

SUSTAINABLE PRECINCT STRATEGY

Homebush North, Burwood-Concord and Kings Bay Precincts
Stage 2 - Addendum Report

Item 9.2 - Attachment 11

May 2023
Prepared by Kinesis for
Canberra City Council



Contents.

Contents.....	1
Introduction	2
Key Criteria & Targets for the Precincts	4
A Pathway to Sustainable Precinct Delivery	5
Precinct Performance.....	9
Appendix	14

Introduction

Kinesis has been working with Canada Bay Council to leveraging the opportunity presented by the Parramatta Road Corridor Urban Transformation Strategy to deliver a clear sustainability strategy for the Homebush North, Burwood-Concord and Kings Bay precincts. After developing a strategy for Stage 1 of the precincts, this addendum report focuses on the modelling of Stage 2 sustainability performance. Following a brief review, the recommendations proposed in the original Stage 1 study remain relevant for Stage 2.

The vision for the three precincts is described below:

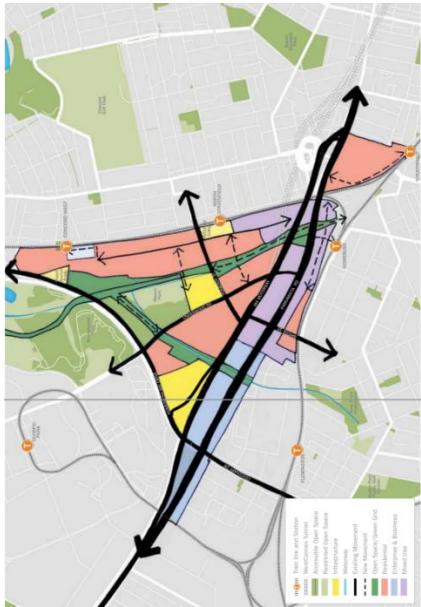
1. **Homebush North:** Sitting between Sydney's two main CBDs, Homebush can be transformed into an active and varied hub, blending higher density housing and a mix of different uses, supported by a network of green links and open spaces with walking access to a train station.

2. **Burwood-Concord:** Burwood-Concord Precinct will be a commercial gateway to Burwood town centre based around the enlivened spine of Burwood Road building upon existing amenity for new residents.
3. **Kings Bay:** Kings Bay will be a new residential and mixed-use urban village on Parramatta Road, with an active main street and strong links to the open space network along Sydney harbour.

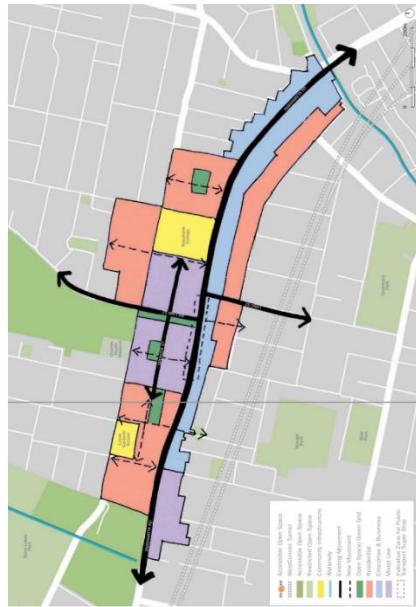
Council has a unique opportunity to implement best practice sustainability measures and deliver on its vision for three precincts.



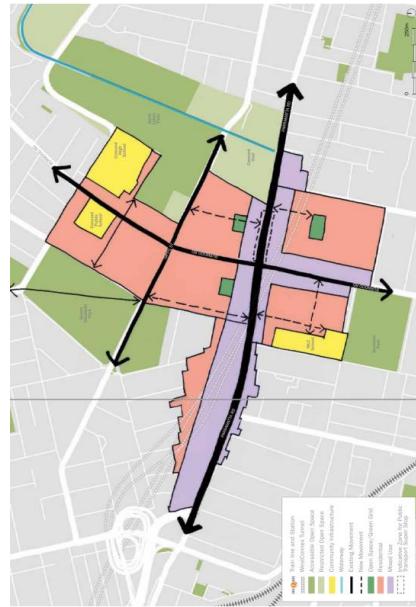
KINGS BAY



HOMEBUSH NORTH



BURWOOD-CONCORD



The proposed land use yield for Stage 2 of these precincts is shown in Table 1 and the spatial context of each of the three precincts is shown in the figures to the right.

