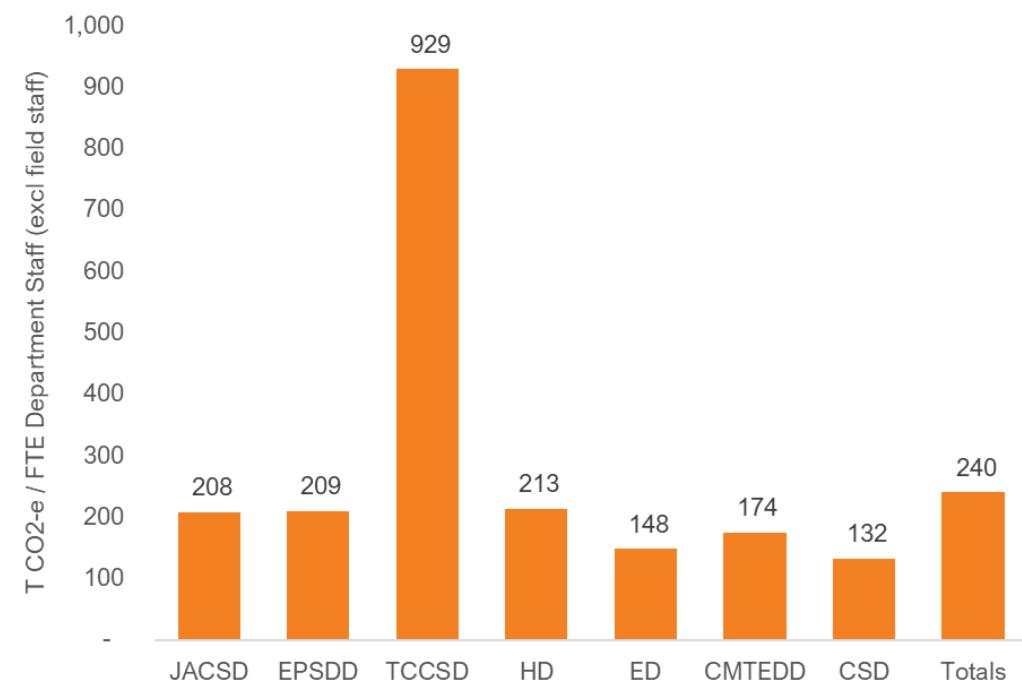


Figure 5 – Absolute Scope 3 Emissions / FTE by Directorate



4. Detailed Results – Supplies (GHG Protocol Category 1)

Class 1 Supplies and Services comprises approximately 14% of total scope 3 emissions. As noted above, evaluating emissions intensity per FTE equivalent provides a measure of the emissions efficiency or intensity of the provision of the service output. Whilst there is some harmonisation in categorisation of financial reporting, over 22% of total purchases were “unallocated”. This is particularly evident for Education Directorate.

Figure 6 shows a comparative analysis of the absolute Scope 3 emissions (in TCO₂-e / FTE) for each Directorate by category. The results show in absolute terms, EPSDD has the highest impact, Health (HD) is second and ED is the lowest and there is high uncertainty in relation to Education (ED) which requires further investigation.

It is to be anticipated that the supply intensity of each Directorate could vary significantly based on the nature of the service output, and because of the large “unallocated” component in accounts, the indicators shown in Figure 6 should be considered from the perspective of: 1) identifying the need to improve / evolve financial reporting to a level consistent with the needs of Scope 3 emissions accounting. 2) For the basis for further work to develop carbon intensity KPI's as a core element of the service output requirements of Directorate and setting reduction targets.

An alternative approach was taken, which was to analyse “Supplies and Services” at a whole of government level by category. Figure 7 shows the results of this approach which provides a meaningful starting point for high level analysis and mitigation pathway recommendations. It can be seen that, fifty two (52) percent of emissions (96,000 TCO₂-e) are accounted for in the top three categories of office accommodation (property); IT equipment and contractors. General consumption accounts for a further 22,000 TCO₂-e.

Considering emissions impact in this way provides an understanding of the power available in government procurement systems to implement and or target emissions reduction. Further analysis of the office occupancy profile of all Directorates identified a significant variance in space per person from 11.5-18 sqm / pp with an average of 14 sqm / FTE. This should be considered against commercial industry of 10 with a move to 7 sqm / pp with the move to hot desk and work from home regimes. Moving all Directorates to 10 sqm from 14 sqm / pp and apply a 40% embodied carbon intensity reduction target to new fitouts, has the potential to avoid over 11,000 TCO₂-e for occupation and over 80,000 TCO₂-e in fitout embodied carbon emissions and save operating cost. Refer to Figure 8.

IT Services and equipment present a significant opportunity for mitigation through the application of mandatory embodied carbon intensity targets for products through the IT procurement system. Apple, HP, Microsoft have all been pursuing product carbon footprint assessments and mitigation actions.

It is recommended that a further stage of work pursue pathways to improve financial and physical reporting via the Auditors office. In addition, work with the central agencies / departments (property, IT etc) to benchmark the emissions footprint of current procurement “standards” (e.g. computers / monitors / phones / office space / furniture etc) and develop unit specific embodied carbon performance metrics which deliver a defined emissions reduction level and integrate these through the procurement systems and also reporting (either through Sustainability or Audit reporting).