	Kings Bay	Homebush North	Burwood-Concord
Apartments	459 dwellings	1,267 dwellings	2,939 dwellings
1 bed	92 dwellings	454 dwellings	588 dwellings
2 bed	275 dwellings	760 dwellings	1,763 dwellings
3 bed	92 dwellings	253 dwellings	588 dwellings
Townhouses	-	-	248
Commercial/retail	3,960m ²	50,155m ²	10,050m ²
Car parks	413 spaces	1,140 spaces	2,645 spaces
Population	1,020 people	2,815 people	7,052 people

Table 1: Stage 2 land use yield of the three precincts

Key Criteria & Targets for the Precincts.

Based on a review of key policies conducted in the first stage of this project, the following performance targets and best practice criteria were considered for the sustainability strategies for the Homebush North, Burwood-Concord and Kings Bay Precincts. While several of these targets and criteria are established for the metropolitan or local government area as a whole, Kinesis has investigated the application and veracity for implementation through the Homebush North, Burwood-Concord and Kings Bay Precincts.

Precinct:

- The delivery of the Homebush North, Burwood-Concord and Kings Bay Precincts as a Low Carbon, High Performance Precincts (Region and District Plans).
- Net zero emissions by 2050 (Canada Bay Council).
- Consideration of short, mid and long-term changes to the electricity grid (AEMO).

Precincture:

- Non-residential building requirements were not a focus due to the low amount of non-residential floor space proposed for the Homebush North, Burwood-Concord and Kings Bay Precincts. For any major commercial or shopping centre development (>10,000 m²) the PRUCUTS targets are applicable.
- Future proof buildings for emerging technologies such as EVs and battery storage (NSW Government).

Buildings:

- BASIX as at April 2023 requirements that meet, at a minimum, the following performance standards identified in PRUCUTS:
 - BASIX Water 50 for all dwellings (and up to 60 where recycled water is available)
 - BASIX Energy 40 for buildings of 6 storeys or greater
 - BASIX Energy 50 for buildings of 4 to 5 storeys
 - BASIX Energy 55 for buildings of 3 to 4 storeys

It should be noted that the NSW Government announced increases to the BASIX standards, as part of the new Sustainable Buildings State Environmental Planning Policy (SEPP) which will come into effect on 1 October 2023. The changes in targets are accompanied by bigger system changes including changes to the BASIX calculator and assumptions. Further information from NSW DPE and modelling is needed to translate the BASIX as at April 2023 targets to the new Sustainable Buildings SEPP BASIX Targets.

A Pathway to Sustainable Precinct Delivery.

This study aims to give Council a clear pathway to achieve high sustainable performance in the three precincts. To develop this pathway, we analysed the performance of the three precincts under three scenarios:

1. **Business-as-usual (BAU):** A reference case scenario simulating current BASIX compliance standards

2. **PRCTS Target:** The Parramatta Road Urban Corridor Transformation Strategy prescribes a set of BASIX targets higher than just compliance.

3. **Stretch:** Going beyond the PRCTS targets to achieve sustainability best practice. This is modelled as an all-electric scenario given that the emissions intensity of gas will be higher than electricity beyond 2036.

The detailed interventions applied under the three scenarios is described in Table 2. Kinesis and Council engaged in a series of workshops to understand the key opportunity areas and constraints for each of the three precincts and prioritise a set of strategies and interventions that can be applied for the three precincts.

Each strategy proposed in this report was tested for its applicability on the built form proposed for each precinct. Given the varied nature of development and expected variability in building design and precinct development, strategies focused on building by building solutions that could reasonably be delivered in all building types. This is particularly important for strategies such as the amount of available roof space for solar PV. Recycled water, however, was one strategy that was included that requires a precinct-level solution.

In addition, strategies considered Council's sphere of influence and alignment to broader local, state and federal sustainability priorities as identified in original Stage 1 study.

ELECTRICITY GENERATION IS DECARBONISING

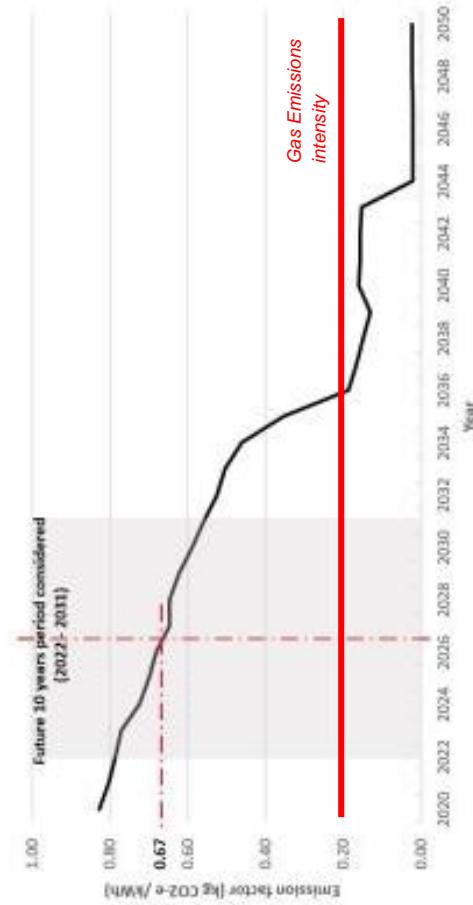


Figure 2: Electricity generation is decarbonising rapidly driven by the uptake of renewables. Gas use will continue to generate the same level of emissions whereas electricity emissions will continue to decrease into the future.
Source: [Net Zero Emissions Dashboard | SEED Portal \(nsw.gov.au\)](#).

INTERVENTIONS APPLIED UNDER DIFFERENT SCENARIOS

Assumptions used in scenario modelling	Base Case	PRCUTS Target	Stretch
Thermal Efficiency (NatHERS)	6 * NatHERS	7 * NatHERS	7 * NatHERS
Space conditioning	2.5 * RCAC	5 * RCAC	5 * RCAC
Hot Water	Gas Instantaneous	Gas Instantaneous	Electric Heat Pump
Lighting	Standard (Halogen/ CFL)	Efficient LED	Efficient LED
Cooking	Gas cooktops, Electric oven	Gas cooktops, Electric oven	Electric cooktop, Electric oven
Appliances	No appliances installed	5* Energy & Water Fridge, Washing Machine, Dishwasher and Heat pump clothes dryer	5* Energy & Water Fridge, Washing Machine, Dishwasher and Heat pump clothes dryer
Water Fixtures	Best Practice (4- 5 star WELS taps, shower heads and toilets)	Best Practice (4- 5 star WELS taps, shower heads and toilets)	Best Practice (4- 5 star WELS taps, shower heads and toilets)
Irrigation Efficiency	Low water use species	Low water use species	Additional greening delivered through recycled water
Solar PV	None	None	0.5 kW per dwelling
Water Reuse	None	None	Recycled Water for irrigation, toilet, laundry
Parking*	0.9 cars per dwelling	0.9 cars per dwelling	Zero Parking
EV Charging	None	Not included	15-20% of spaces are enabled with EV charging and these spaces can be used by all residents on a rotating basis.

Item 9.2 - Attachment 11

Table 2: Interventions applied under each scenario

Note:

* Parking under the Base Case and PRCUTS Targets scenarios represent the weighted average parking rate obtained from the PRCUTS Planning and Design Guidelines

CURRENT (AS AT MAY 2023) BASIX TARGETS

BASIX as at April 2023 Outcomes	Base Case (Compliance)	PRCUTS Target	Stretch
BASIX Energy Detached and Attached	50	65	70
BASIX Energy 2-3 Storeys	45	60	65
BASIX Energy 4-5 Storeys	35	50	55
BASIX Energy 6 Storeys	25	40	50
BASIX Water	40	60	60

The NSW Government announced increases to the BASIX standards, as part of the new Sustainable Buildings State Environmental Planning Policy (SEPP) which will come into effect on 1 October 2023. The changes in targets are accompanied by bigger system changes including changes to the BASIX calculator and assumptions.