Figure 6 – Normalised / FTE Scope 3 Emissions by Directorate

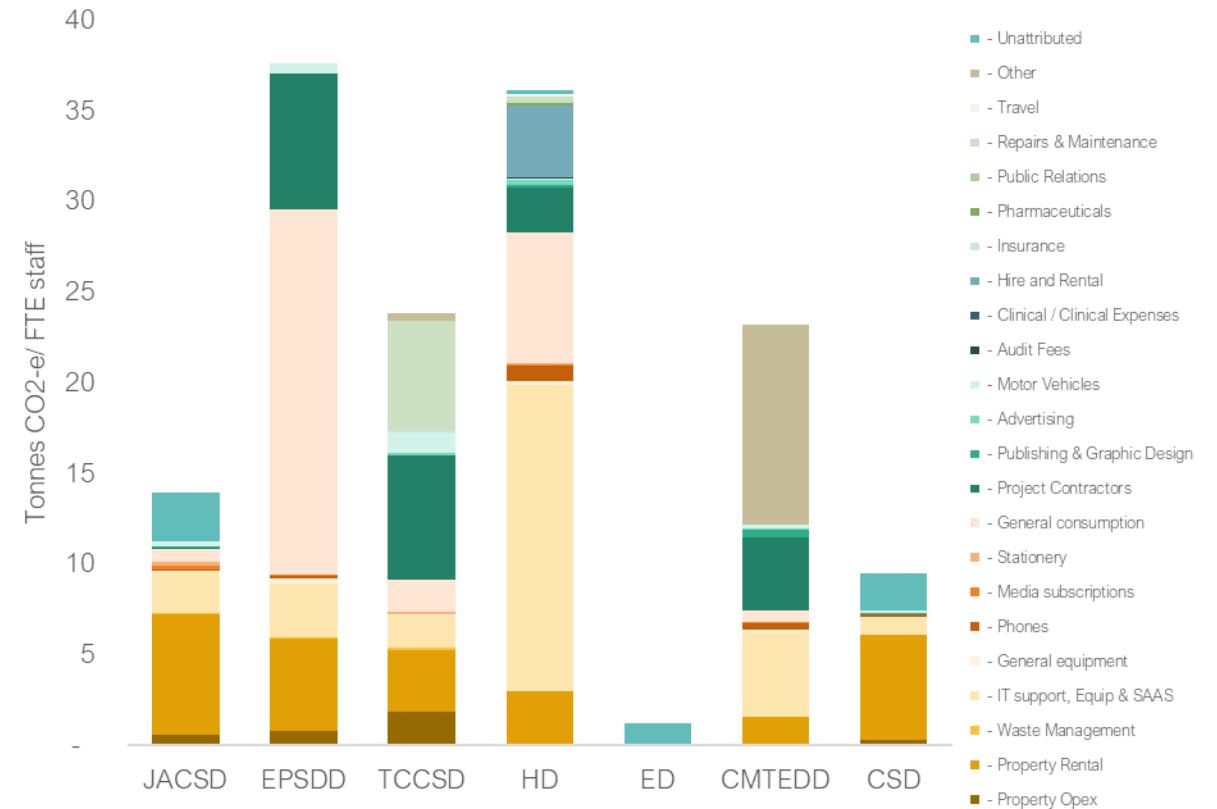
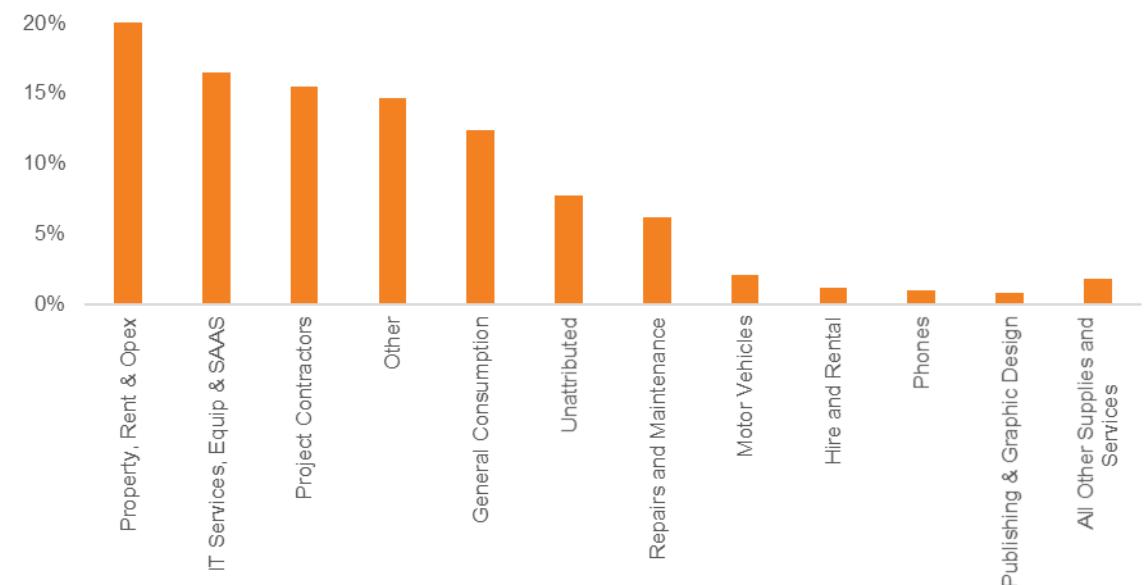


Figure 7 – Proportion of Scope 3 Emissions All Directorates by Category



1. Apple Newsroom, 21 July 2020, “Apple commits to be 100 percent carbon neutral for its supply chain and products by 2030,”[online] <https://www.apple.com/newsroom/2020/07/apple-commits-to-be-100-percent-carbon-neutral-for-its-supply-chain-and-products-by-2030/>

4. Detailed Results – Supplies (GHG Protocol Category 1)

Figure 8 shows the office space occupancy per FTE for each Directorate. The average is 14 sqm / FTE which should be considered against the commercial industry best practice benchmark of 7-8 sqm / pp – where there is a move to “hot-desk” work from home (shown by the Green line). The Grey line indicated on Figure 8 represents the sqm / pp recently employed for Directorate staff at the Same Pattie Menzies House.

As noted above, achieving a move towards 10 sqm per person would result in total emissions mitigation in excess of 90,000 TCO₂-e, across property rental, operating costs, fitout and maintenance costs. It would also have flow on effects to reducing emissions associated with scope 1 and 2 energy purchases. It would also save cost.

Figure 9 shows a comparison between the estimated embodied carbon emissions of current office fitout of all Directorates and the potential emissions footprint where both space reduction and fitout embodied carbon reduction were achieved. This analysis assumes for simplicity, that emissions are like for like in a temporal sense. The suggested 81,000 TCO₂-e mitigation would be achieved over a time frame as office churn occurred.

In terms of the embodied carbon intensity of fitouts, The Footprint Company has a database of whole building and fitout whole of life carbon assessments in excess of 120m sqm providing significant insight into the definition of average prevailing embodied carbon and best in class.

This analysis can also be applied to all of the Directorate and their deployment of capital to procure new building, road, infrastructure and capital works. Each year, each Directorate has investment commitments in budgets for new school classrooms, hospitals, community services infrastructure, roads, parks etc. Every one of these capital investment categories has an embodied carbon “benchmark” which can be established from prevailing building “standards”. Internationally, there is a general consensus for a 40% reduction from “average” practice for embodied carbon, moving to 65% by 2025 and Net Zero by 2040.

There is significant opportunity for the ACT Government to implement best practice (and follow global leaders) in implementing mandatory “not to exceed” embodied carbon performance metrics in all new and replacement building, fitout, infrastructure works (e.g. kg CO₂-e / sqm of functional area). This approach was recently deployed for the ANU “Kambri” redevelopment in the centre of Canberra and delivered a 40% embodied carbon reduction across 95,000sqm of buildings and avoiding over 34,000 TCO₂-e in absolute terms (and equal to 56 years of the operating carbon scope 1 & 2 footprint).

It is recommended that a further stage of work involve benchmarking all current fitout standards for embodied carbon intensity and develop 40-50% reduction performance metrics and a pathway for inclusion of these within the procurement and validation systems. Prioritisation of work would be guided by the office tenancy churn forecasts by Department.

Figure 8 – Office Space Occupancy / FTE

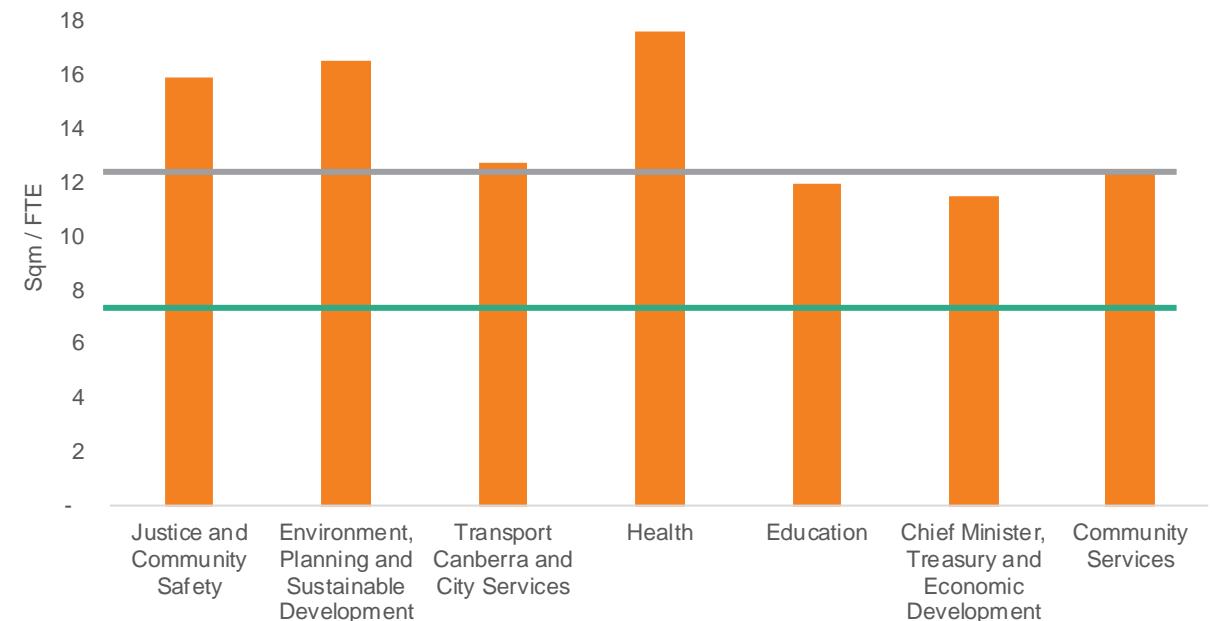
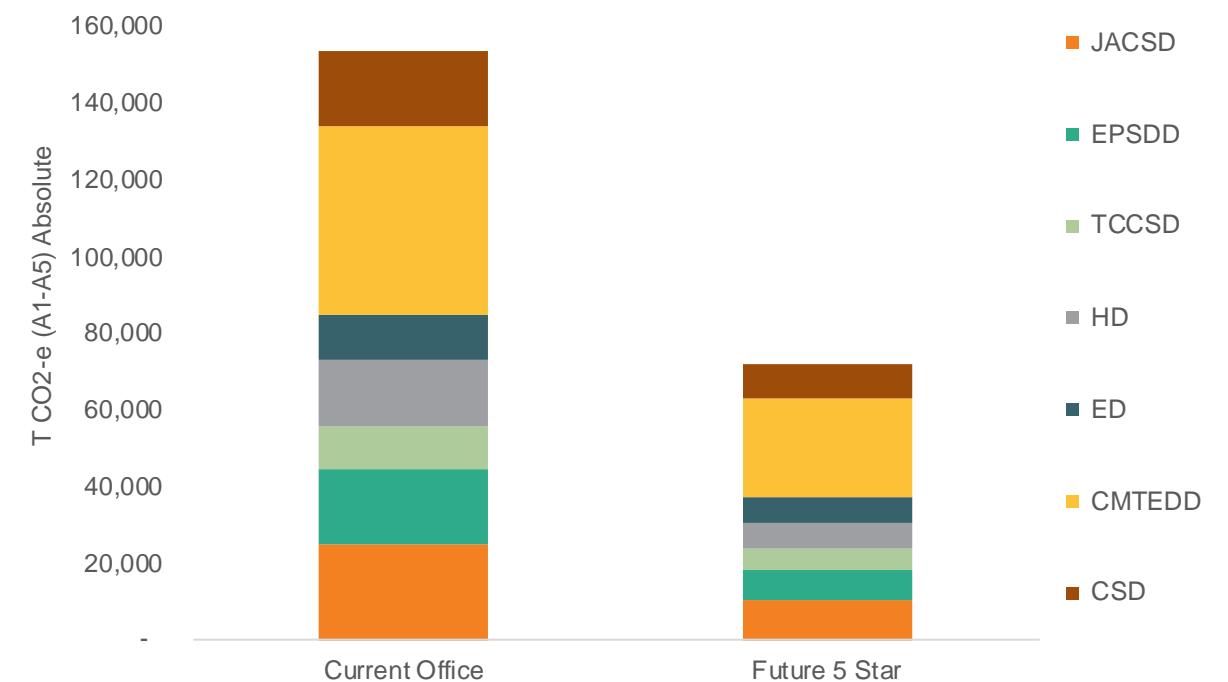


Figure 9 – Estimated Embodied Carbon Footprint of Existing vs “Net Zero Standard” Fitout



4. Detailed Results – Capital Goods (GHG Protocol Category 2 & 15)

Approximately 30% of total Scope 3 emissions are associated with the ownership, repair, renewal and improvement of capital goods (buildings and built infrastructure). Figure 10 shows an estimate of the total embodied carbon in TCO₂-e for the register of existing assets, by Directorate, by building class. This analysis is intended to provide context to the scale of total emissions driven by Government investment into built assets. Refer to Appendix Table 5 for a schedule of building areas by classification and Directorate.

The embodied carbon intensity data per sqm of building class was derived from TFC database of building data and is based on a “hybrid cLCA” measurement method following RiCS best practice method of measurement and represented absolute upfront carbon A1-A5 (that is complete at the point of operation). The values have not been annualised. NOTE: excluded from this analysis are all hospital buildings and some school / classroom buildings as suitable data on these assets was not available.

Class 1 office buildings represent the largest component of impact overall with class 1 office fitout next. “Depreciation” represents the replacement value of capital goods and suggests that a ten year cycle could represent substantial replacement of all assets. Each year, each Directorate has investment commitments in budgets for new school classrooms, hospitals, community services infrastructure, roads, parks etc. Every one of these capital investment categories has an embodied carbon “benchmark” which can be established from prevailing building “standards”. Internationally, there is a general consensus for a 40% reduction from “average” practice for embodied carbon, moving to 65% by 2025 and Net Zero by 2040.