Information from the BASIX team at NSW DPE has been used to translate the BASIX as at May 2023 targets to the updated Sustainable Buildings SEPP BASIX Targets under the base case or compliance scenario. The same uplift on the compliance score that can be achieved in the current (as at May 2023) BASIX system has been applied to estimate the new PRCUTS target and Stretch scenario scores under the expected new Sustainable Buildings SEPP BASIX system from October 2023. Further work (outside the scope of this study) through detailed modelling using the new BASIX calculator is needed to validate these targets under the PRCUTS Target and Stretch scenario.

PROVISIONAL TRANSLATION OF BASIX SCORES UNDER SUSTAINABLE BUILDINGS SEPP 2023

Sustainable Buildings SEPP BASIX	Proposed Compliance*	Estimated PRCUTS Target score^ (Indicative)	Stretch score^ (Indicative)
BASIX Energy Detached and Attached	68	83	88
BASIX Energy 2-3 Storeys	67	82	87
BASIX Energy 4-5 Storeys	61	76	81
BASIX Energy 6 Storeys	60	75	80
BASIX Water**	40	60	60

* The compliance BASIX scores are sourced from the DPE BASIX calculator for translating compliance scores, version 3.1. The changes in the BASIX scores are driven by several changes including but not limited to decarbonisation of the NSW electricity grid emissions factor, updated NatHERS thermal performance standards aligned with energy standards prescribed in the updated National Construction Code 2022 and other changes to the BASIX calculator that relate to specific interventions such as lifts, LED lighting, heat pump hot water systems, etc.

** At this stage, proposed changes to the BASIX compliance under the Sustainable Buildings SEPP do not impact water scores.

^ The estimated PRCUTS Target and Stretch scores under the Sustainable Buildings SEPP policy setting should be treated as indicative only. Further modelling using the updated BASIX calculator is needed to validate the scores that can be achieved under these two scenarios.

NOTES REGARDING CLAUSE 8.9

Clause 8.9 in Canada Bay Council's LEP incentivises sustainability through a floorspace bonus.

- (1) A BASIX building on land to which this Part applies may exceed the maximum permissible FSR by up to 5% if the building—
 - (a) exceeds the BASIX commitment for energy for the building by at least 15 points, and
 - (b) exceeds the BASIX commitment for water for the building by at least 20 points.

The incentive and proposed increase BASIX requirements remain relevant for stage 2 developments with the following notes:

- The clause only applies to multi unit (apartment) buildings with 3 storeys and above.
- Higher BASIX requirements relate to the BASIX system as at May 2023. It should be noted that the NSW Government announced increases to the BASIX standards, as part of the new Sustainable Buildings State Environmental Planning Policy (SEPP) which will come into effect on 1 October 2023. The changes in targets are accompanied by bigger system changes including changes to the BASIX calculator and assumptions. Further modelling is needed to understand the impacts on the proposed overcompliance requirements due to changes to the BASIX system through the Sustainable Buildings SEPP.

Precinct Performance.

The performance of the precincts under the three scenarios were analysed against the following sustainability indicators:

- Stationary or Building emissions
- Transport emissions
- Water consumption

Stationary or Building emissions

The stationary emissions for the three precincts under the three scenarios are shown in Figure 3. The red lines represent the performance of the precincts if the dwellings performed similar to an average dwelling across Metro Sydney.

Under the PRCUTS Target scenario, all three precincts achieve the prescribed emissions targets outlined in the Parramatta Road Urban Transformation Sustainability Implementation Plan.

In some of the stretch scenarios, which exceed current targets, stationary emissions increase. This reflects an assumed 30% uptake of EV's increasing electricity demand. As the electricity grid becomes less emissions intensive these emissions will sharply decline. These emissions are more than offset by a large reduction in transport emissions.