There is significant opportunity for the ACT Government to implement best practice (and follow global leaders) in implementing mandatory “not to exceed” embodied carbon performance metrics in all new and replacement building, fitout, infrastructure works (e.g. kg CO₂-e / sqm of functional area). This approach was recently deployed for the ANU “Kambri” redevelopment in the centre of Canberra and delivered a 40% embodied carbon reduction across 95,000sqm of buildings and avoiding over 34,000 TCO₂-e in absolute terms (and equal to 56 years of the operating carbon scope 1 & 2 footprint). ***There is an immediate opportunity to implement a similar approach for the procurement of the proposed CIT New Technology Campus building in Woden.***

Figure 11 shows the results of a forward 20 year development forecast for the CSD Housing Directorate. Forward forecast shows a commitment to 149 new dwellings to housing stock annually. Applying the average embodied carbon intensity per sqm for ACT dwellings to the annual additional build, shows a total potential “business-as-usual” embodied carbon intensity of approximately 1,549,000 TCO₂-e over the next twenty years (excluding additional replacement / repairs). Implementing a 40% embodied carbon intensity target over BAU, could result in absolute mitigation of 520,000 TCO₂-e (or 26,000 TCO₂-e / annum) (25% of the annual scope 1 & 2 total emissions).

It is recommended that the next stage of work involve a similar benchmarking exercise for all current building standards for embodied carbon intensity and develop 40-50% reduction performance metrics and a pathway for inclusion of these within the procurement and validation systems. Prioritisation of work would be guided by Directorate capital works / asset management 10 year programs.

Figure 10 – Embodied Carbon Intensity of Owned Built Assets

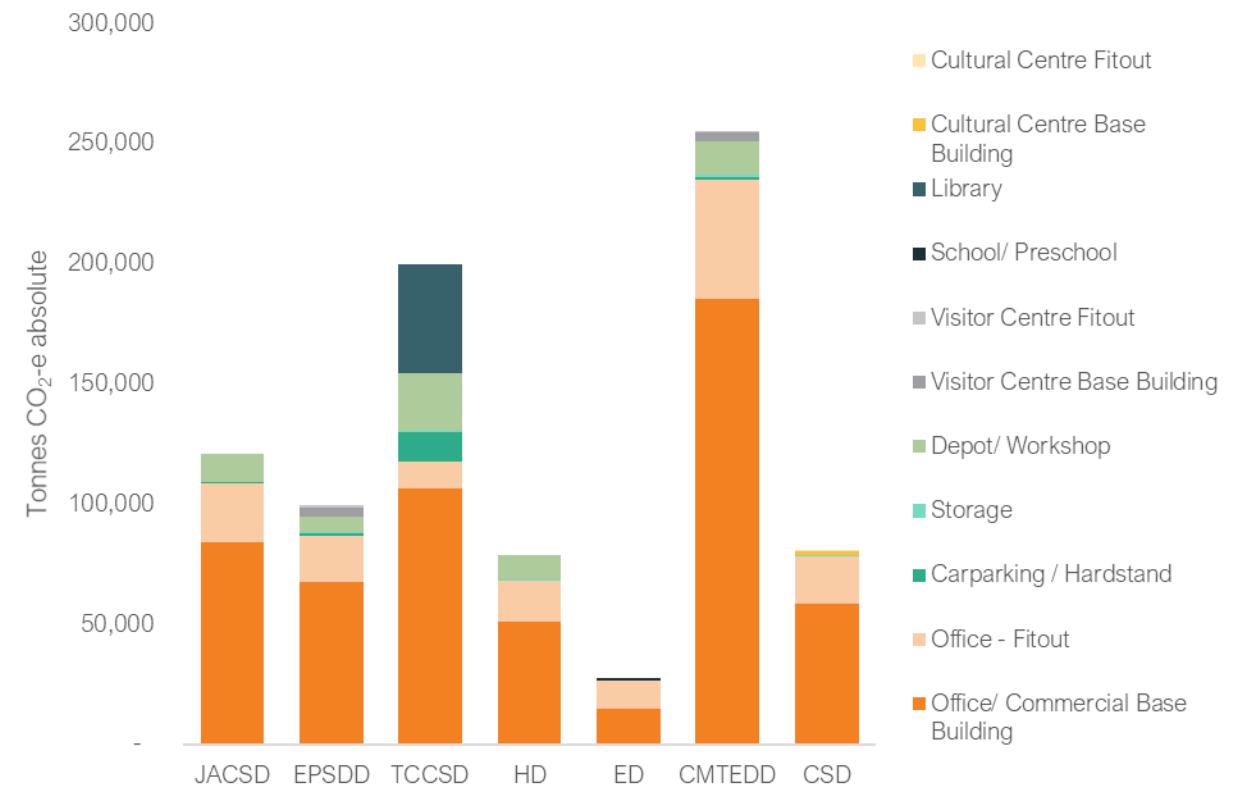
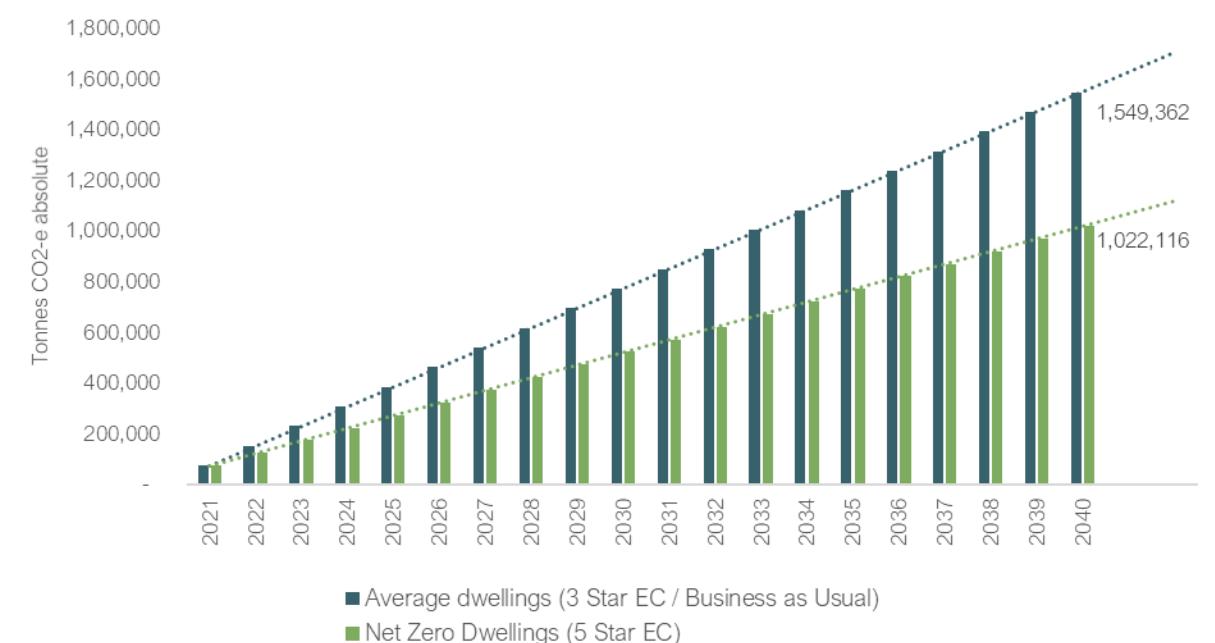


Figure 11 – Housing Embodied Carbon Mitigation Forward Estimate



4. Detailed Results – Infrastructure (GHG Protocol Category 15)

A similar approach was taken in the analysis of infrastructure assets. Figure 12 shows an estimate of the total embodied carbon in TCO₂-e for the register of existing infrastructure assets, by type. This analysis is intended to provide context to the scale of total emissions driven by Government investment into infrastructure procurement and management.

The embodied carbon intensity data per functional unit of asset type was derived from TFC database of building data and is based on a “hybrid cLCA” measurement method following RICS best practice method of measurement and represented absolute upfront carbon A1-A5 (that is complete at the point of operation). The values have not been annualised.

Stormwater infrastructure represents the largest impact overall with bridges and roads next. The procurement and delivery of infrastructure under “PPP” type agreements also presents a significant opportunity by ACT to transform the infrastructure sector to a low embodied carbon basis by implementing mandatory embodied carbon performance deliverables in all infrastructure agreements. Infrastructure assets present a particular opportunity for embodied carbon mitigation due to their relative concentration of construction to a limited number of traditionally high intense materials such as steel, concrete, aluminium and copper.

Figure 13 shows the results of a forward 10 year forward forecast for Infrastructure Directorate. Forward forecast shows a commitment to 4% resurfacing of all road stock annually. Applying the embodied carbon intensity per sqm for typical road surface materials to the annual 4% rate, shows a total potential “business-as-usual” embodied carbon intensity of approximately 840,000 TCO₂-e over the next ten years (excluding additional replacement / repairs). Implementing a 50% embodied carbon intensity target over BAU, could result in absolute mitigation of 110,000 TCO₂-e (or 11,000 TCO₂-e / annum) (9% of the annual scope 1 & 2 total emissions).

Significant mitigation options are possible across all classes of infrastructure and public realm assets.

It is recommended that the next stage of work involve a similar benchmarking exercise for all current standards for embodied carbon intensity and develop 40-50% reduction performance metrics and a pathway for inclusion of these within the procurement and validation systems. Prioritisation of work would be guided by Directorate capital works / asset management 10- 20 year programs.

Figure 12 – Embodied Carbon Intensity of Infrastructure

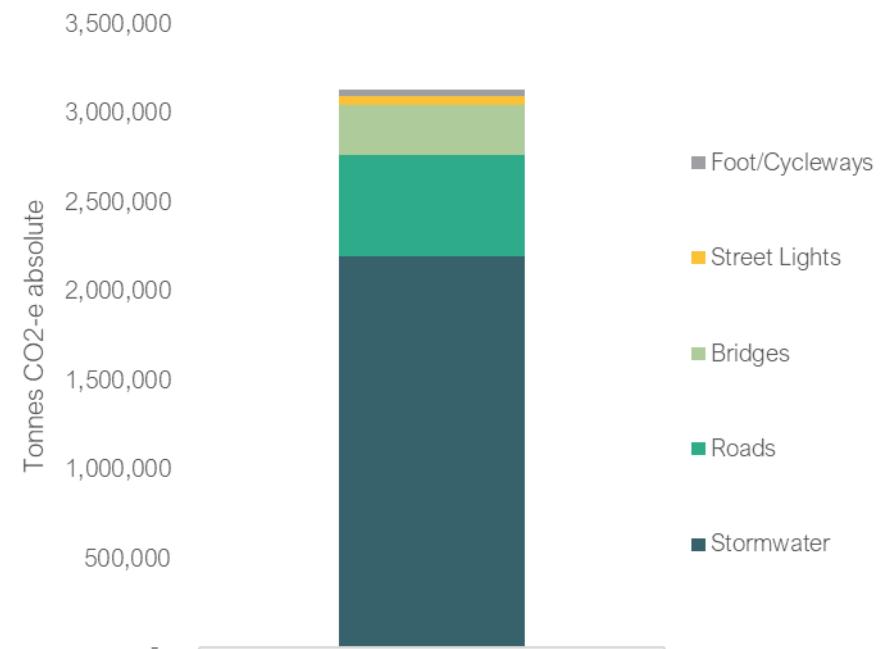
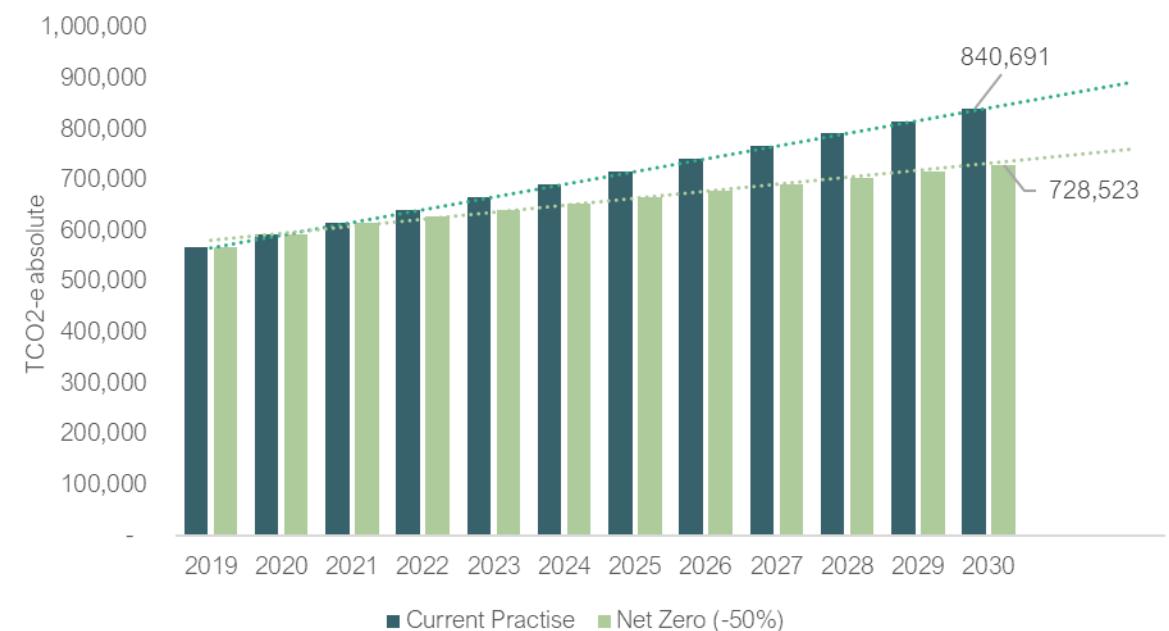


Figure 13 – Embodied Carbon Mitigation Potential for Road Resurfacing – 10 year forecast



CONCLUSION AND RECOMMENDATIONS

5. Conclusions and Recommendations

This report was commissioned to investigate the scale of Scope 3 emissions footprint for ACT Government operations and to understand their scale as compared to Scope 1 and 2. The question of mitigation potential was also attempted.