When the expected change in the electricity grid are factored in, the cleaner electricity use will drive the precincts to achieve net zero emissions beyond 2043. However, a temporal view must be held when thinking about emissions reduction. That is, emissions reduction achieved earlier rather than later will have a significant impact on global warming and climate change. The Intergovernmental Panel on Climate Change released a special report for policy makers which suggests the use of a "carbon budget" or a quota of carbon emissions for the world which can be trickled down to local governments¹.. Council led action to limit emissions early rather than waiting for changes to the grid will help Canada Bay meet its carbon budget

STATIONARY EMISSIONS

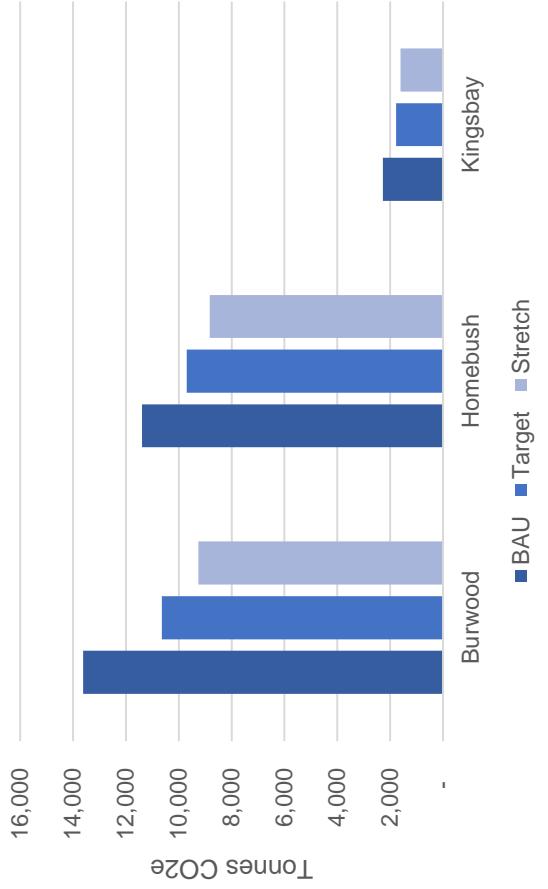


Figure 3: Stationary emissions performance under the three scenarios in each precinct

¹ IPCC Special Report on 1.5 Degrees, <https://www.ipcc.ch/sr15/>

Transport Emissions

TRANSPORT EMISSIONS

The three precincts are strategically located close to major public transport nodes including existing train lines and proposed future metro stations. The proximity of these precincts to public transport nodes can be leveraged to limit car use and resulting transport emissions.

A strategic way Council can affect car use is through the design and delivery of parking in these precincts. Our view is that parking should reflect car ownership and accessibility patterns of the future. Kinesis has modelled the expected car ownership rates in these future precincts and they align well with the recommended parking rate under the PRCUTS planning and design guidelines.

The transport emissions of the three precincts under the three scenarios is shown in Figure 4. The red lines represent the performance of the precincts if the dwellings performed similar to an average dwelling across Metro Sydney.

The Business-as-usual and the PRCUTS Target scenario both assume the parking rate proposed under the PRCUTS planning and design guidelines.

Under the stretch scenario, we have assumed zero parking in the developments – this is expected to be the best-case performance scenario and is discussed further in the next section of this report. It is also important to consider changing trends and shifts in mobility which may further reduce the need for car parking across these precincts (see Box 1)

The Stretch scenario also assumes a 30% EV take up (reflective of expected take up around 2036 as per the [Electric Vehicle Projections 2021 released by CSIRO](#)).

Limited car use and switching to electric vehicles drive a significant reduction in travel emissions under the Stretch scenario. Travel emissions decrease by over 50% relative to the BAU and PRCUTS Target scenarios. This reduction will increase as the grid becomes less emissions intensive.