The study method adopted has been based on the GHG Protocol for Scope 3 assessment as well as ISO14044 methods. The scope of work has been limited to a desk-top level analysis from available Directorate published and Audit office reports in this first stage. All carbon emissions are expressed in CO₂-e equivalents in Tonnes and also TCO₂ / unit to enable comparison with Scope 1 and 2 emissions.

Key findings and conclusions of this initial study are:-

- Total Scope 3 emissions for the baseline year are substantially higher than Scope 1 & 2 emissions – even within the data limitations and encountered. Scope 3 amounting to 1.4MTCO₂-e for the reporting period versus 98,000 TCO₂-e for Scope 1 & 2 for the same period.
- There is significant mitigation potential across all Directorates and consumption categories some of which have been presented in the report to provide context and example methods. If implemented in a metrics based performance approach, by ACT it would also have transformational flow on effects to the ACT economy at large. The scale of absolute mitigation per annum is larger than Scope 1 & 2 combined, and increasingly so, given the "carbon neutral" status of the ACT electricity grid.
- To pursue Scope 3 emissions monitoring, reduction and reporting will require modification to existing accounting and audit systems across all Departments. Large variations in financial accounting and allocation methods were encountered during the study which have accuracy and completeness implications on the findings (refer to statements in the Appendix) and need to be resolved to ensure a robust basis for more detailed modelling and ultimately setting and mandating measurable targets.

Key recommendations for further stages of work include:-

- Working with the Audit office to improve and align the accounting categories and methodology to enable efficient and comprehensive reporting of all scope 3.
- Additional work with property and other Directorates to establish robust forward mitigation pathways and define cascading Scope 3 performance metrics for at least 65% of all consumption / assets investments in the medium term.
- Development of Directorate procurement requirements inclusive of defined Scope 3 targets.
- Consolidation of mitigation pathways into a whole of government Net Zero 2045 roadmap.

APPENDIX – METHODOLOGY & LIMITS

Overall Study Methodology

Appendix Table 1

Study Element	Description
Goal	<p>Quantify the Scope 3 emissions associated with the operational and capital investment services of the ACT government and its directorates for the FY 2018-2019 consistent with the requirements of the GHG Protocol for Scope 3 emissions.</p> <p>Profile emissions by end-use to understand magnitude and importance. Where possible identify priority mitigation options and quantify benefits as appropriate.</p>
Standards	ISO 14044 / 14067 / GHG Protocol
Functional Units	<ol style="list-style-type: none"> 1. Absolute Tonnes CO₂-e 2. Normalised Tonnes CO₂-e / FTE & Per Capita 3. Normalised Tonnes CO₂-e / m² for property
Scope Included	Consumption Categories: 1, 2, 5, 6, 8, 13 and 15 (GHG Protocol). Estimate of total embodied emissions (A1-A5) in existing physical assets.
Scope Excluded	All salaries, wages and entitlements. Intangible depreciation. Expensing of capital works (to avoid double counting).
Overall Method	Hybrid LCA for buildings. GHG Protocol Spend-based and Average Data methods. Refer Table 1. \$ spend x by Australian EEIO sectoral specific emissions co-efficients. Physical flows of materials applied to Hybrid LCI values. Capital works, buildings and infrastructure values complete for A1-A5.
CO₂-LCI Sources	EEIO – IE Lab Australia / EPiC generic hybrid database / TFC proprietary hybrid including generic and product specific.
Sources of Data	Directorates' annual reports (FY 2018-19), Supplementary financial data, PTY property report June 2019. Direct correspondence with Directorates.

Critical Data Limits & Assumptions

Critical Data Limits

- Full-time Equivalent (FTE) staff numbers need further clarification as there seem to be inconsistencies. Also need to deal with FTE drivers and teachers. This impacts on m² / FTE for occupied space and also ultimate emissions intensity.
- Missing data for Education & Health directorates appears to be materially incomplete and not allocated to account codes. Impacts on resultant intensity findings and mitigation options.
- Clarify extent of property assets (buildings and infrastructure) on registers provided are ACT owned.
 - Clarification sought on hospital, school and housing areas as these seem to be missing and will be material to overall value.
- Ideally further work on ensuring depreciation (reflection of asset replacement) and capital works in progress are aligned to eliminate possible double counting.

Notes and Assumptions

Financial Expenses data:

- Results for 'Supplies and Services', 'Financial Expenses' and 'Assets' are derived from financial data and are estimates only.
- Financial data provided for CMTEDD includes for services and support provided to other directorates and may be affected by double counting.
- Results for 'Assets' includes Property, Plant and Equipment, which may overlap with 'Buildings'.
- 'Unattributed' values in Supplies and Services results are derived from a generic "State Government" coefficient in EEIO database. These results may therefore vary a great deal from the actual emissions related to unknown supplies and services in the relevant directorates.

Buildings results:

- Building areas are based on PTY reports provided and do not include hospitals and medical centres, schools, TCCS infrastructure, or CSD housing portfolio. Building areas by external vendors have been excluded.
- Building classifications and types are based on descriptions in PTY report and may contain inaccuracies.
- Embodied carbon data for buildings has been generated using The Footprint Calculator™ and The Footprint Company's proprietary benchmarks data.

General Notes:

- Emissions from Energy and Transport (Scope 1 & 2) as well as water consumption data are sourced from the directorates' FY 2018-19 annual reports.
- Carbon Emissions Results from water consumption have been generated using The Footprint Calculator™
- Assets and Buildings results are absolute and have not been amortised. Supplies and Services, and other expenses are for a single financial year (2018-19).
- ACT population based on 2018 estimate of 420,321.

Sources of Information & Scope of Inclusions

Table 2 outlines the scope of included data, sources of information, and a qualitative estimate of completeness of the total set of data across all directorates.

Data obtained from Annual Reports was generally consistent and had a high level of completeness and assumed accuracy, with the only query regarding the total value of Property, Plant and Equipment assets, as the cope of inclusion is unclear. Other notes and observations on completeness are:

- Supplies and Services – due to data limitations from the Education directorate, as well as inconsistency of scope / inclusions. This is discussed further on the next page.
- Buildings / Areas Owned & Operated – There appears to be irregular scope of inclusions. For example, only a small number of childcare centers was included, while schools, and colleges were omitted completely. However, an additional sustainability report was provided for schools and education facilities, in which the electricity generated using small-scale solar on school rooftops was reported. Scope of inclusion within the PTY report as well as across different reports was inconsistent. Similarly, certain health facilities such as hospitals were not reported in the PTY report.
- Physical measurements of assets – this data was used to provide further detailed insight to physical / fixed assets embodied carbon to assist in dealing with uncertainty in Property, Plant and Equipment total asset values. Some detail on this was available in the Transport Canberra and City Services Directorate report, however this type of information was not available for the Community Services Directorate’s housing portfolio.

Appendix Table 2 – Data Sources, Scope of Inclusions, Estimate of Completeness

Data Sources	JACSD	EPSDD	TCCSD	HD	ED	CMTEDD	CSD	Completeness %
Financial Expenses	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	90%
Asset Value Total	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	90% Uncertainty in inclusions
Depreciation	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	95%
Supplementary Supplies and Services Breakdown	Via Email directly	Via Email directly	Via Email directly	Via Email directly	Not Available	Via Email directly	Via Email directly	75% Substantial incompleteness
Sustainability Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	95%
Areas of office accommodation	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	✓ Annual Report	95%
Buildings/ Areas Owned & Operated	✓ PTY report	✓ PTY report	✓ PTY report	✓ PTY report	✓ PTY report	✓ PTY report	✓ PTY report	80% Uncertainty in scope & completeness
Physical measurements of assets	N/A	N/A	✓ Annual Report	N/A	N/A	N/A	Not Available	80%
Asset renewal quantities and rate of change	N/A	N/A	✓ Annual Report	N/A	N/A	N/A	Via Email directly	80% Limited data

Study Inclusions: Financial Data

Table 3 shows the financial data included in the study. Hatched cells indicate data not provided, and 'NA' is included where data has not been provided, but seems to be non-relevant to the services provided by the respective directorate. Where the supplementary breakdown of supplies and services did not total the amount reported in the annual report, the difference has been listed under 'unattributed'. Key observations are the scope of data reported, inconsistency between directorates, and differences in scale of spend (e.g. capital works in progress compared to Property assets).

To progress to annual reporting of Scope 3 emissions, implementation of a consistent standard of accounting and allocation for material impact aspects will be crucial.

Appendix Table 3: Scope of Included Financial Data by Directorate

Scope 3 Aspect	JACSD	EPSDD	TCCSD	HD	ED	CMTEDD	CSD
Supplies and Services							
- Total Reported	\$ 85,999,000	\$ 71,943,608	\$ 202,407,302	\$ 64,882,000	\$ 61,600,000	\$ 256,743,999	\$ 26,470,000
- Property operating services	\$ 5,686,129	\$ 2,709,438	\$ 18,940,153	\$ 341,791	\$	\$ 487,228	\$ 1,583,074
- Property Rental	\$ 11,419,283	\$ 3,078,537	\$ 5,873,481	\$ 1,465,279	\$	\$ 3,491,945	\$ 4,753,119
- Waste management	\$ 332,489	\$ 141,576	\$ 962,008	\$ 16,796	\$	\$ 105,632	\$ 45,114
- IT support, Equipment & Software	\$ 16,722,806	\$ 7,621,216	\$ 13,132,075	\$ 36,553,408	\$	\$ 44,521,516	\$ 3,327,158
- General Equipment	\$ 324,108	\$ 680,648	\$ 617,074	\$ 366,341	\$	\$ 1,356,533	\$ 161,765
- Phones	\$ 1,067,282	\$ 754,062	\$ 59,128	\$ 2,941,775	\$	\$ 5,168,982	\$ 503,386
- Media Subscriptions (journals & news)	\$ 1,690,371	\$ 8,432	\$ 75,040	\$ 62,711	\$	\$ 169,619	\$ 5,405
- Stationery	\$ 1,458,019	\$ 82,582	\$ 625,009	\$ 131,477	\$	\$ 317,595	\$ 126,101
- General consumption	\$ 2,930,784	\$ 29,903,498	\$ 7,501,777	\$ 9,097,539	\$	\$ 3,638,174	\$ -
- Project Contractors	\$ 638,664	\$ 25,417,732	\$ 67,235,900	\$ 7,101,143	\$	\$ 50,459,484	\$ -
- Publishing & Graphic Design	\$ 678,955	\$ 25,744	\$ 336,318	\$ 233,881	\$	\$ 5,458,746	\$ 100,097
- Advertising (staff vacancies)	\$ 7,647	\$ 39,243	\$ 2,013,310	\$ 1,288,259	\$	\$ 149,615	\$ 43,332
- motor vehicles costs	\$ 2,192,544	\$ 1,480,900	\$ 8,502,756	\$ 224,140	\$	\$ 2,514,392	\$ 466,213
- Audit fees	\$	\$	\$	\$ 78,221	\$	\$	\$
- Clinical expenses/ medical surgical supplies	NA	NA	NA	\$ 245,677	NA	NA	NA
- Hire and rental charges	\$	\$	\$	\$ 1,996,027	\$	\$	\$
- Insurance	\$	\$	\$ 5,432,603	\$ 1,000	\$	\$	\$
- Pharmaceuticals	NA	NA	NA	\$ 328,957	NA	NA	NA
- Public relations	\$	\$	\$ -	\$ 90,402	\$	\$	\$
- Repairs and maintenance	\$	\$	\$ 56,983,392	\$ 1,011,930	\$	\$	\$
- Travel and accommodation	\$	\$	\$ 295,697	\$ 294,629	\$	\$	\$
- Other	\$	\$	\$ 5,433,656	NA	\$	\$ 138,904,538	\$
- light rail monthly payments	NA	NA	\$ 8,387,925	NA	NA	NA	NA
- Unattributed (Provided as a lump sum)	\$ 40,849,919	NA	NA	\$ 1,010,617	\$ 61,600,000	NA	\$ 15,355,236
Other Expenses							
- Depreciation allowance	\$ 24,570,000	\$ 4,943,000	\$ 176,699,000	\$ 15,493,366	\$ 72,400,000	\$ 56,384,000	\$ 2,154,000
- Expensing of capital works in progress	\$ 22,728,000	\$ 164,015,000	\$ 99,872,619	\$ 1,010,579	\$ 89,894,000	\$ 25,451,000	\$ 4,794,000
Assets							
- Property, Plant & Equipment	\$ 491,841,000	\$ 222,300,000	\$ 10,836,076,000	\$ 58,638,000	\$ 1,955,700,000	\$ 844,700,000	\$ 74,277,000
- Capital Works in Progress	\$ 14,562,000	\$ 187,200,000	\$ 155,537,000	\$ 9,333,000	\$	\$ 83,500,000	\$ 4,794,000

Key Data Tables

Appendix Table 4: Directorate Staff Populations and Office Occupancy

NR = Not Reported

	Units	JACS	EPSDD	TCCSD	HD	ED	CMTEDD	CSD
Office Based Employees	no.	868.0	647	488	540	547	2,174	735.5
Other Employees	no.	NR	NR	1,567	72	7,131	306	139
Reported FTE staff	no. FTE	1,822	639	1,842	540	5,968	2,382	875
Office accommodation / office staff	m ² /staff	15.9	16.5	12.7	17.7	12.0	11.5	12.4

Appendix Table 5: Areas of Buildings and Fitouts Owned and Operated by Directorates, by type

Area data from PTY reports, excluding "Vendors External to ACTPS". Fitout Areas assumed from associated base building occupied area and from reported office accommodation data in Annual Reports.