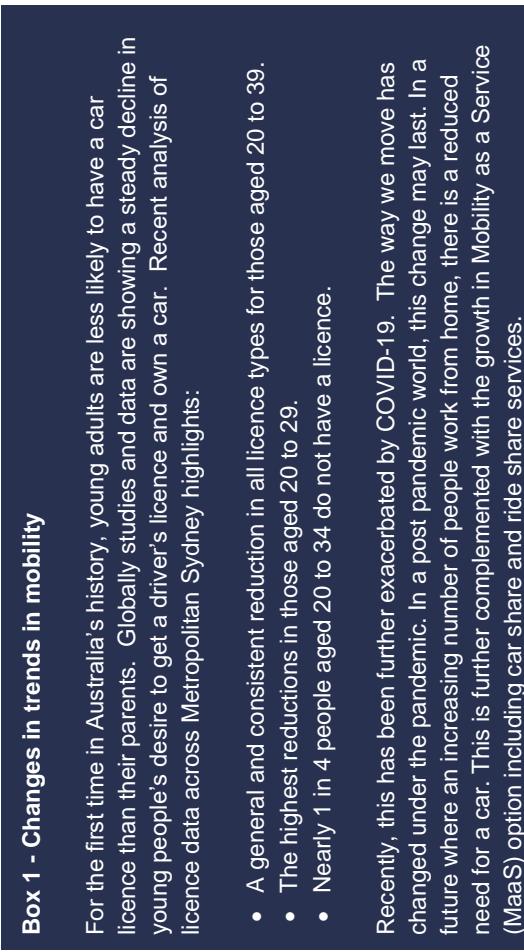


Figure 4: Transport emissions performance under the three scenarios in each precinct

Box 1 - Changes in trends in mobility

For the first time in Australia's history, young adults are less likely to have a car licence than their parents. Globally studies and data are showing a steady decline in young people's desire to get a driver's licence and own a car. Recent analysis of licence data across Metropolitan Sydney highlights:

- A general and consistent reduction in all licence types for those aged 20 to 39.
- The highest reductions in those aged 20 to 29.
- Nearly 1 in 4 people aged 20 to 34 do not have a licence.

Recently, this has been further exacerbated by COVID-19. The way we move has changed under the pandemic. In a post pandemic world, this change may last. In a future where an increasing number of people work from home, there is a reduced need for a car. This is further complemented with the growth in Mobility as a Service (MaaS) option including car share and ride share services.

Water Consumption

WATER CONSUMPTION

The water consumption of the three precincts under the three scenarios is shown in Figure 5. The red lines represent the performance of the precincts if the dwellings performed similar to an average dwelling across Metro Sydney.

Under the PRCUTS Target scenario, all three precincts achieve the prescribed emissions targets outlined in the Parramatta Road Urban Transformation Sustainability Implementation Plan.

The Stretch scenario results show that the precincts can exceed the targets developed in the Parramatta Road Urban Transformation Strategy. It should be noted that the Stretch Scenario incorporates interventions that are currently available in the market and implemented in dwellings.

The Stretch scenario assumes the delivery of recycled water infrastructure in the precincts. Given the fragmented land ownership and incremental build out of the precincts, delivering this infrastructure may be challenging. However, there are examples of this successfully delivered in other high density precincts in Sydney including Green Square, Central Park, Shepherds Bay, etc. These implementation mechanisms are discussed further in the following sections.

Costs and Benefits of each Scenario

The improved performance outcomes delivered by the Stretch Scenario will require additional marginal capital costs for developers, as well as deliver increased utility savings to households. The tables below outline the marginal capital costs for each additional strategy outlined in this report, as well as the additional cost savings to residents. Overall:

- **The PRCUTS Target scenario** is expected to cost an additional \$3,222 per dwelling, with a household saving of nearly \$400 per year.
- **The Stretch scenario** is expected to cost an additional \$6,767 per dwelling, with a household saving of over \$700 per year.

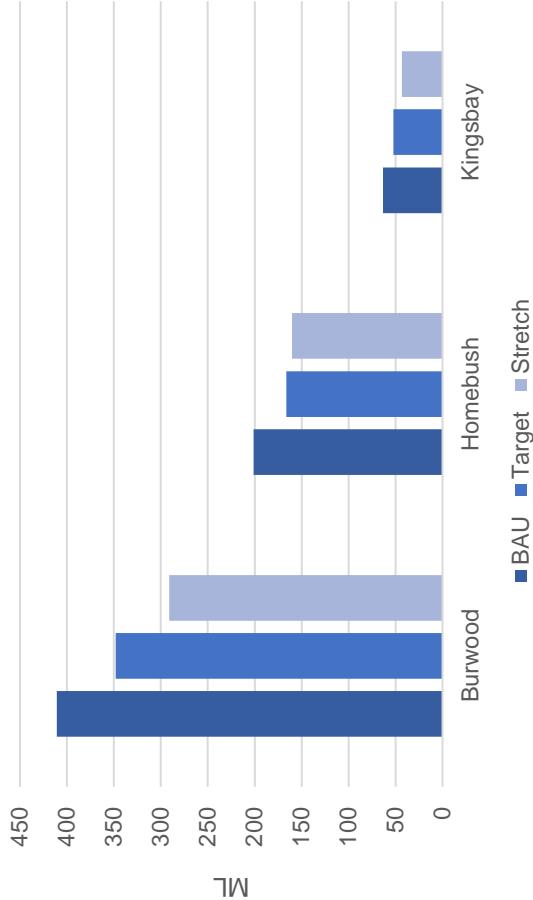


Figure 5: Water consumption performance under the three scenarios in each precinct