Directorate	JACSD	EPSDD	TCCSD	HD	ED	CMTEDD	CSD
Building Type	Area Owned & Occupied (NLA m ²)						
Class 5 Base Building (office)	19,919	15,996	25,251	12,091	3,450	44,019	13,907
Office Accommodation Fitout	13,839	10,707	6,210	9,523	6,546	27,382	10,863
Carparking / Hardstand	107	487	5,696	77	62	674	115
Storage		294	422	263		425	56
Depot/ Workshop	5,432	2,888	10,998	46,875		6,560	
Visitor Centre		1,600				803	
School/ Preschool					522		
Library			8,885				
Cultural Centre							454

Data Quality, Sources and Limits of Accuracy

Table 6 provides a summary of the information used to prepare this assessment, its source and a statement of quality and accuracy.

Table 6: Data Quality, Sources and Accuracy

Data	Source	Quality	Accuracy / % Complete
ACT Government Directorates' Annual Reports 2018-19	ACT Government Website	Individual reports audited separately	90%
Supplementary Financial Data	Provided via email directly	Some data doesn't match annual reports total, Education data not available	75%
PTY Building Report: June 2019	Provided via email directly	Unclear if all buildings captured due to schools & hospitals not included	70%
Supplementary Housing Portfolio Data	Provided via email directly	Limited Data availability	80%
Embodied Carbon rates	Footprint Company datasets – HIO and HLCA with various data sources	Good - Excellent	80-90%
Economic carbon co-efficient	EEIO tables, IE Laboratory	Good - Excellent	80-90%

Sample Scope 3 – Housing EC3 and Mitigation Pathways

Chart A shows the approx. embodied carbon savings potential for the application of not-to-exceed EC3 quotas in all new housing construction and capital works maintenance. A potential 30-40% absolute emissions reduction where a best-in-class (5 Star EC) performance target was set. (Assumes an average of single and multi-res)

Calculation boundary : Community Services Directorate Housing portfolio (estimated) only.

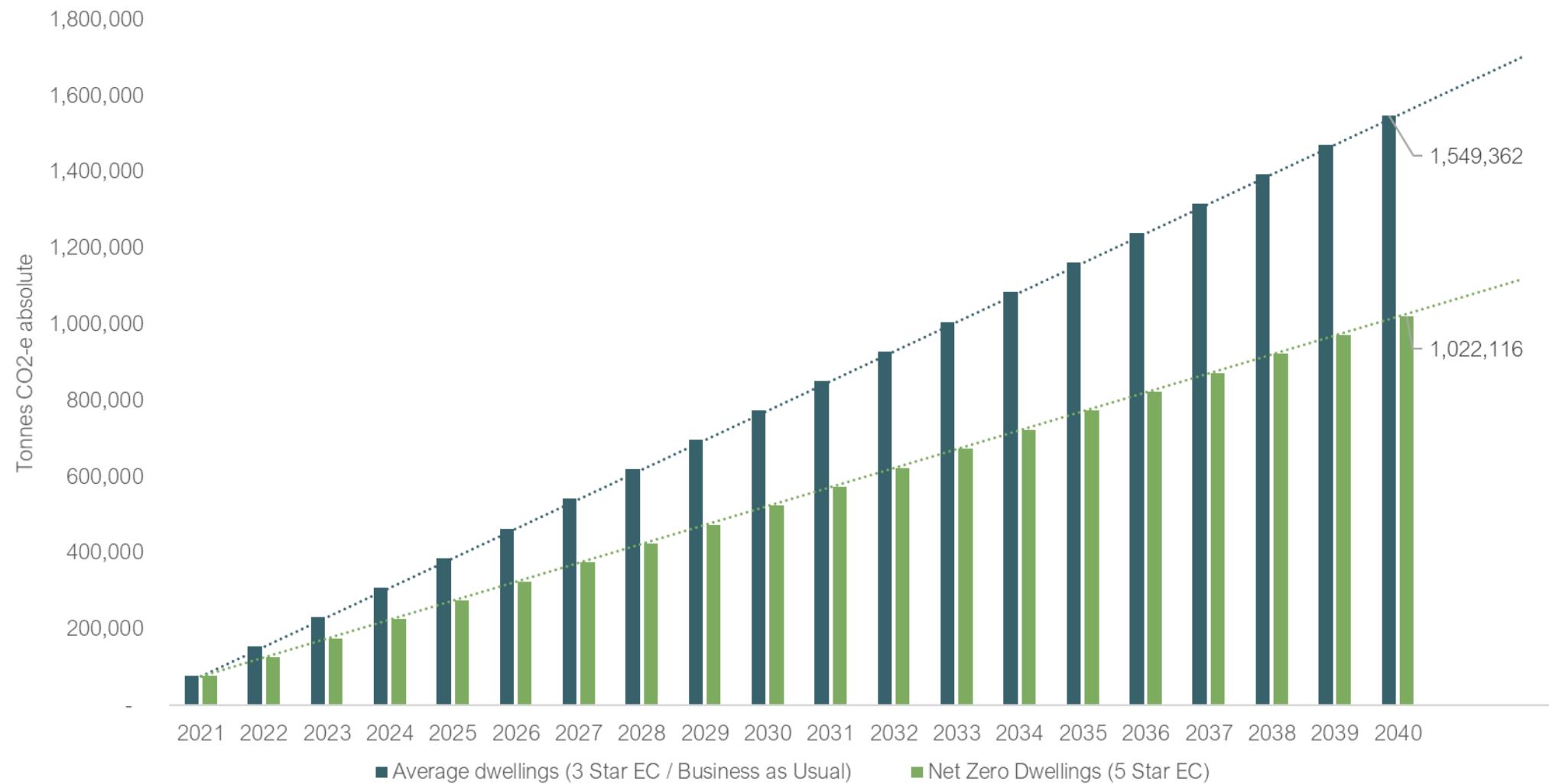
Overlap in calculation boundaries none.

Exclusions : All other buildings and assets. Excludes depreciation.

Calculation methodology : Hybrid LCA data applied to addition of 149 housing units per year, approximate rate of change of +1% per year. Assumes average dwelling size of 194m², and a 50/50 mix of single dwellings and apartments/ units. TFC proprietary benchmarks have been used in combination with total additional areas each year to achieve results.

Data sources: Supplementary housing portfolio data provided directly via email, plus The Footprint Company's proprietary benchmark values per m² of Class 1 & Class 2 dwellings.

Chart A– Mitigation Potential for Housing New Build / Capital Works and Replacements



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