COST BENEFIT ANALYSIS OF PRUCTS SCENARIO

Assumptions used in scenario modelling	Base Case	PRCUTS Target	Marginal Capital Cost (\$ per dwelling per year)	Operational benefit (\$ per dwelling per year)**
Thermal Efficiency (NatHERS)	6 * NatHERS	7 * NatHERS	\$1,200	\$74
Space conditioning	2.5 * RCAC	5 * RCAC	\$240	\$16
Hot Water	Gas Instantaneous	Gas Instantaneous	-	\$31
Lighting	Standard (Halogen/ CFL)	Efficient LED	\$531	\$36
Cooking	Gas cooktops, Electric oven	Gas cooktops, Electric oven	-	\$59
Appliances	No appliances installed	5* Energy & Water Fridge, Washing Machine, Dishwasher & Heat pump clothes dryer	\$1,250	\$176
Water Fixtures	Best Practice (4- 5 star WELS taps, shower heads & toilets)	Best Practice (4- 5 star WELS taps, shower heads & toilets)	-	-
Solar PV	None	None	-	-
Water Reuse	None	None	-	-
Parking*	0.9 cars per dwelling	0.9 cars per dwelling	-	-
EV charging	None	Not included	-	-
Total cost/ savings			\$3,221	\$392
BASIX Energy (BASIX as at April 2023)***	25	40		
BASIX Water (BASIX as at April 2023)	40	60		

Table 3: Interventions applied under each scenario

Note:

* Parking under the Base Case and PRCUTS Targets scenarios represent the weighted average parking rate obtained from the PRCUTS Planning and Design Guidelines.

** Uplift applied to energy savings to reflect expected 20% increase in electricity and gas prices.

*** NSW Government announced increases to the BASIX standards, as part of the new Sustainable Buildings State Environmental Planning Policy (SEPP) which will come into effect on 1 October 2023. The changes in targets are accompanied by bigger system changes including changes to the BASIX calculator and assumptions. A provisional translation of the BASIX scores between the current BASIX system and the new Sustainable Buildings SEPP system is provided in page 7. Further modelling is needed to test and validate these indicative scores.

COST BENEFIT ANALYSIS OF STRETCH SCENARIO

Assumptions used in scenario modelling	Base Case	Stretch Scenario	Marginal Capital Cost (\$ per dwelling per year)	Operational benefit (\$ per dwelling per year)**
Thermal Efficiency (NatHERS)	6 * NatHERS	7 * NatHERS	\$1,080	\$44
Space conditioning	2.5 * RCAC	5 * RCAC	\$238	\$31
Hot Water	Gas Instantaneous	Electric Heat Pump	\$2,230	\$74
Lighting	Standard (Halogen/ CFL)	Efficient LED	\$531	\$70
Cooking	Gas cooktops, Electric oven	Electric cooktop, Electric oven	-	-
Appliances	No appliances installed	5* Energy & Water Fridge, Washing Machine, Dishwasher and Heat pump clothes dryer	\$1,250	\$224
Water Fixtures	Best Practice (4- 5 star WELS taps, shower heads & toilets)	As per Base Case	-	-
Solar PV	None	0.5 kW per dwelling	\$438	\$231
Water Reuse	None	Recycled Water connection	\$1,000	\$55
Parking*	0.9 cars per dwelling	Zero Parking	-	-
EV charging^	None	30% EV uptake	\$100	\$2,000
Total cost/ savings			\$6,867	\$2,729
BASIX Energy (BASIX as at April 2023)***	25	50		
BASIX Water (BASIX as at April 2023)	40	60		

Table 4: Interventions applied under each scenario

Note:

* Parking under the Base Case and PRCUTS Targets scenarios represent the weighted average parking rate obtained from the PRCUTS Planning and Design Guidelines
** Uplift applied to energy savings to reflect expected 20% increase in electricity and gas prices.

*** NSW Government announced increases to the BASIX standards, as part of the new Sustainable Buildings State Environmental Planning Policy (SEPP) which will come into effect on 1 October 2023. The changes in targets are accompanied by bigger system changes including changes to the BASIX calculator and assumptions. A provisional translation of the BASIX scores between the current BASIX system and the new Sustainable Buildings SEPP system is provided in page 7. Further modelling is needed to test and validate these indicative scores.

^ EVs are expected to reach upfront cost parity with petrol vehicles by 2025-2030 and the cost of purchasing a new vehicle is not included in the marginal capital cost.
(Will the new electric vehicle strategy put more EVs on the road, and how much will they cost? - ABC News)

Appendix.

All results contained in this report are derived from Kinesis analysis using both the DPIE BASIX engine and the Kinesis PRECINX modelling platform.

PRECINX draws on local climate, land use and tariff data, and available utility, government, public and private sector datasets to calculate to performance of proposed developments, precincts, corridors and regions.

Important datasets used in the analysis include:

- Department of Planning and Environment, BASIX – www.basix.nsw.gov.au
- NSW Department of Planning (Ongoing) BASIX Report Data.
- Department of the Environment (Ongoing) National Greenhouse Accounts Factors
- Sydney Water Best Practice Guidelines for water conservation in commercial office buildings and shopping centres (2007) and Best Practice Guidelines for holistic open space turf management (2011)
- National Water Commission, 2011, National performance report 2009-2010: urban water utilities, National Water Commission, Canberra
- Department of Resources, Energy and Tourism, 2010, Energy in Australia – 2010, ABARE, Canberra
- Energy Use in the Australian Residential Sector, 1986 – 2020, Australian Government Department of the Environment, Water, Heritage and the Arts (DEHWA), 2008.
- National Construction Code (2010) Section J - Energy Efficiency Requirements
- Transport Data Centre (2006) The Development of a Sydney VKT Regression Model
- Department of Infrastructure and Transport, 2011, Road vehicle kilometres travelled: estimations from state and territory fuel sales, Australian Government, Canberra
- ABS (2010) 'Household Expenditure Survey, Australia: Summary of Results', catalogue number 65300DO001_200910, Australian Bureau of Statistics, Canberra.
- Kinesis (Ongoing) Water and energy end use data derived from first principle analysis of a range of metered residential and non-residential building types (ongoing, sourced from anonymised CCAP datasets from thousands of buildings, suburbs and cities across Australia), see: www.kinesis.org/ccap-integrated-and-www.kinesis.org/ccap-city

*Note electricity and gas have been increased by 20% to reflect AER forecasts

Metropolitan Sydney average benchmarks		
Electricity	2,310 kWh per person/year	
Gas	3,888 MJ per person/year	
Water	201.9 L per person/day	
Transport	19.2 km per person/day	

Grid Co-efficient		
Electricity	0.79 kgCO ₂ -e/kWh	
Gas	0.064 kgCO ₂ -e/MJ	

Tariffs and rates

Household cost savings outlined in this report are based on tariffs outlined below:

Residential Water	Rate	Unit
Mains tariff	2.04	\$/kL
Recycled water tariff	1.817	\$/kL
Service charge per dwelling	738	\$/yr
Recycled water service charge	0	\$/yr

Residential Grid Electricity

Residential Grid Electricity	Rate	Unit
Applied tariff	0.3768*	\$/kWh
Solar feed-in tariff	0.06	\$/kWh
Service charge per dwelling	335.04	\$/yr

Residential Gas

Residential Gas	Rate	Unit
Gas (first 7,565 MJ per qtr/remaining)	0.049/0.033*	\$/MJ
Service charge per dwelling	229	\$/yr

Residential Transport

Residential Transport	Rate	Unit
Fuel	1.82	\$/L
Annual capital costs (devaluation)	6,642	\$/yr
Annual registration/insurance	2,172	\$/yr